

## *Project 4: Institutional Barriers, Economic Modelling and Stakeholder Engagement*

**Intelligent Grid Cluster Researchers Meeting**  
Brisbane, 14 April 201

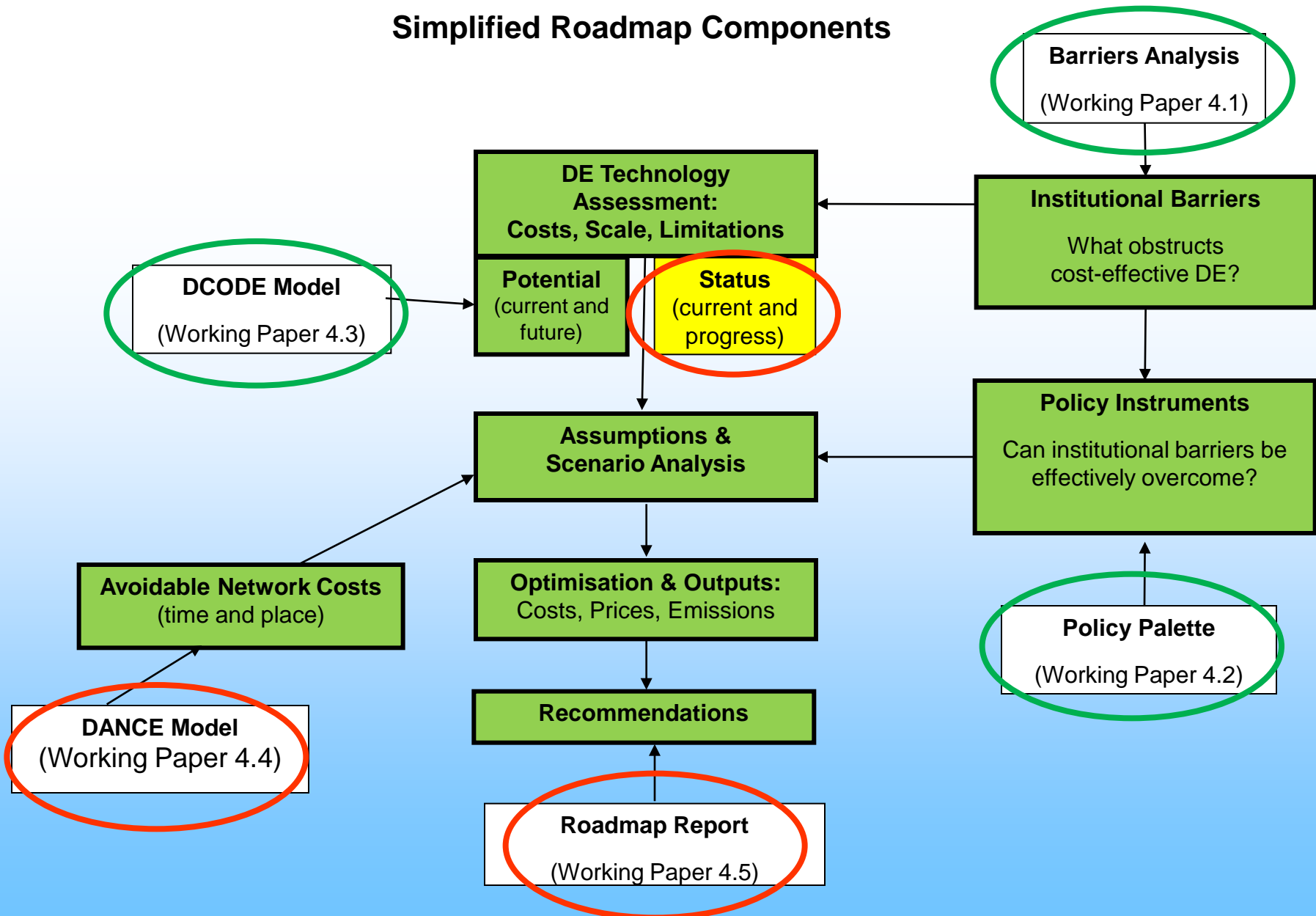


**Chris Dunstan, Research Director**  
**Institute for Sustainable Futures, UTS**  
(With thanks to **Ed Langham**)

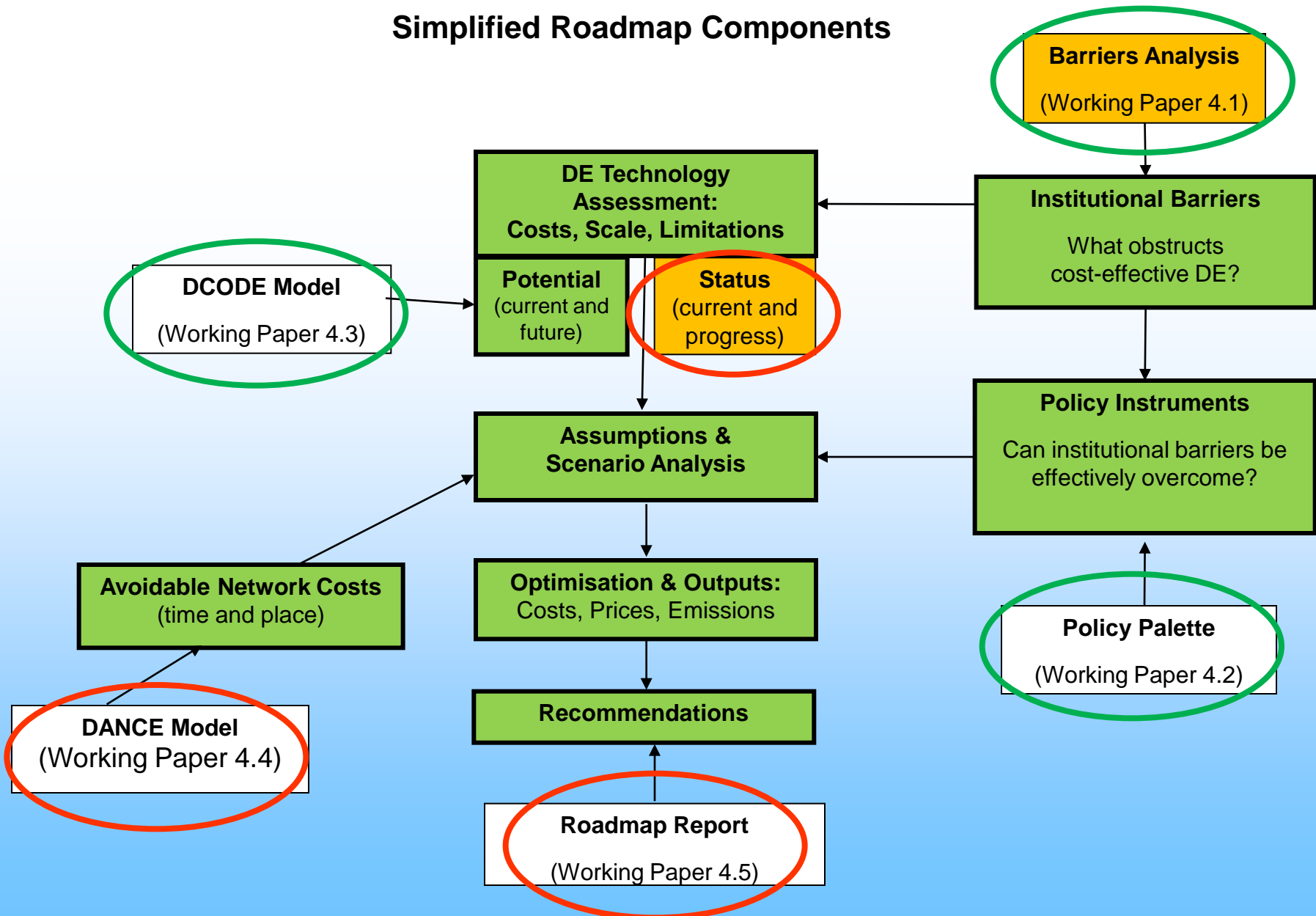
## **Components of P4**

- 1. Cost and potential of Distributed Energy (DCODE)**
- 2. (Network) Benefits of Distributed Energy (DANCE)**
- 3. Institutional Barriers to DE**
- 4. Policy tools: How to facilitate DE?**
- 5. Distributed Energy Roadmap**

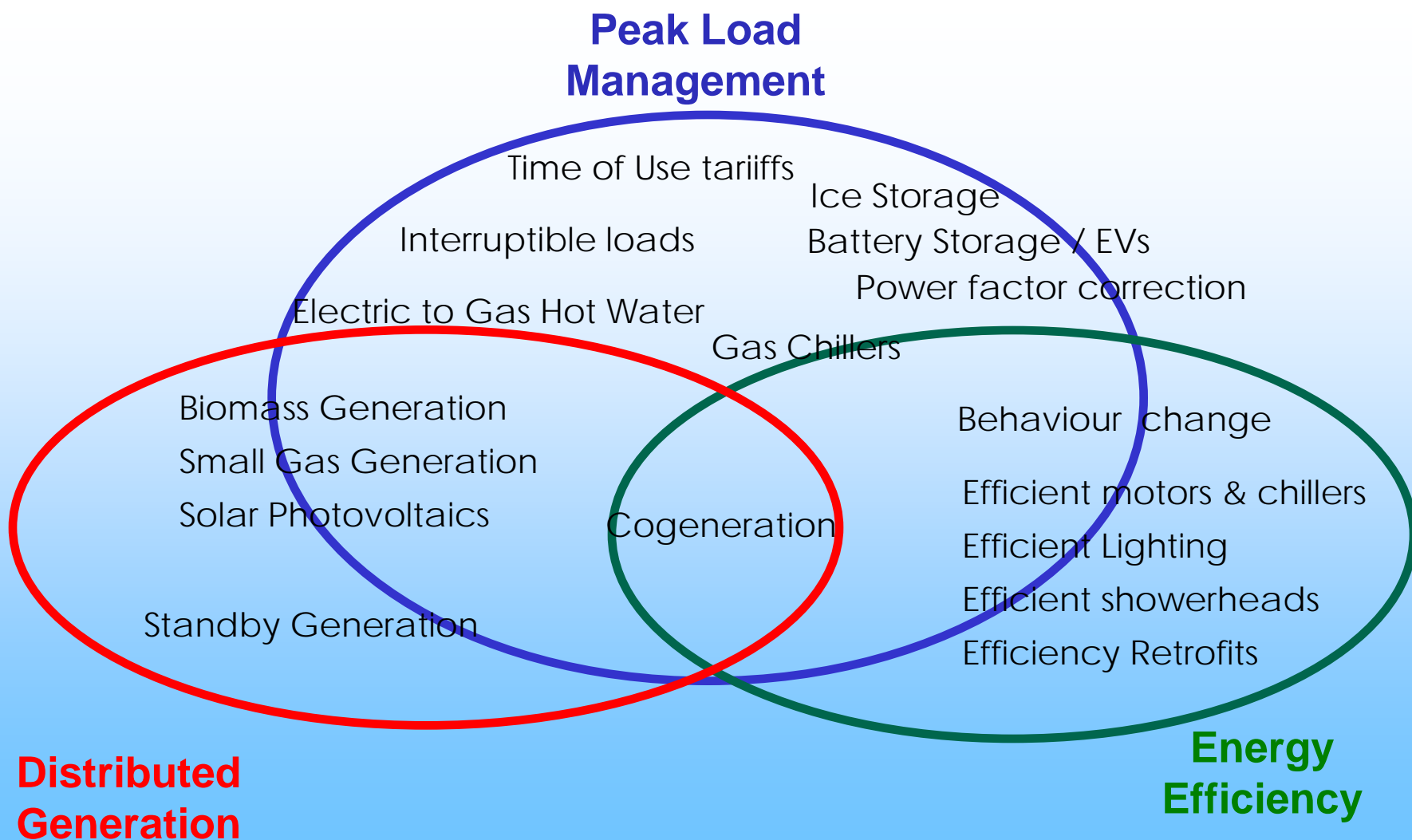
## Simplified Roadmap Components



## Simplified Roadmap Components



# What is Distributed Energy (DE)?





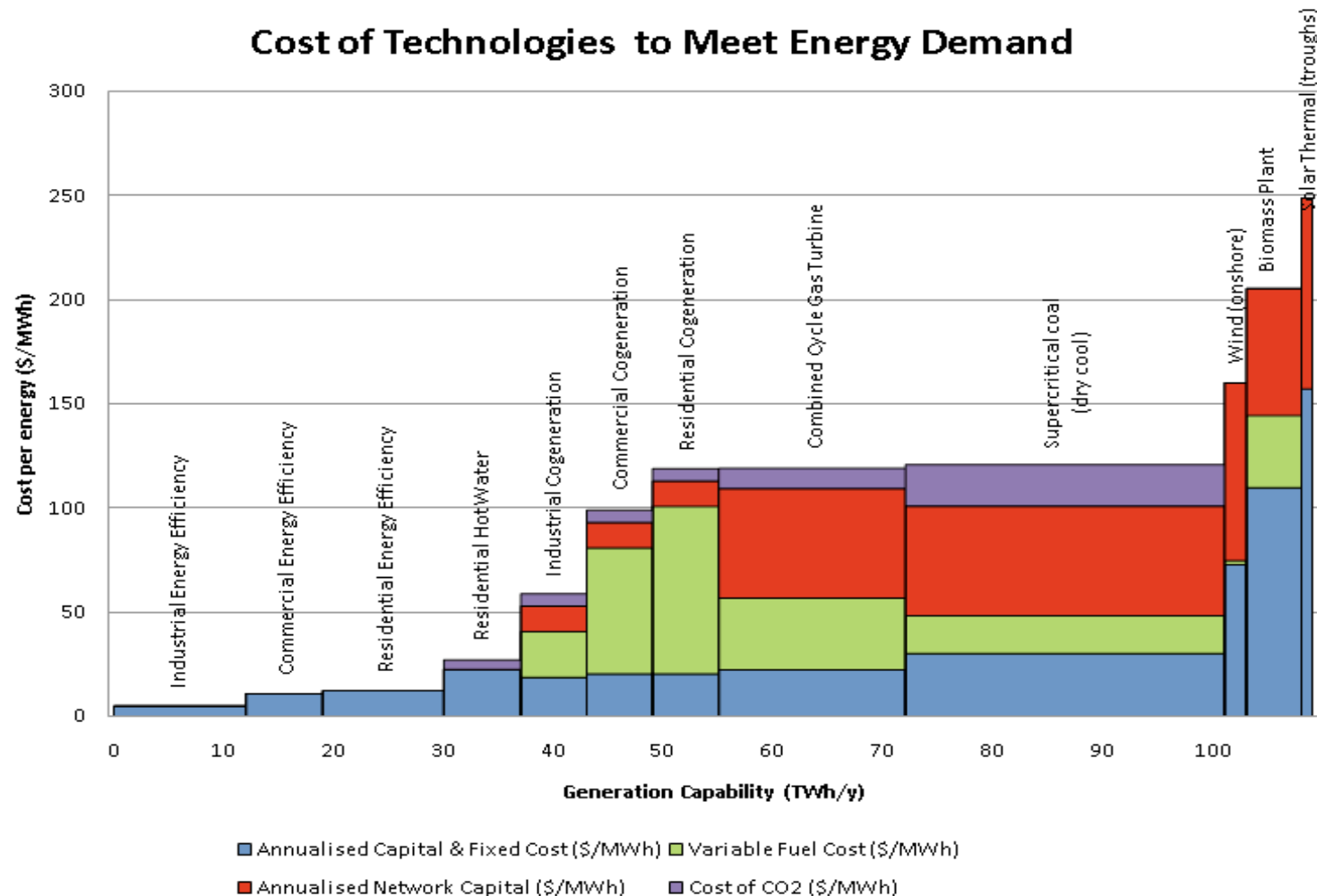
# Cost and Potential of Distributed Energy

See Working Paper 4.3

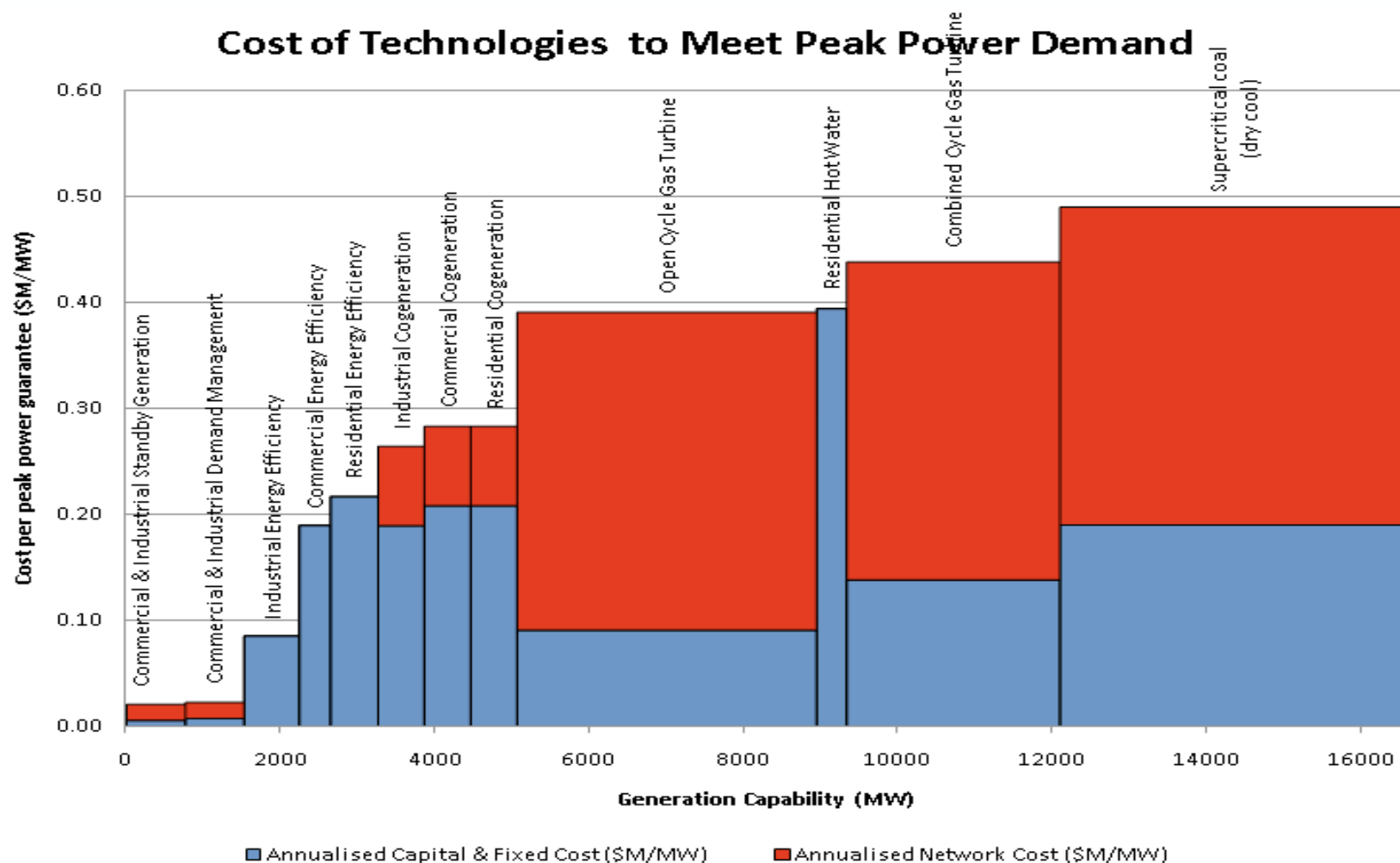
[www.igrid.net.au](http://www.igrid.net.au)

# Description and Cost Of Distributed Energy (D-CODE Model)

Cost of Technologies to Meet Energy Demand



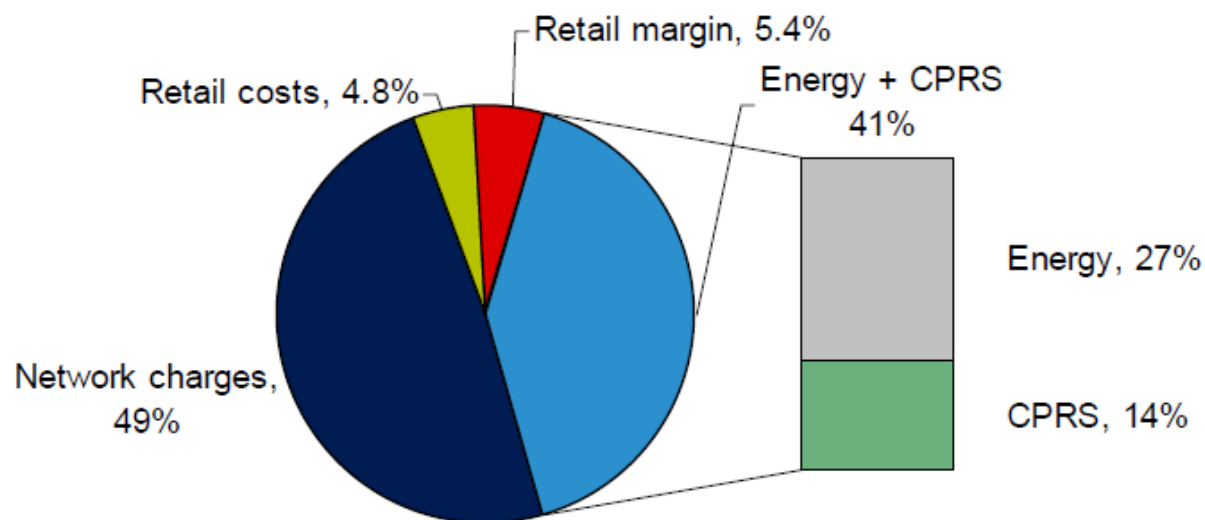
# Description and Cost Of Distributed Energy (D-CODE Model)



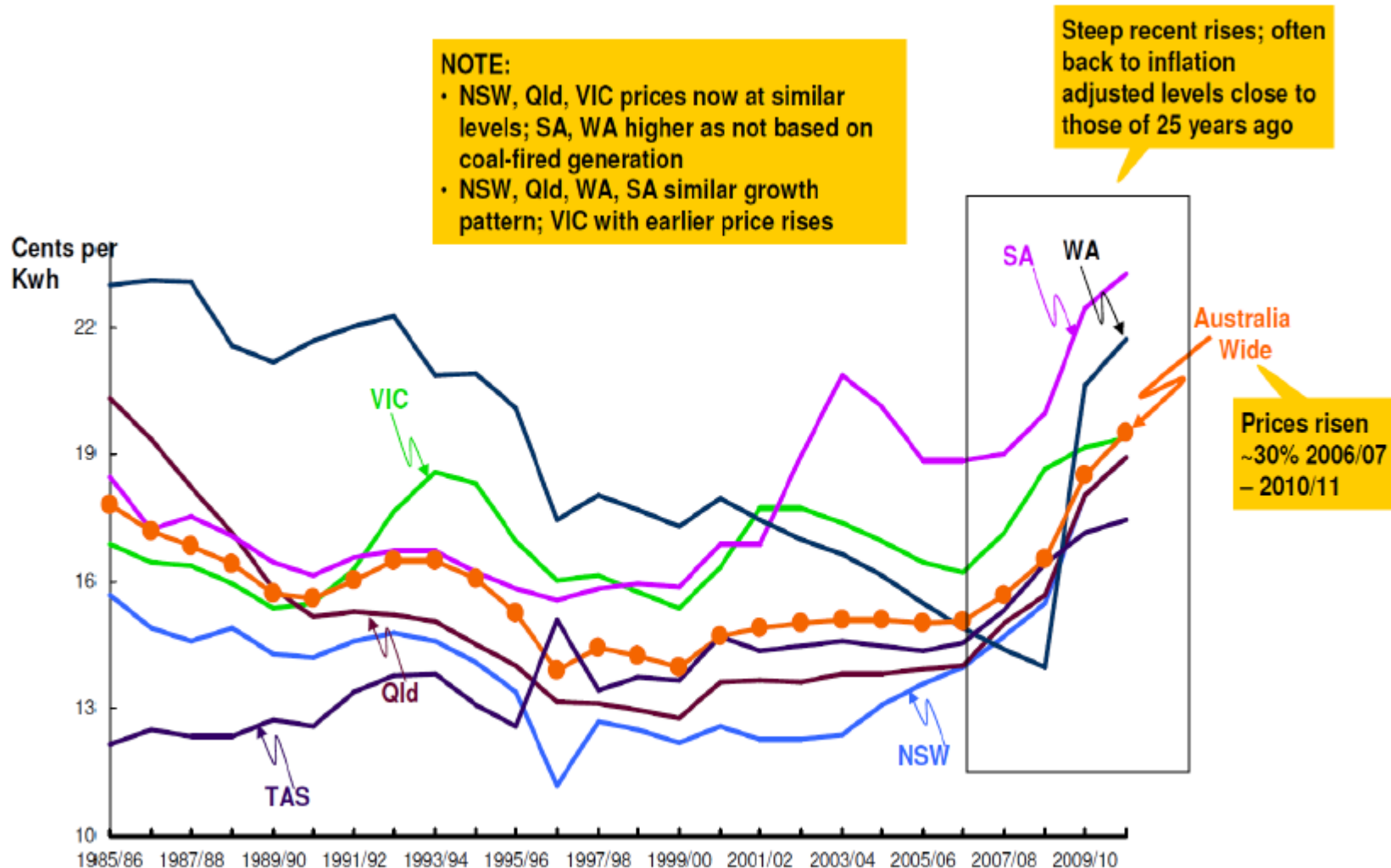
# Potential Benefits of Distributed Energy

- Lower costs
- Lower greenhouse gas emissions
- Increased reliability
- Managed peak load
- Enhanced social equity and access
- Avoided generation costs
- **Avoided network costs**
  - See Working Paper 4.4 (forthcoming)

**Figure 1.1 Composition of a typical NSW electricity retail bill under final determination, 2012/13**



**Note:** Figure shows composition of a typical bill averaged across the 3 NSW Standard Retailers for a customer consuming 7000kWh per annum.



**Figure 15 - State electricity prices, inflation adjusted<sup>1</sup>**

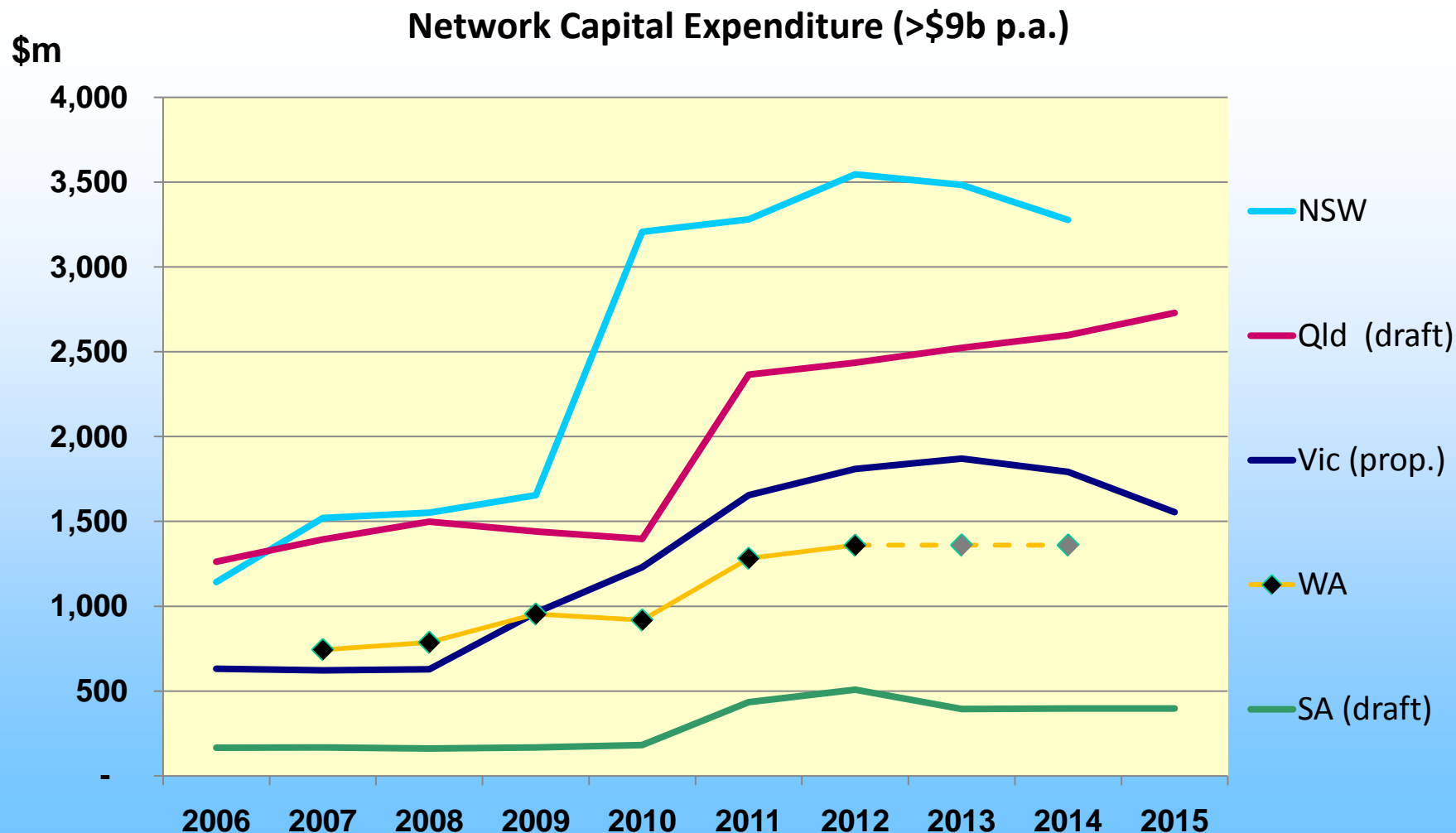
*“Residential electricity prices have increased by about 40 per cent over the last three years and are forecast to increase in the order of 30 per cent in the next three years to June 2013.”*

- **Martin Ferguson**, Weekend Australian, 2 April 2011, p.4

A \$20 per tonne carbon price is forecast to increase electricity prices by 10% (and petrol by 4%)

# Network Investment: >\$45 Billion by 2015

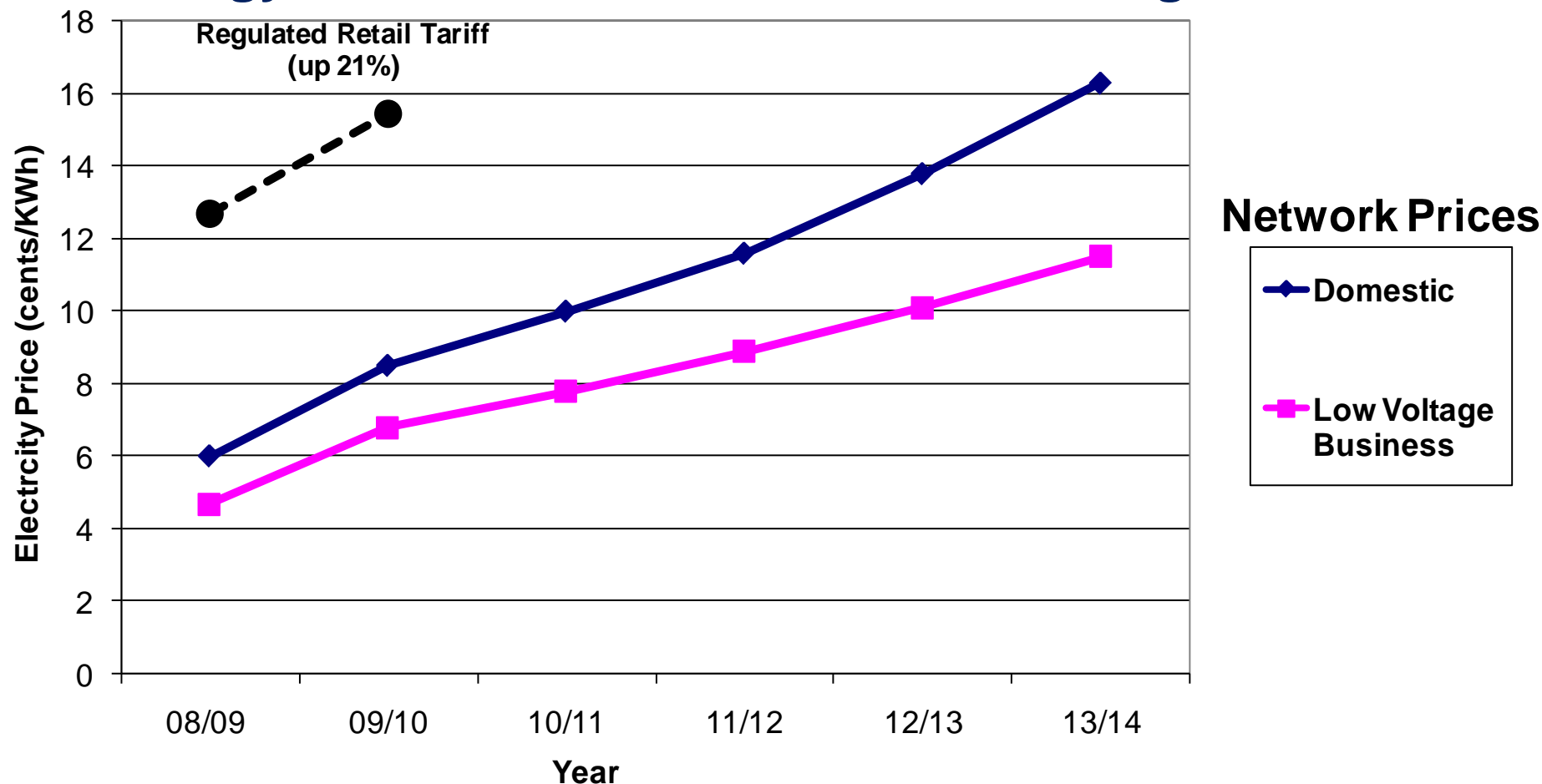
(bigger and sooner than National Broadband Network)



... pushing power prices up steeply

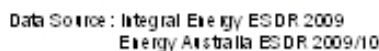
1

## Energy Australia Indicative Network Charges



# **Where, when and what is the network value in Distributed Energy?**

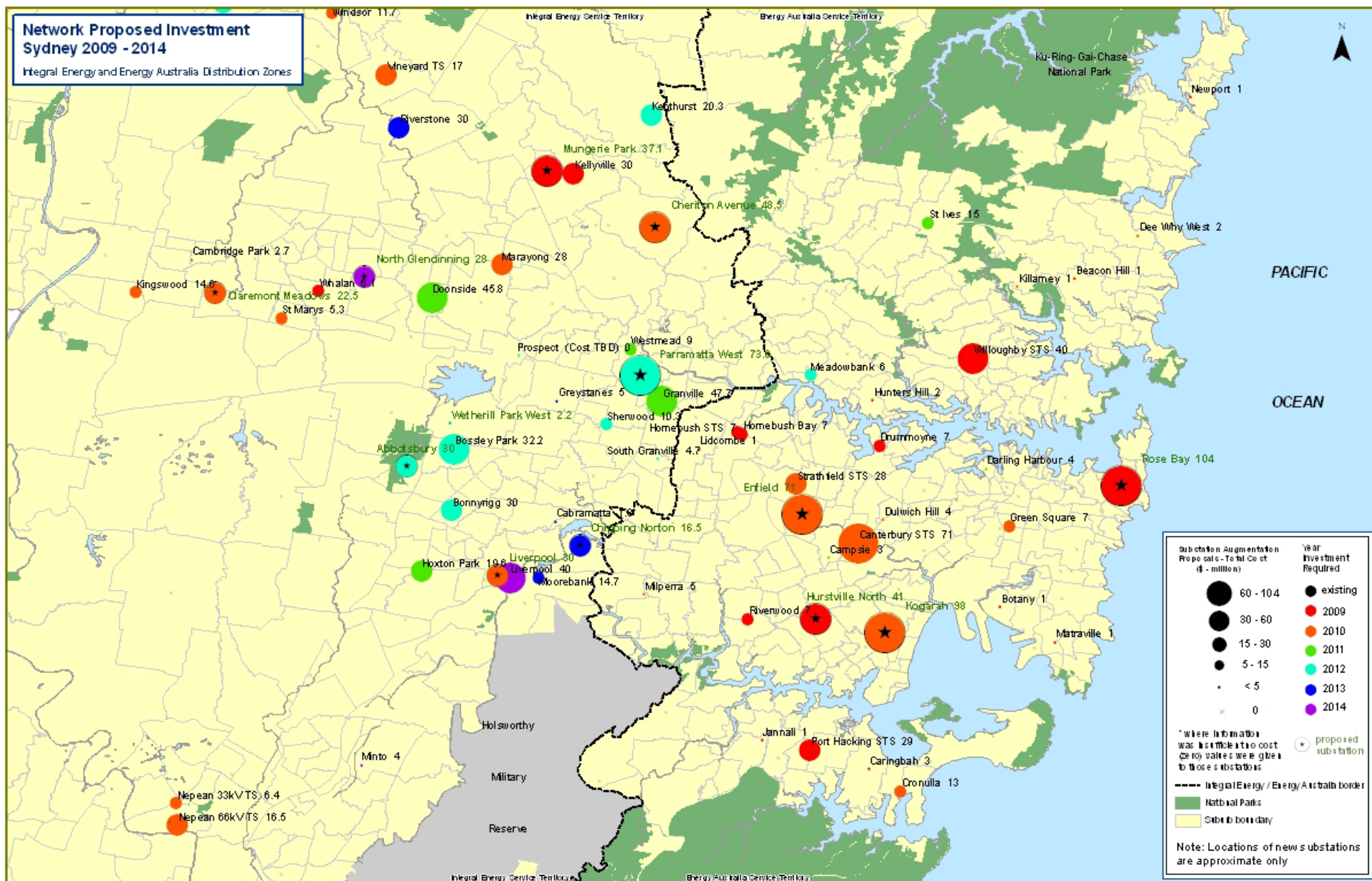
Integral Energy & Energy Australia  
Distribution Zones



Coordinate System: GCS - AGD86  
Author: Institute for Sustainable Futures

## Network Proposed Investment Sydney 2009 - 2014

Integral Energy and Energy Australia Distribution Zones



Data Source: Integral Energy ESDR 2009  
Energy Australia ESDR 2009/10

0 2.5 5 10 15 20  
Kilometers

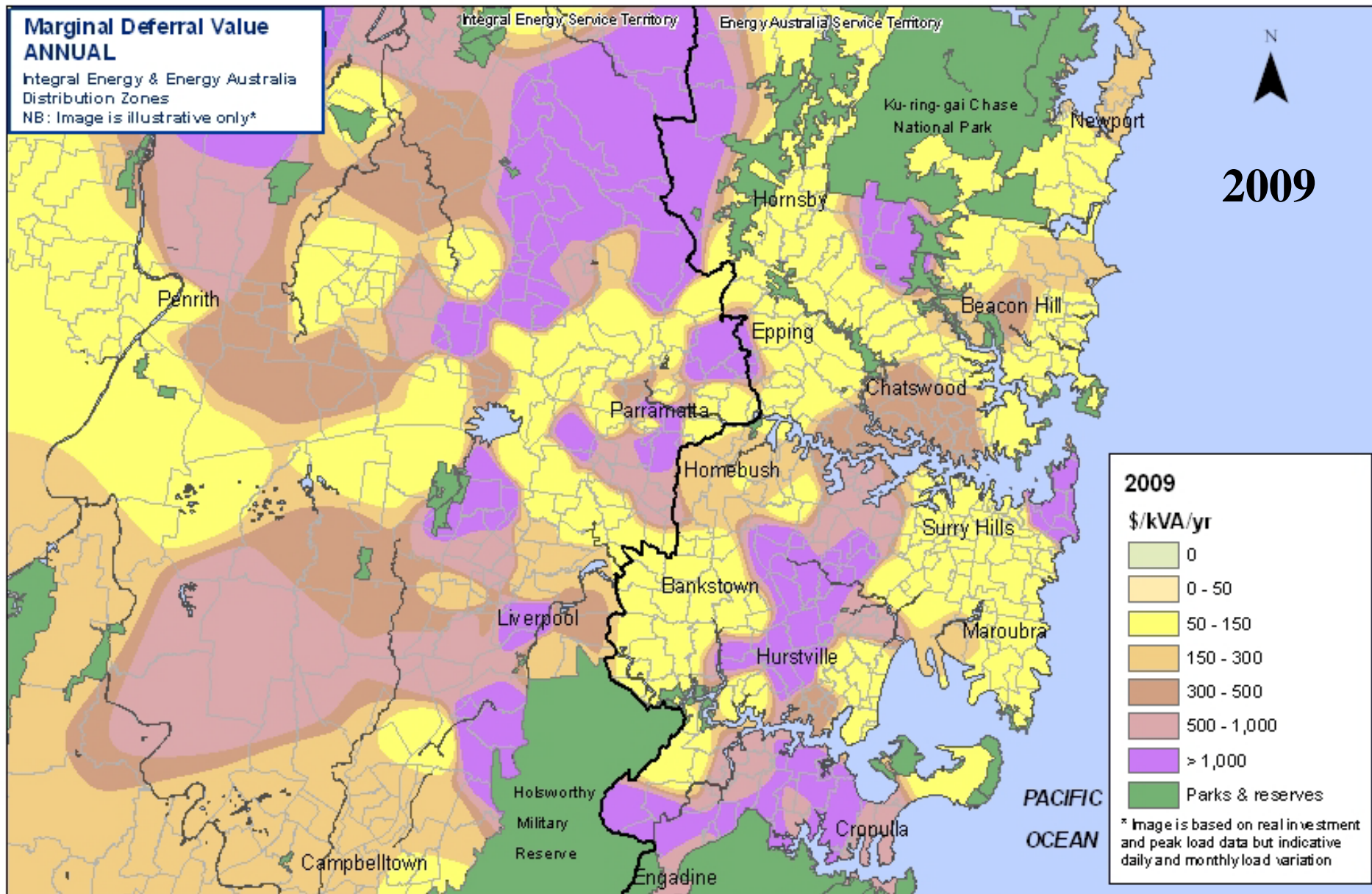
Integral Energy / Energy Australia Sydney Zone  
Substations Proposed Investment by 2014

Coordinate System: GCS - AGD86  
Author: Institute for Sustainable Futures

# Marginal Deferral Value ANNUAL

Integral Energy & Energy Australia  
Distribution Zones

NB: Image is illustrative only\*



2009



PACIFIC  
OCEAN

Data Source: Integral Energy ESDR 2009  
Energy Australia ESDR 2009/10

0 2 4 8 12 16  
km

iGrid  
Intelligent grid  
an Australian research network



© UTS 2010

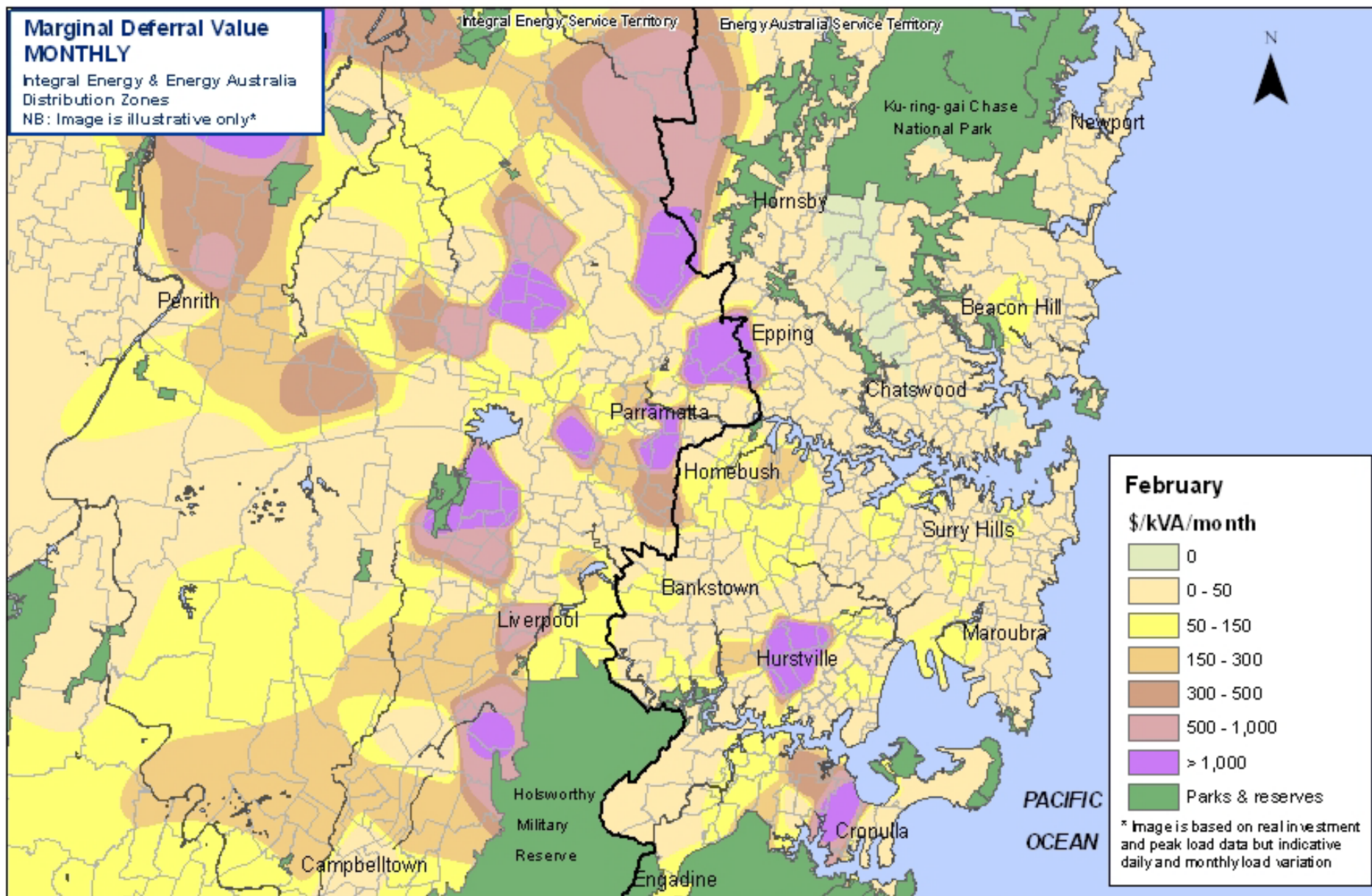
Coordinate System: GCS - AGD66  
Author: Institute for Sustainable Futures

# MONTHLY DEFERRAL VALUE

## Marginal Deferral Value MONTHLY

Integral Energy & Energy Australia  
Distribution Zones

NB: Image is illustrative only\*



Data Source: Integral Energy ESDR 2009  
Energy Australia ESDR 2009/10

0 2 4 8 12 16  
km

iGrid  
Intelligent grid  
an Australian research network



© UTS 2010

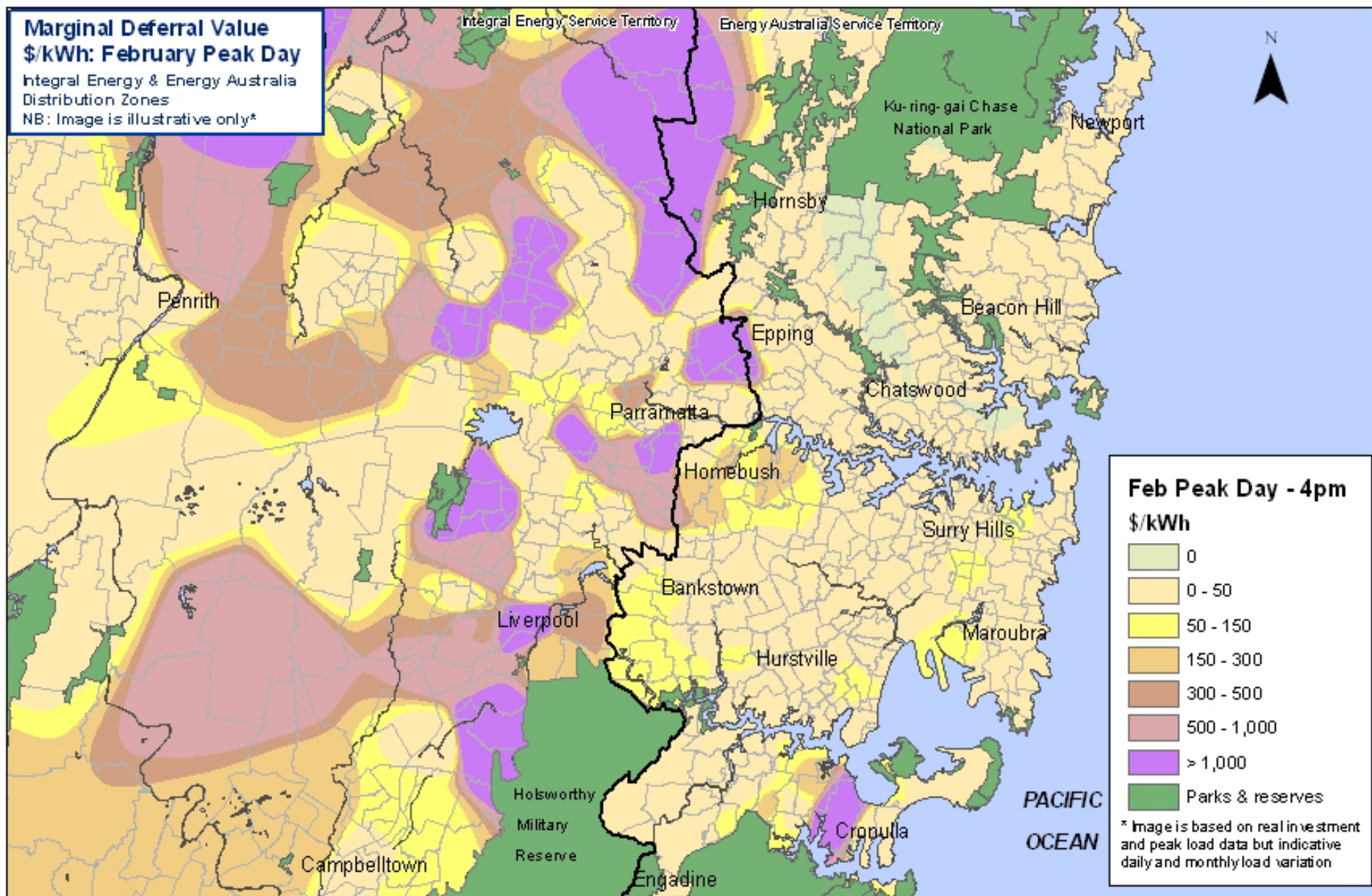
Coordinate System: GCS - AGD66  
Author: Institute for Sustainable Futures

# HOURLY DEFERRAL VALUE

# Marginal Deferral Value \$/kWh: February Peak Day

Integral Energy & Energy Australia  
Distribution Zones

NB: Image is illustrative only\*



Data Source: Integral Energy ESDR 2009  
Energy Australia ESDR 2009/10

0 2 4 8 12 16  
km

iGrid  
Intelligent grid  
an Australian research network



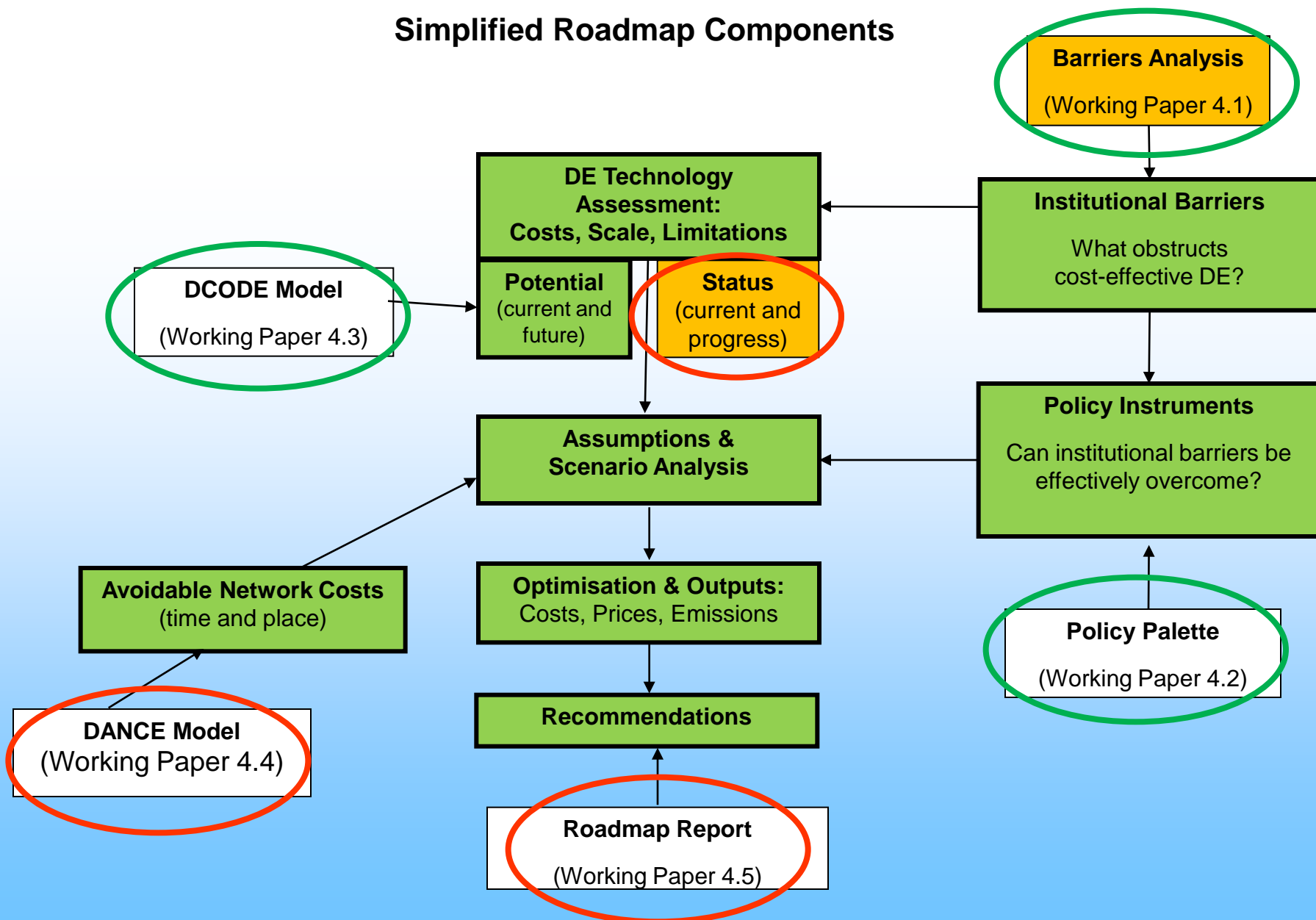
© UTS 2010

Coordinate System: GCS - AGD66  
Author: Institute for Sustainable Futures

## Status of Network DM

- ***Survey of Electricity Network Demand Management in Australia*** (SENDMA)  
commissioned by the Australian Alliance to Save Energy (A2SE)
- ISF/UTS with Energetics, Climate Works and Energy Futures Australia
- Funded by DECCW (NSW), DPI (Vic), NEM Consumer Advocacy Panel in conjunction with IGrid
- SENDMA is part of Stage 1 of a larger research project on DM and Networks

## Simplified Roadmap Components



## Why Survey Network DM?

- > To understand current practice:
  - What is happening, what is it delivering, what does it cost
- > To share experience and lessons
- > To raise awareness of potential, barriers and solutions:
  - among policy makers, utilities and community
- > To establish a baseline and test an approach
- > *You can't manage what you don't measure.*

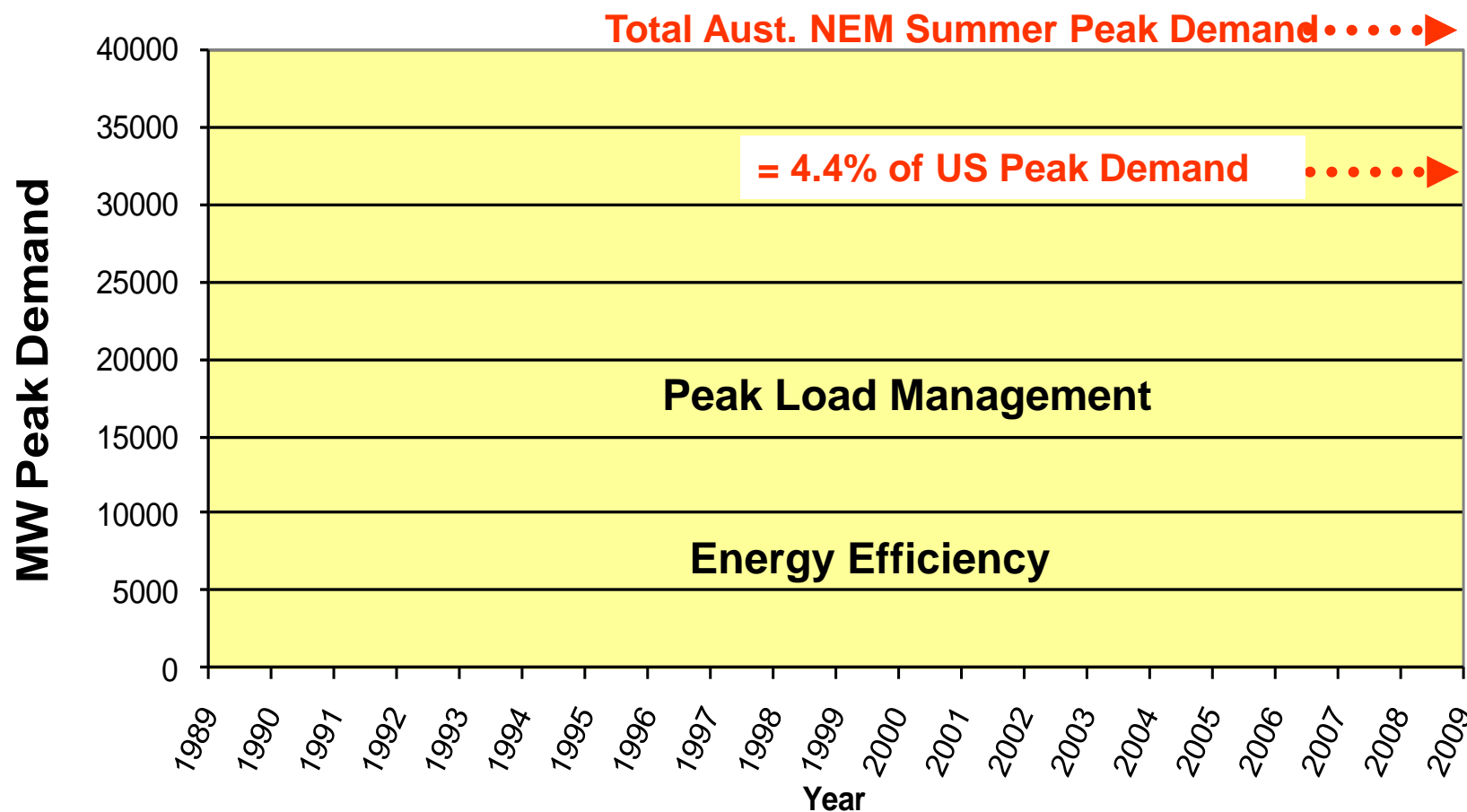
# Survey Responses

Utility	Response	Utility	Response
ActewAGL	Received	SP Ausnet	Received
CitiPower	Received	Transend	Received
Country Energy	Received	NT Power & Water	Received
Electranet	Received	ETSA	Received (2010 only)
Energex	Received	Jemena	Received
Energy Australia	Received	Ergon	Received
Horizon Power	Received	United Energy	Received
Integral Energy	Received		
PowerCor	Received	Aurora Energy	Not yet received
Powerlink	Received		
Transgrid	Received		
Western Power	Received		

# Caveats

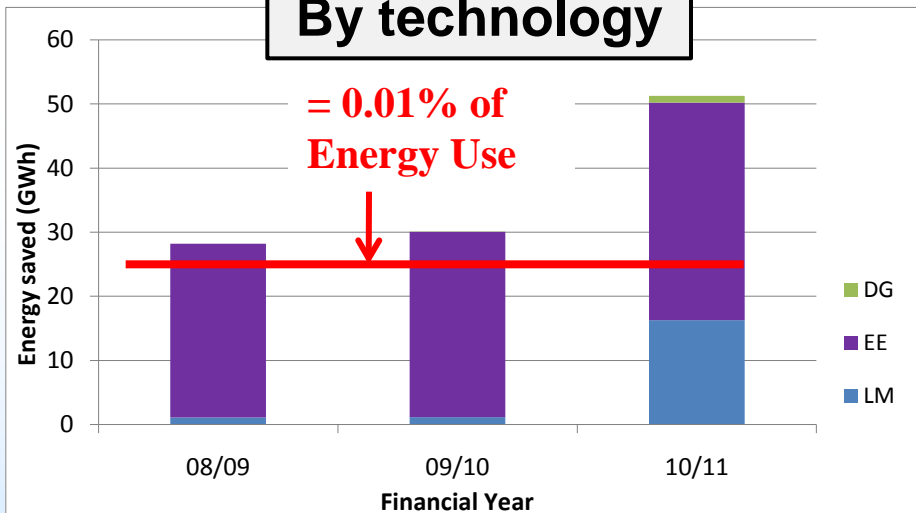
- > This is incomplete data
  - Not all network businesses have responded
  - Not all current projects reported
  - Not all projects have reported complete data
- > There may be errors
- > Part of the point is to start the analysis. We expect it to be imperfect.

# US Utility Demand Management (DM) - Actual Peak Load Reductions

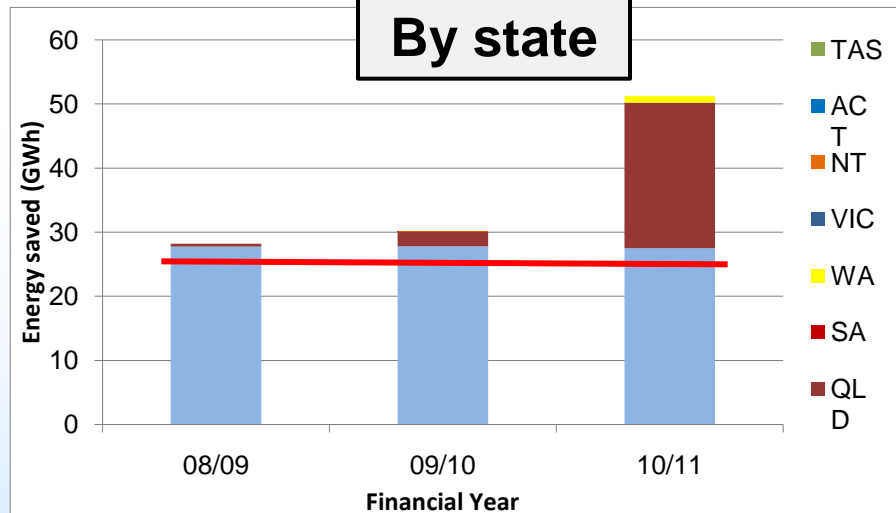


# Energy Savings (and Generation)

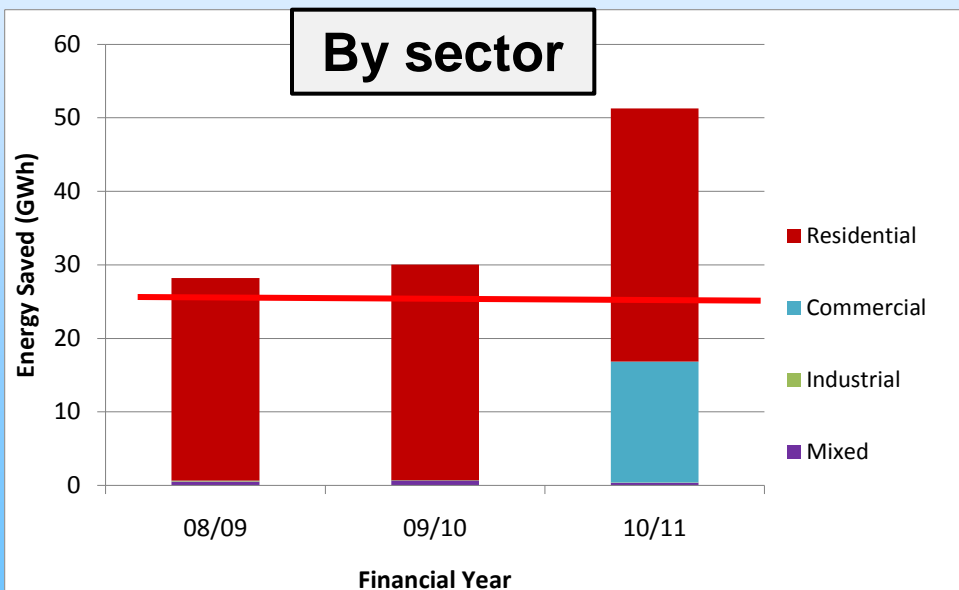
## By technology



## By state



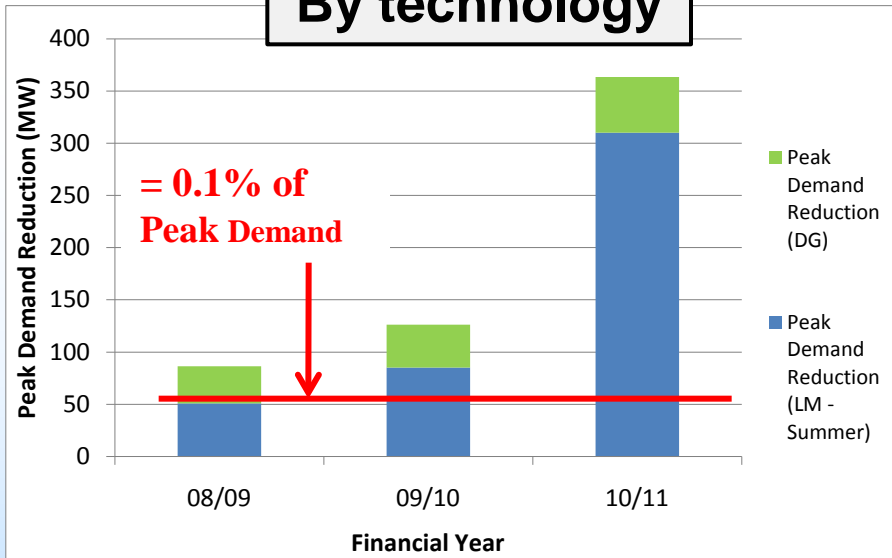
## By sector



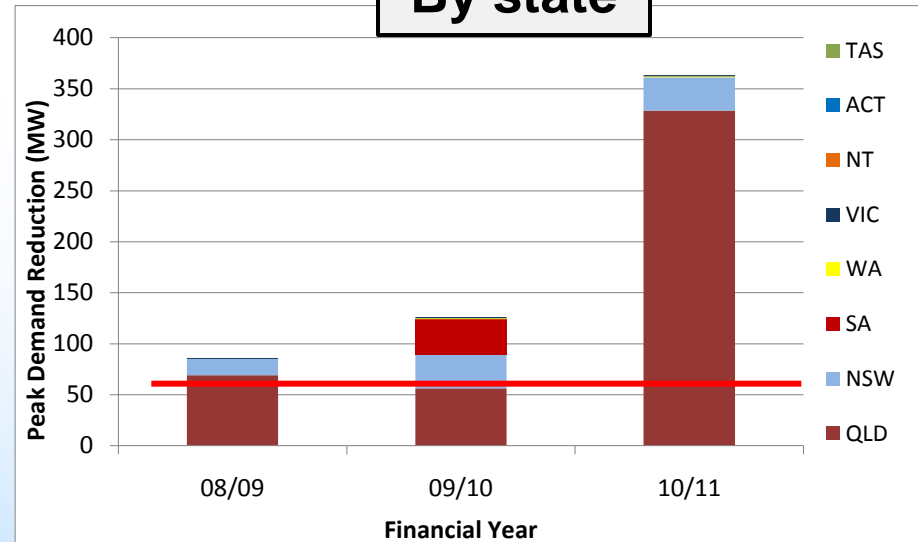
Note that energy generation was reported for 2 NSW DG projects in 08/09, but not in subsequent years.

# Peak Demand Reduction

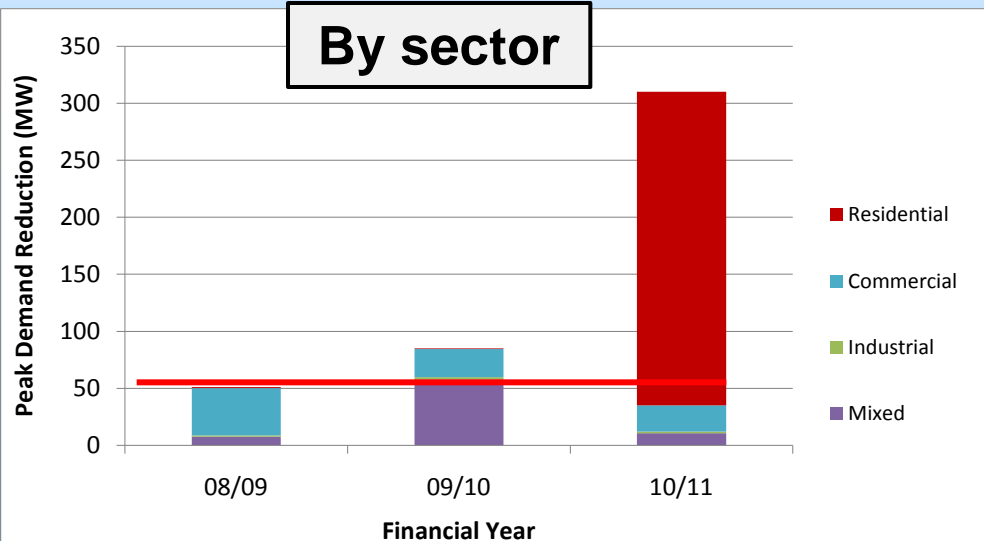
## By technology



## By state

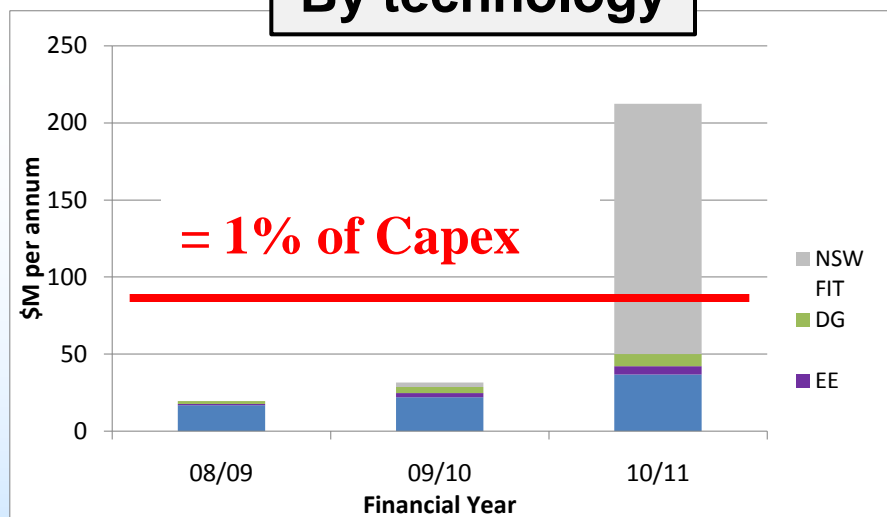


## By sector

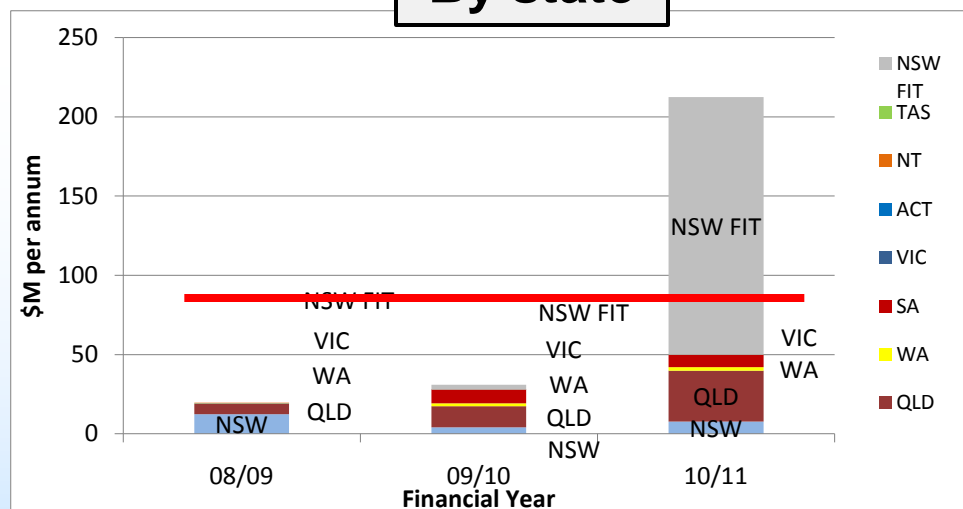


# Expenditure on DM with NSW FiT

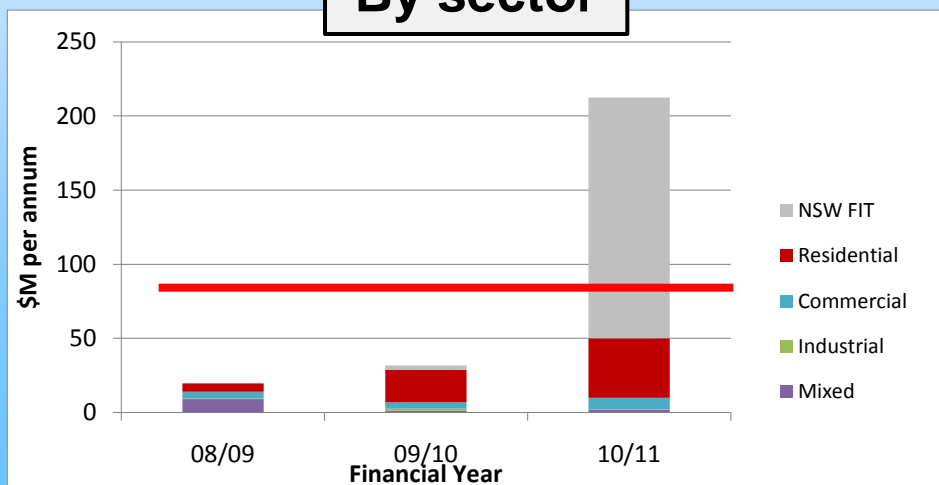
## By technology



## By state



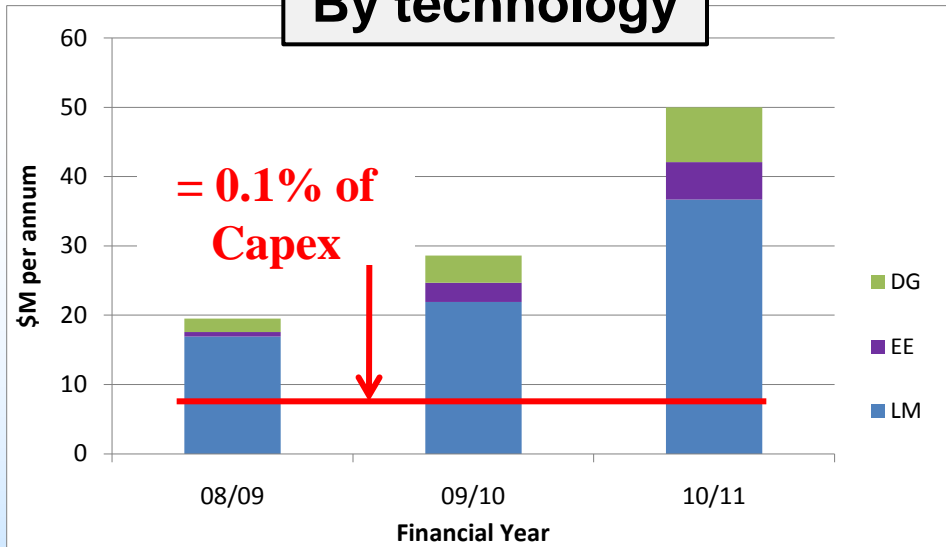
## By sector



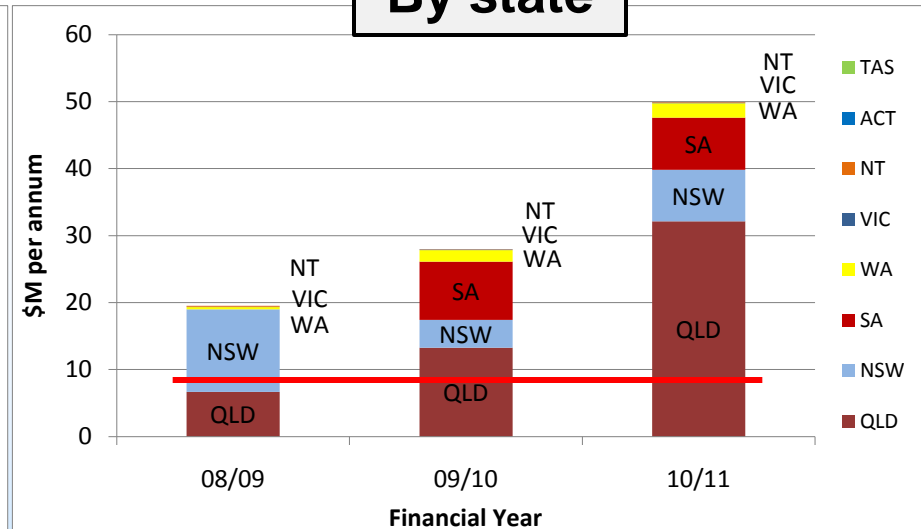
Note: NSW FIT expenditure estimates for 10/11 were included here only

# Expenditure on DM

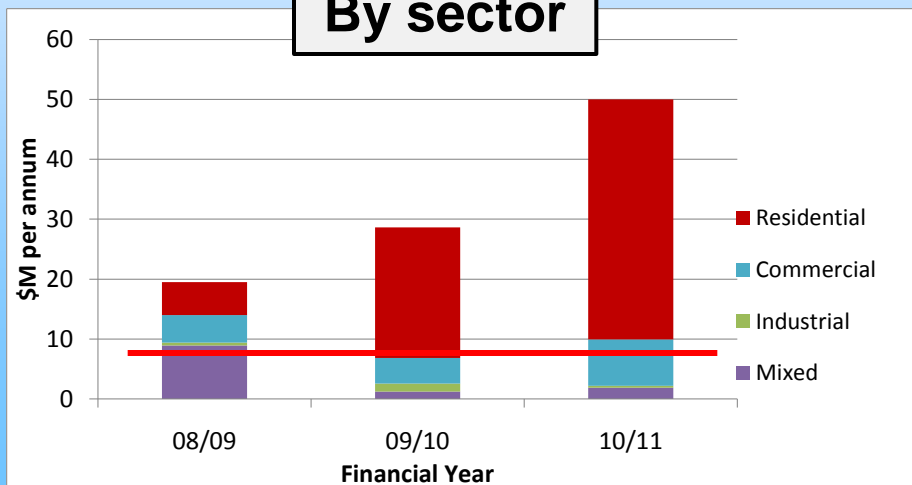
## By technology



## By state



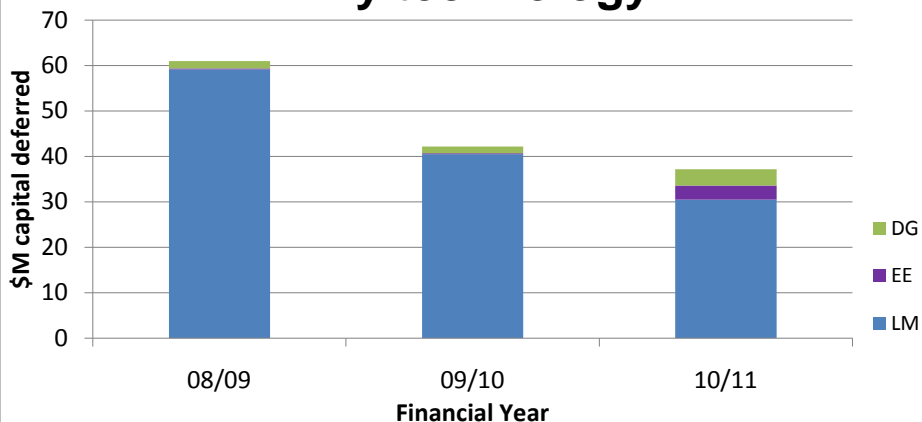
## By sector



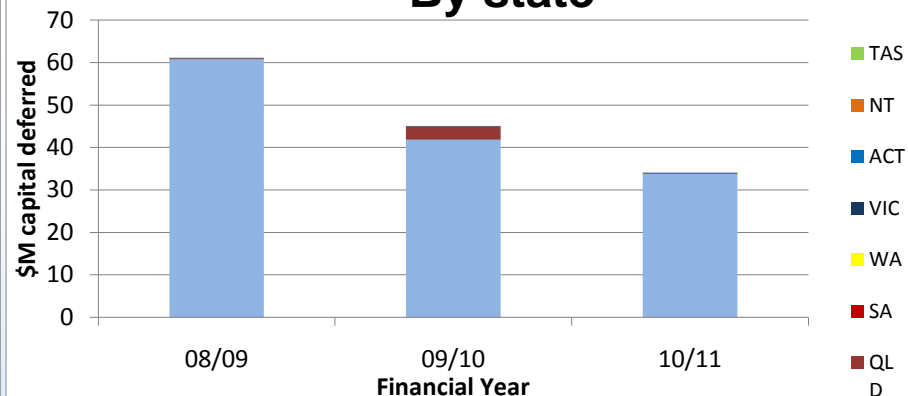
Figures shown here are without estimated NSW FIT expenditure estimates for 10/11

# Deferral and savings from DM

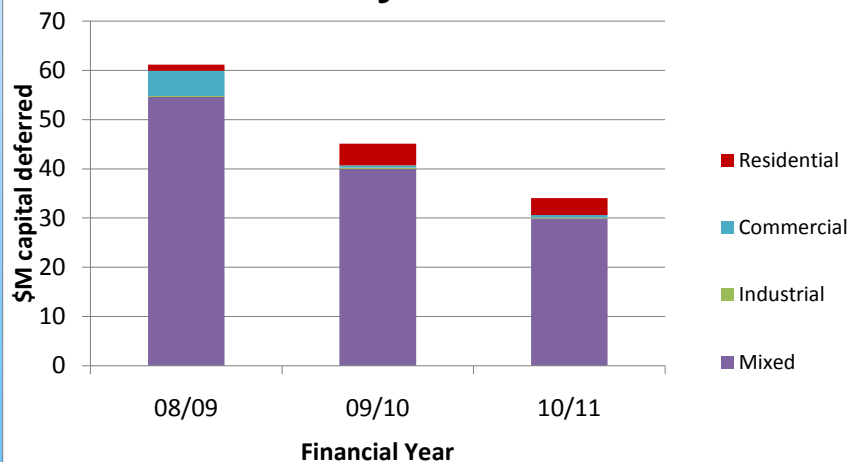
## By technology



## By state



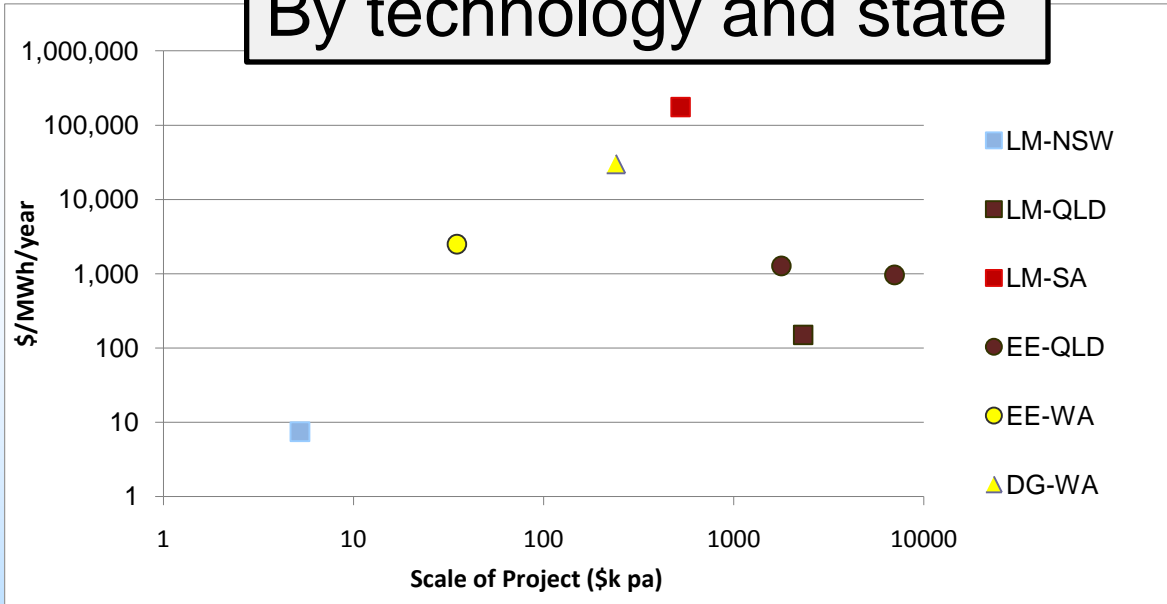
## By sector



Annualised Capex savings  
calculated using a 7.5% Weighted  
Av. Cost of Capital (WACC) and  
40-year straight line depreciation =  
10% p.a.

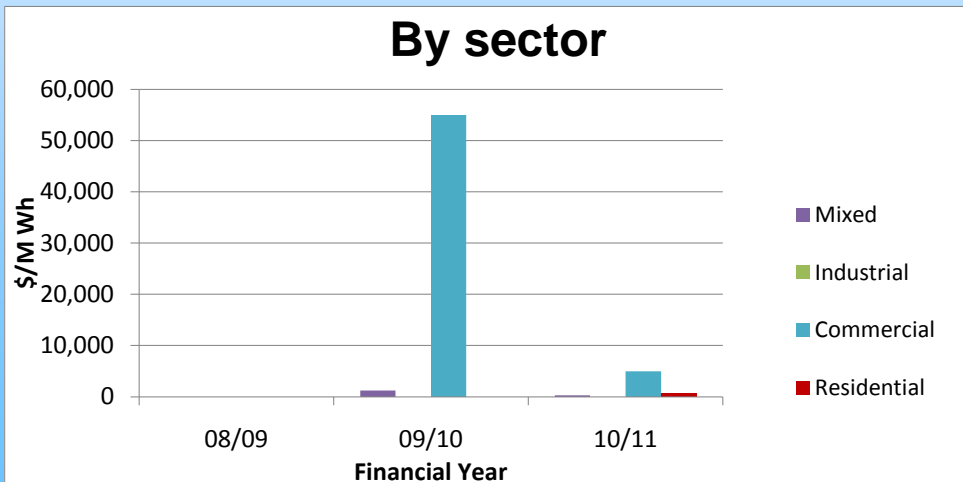
# Cost Effectiveness - energy

## By technology and state



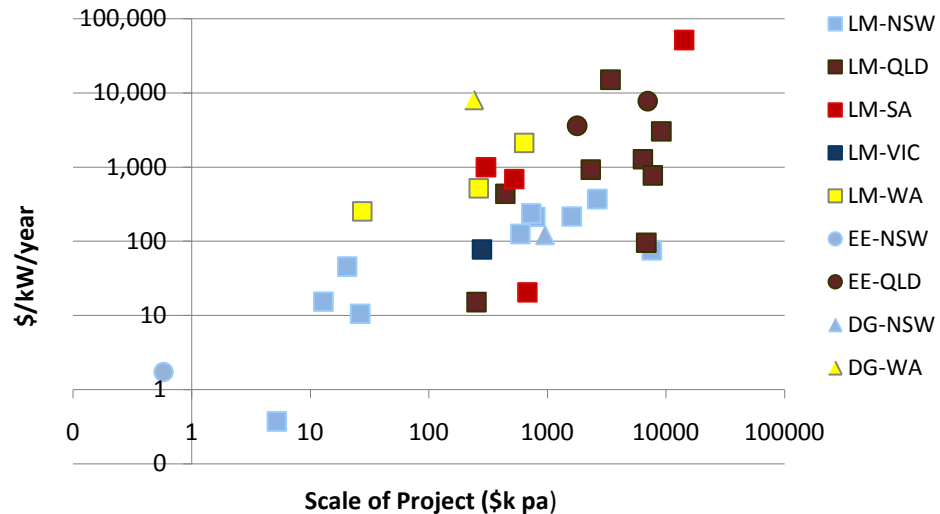
\$/MWh figures only  
provided for projects which  
had relevant data

## By sector



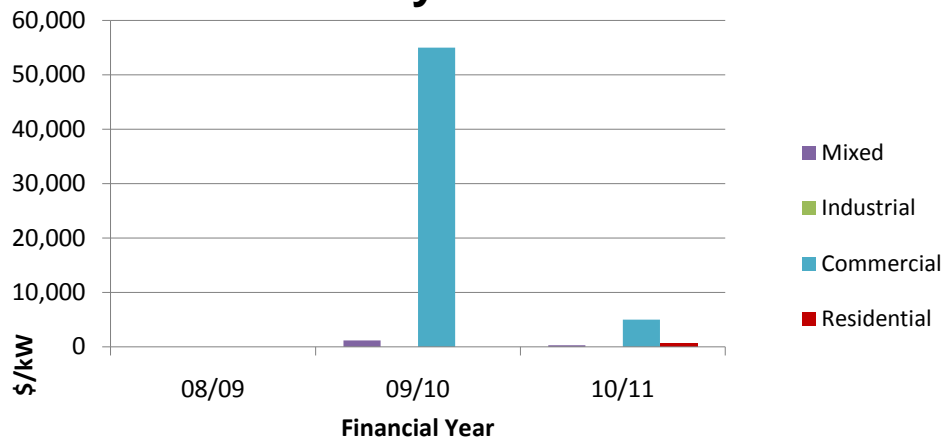
# Cost Effectiveness - demand

## By technology and state



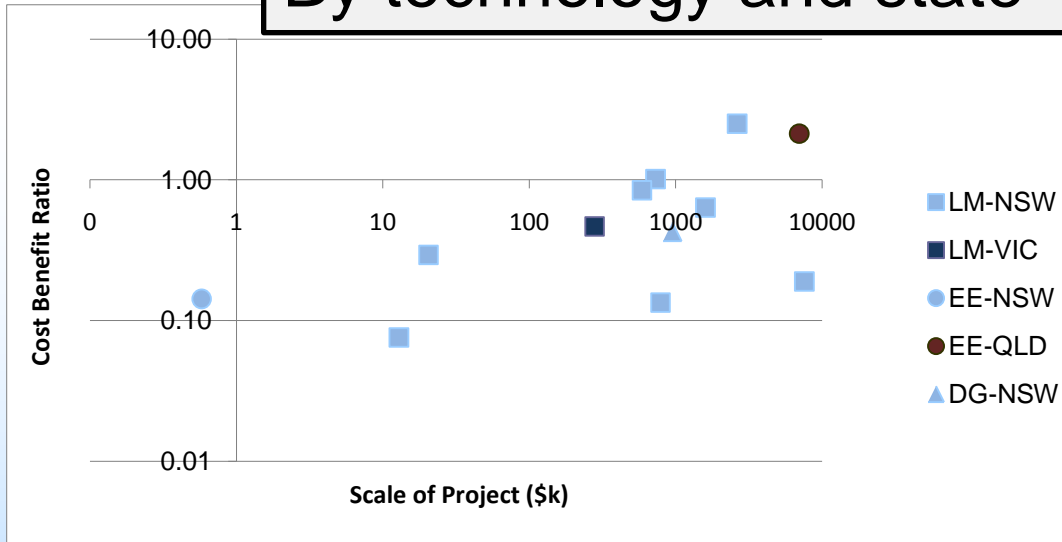
\$/kW figures only provided for projects which had relevant data

## By sector



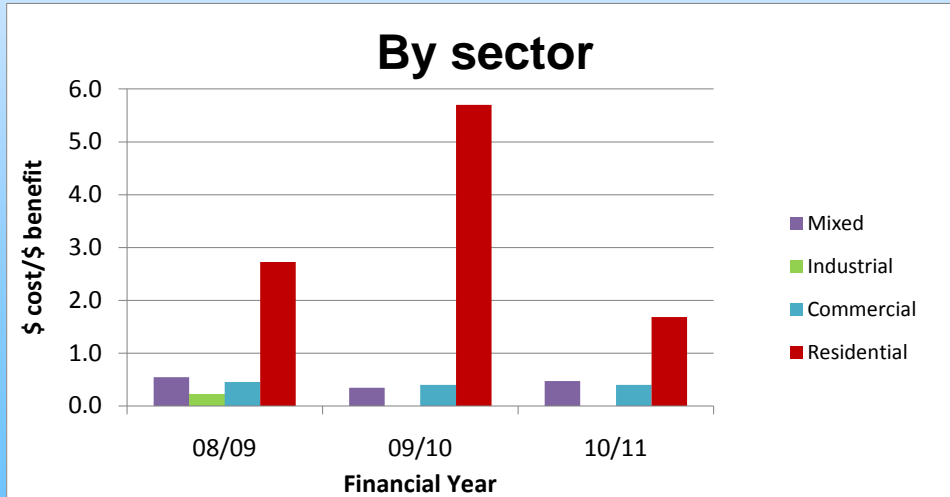
# Cost Benefit Ratio

## By technology and state



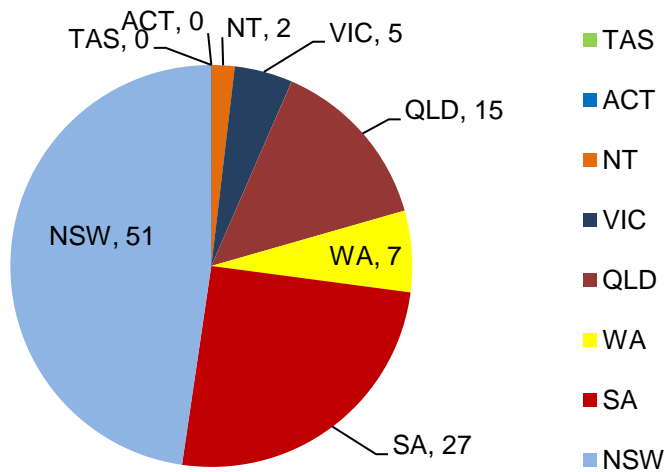
Cost benefit ratio figures only provided for projects which had relevant data

## By sector

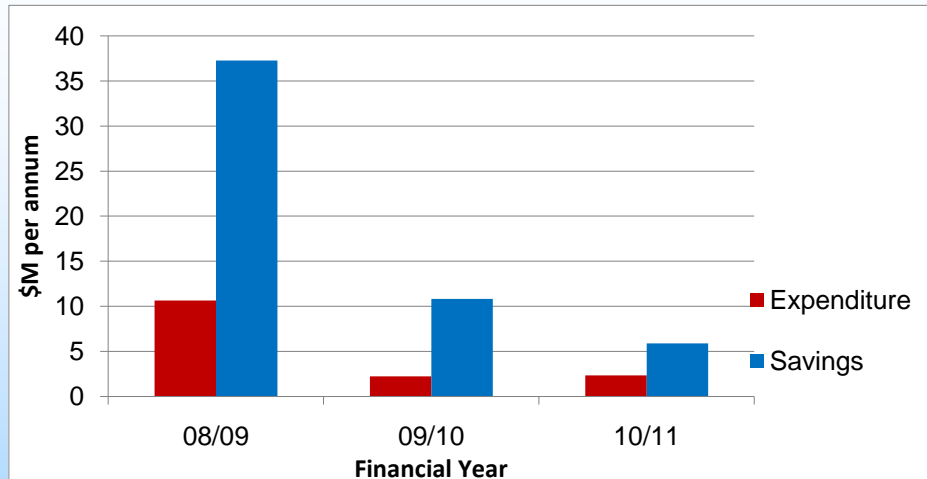


# Projects Summary

## Number of projects by state



## Expenditure vs. savings

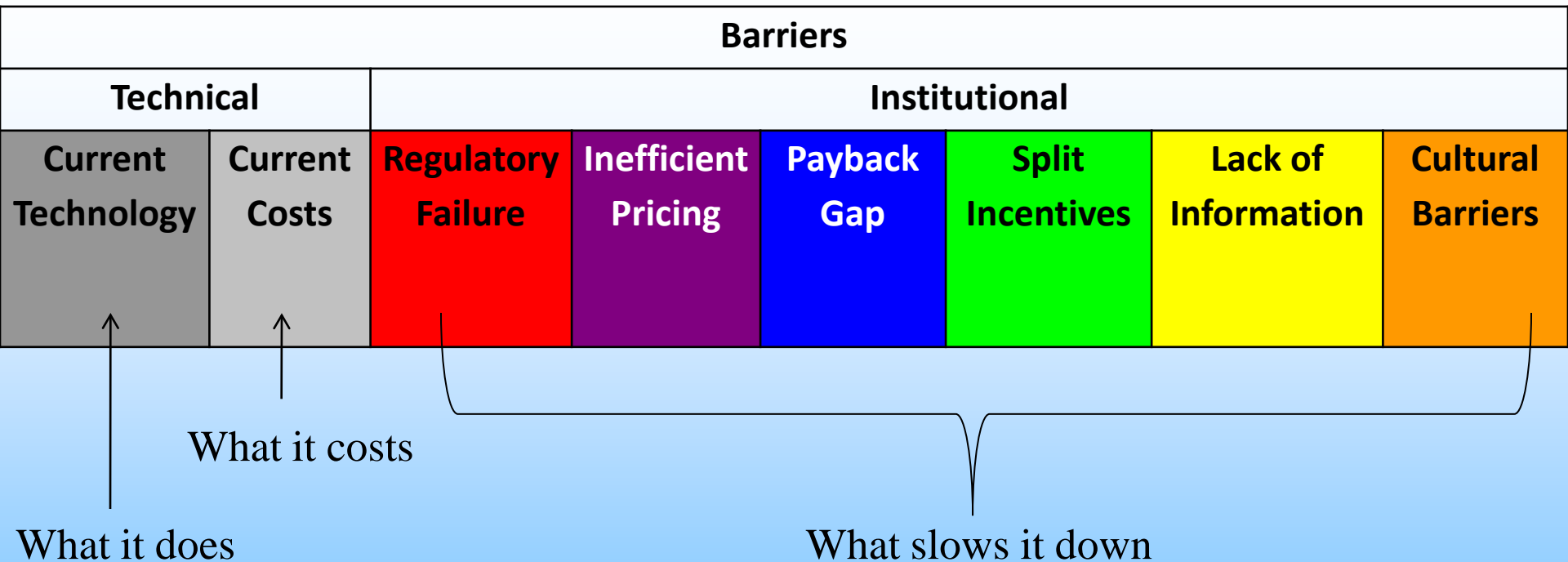


- > Future Surveys:
  - Systematic, consistent, regular?
  - Who to manage?
- > The Future of DM and Networks:
  - Core or marginal activity ?
  - Obligation, business opportunity or neither?
  - Cost or profit centre?

# Perceived Barriers to DM Survey

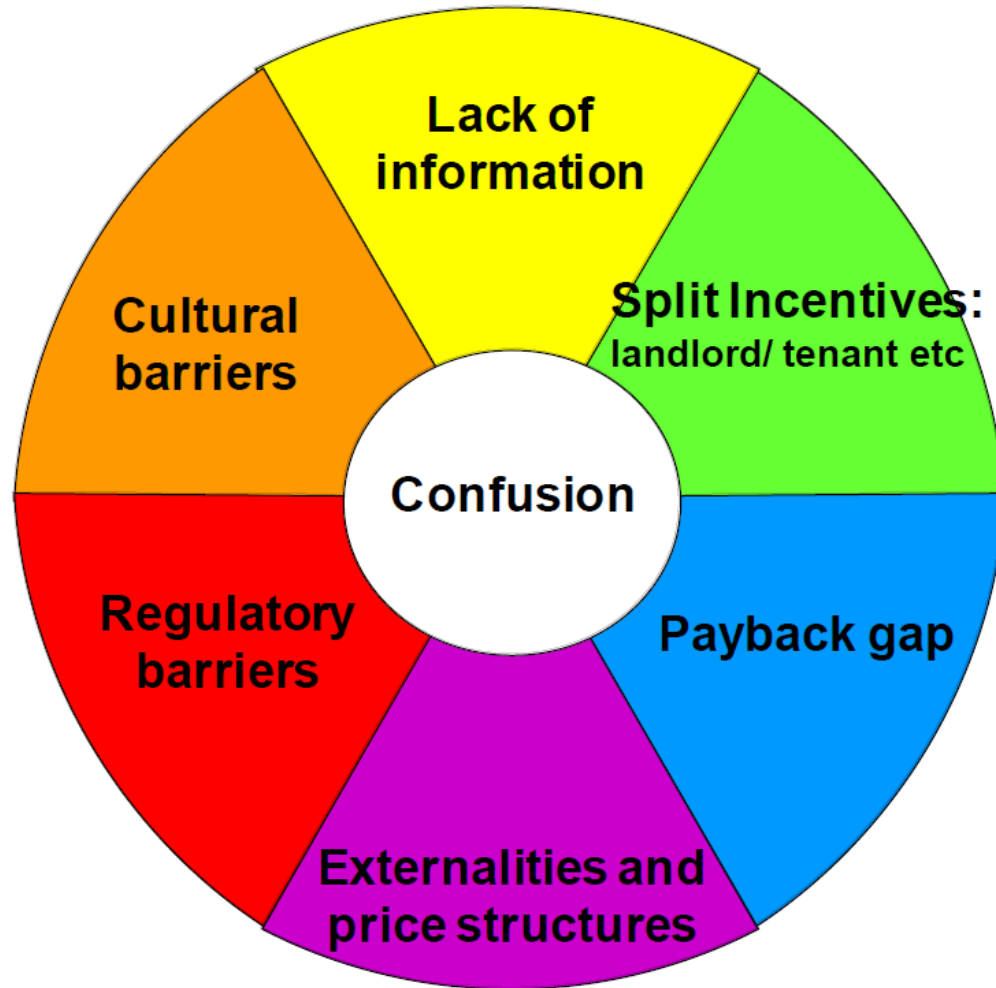
- > To reality check proposed barriers from analysis
  - Do stakeholders agree these are barriers?
- > To assess perceived relative importance of barriers.
- > To improve understanding of different stakeholders perspectives

# Classifying Barriers to Distributed Energy

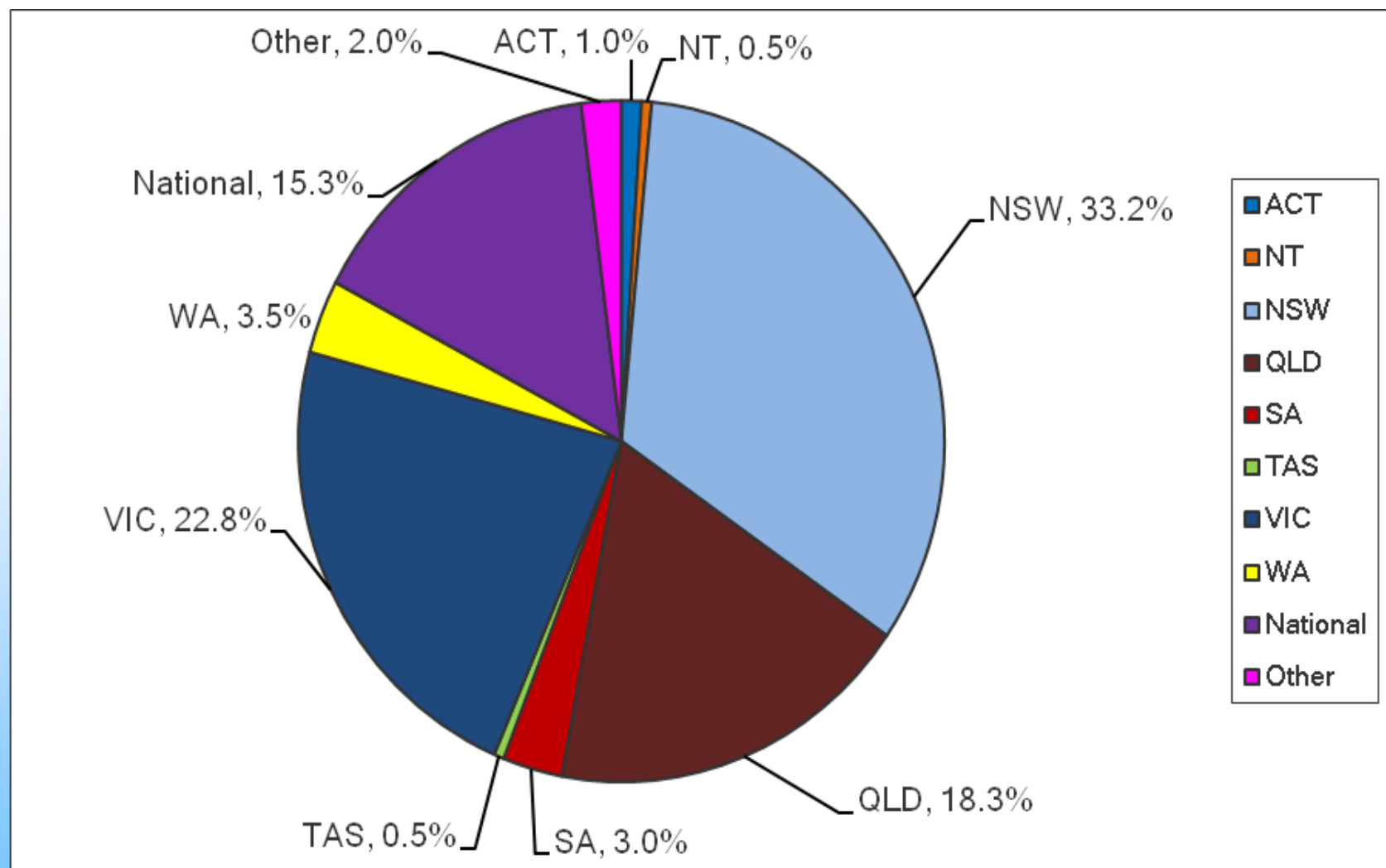


*Institutional barriers are crucial*

# Institutional barriers



# Survey Respondents

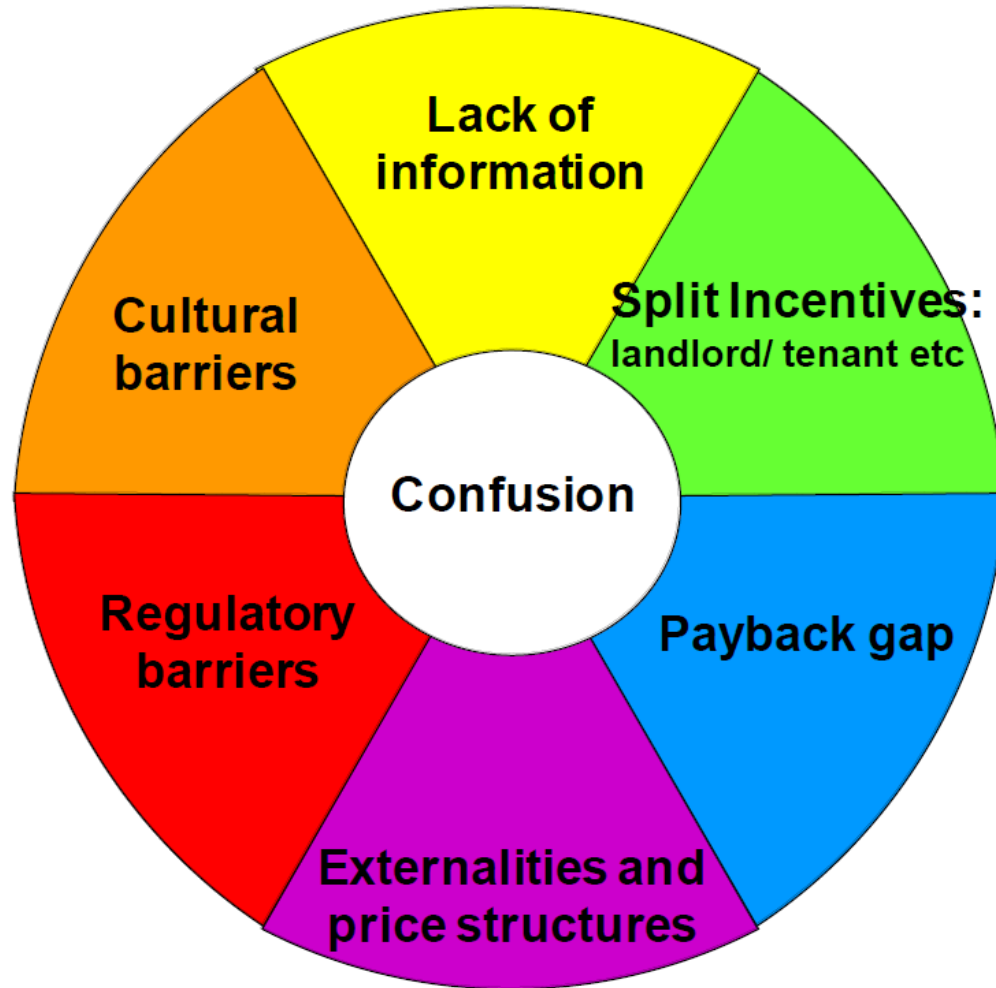


# Survey Respondents

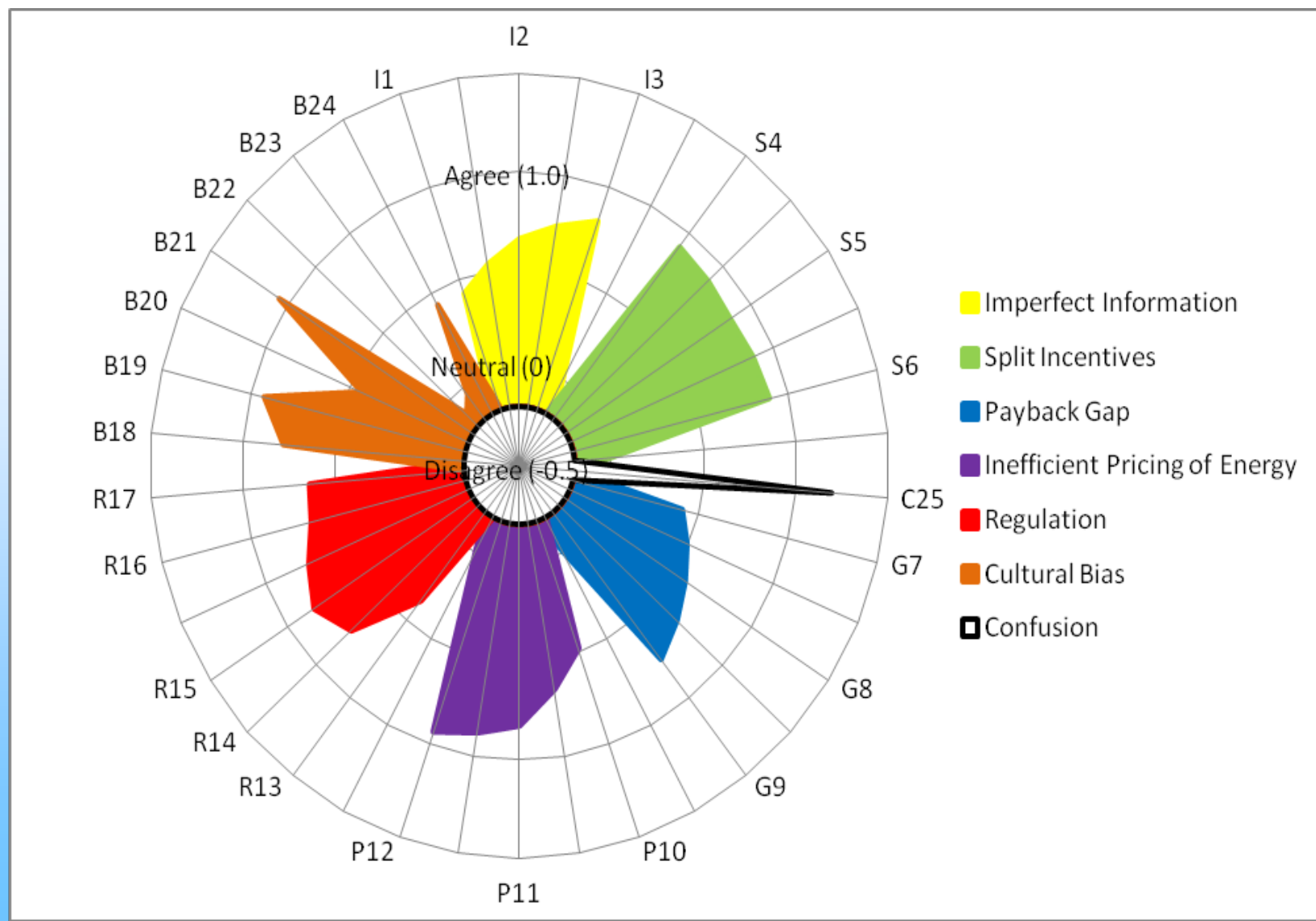
Category	Respondents	No. of Respondents
<b>Utilities</b>	Energy Utility – Network	29
	Energy Utility – Retailer	5
	Energy Utility – Generator	1
<b>Government</b>	Government Agency – Federal	2
	Government Agency – State	20
	Government Agency – Local	8
<b>End User</b>	Energy Consumer – Commercial	12
	Energy Consumer – Industrial	2
<b>DM Provider</b>	Demand Management Provider	8
	Demand Management Consultancy	17
	Energy Supply Consultancy	14
<b>Other</b>	Environmental organisation	16
	Consumer organisation	8
	Industry organisation	3
	Regulator	2
	Research Institution	26
	Other	28

I1	Limited experienced / skilled DM service providers
I2	Lack of data on costs, reliability, potential from DM precedents
I3	Lack of information about network constraints
S4	Competing priorities in utilities limit consideration of DM
S5	Disaggregated electricity market - DM benefits hard to capture
S6	Landlord-tenant relationship
G7	Lack of capital, financiers, funds for DM project proponents
G8	Consumers / utilities want shorter DM payback than for supply
G9	Utilities have easier access to finance than DM providers
P10	Lack of carbon price
P11	Local peak / network constraints not reflected in power prices
P12	ToU tariffs don't represent time / location cost of energy
R13	Electricity suppliers profit from electricity sold, DM cuts profits
R14	Networks don't invest in DM unless constraint is imminent
R15	Regulatory processes (security, reliability ) don't consider DM
R16	Regulatory Test (RIT) limits assessment of DM
R17	High \$ threshold of Regulatory Investment Test restricts DM
B18	Lack of state / national government consideration for DM
B19	Utility bias towards centralised supply
B20	Electricity suppliers lack expertise / experience with DM
B21	Absence of DM / environmental objective in National Electricity Law
B22	Electricity consumers lack interest in saving energy
B23	Consumers want to use power when & how they choose
B24	Electricity suppliers prefer CAPEX to OPEX, DM is OPEX
C25	Coordinated approach lacking at state / national level

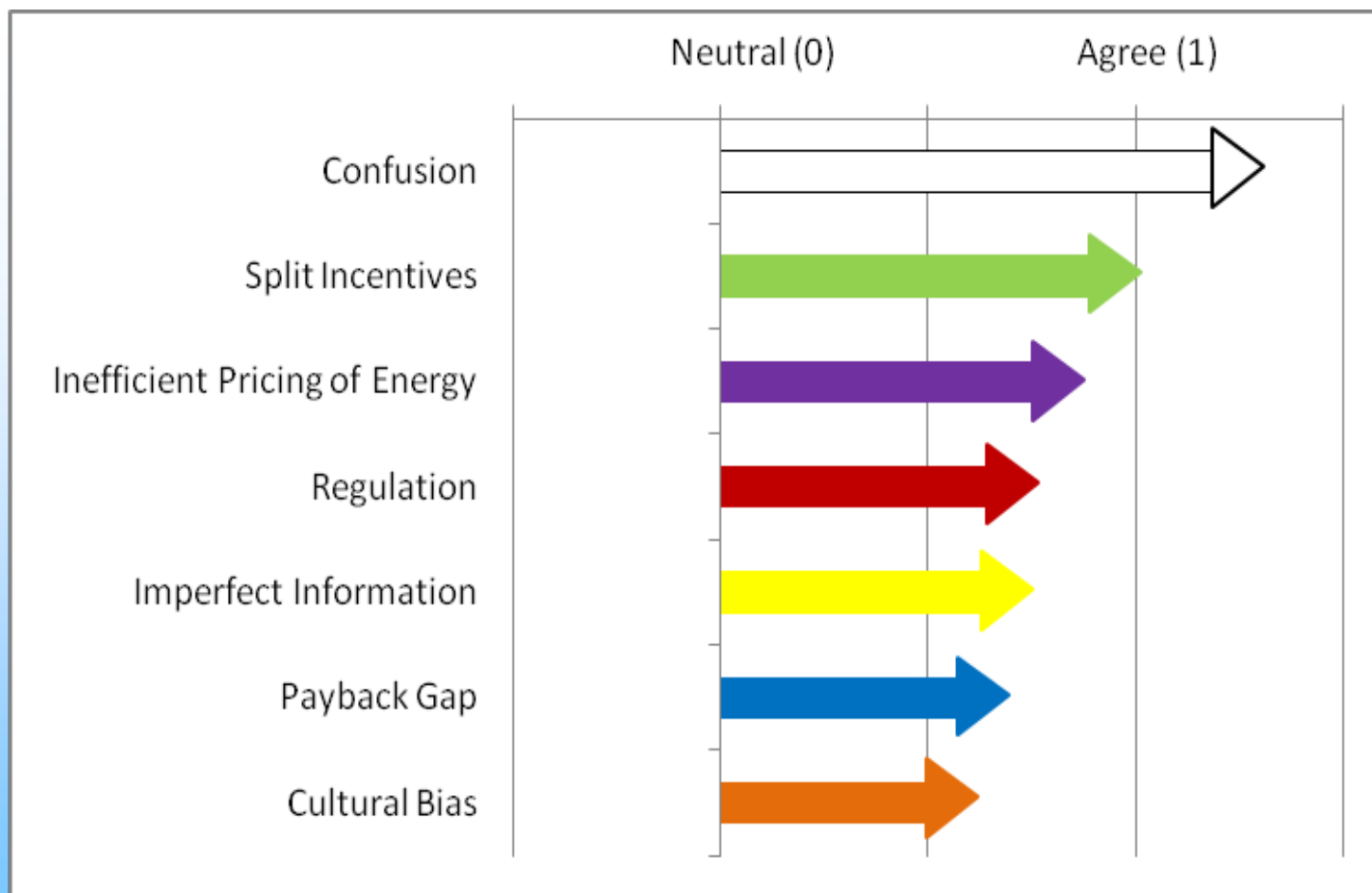
# Institutional barriers



# Extent of Agreement



# Extent of Agreement



C25. Lack of coordination at state / national level

B21. No DM / environmental objective in National Electricity Law

P12. Time based prices poorly reflect time & location cost of energy

B19. Utility bias towards centralised supply

S4. Competing priorities in utilities limit consideration of DM

S6. Landlord-tenant relationship

S5. Disaggregated electricity market - DM benefits hard to capture

R15. Regulatory processes (security, reliability ) don't consider DM

P11. Local peak / network constraints not reflected in power prices

I3. Lack of information about network constraints

B18. Lack of state / national government consideration for DM

G9. Utilities have easier access to finance than DM providers

R14. Networks don't invest in DM unless constraint is imminent

R16. Regulatory Test (RIT) limits assessment of DM

I2. Lack of data on costs, reliability, potential from DM precedents

R17. High \$ threshold of Regulatory Investment Test restricts DM

G8. Consumers / utilities want shorter DM payback than for supply

P10. Lack of carbon price

B20. Electricity suppliers lack expertise / experience with DM

B24. Electricity suppliers prefer CAPEX to OPEX, DM is OPEX

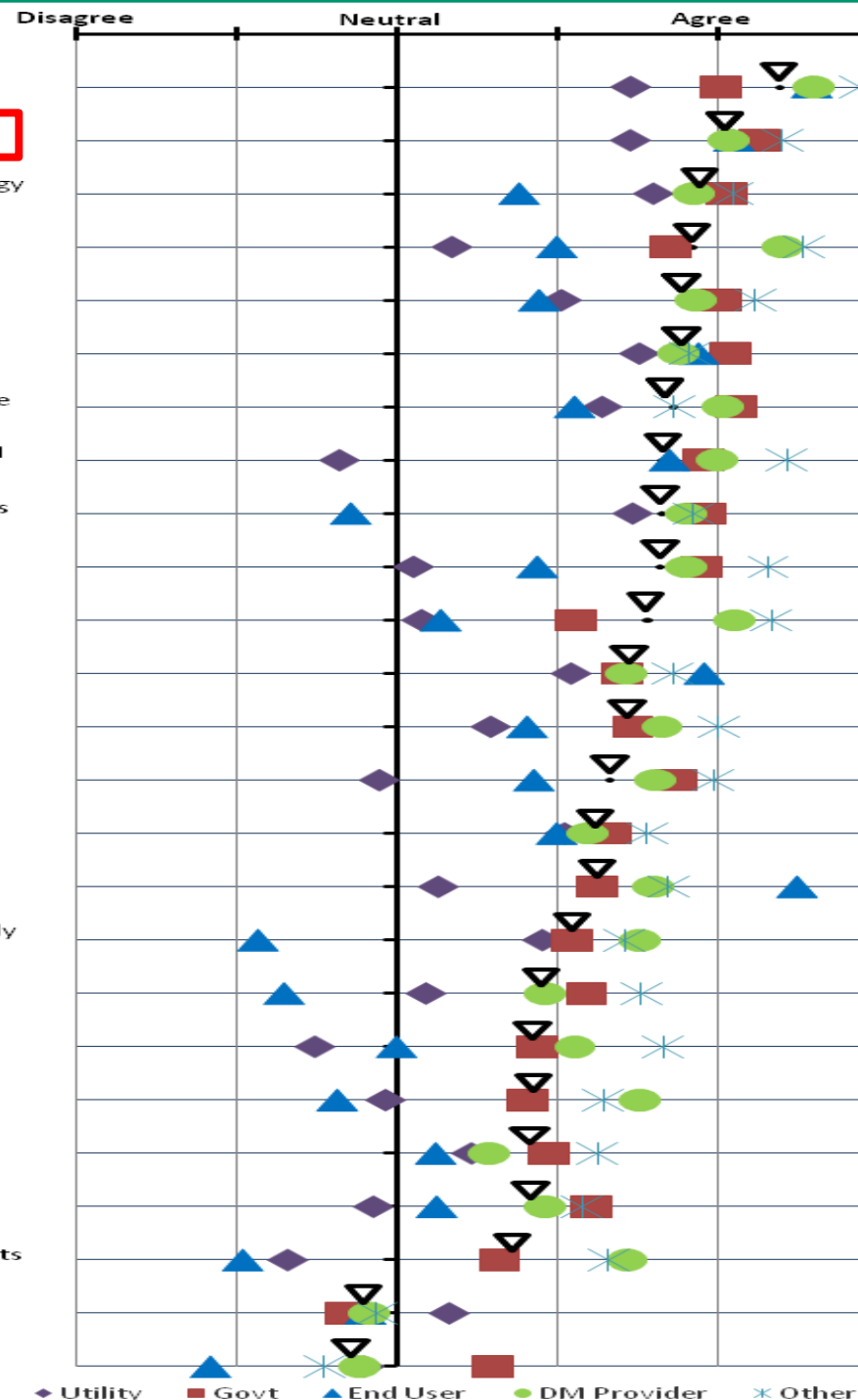
I1. Limited experienced / skilled DM service providers

G7. Lack of capital, financiers, funds for DM project proponents

R13. Electricity suppliers profit from electricity sold, DM cuts profits

B23. Consumers want to use power when & how they choose

B22. Electricity consumers lack interest in saving energy



Disagree

Neutral

Agree

C25 Coordinated approach lacking at state / national level

B21 Absence of DM / environmental objective in National Electricity Law

B19 Utility bias towards centralised supply

S6 Landlord-tenant relationship

S4 Competing priorities in utilities limit consideration of DM

R15 Regulatory processes (security, reliability ) don't consider DM

P12 ToU tariffs don't represent time / location cost of energy

S5 Disaggregated electricity market - DM benefits hard to capture

G9 Utilities have easier access to finance than DM providers

R14 Networks don't invest in DM unless constraint is imminent

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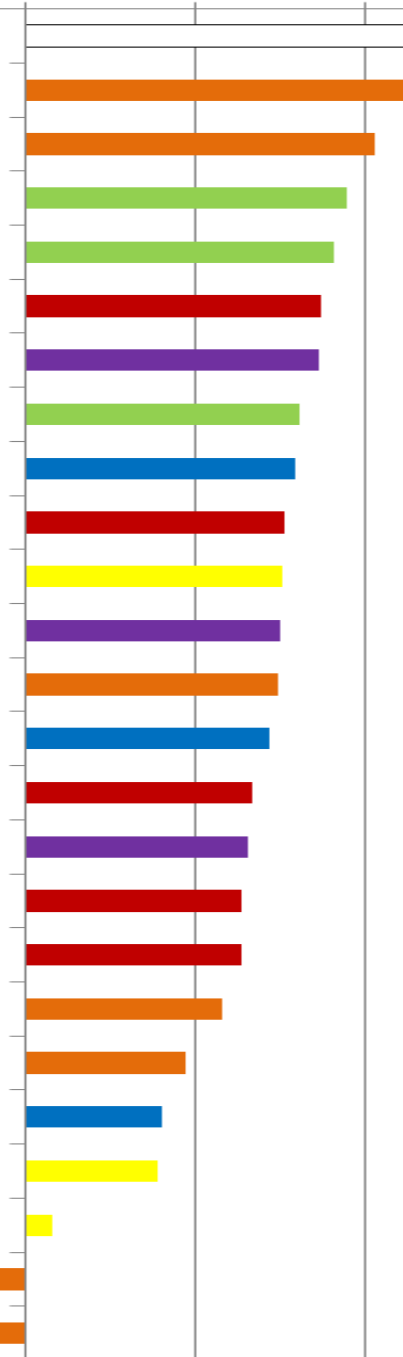
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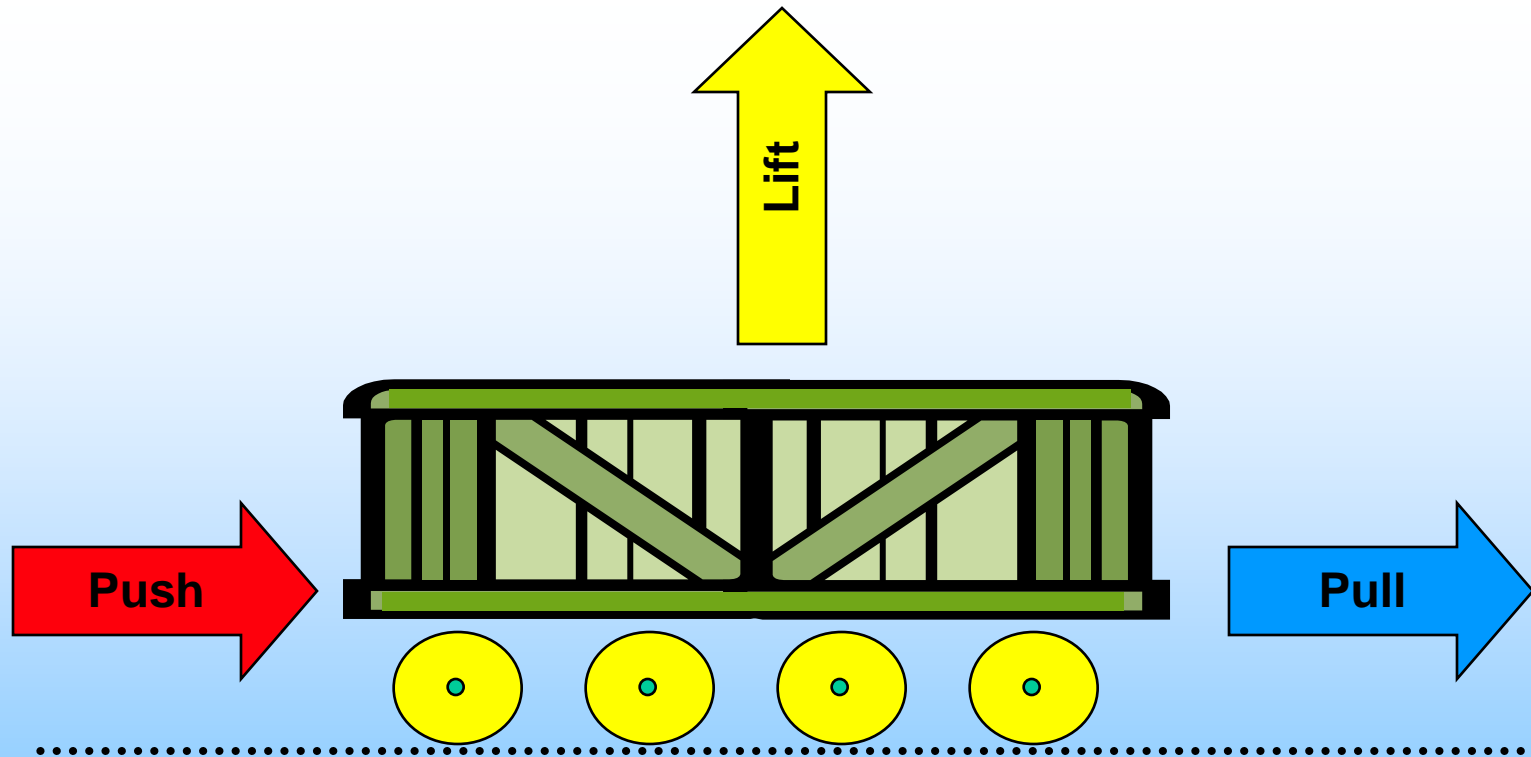
I1 Limited experienced / skilled DM service providers

B23 Consumers want to use power when & how they choose

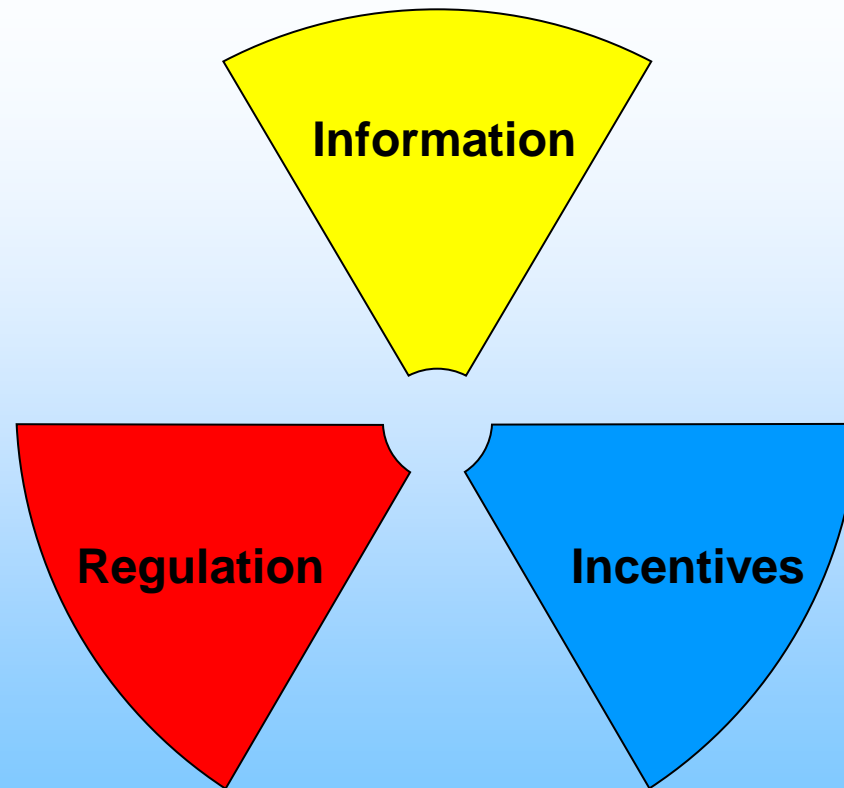
B22 Electricity consumers lack interest in saving energy



# Policy Tools to Move the Market



# The Policy Palette



## Primary Instruments

# The Policy Palette - “PIRFICT”



# 20 Policy Tools for DE



- 1: Decouple electricity sales from network profits**
- 2: Reform National Electricity Rules**
- 3: Streamline DG Licensing**
- 4: Carbon Price**
- 5: Cost reflective pricing**
- 6: Network support payments**
- 7: Distributed Energy Fund**
- 8: Reform feed-in tariffs**
- 9: Public recognition & awards**
- 10: Streamline network negotiation process**
- 11: DE Ombudsman**
- 12: Annual DE Review**
- 13: Training & skills development**
- 14: Energy audits & technical support**
- 15: Network planning info**
- 16: DE handbook & advisory service**
- 17: Resource assessments & case studies**
- 18: Extend retailer EE targets**
- 19: DE targets & reporting**
- 20: DE Coordination Agency**



- 1: Decouple electricity sales from network profits**
- 2: Reform National Electricity Rules
- 3: Streamline DG Licensing
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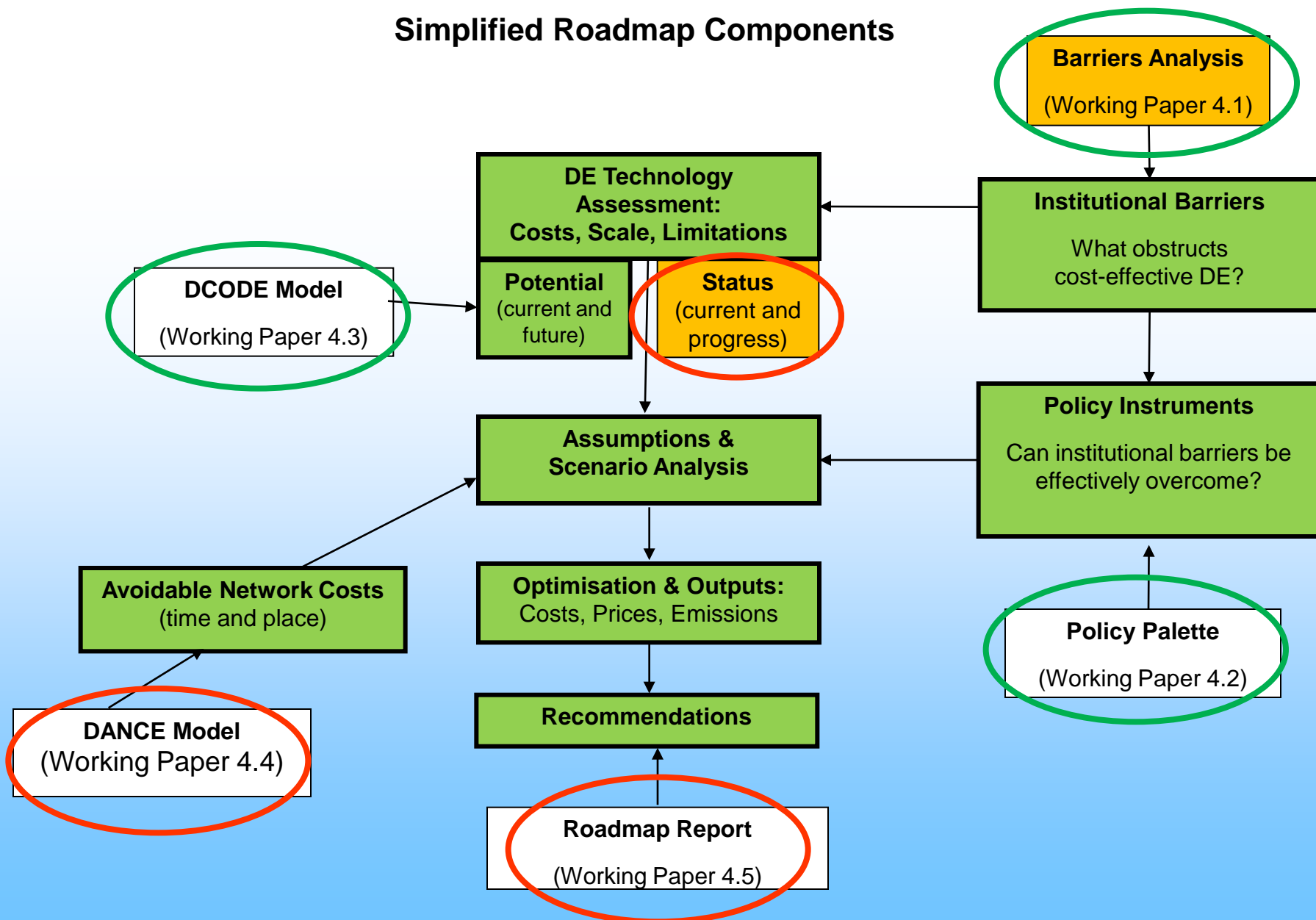
# Towards an effective policy package for DE

- > Reducing upward pressure on electricity prices via:
  - > An ***Energy Savings Partnership*** with electricity networks
    - Focus on reducing peak demand
    - Collaborative targets and regular performance reporting
    - Partnership fund to incentivise energy savings actions and Demand Management

# Proposal for ACCEDE

- Recognition that a permanent research ‘centre of excellence’ for Energy Efficiency and Decentralised Energy is warranted, given the opportunity
- Building on A2SE’s networks and ISF’s capabilities
- International linkages and networks
- ACCEDE prospectus now available for comment and foundational financial supporters being sought

## Simplified Roadmap Components



# Thanks

**Chris Dunstan**

[chris.dunstan@uts.edu.au](mailto:chris.dunstan@uts.edu.au)

Tel: 02 9514 4882

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