



# **Mandating Demand Response Interfaces for Selected Appliances**

## **Consultation Regulation Impact Statement, April 2013**

### **Dr George Wilkenfeld**

*On behalf of the E3 Committee*

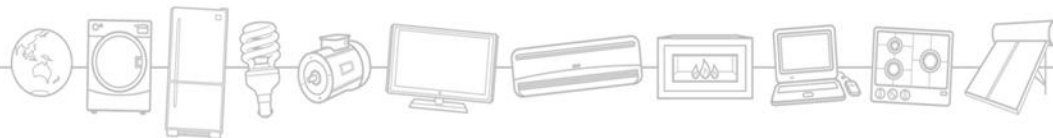
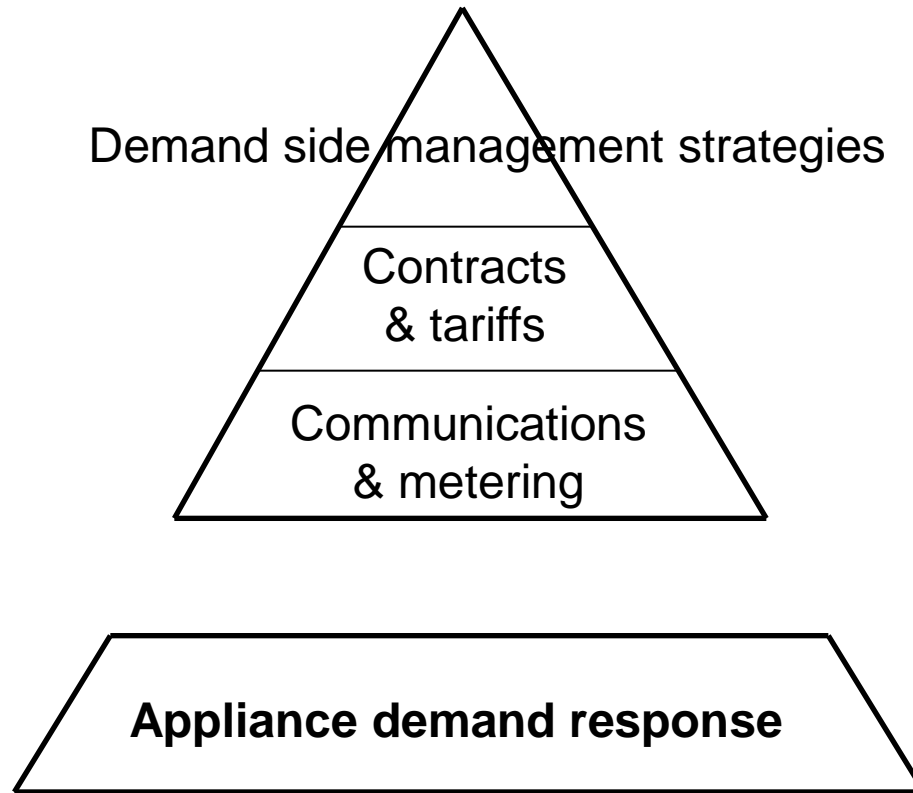
A joint initiative of Australian, State and Territory and New Zealand Governments.

# Overview

- Background
- What the proposal is
- What it is not
- How it developed
- How it will create economic benefit
- Risks
- Next steps



# Appliance DR is bedrock of residential sector demand side management



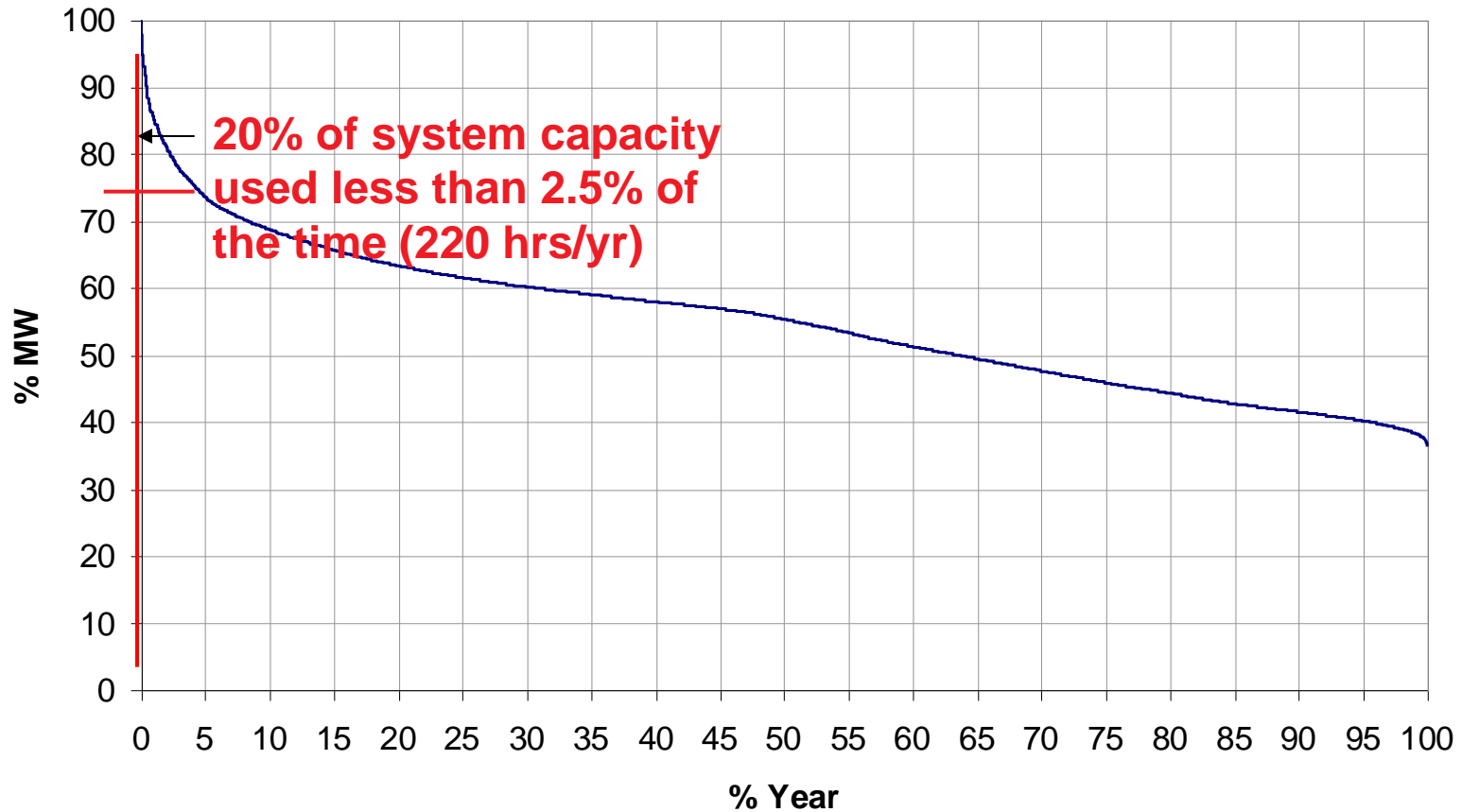
# Background

- Air conditioner-induced peak load problems became apparent in early 2000s
- Partly due to cheaper capital costs, lack of energy price signals
- Ministers asked E3 if more stringent energy efficiency standards could address problem
- Study (2004) concluded that large scale demand response capability was necessary
  - DR could be direct load control OR price-driven



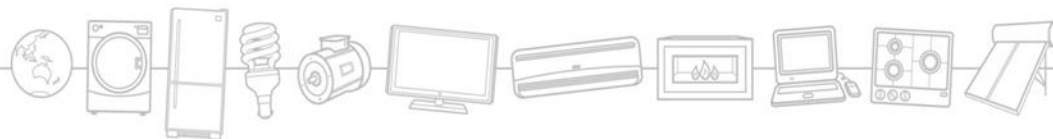
# The Problem – build more or control demand

2010 SWIS Load Duration Curve (% MW vs Time)



# Demand Response Standards History

- Standards Committee EL-054 set up in 2005
- AS4755 published April 2007 (to be revised)
  - *Framework for demand response capabilities and supporting technologies for electrical products*
- Progress then slowed
  - Utilities, appliance suppliers tended to ‘mind each other’s business’
  - Key was to separate the communications from the appliance
- AS/NZS4755.1, 4755.2 published 2012
- AS/NZS 4755.3, 4755.4 in advanced draft



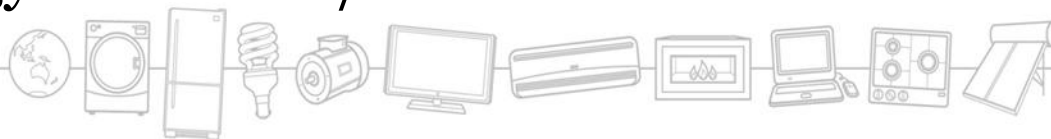
# The proposal

- Mandate compliance with relevant part of AS/NZS 4755 for 4 types of electrical product
- Requires minimal demand response functionality – but expect market to demand more functions
- Activation, contracts etc will be up to the market
- Intention is not to create technology but to create a market for demand response services
- Value lies in greater economic efficiency of grid
  - Offers a lower-cost way of meeting peak demand
- The integration of supply & demand = ‘smart grid’



# What the proposal is NOT

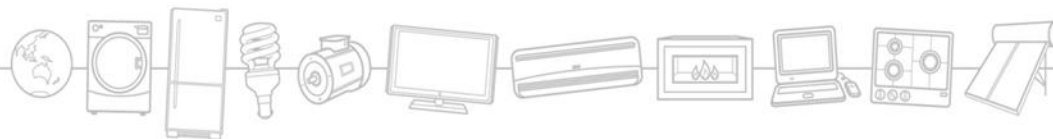
- It will *not* be mandatory for customers to participate
  - They can choose to, e.g. in order to avoid high-price periods or to gain cash incentives
- Proposal does *not* depend on smart metering
  - There are several alternative activation pathways
- Proposal does *not* depend on TOU Pricing
  - Trials so far have not used TOU; makes TOU less risky
- Proposal is *not* an energy efficiency measure
  - But will increase economic efficiency of electricity supply and lower bills, through less investment in poles & wires
  - Allows energy to be used/stored when renewables are high





# What makes an appliance AS/NZS4755 compliant?

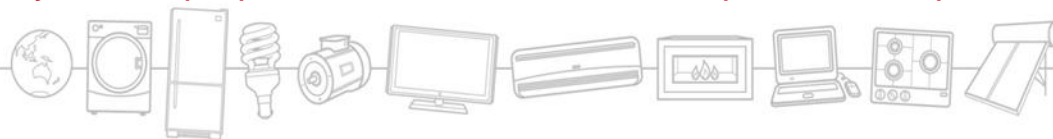
- Presence of standard physical/electrical interface
- Ability to receive and respond to at least one type of signal from an external device (DRM1)
- Responses must be as prescribed in standard
- May have other optional features related to DR
  - But if present, must operate as prescribed
- All aspects of compliance are verifiable



# AS/NZS 4755 Demand Response Modes

Product	Standard Part	Minimum load/Off	Operation permitted at reduced load		Request Load on	No discharge to grid	Discharge to grid permitted at reduced rate		Request discharge to grid
			Limit to 50%	Limit to 75%			Limit to 50%	Limit to 75%	
Air Conditioner	3.1:2012	DRM 1*	DRM 2	DRM 3	NA	NA	NA	NA	NA
Pool pump controller	3.2:2012	DRM 1*	DRM 2	NA	DRM 4	NA	NA	NA	NA
Electric water heater	3.3:201X	DRM 1*	DRM 2	DRM 3	DRM 4	NA	NA	NA	NA
EV Charge Controller	3.4:201X	DRM 1*	DRM 2	DRM 3	DRM 4	DRM 5*	DRM 6	DRM 7	DRM 8

\* These are the only mandatory modes proposed – all others would be optional and up to the market



# Air conditioners (Part 3.1)

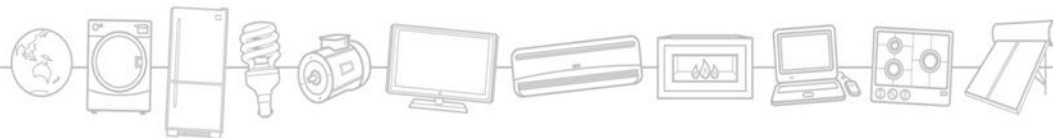


## Demand Response Enabling Device

Connection point  
(RJ45 plug or  
screw terminal)



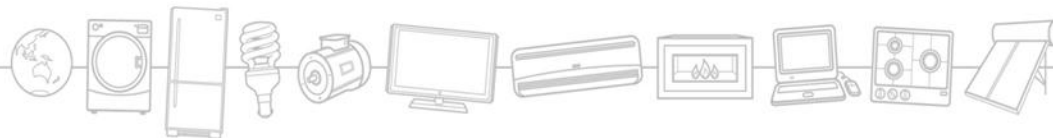
Note: Product shown as illustration of type only. Does not indicate that this model has AS/NZS 4755 interface



# Pool pump controllers (Part 3.2)



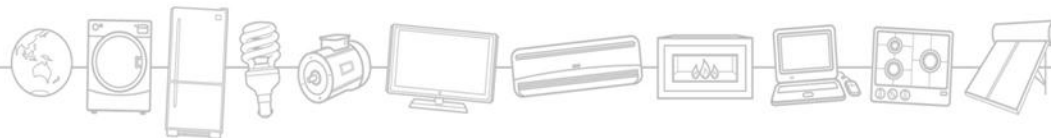
Note: Product shown as illustration of type only. Does not indicate that this model has AS/NZS 4755 interface



# Water heaters using electricity (Part 3.3)



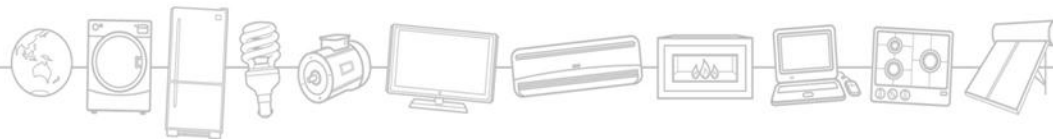
Note: Products shown as illustration of type only. Does not indicate that these models have AS/NZS 4755 interface



# Electric Vehicle Charger/Discharge Controllers (Part 3.4)



Note: Product shown as illustration of type only. Does not indicate that this model has AS/NZS 4755 interface

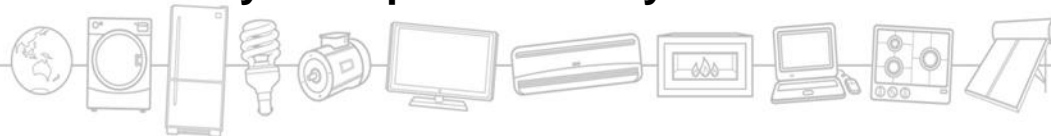
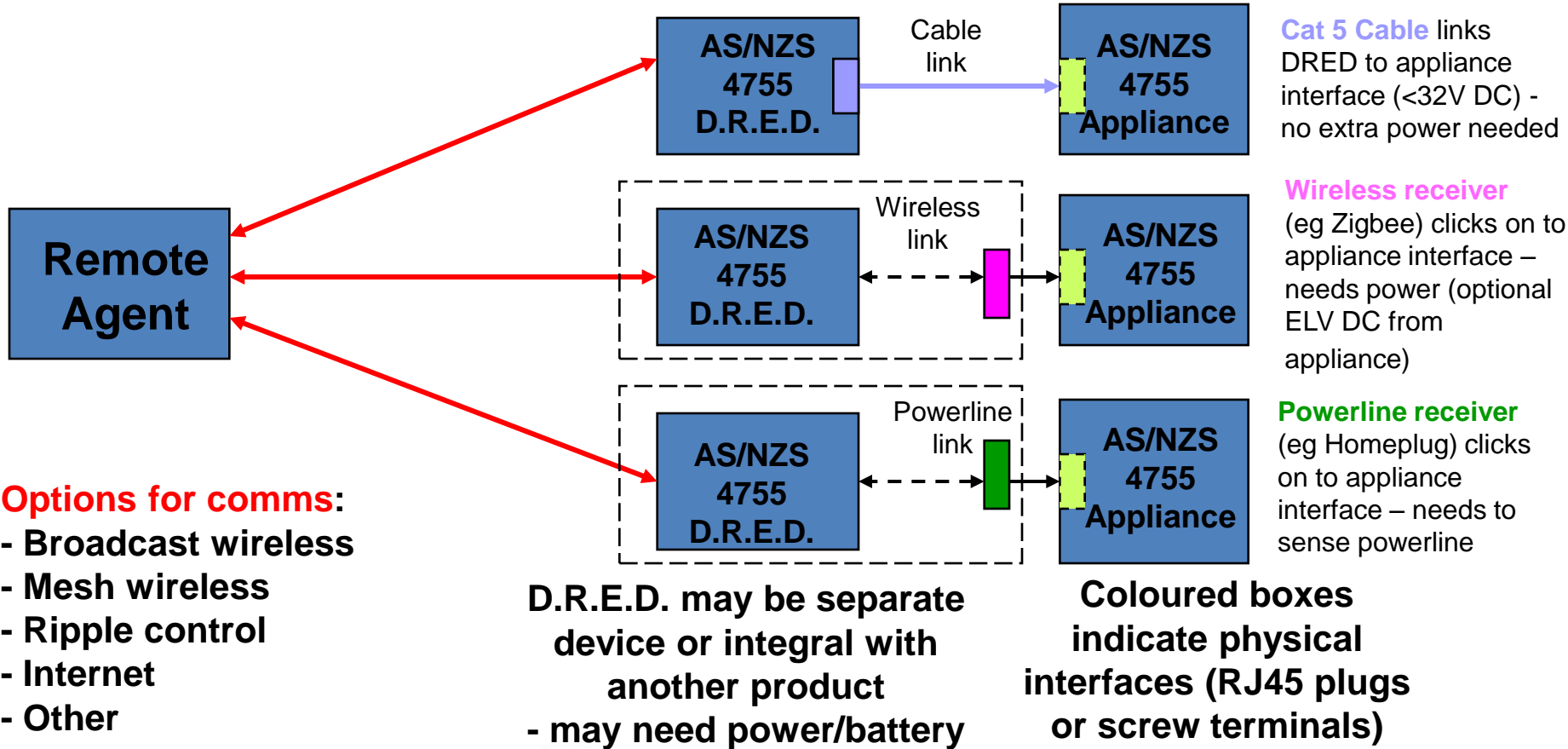


# Activation by Demand Response Enabling Device (1)

## Communications & Advanced Functions

## Link options

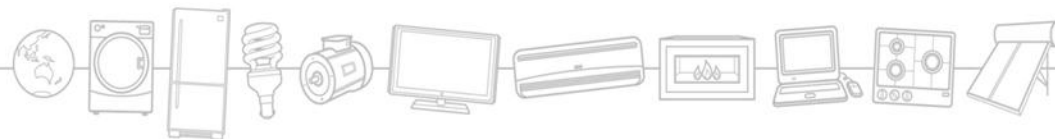
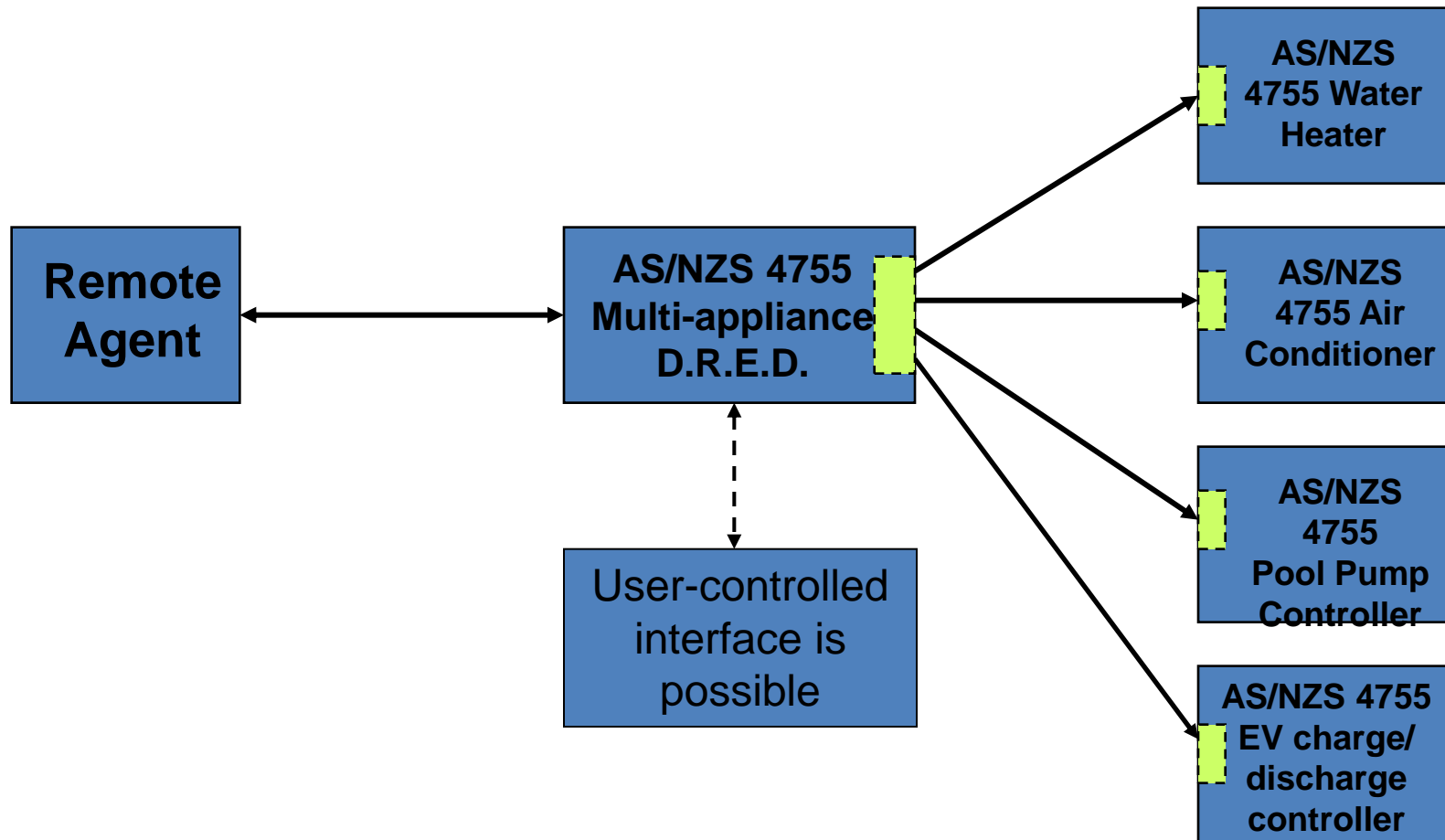
## Basic Functions (DRMs) in Appliance



# Activation by Demand Response Enabling Device (2)

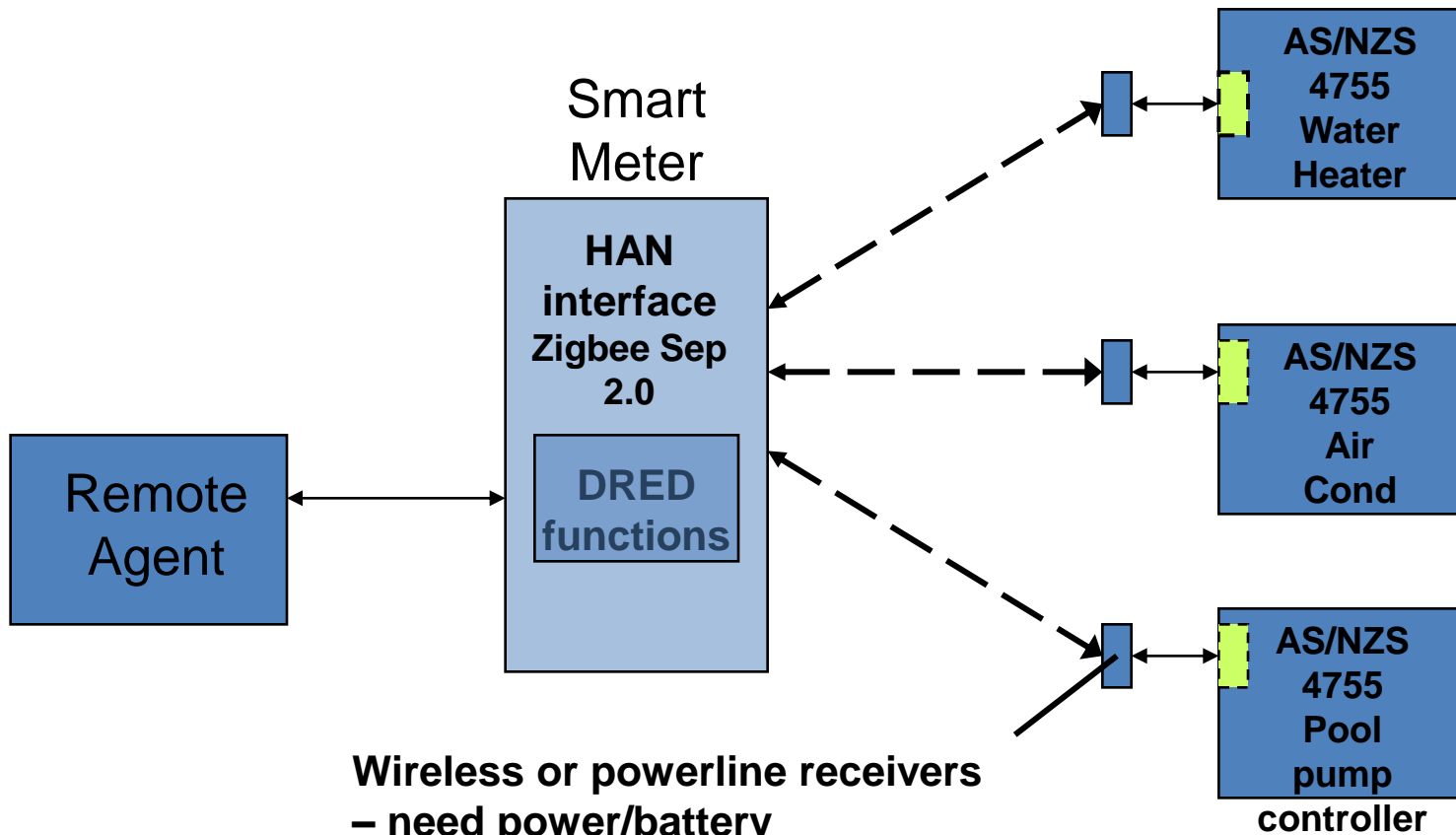
## Communications & Advanced Functions

## Basic Functions

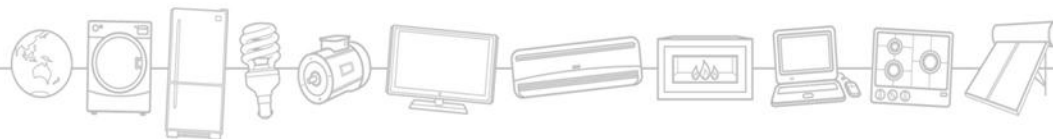




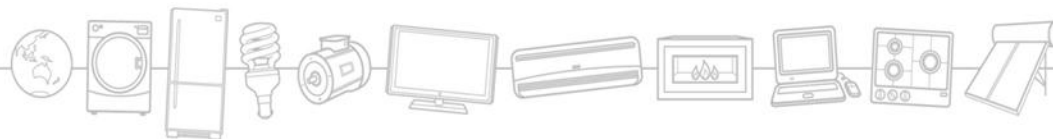
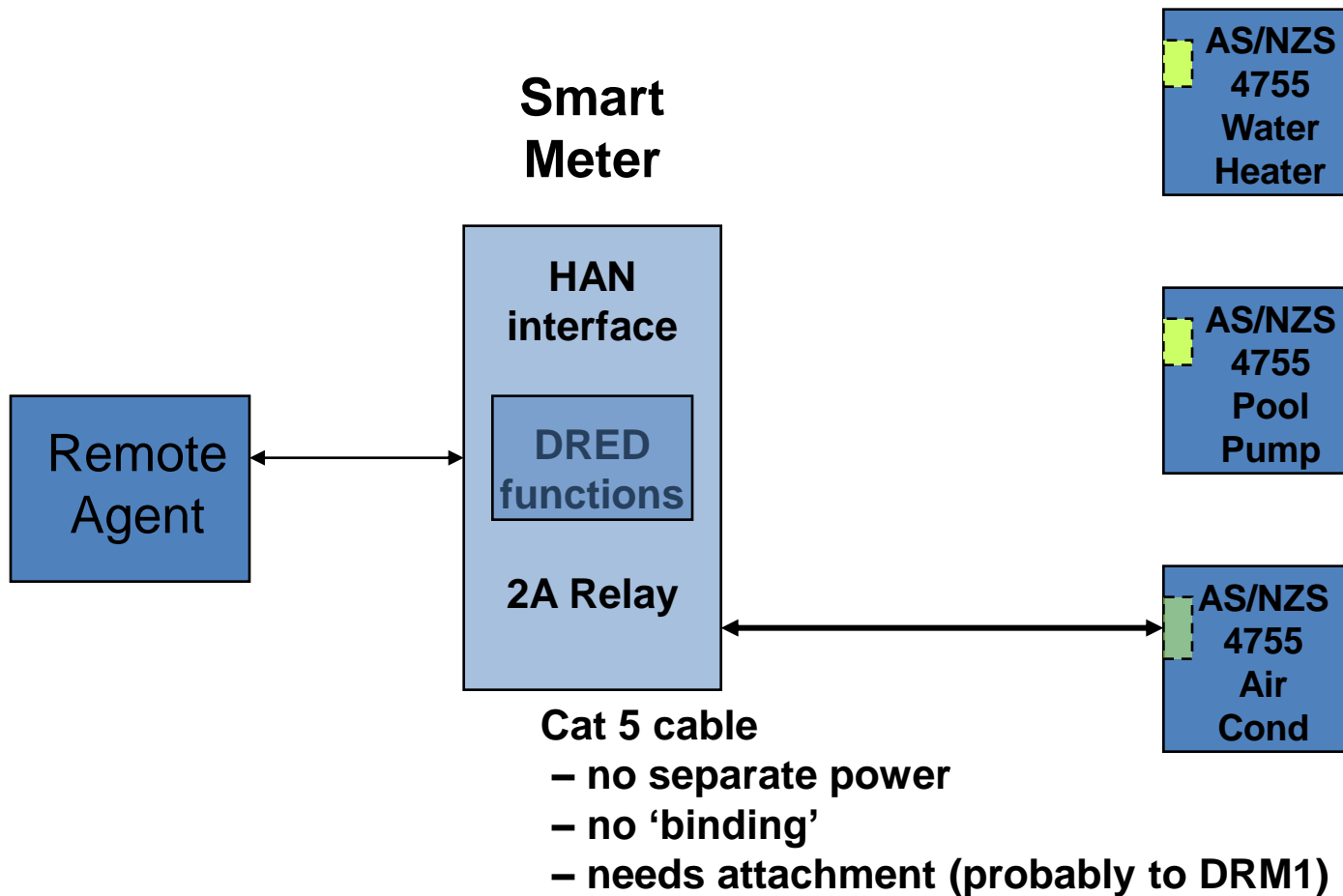
# Activation by smart meter - Home Area Network



- Wireless or powerline receivers**
- need power/battery
  - need 'binding' to meter
  - need attachment to interface



# Activation by smart meter – Controlled Load Relay



# Costs

- Interface adds about \$10 per appliance sold
- Activation costs: Range \$75 - \$180
  - Only incurred when appliance is activated
  - Assume remote agent pays, recovers from benefits
- Participation costs
  - Marketing DR contracts; annual letters, calls etc
- Constraint on energy services during DR events
  - Room temperatures slightly higher
  - Delay in obtaining desired energy service
- Participation payments are transfers, not costs

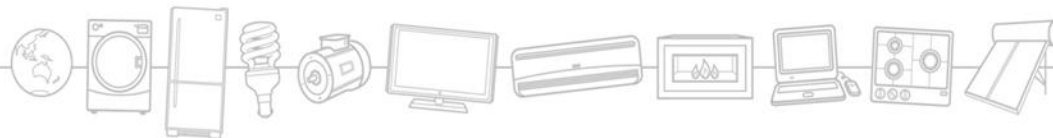
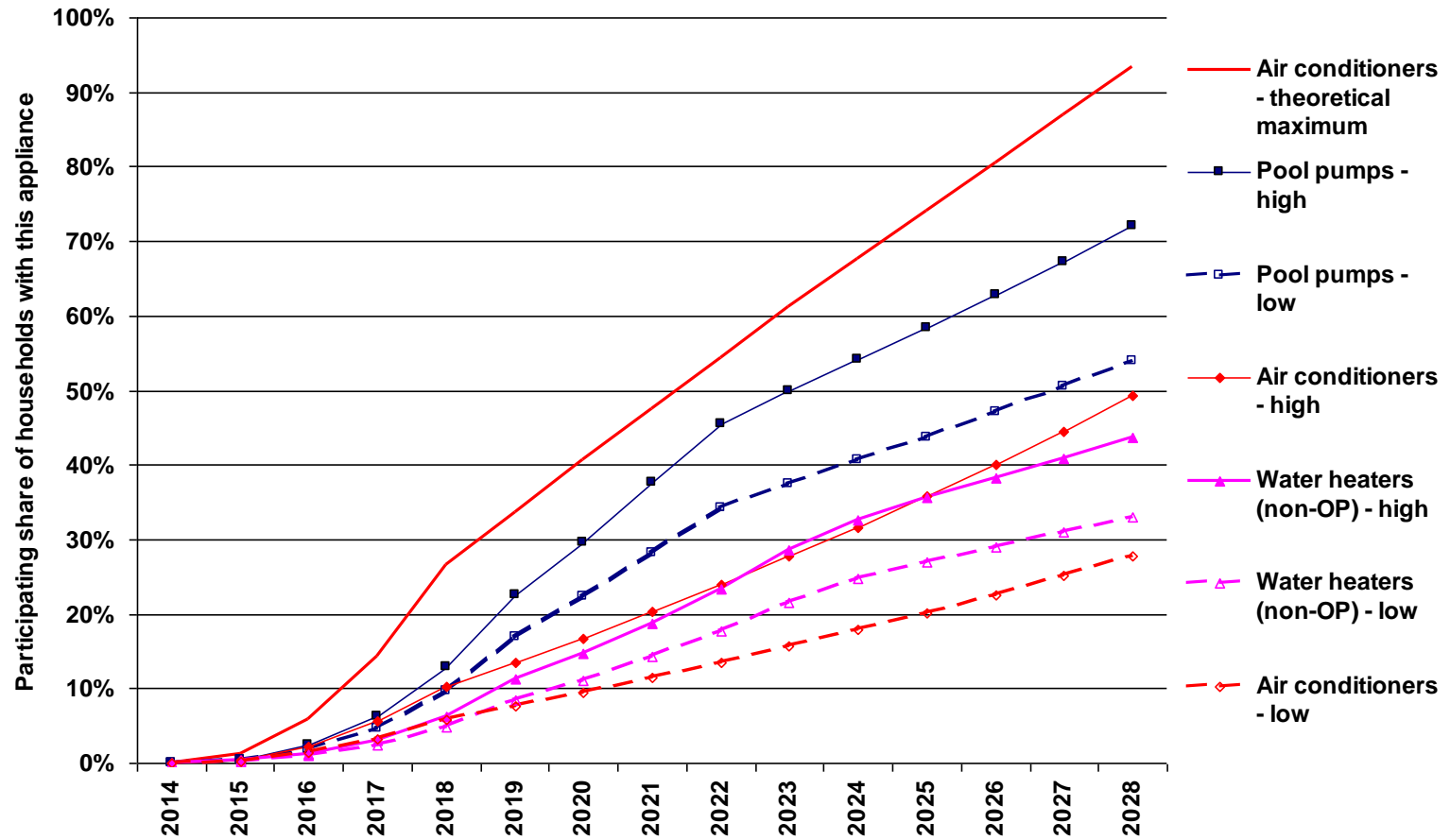


# Benefits

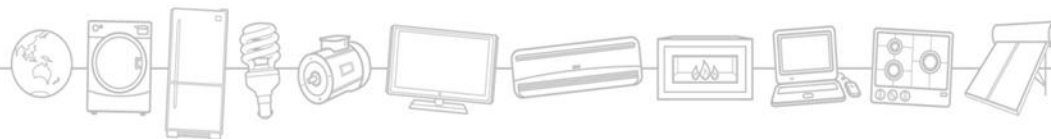
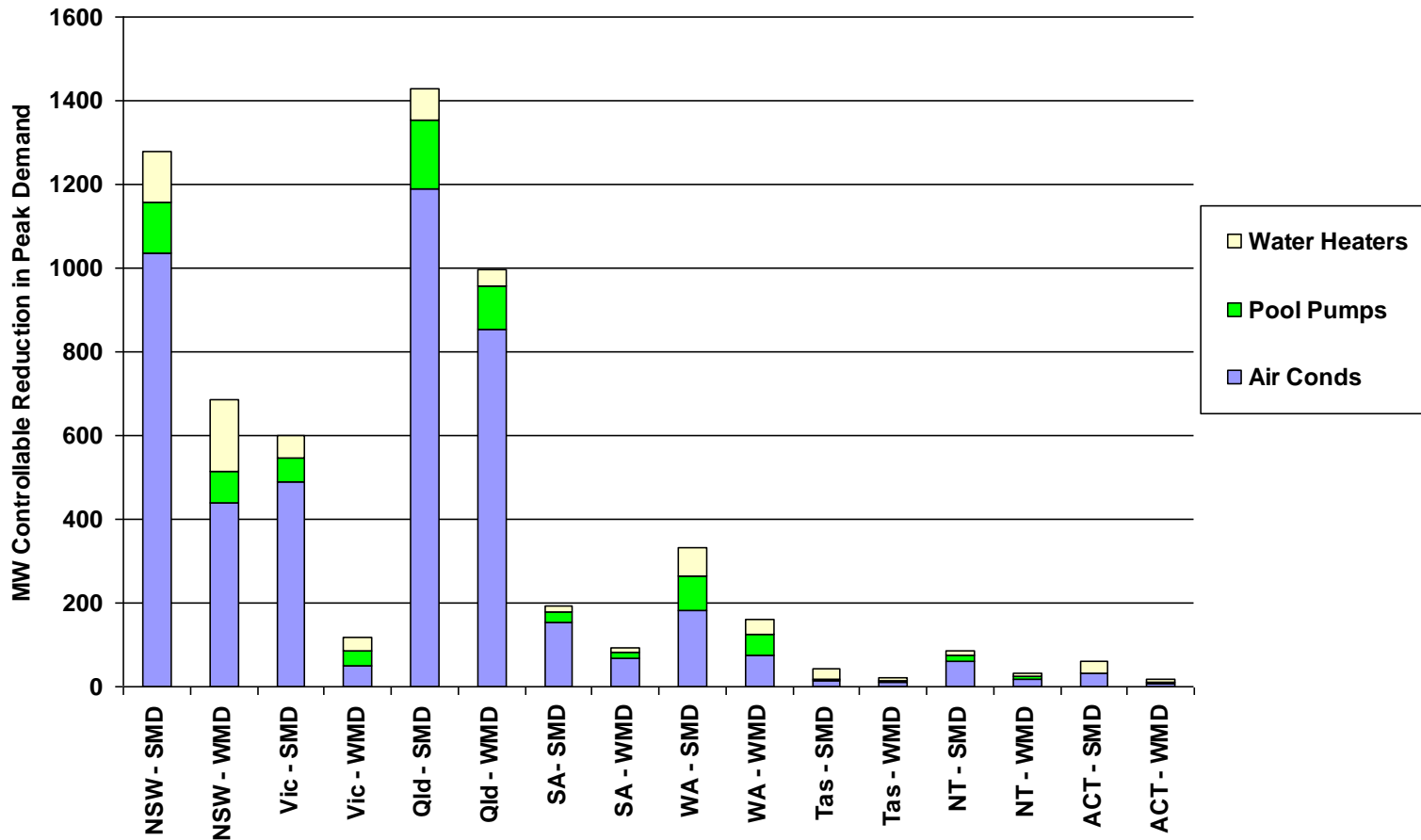
- Reduction in network peak demand
  - Grid-wide and local
  - Est. \$ 500 - 3,500 per firm kW (Aust av. \$2,900)
- Reduction in wholesale prices (retail benefit)
- Better utilisation of renewable generation
- Grid support (supply, VARs)
- Emergency management
- PV of benefits – PV of costs = Net benefit
- Participation incentives out of net benefits



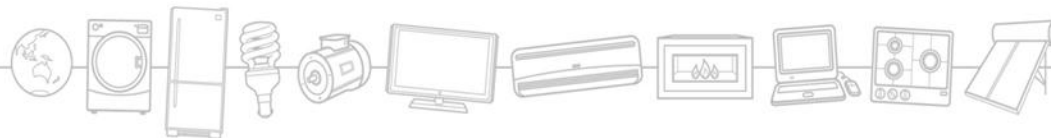
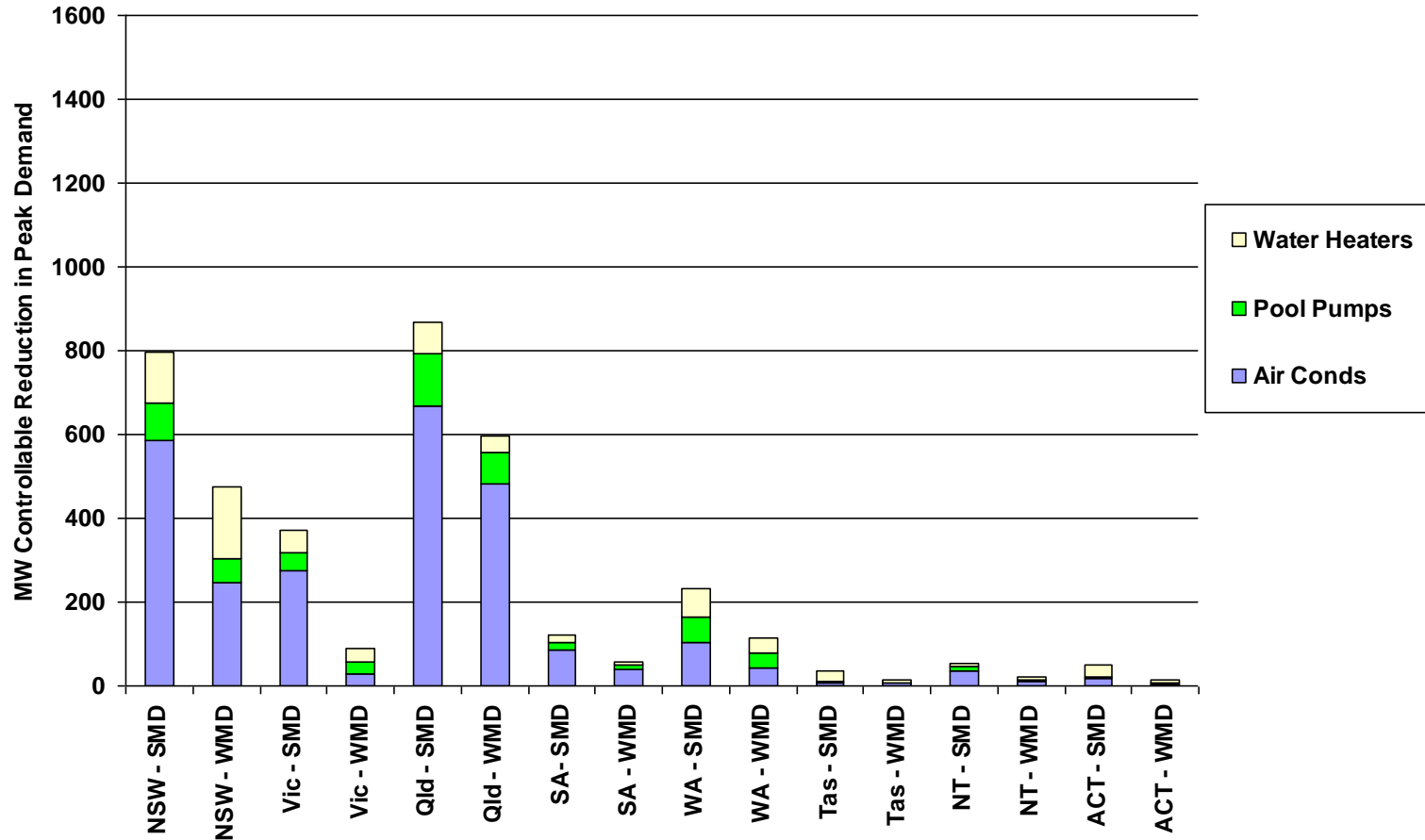
# Projected activation rates



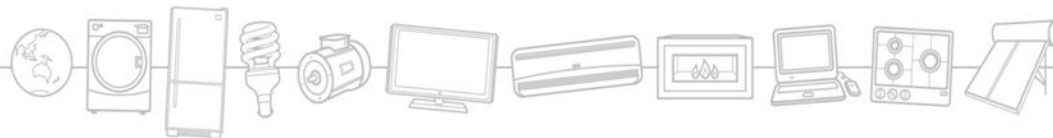
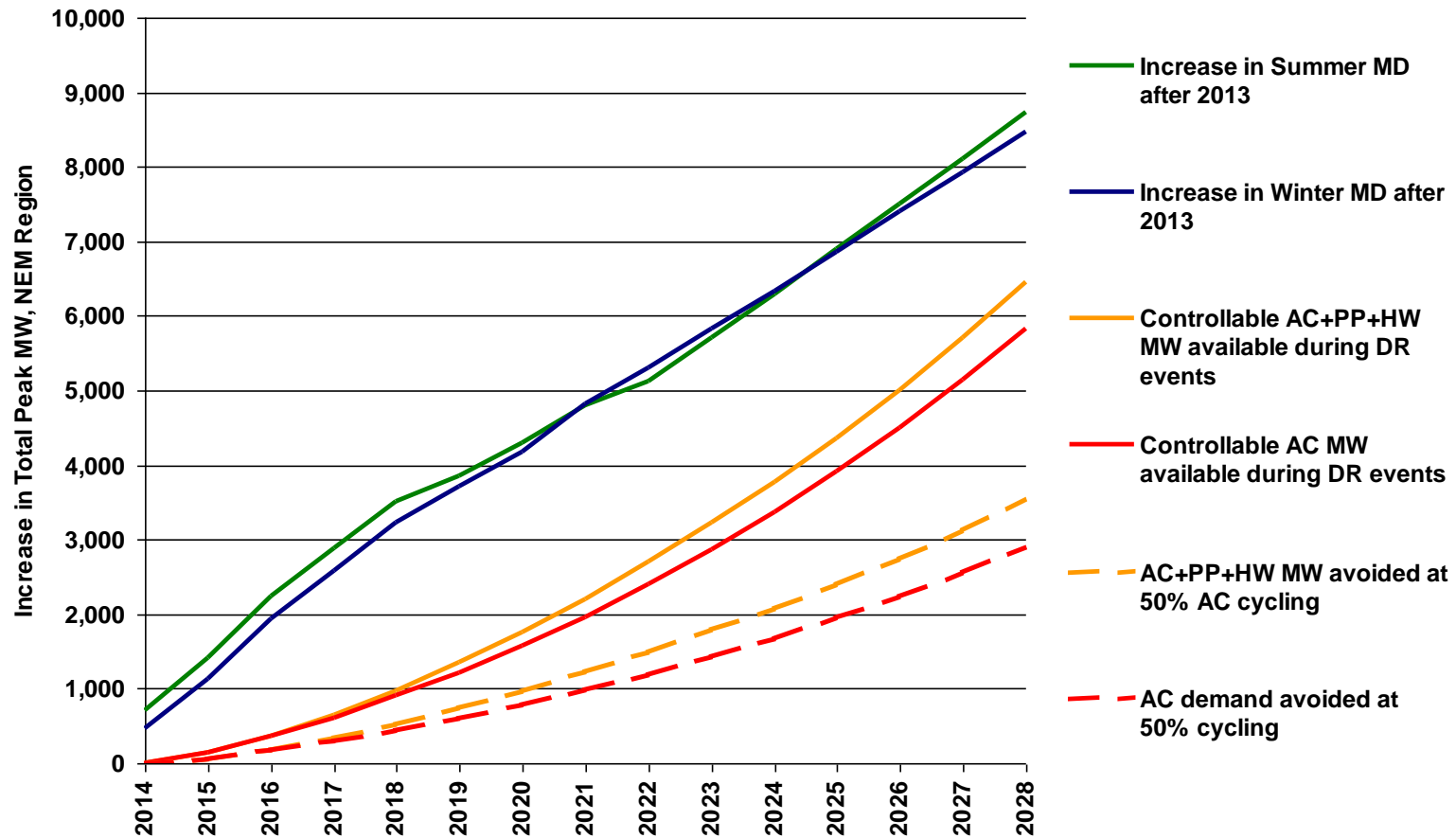
# Controllable reduction in SMD, 2028



# Controllable reduction in WMD, 2028

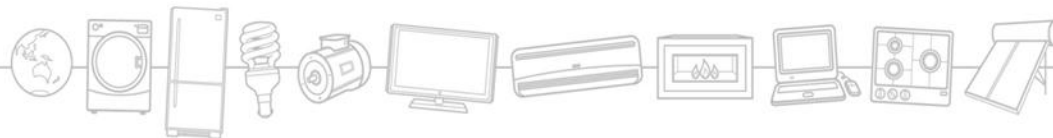
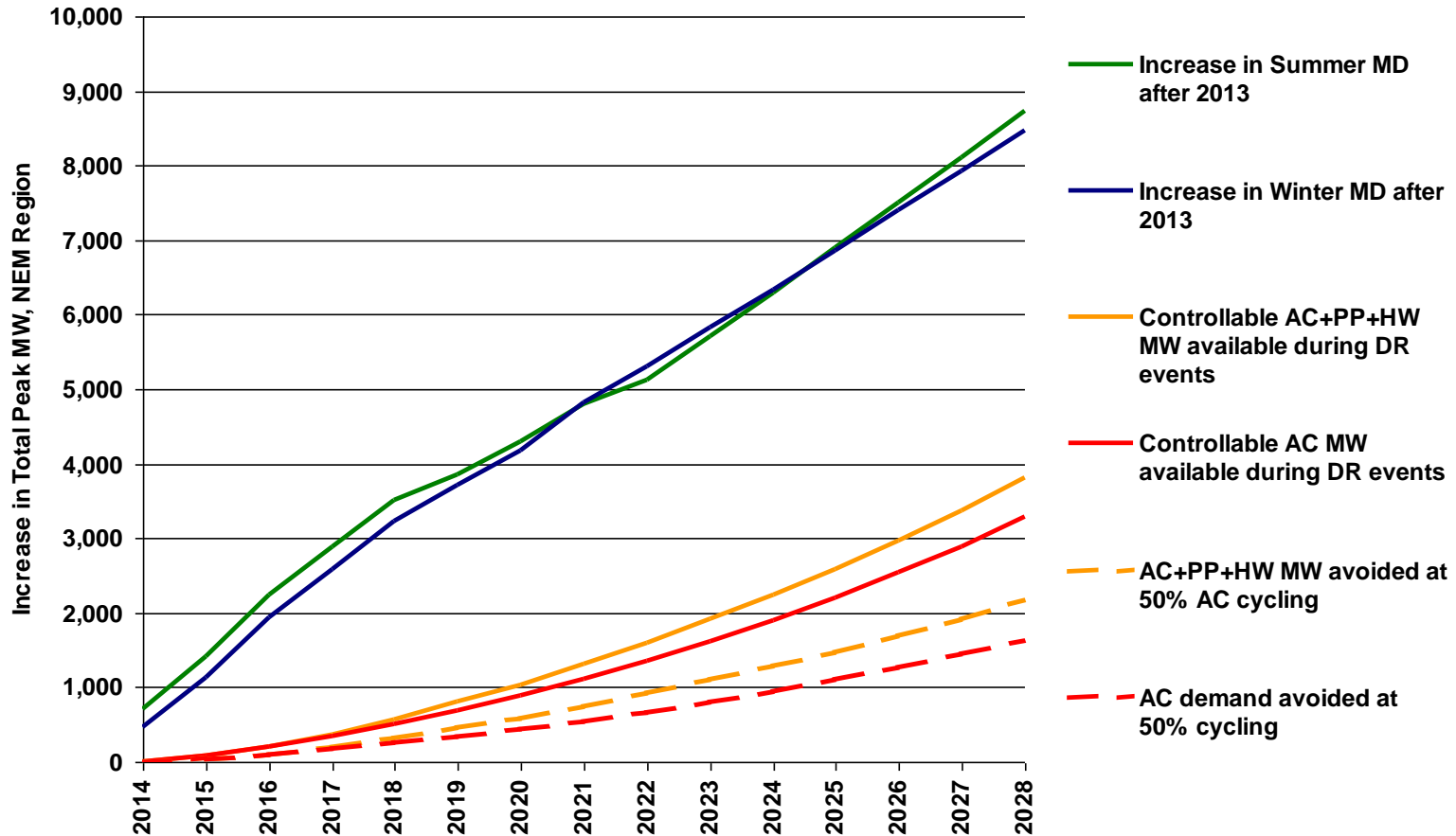


# Projected controllable load, High participation

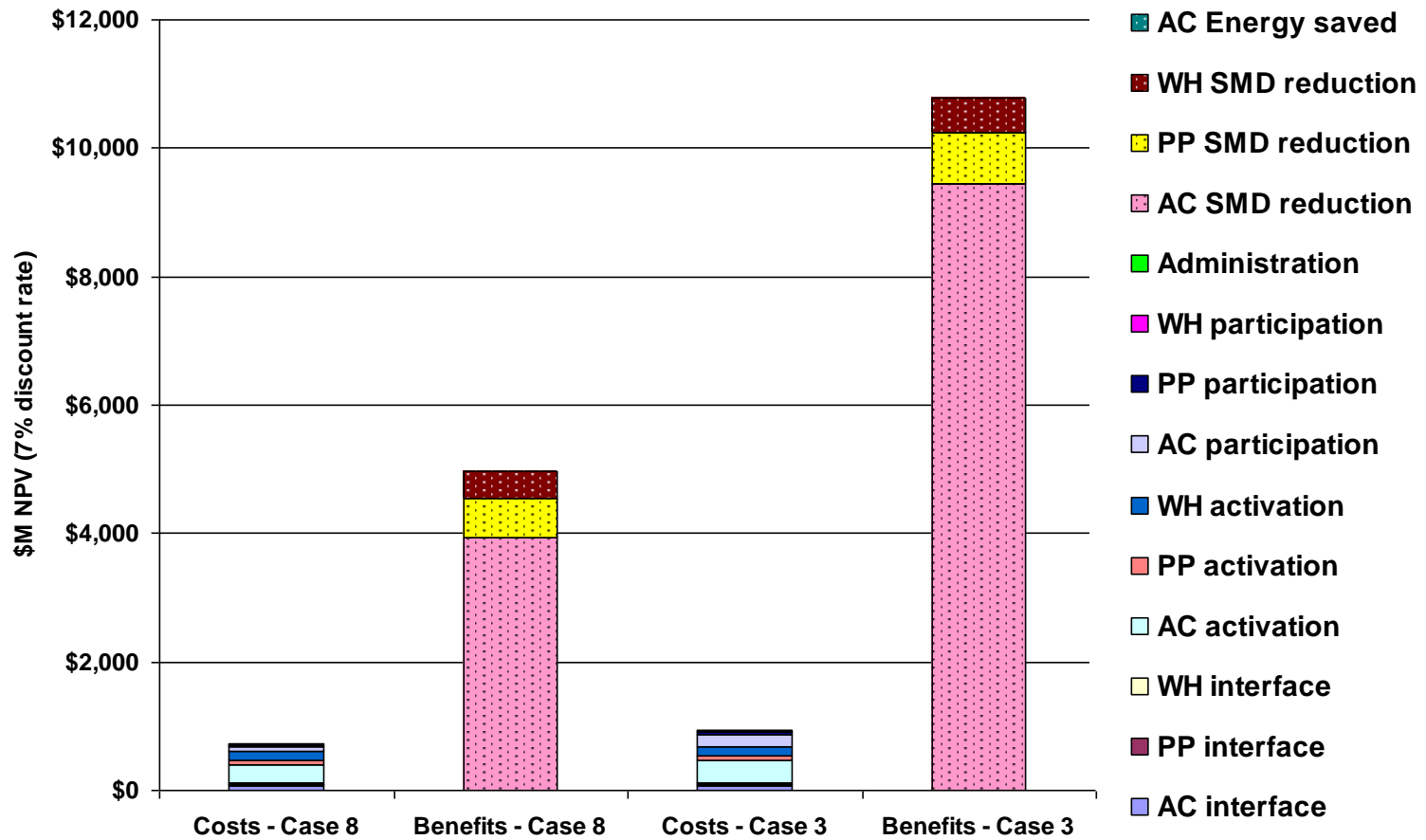




# Projected controllable load, Low participation



# Costs and benefits



# Why mandate compliance?

## Addresses market failures:

- Lack of energy price signals leads to over-investment in supply – bills higher than necessary
- ‘Positive externality’ – no stakeholder can gain enough of the value to risk introducing standard

## Cost of retrofitting DR capability prohibitive

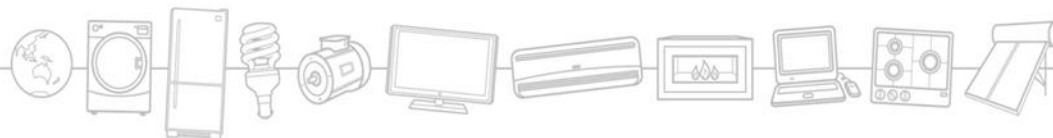
- Mandating for new creates 2 to 3 times as much benefit

## Reduces risks to manufacturers, utilities

- Products have value throughout Australia

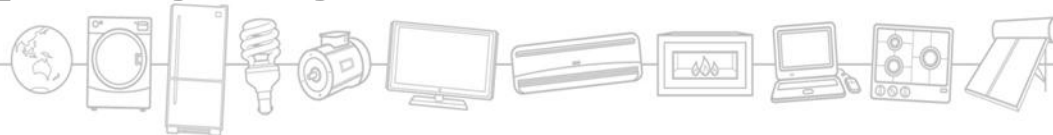
## Benefits also accrue to non-participants

- Lower network charges for all

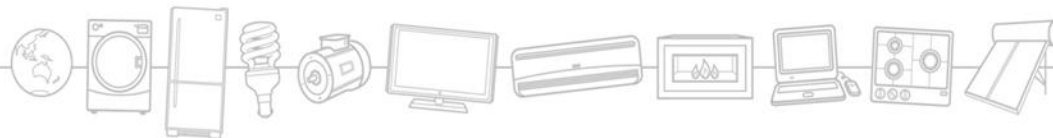
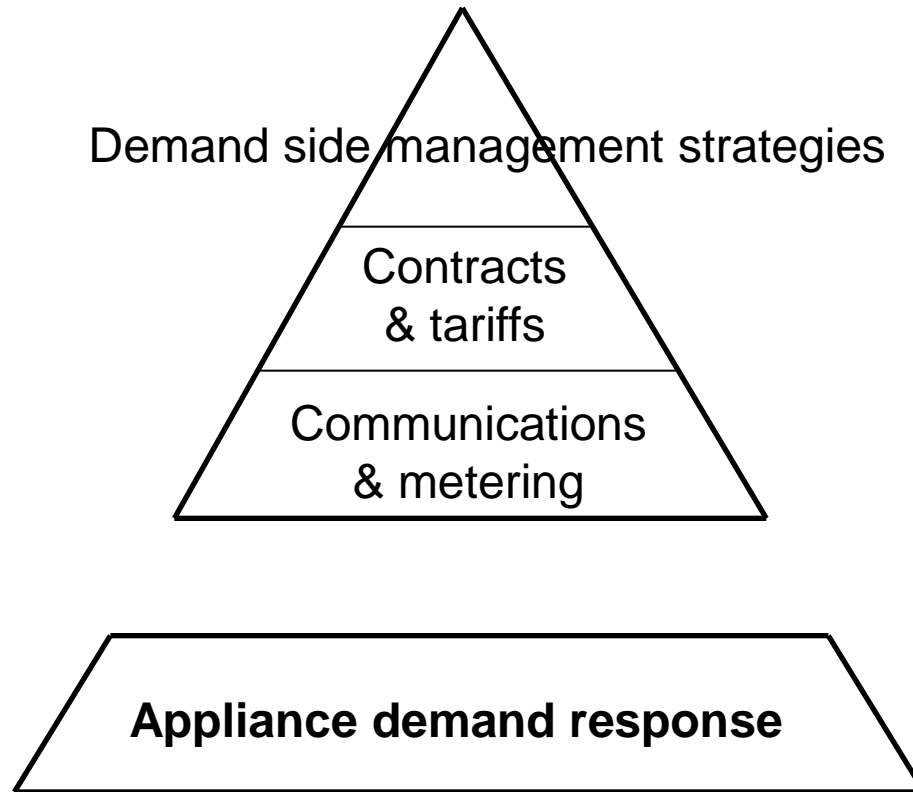


# Risks

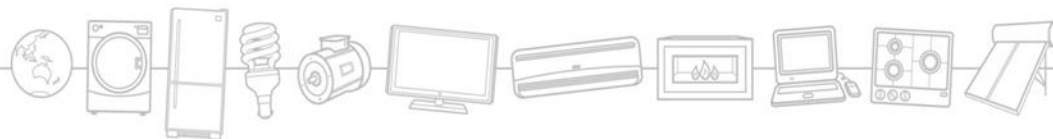
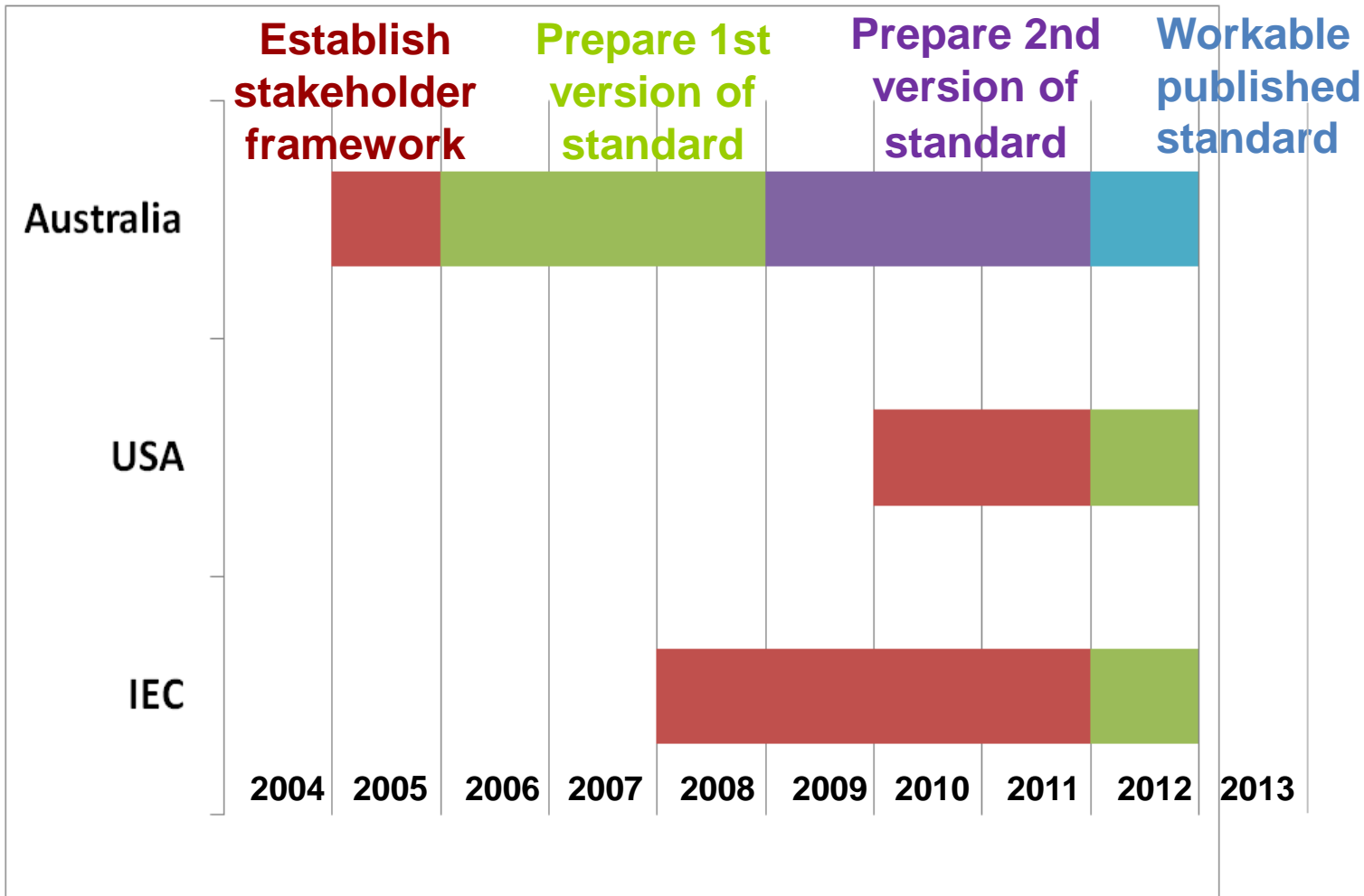
- Distributors could fail to develop DR options
  - Regulator can now require consideration
- Lack of comms. platforms in some states
  - 85% of net benefit in states with platforms
- No TOU tariffs, or low takeup of TOU tariffs
  - Consumers can be offered cash incentives
- Consumers decline or withdraw from DR
  - Trials show high level of acceptability
- Conflict with international standards
  - E3 participating in global standards work



# Appliance DR is bedrock of residential sector demand side management



# How long has demand response standard taken?



# Next steps

- Written comments on Consultation RIS
  - by 17 May, please
  - To [energyrating@climatechange.gov.au](mailto:energyrating@climatechange.gov.au)
- Questions on p31 of Consultation RIS
- E3 will consider responses
- E3 will prepare a Decision RIS
- Ministers will then consider and decide

