OUTLINE

• Residential water heating in Australia
• Current policy pressures
  – Cost of living
  – Energy prices
  – Environmental impacts
• Range of government programs
• Australian water heater market
• Addressing market failures
  ✓ Heat Pump water heaters
  ✓ Solar
  ✓ Climate labelling
WATER HEATING IN AUSTRALIA

• 22% of residential energy 2012 – second only to space heating

• Electric resistance storage was dominant type
  – Accounts for about 39% of installed stock
    (largely storage 36%)

• Rest of water heater stock:
  – 12% solar (mainly electric boost - 9%)
  – 46% natural gas or LPG
  – 3% heat pump
Policy Pressures

ENERGY PRICE TRENDS

- Retail electricity prices up 40-50% in past 3 years
- Residential electricity prices in Australia rose nationally over the past five years by 91%.

2011/12, the national average residential electricity price in Australia was AU25.9c/kWh.
Rose to AU29.6c/kWh in 2012/13 (AEMC, 2012).

- Domestic gas prices also predicted to rise significantly.
Residential gas prices in Australia rose over the past five years by 62% (AER, 2012).
Policy Pressures

ENVIRONMENTAL IMPACTS

- Electricity generation in Australia still dominated by coal - Despite rapid growth in renewables, natural gas

- Electric storage water heating is about 2 to 3 times as greenhouse-intensive as other options

- In Australia, about 48% of the energy used for water heating comes from natural gas, 45% from electricity, 3% from Liquefied Petroleum Gas (LPG) and 4% from solar.
Australian Government Policy and Programs - *Current*

- Australia committed to reduce its greenhouse emissions by 5 per cent compared with 2000 levels by 2020

- One Million Solar Roofs Program
  - Is an element of the Australian Government's Direct Action Plan
  - $500 million in funding over 10 years commencing from 2014-15 financial year.
  - $500 rebates for installing one million rooftop systems (solar and heat pump water heaters and PV systems).
  - Priorities are low-income households and solar water heaters.

- **Renewable Energy Target** - 20% of Australia’s electricity from renewable energy by 2020 – Small-scale Technology Certificates (STC’s)

- **National Strategy for Energy Efficiency 2010** (Council of Australian Governments agreed to National Hot Water Strategic Framework)

- **New homes – National Construction Code 2010** – encourage installation of solar and heat pump water heaters
Australian Water heater market

Significant shifts in last 5 years

- Electric storage – 2008 – 47% now 36% 2012
- Gas – 46% (1 % increase since 2008) (*includes instantaneous and storage*) 27% is storage
- Heat Pump – increase from 0.5% in 2008 to 3 % 2012
- Solar 7% in 2008 and now 12% in 2012
The Market – heat pumps

• At least 18 suppliers, 80 models in ANZ

• No mandatory efficiency requirements exist (e.g. labels or MEPS)

• Has been sensitive to policy and regulations:
  – STCs, rebates, building code & other regs
  – Most rebates have come to an end

• Many consumers still unfamiliar with HPWHs

• Confidence in the product is important for future growth
Impact of cash rebates HPWH

Annual sales of HPWHs (Rest of Aust + NSW)

Average combined CW+NSW rebate per HP sale

2005 2006 2007 2008 2009 2010 2011 2012

$0

$500

$1,000

$1,500

$2,000

$2,500
Solar water installations by year - Australia

SWH installations peaked in 2009, with over 120,000 SWHs installed. Installations have steadily declined since 2009, to approximately **55,000** installations in **2012**.
Impacts of policies

- **Impacts of policies (rebates and STCs plus state programs)— the good**
  - Progress to achieve 20% renewables by 2020 significant
  - Encouraged the new technologies such as heat pump water heaters to obtain a hold in the market

- **Possible unintended outcomes ?**
  - Design / manufacture in some cases focussed on receiving financial incentives at expense of functionality eg producing hot water - more evident as issue in cold areas. Quality compromised ….
  - Oversizing both solar and HPWH’s
  - noise issue not addressed for HPWH
  - Boom / bust with range of incentive programs both federal and state
Focus on hot water heating

- Australian E3 Committee began review of HPWH market in 2011
- Mandate under NSEE: identified assessing options to improve information and energy efficiency for all water heaters, starting with unregulated technologies
- HPWHs and SWH’s - no mandatory efficiency requirements exist (e.g. labels or MEPS)
- Development of ‘electric water heater phase-out’ policy also identified issues with heat pump and solar technologies
EE standards for HPWH


- Energy efficiency and noise information hard to locate and compare

- Cold temperature performance and noise were raised as issues

- Found modelled performance (AS/NZ 4234) does not align with claimed performance

- Modelling procedure does not enable independent compliance testing
HPWH energy savings compared with electric storage water heater
HPWH - Heating and recovery

- Heat-up time from cold can be very long
  - Up to 30 hr in LT conditions
- Litres/hr reflects ability to reheat after draw-off
  - More useful indicator than heating from cold
Similar story for solar hot water

Eg Standing heat loss from the solar water heater tanks tested with respect to the MEPS levels.

*6 out of the 8 units tested would have failed the MEPS requirements for electric resistive water heaters.*

**Major issues**

- High system heat loss in cold climates
- Freezing
- Differences in individual component and system performance
Implementation measures for EE

1. Revision of the energy efficiency test procedures and adoption of a noise test procedure;
2. Converting Minimum Energy Performance (MEPS) levels in the options to equivalent levels based on the revised physical test;
3. Development of a method of calculating energy efficiency metrics for labelling; and
4. Developing an energy efficiency label for HPWHs, in a form that is consistent with the energy labels for other climate sensitive consumer products.
Noise

• Noise was tested for 6 models
• Models showed a wide range of noise levels
• Laboratory developed procedure to apply ISO 3741 to HPWHs
• Australia proposing mandatory noise level testing to ISO 3741. Will be reported but no required levels.
Cold, EE Performance claims and compliance

MEPS and physical test - Proposed Solution:

• Australia has DRAFTED a tapping load test for MEPS

Test Conditions

• Testing all models at 20°C (68°F)
• Also cold performers at 0-2 degrees C
• Also non-cold performers, or models with elements for cold, at 7°C

Test Procedure

• Existing heat up test is applied
• 2 large draws of hot water, with recharges, are applied to ensure stratification
• Tapping load test over at least 24 hours (longer if not recharged)
• 8 tapping's of hot water that align with those in existing simulations (AS/NZS4234)
Data Flows in Current Standards

For annual energy savings estimates we use above. Annual energy consumption may feed into a label but will require some tightening.
Proposed - Establish a system of mandatory product testing and registration, based on AS/NZS 5125

While the tapping load test is for MEPS testing, it may also help ensure simulations are more representative of real performance. May also allow labels to use simulations results.
Existing Energy Rating Label (ERL) not available for water heating but now under consideration
Addressing information failure
Draft Climate Rating Labels

Australia proposing to move to climate-based energy efficiency labelling for appliances where performance is affected by climate eg water heaters, air-conditioners, space heaters
EU water heater label
Seasonal Energy Efficiency Rating (SEER)

USA Proposed Energy Labels for Home Heating and Cooling Equipment Regional ee standards
Conclusion

- Need to fix following - *cold climate performance, noise, make available comparative info, testing of claims (physical)* to establish consumer confidence

- Sales of HPWH’s and SWHs in Australia and New Zealand likely to increase if:
  - consumer confidence in the technology increases;
  - energy efficiency increases;
  - relative costs decline;
  - electricity and gas prices increase; and
  - installation is optimised.

- Established consumer confidence will enable manufactures / retailers to take full advantage of incentives and truly establish these products in the market.
Next 12 -18 months

- Implement MEPS standards for HPWH’s under national regulation 2014
- Seek to increase MEPS for electric storage water heaters
- Examine costs and benefits of establishing energy efficiency standards for SWH
- Establish support for implementation of a climate label – water heaters
Contact details

Sara Williams

Appliance Energy Efficiency Branch
Department of Industry
GPO Box 1564
Canberra ACT 2601
Australia

Telephone:  +61 2 6159 6970
Mobile:  0402 279 080
Email:  sara.williams2@ret.gov.au