

# Evaluation Measurement & Verification of NSW Energy Efficiency Programs

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Environment  
& Heritage

**2<sup>nd</sup> Australian Summer  
Study on Energy Efficiency  
& Decentralised Energy**



AUSTRALIAN  
ALLIANCE TO  
**SAVE ENERGY**  
Creating an Energy-Efficient Australia

**27 Feb – 1 March, 2013**  
Novotel Sydney Brighton Beach

# Overview

- Evaluation objective / rationale for reliable information
- First stage savings verification outcomes
- Current activities
- Observation

# Scope

## Programs in scope

Home Power Saving Program

Home Saver Rebates Program

Energy Efficiency for Small Business Program

Energy Saver Program

Government Building Retrofit Program

Energy Savings Scheme

Energy Efficiency Community Awareness Program

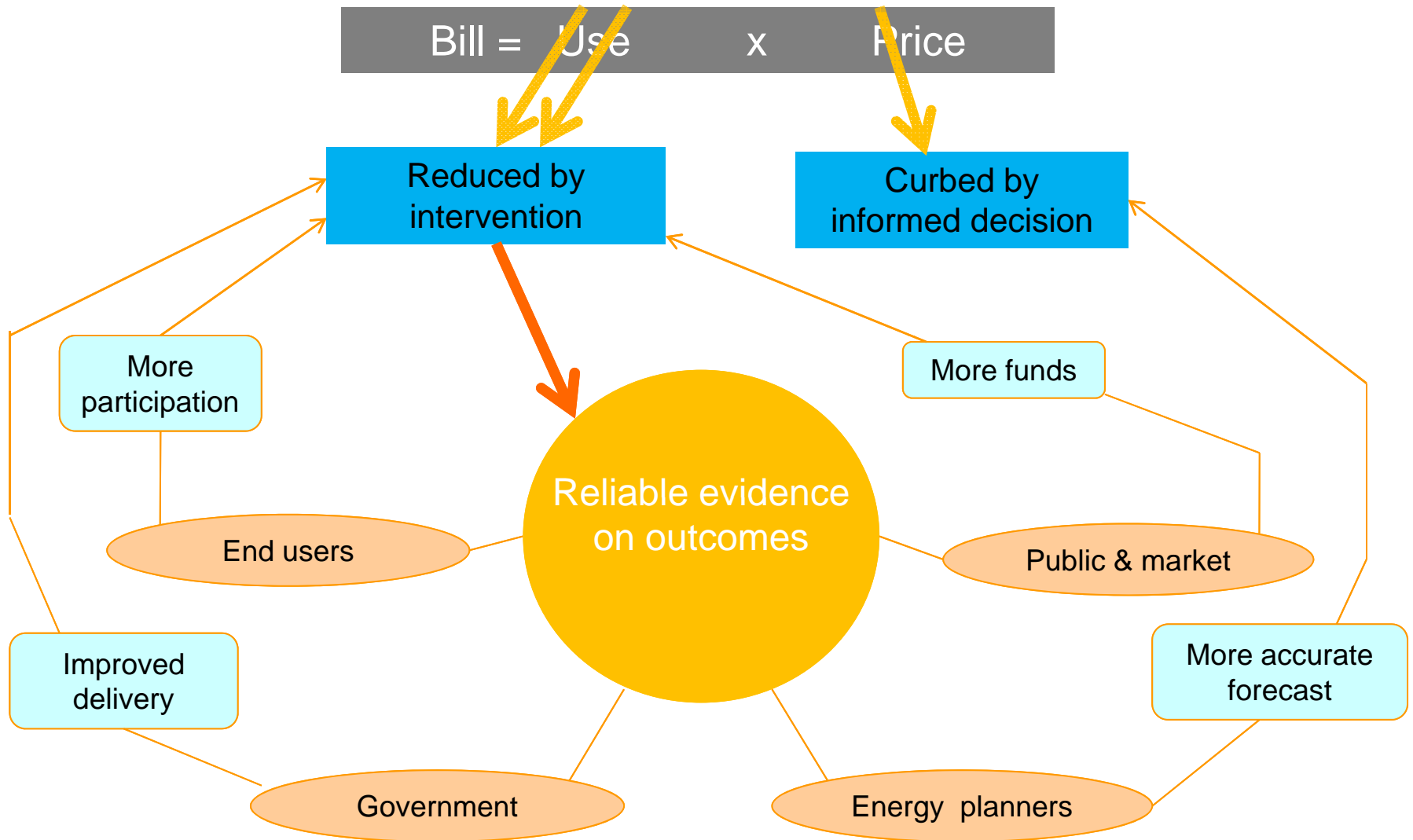
Energy Efficiency Training Program

Accountability

learning &  
improvement

Informing  
policy &  
planning

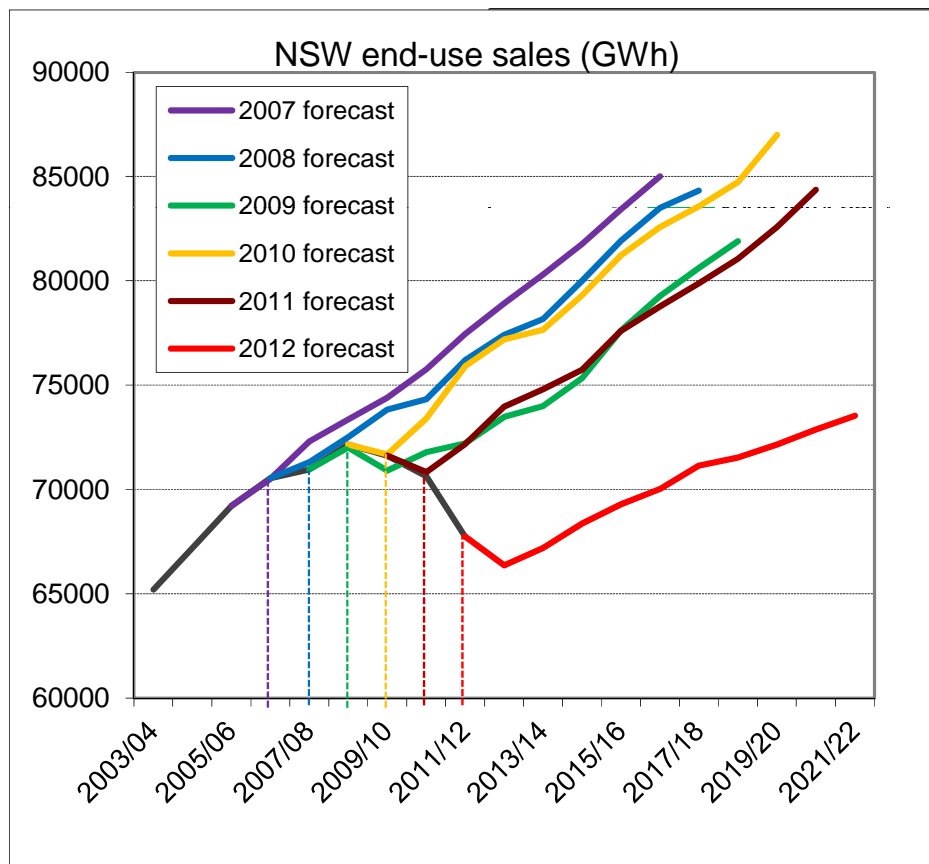
# To reduce bill pressure on customers



# Uncertainty in energy planning

Observed: since 2009/10 energy use declining across networks

Dramatic readjustments year by year - lack of confidence in forecasts



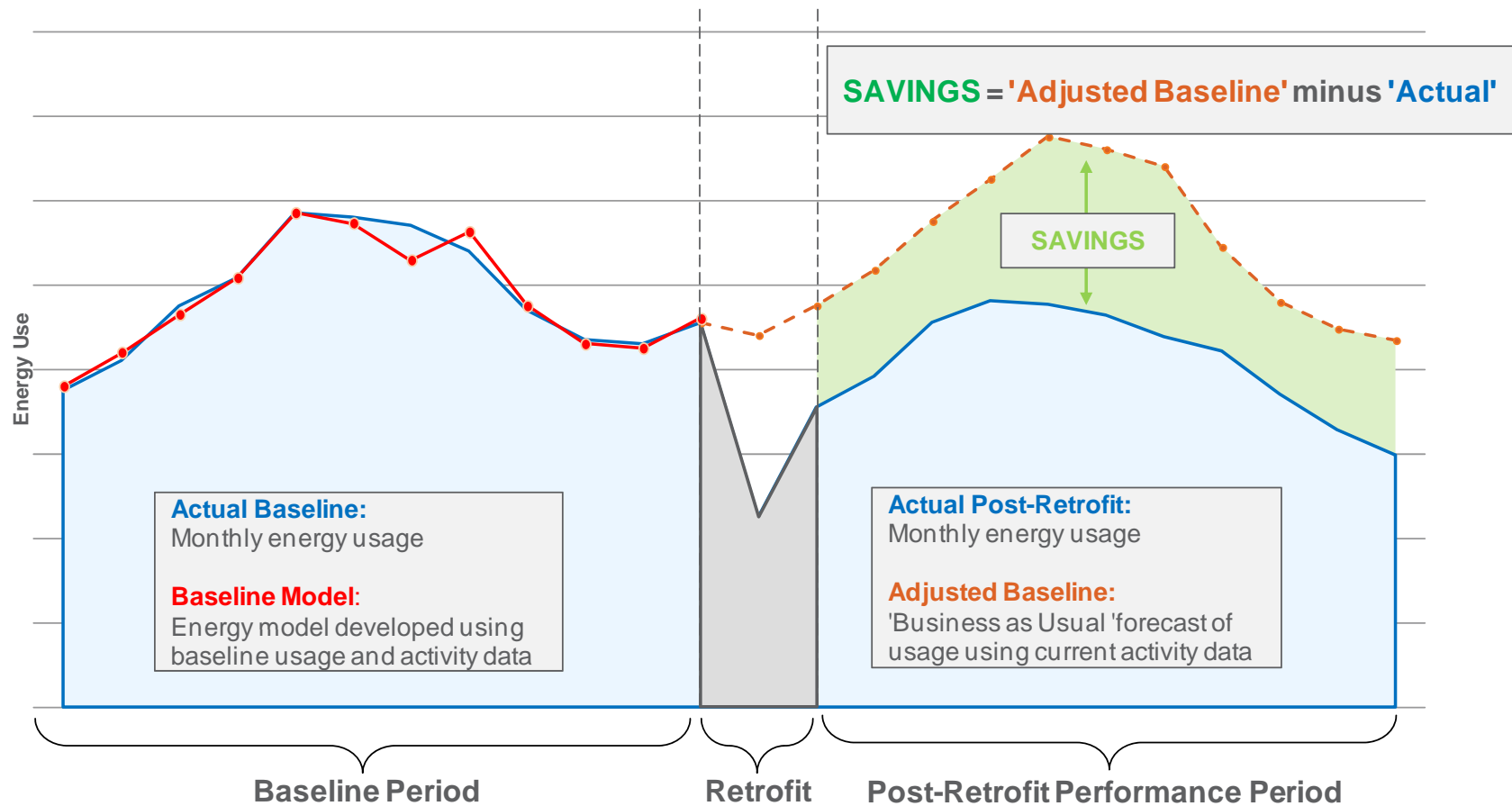
## AEMO

- ESOO 2010, 11, 12: “difficult to separate contributions” of energy efficiency and price elasticity

- 2012 modelling report: future work - to understand behaviour change, monitor energy efficiency impact

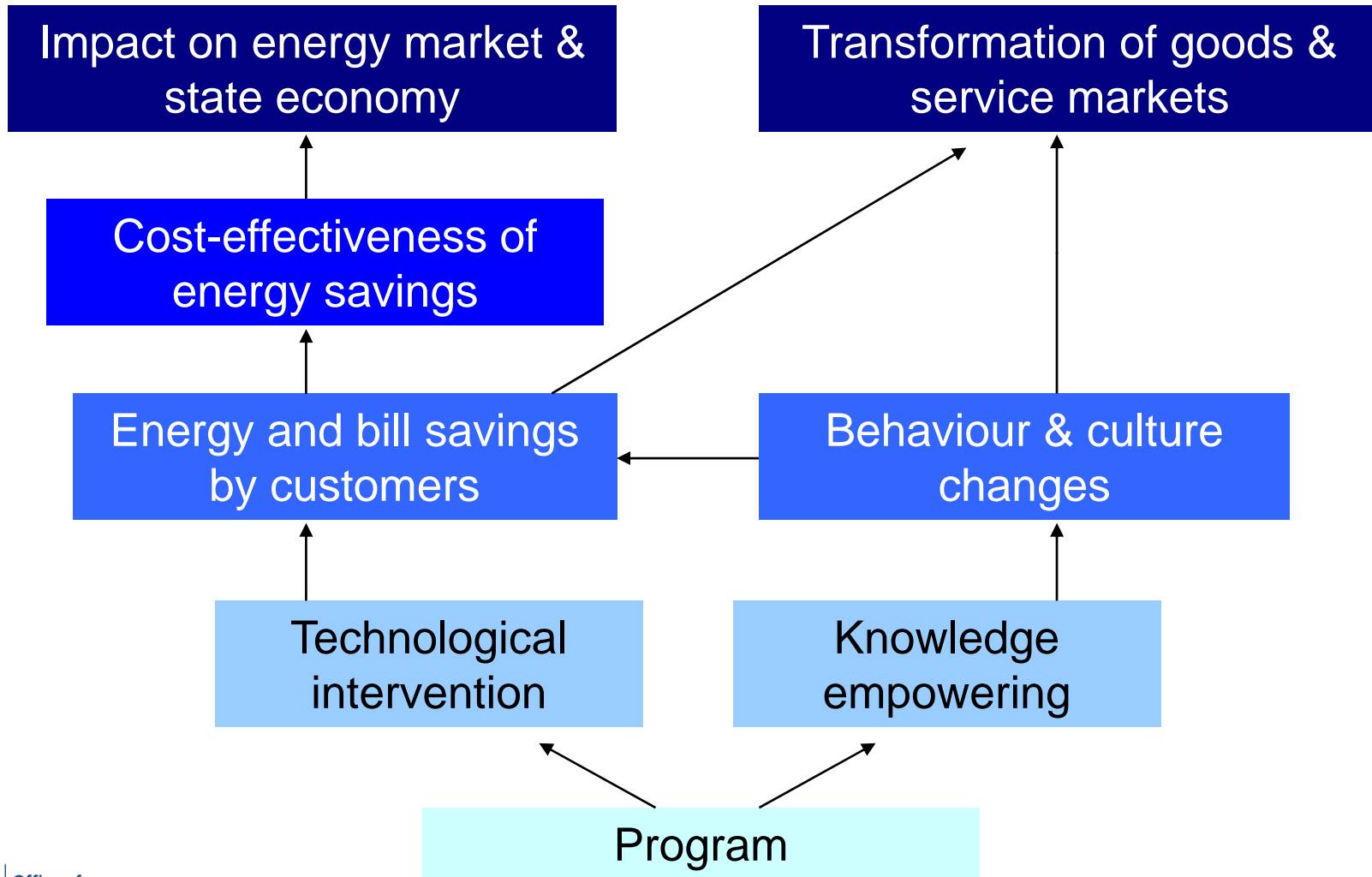
- Jan 2013 consultation papers for 2013 Network Development Plan: no mentioning of energy efficiency

# Savings Verification



# Evaluation Framework

**Principle: Outcome-based + Ground-truthing**



# Verified savings Low Income Homes



## Home Power Savings Program

- Equity objective
- Target 220,000 low income homes
- Free to low-cost saving measures

## Verification method

- Customer billing data
- Regression, control group
- Net savings including rebound effect

# Verified savings Low income homes



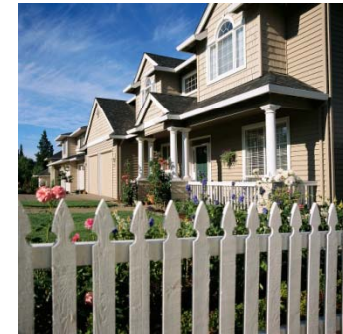
## Year 1 Net Savings – control group + regression

	Saving	Unit	% saving
Full kit	365	kWh/hh/y	7.3%
Average	208	kWh/hh/y	4%
Lighting only	128	kWh/hh/y	2.3%
Showerhead only	124	kWh/person/y	4.8%

- Gross savings higher (10%) including community wide reduction (6%)

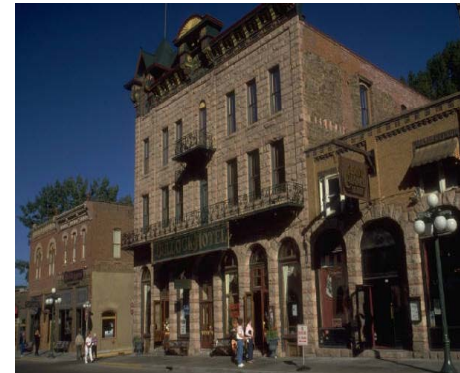
# Verified savings

## Low income homes



- Cost-effective against IPART benchmark
- NSW 2021 - “Support 220,000 low income households to reduce energy use by up to 20% by June 2014” (NSW 2021)
- Aspirational for achieve more savings
  - o larger saving items
  - o more sustained influence on behaviour
  - o better ways to inform decision making
- Government developing new programs

# Verified savings Small businesses



## **Energy Efficiency for Small Business Program**

- Merged with other business programs in Dec 2012
  - Equity - SMEs ill-resourced
- Reached 16,000+ SMEs , 2500+ implemented
  - To subsidise the cost of implementation

## **Verification method**

- Billing data
- Option C under IPMVP – temperature data

# Verified savings Small businesses



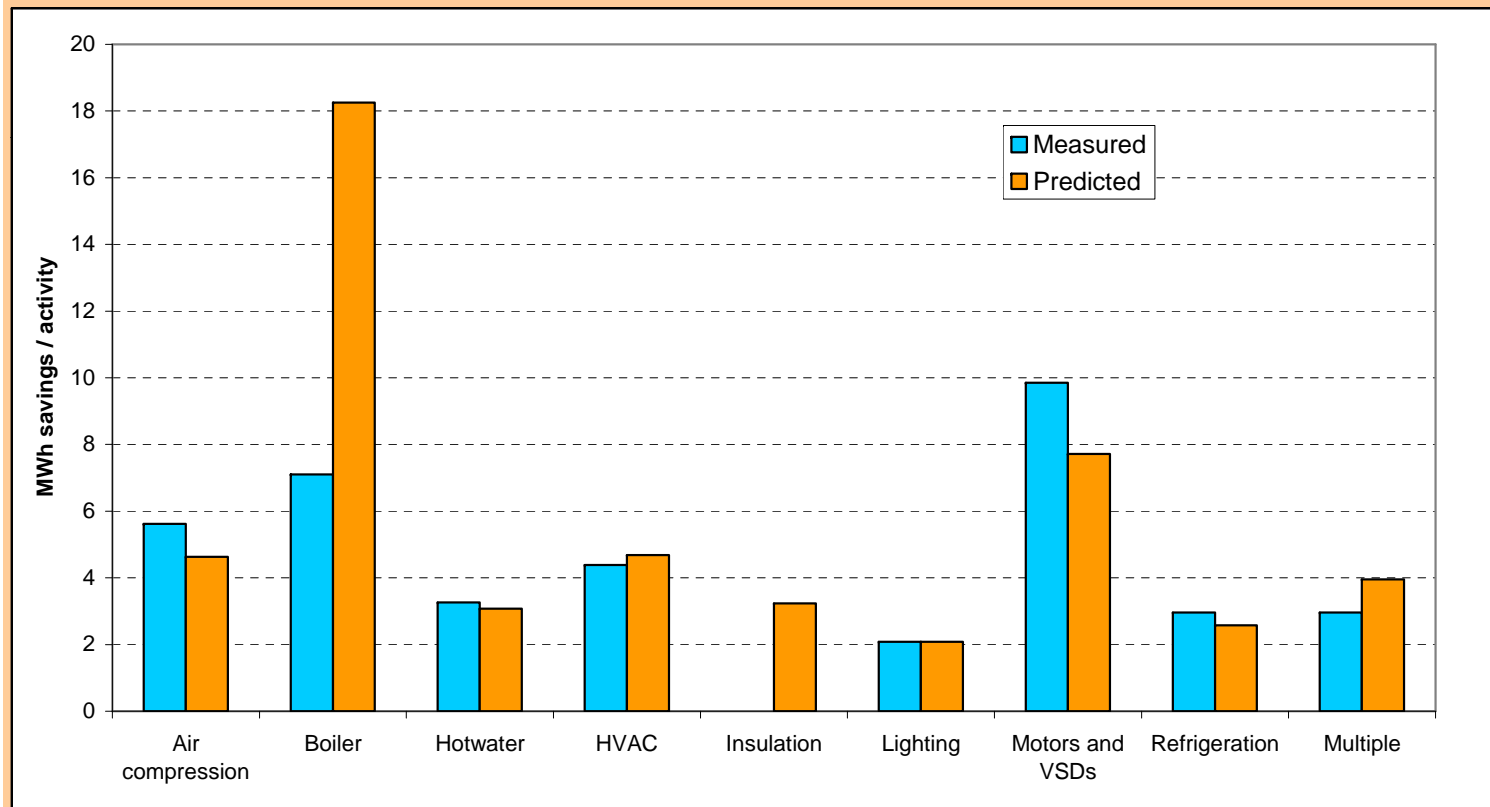
## Stage 1 saving results – (a sample of 509 sites, 331 verified)

Activity	Sample	Savings (MWh)	% saving relative to BAU
Air compression	2	11.236	14.6%
Boilers	4	28,417	9.1%
Hot water	21	68,615	6.6%
HVAC	56	245,460	7.8%
Insulation	3	undetected	Undetected
Lighting	124	1,030,376	13.0%
Motors & VSDs	5	49,272	12.5%
Refrigeration	86	254,056	3.2%
Multiple	30	179,379	11.0%
<b>Grand total</b>	<b>331</b>	<b>1,866,739</b>	<b>8.3%</b>

# Verified savings Small businesses



## Measured savings compared with estimated savings



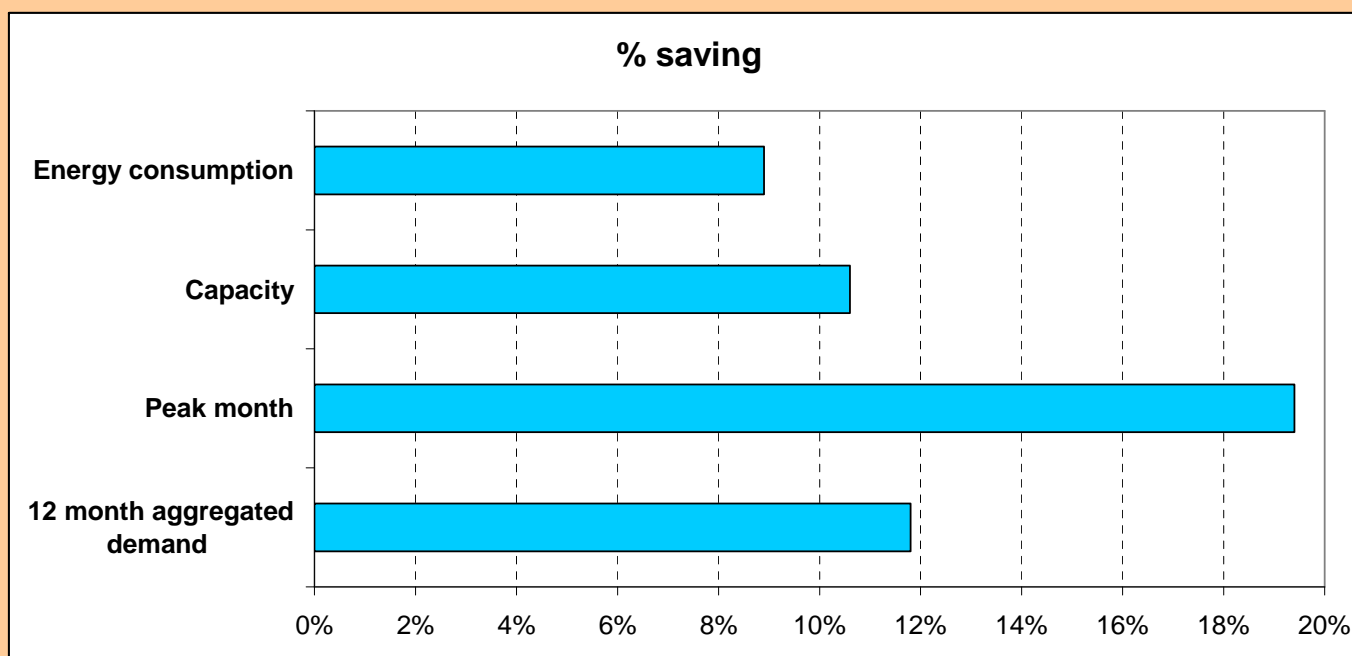
# Peak savings

## Small businesses



### Peak load reduction – 12 sites

	Savings (kVA)	% savings (relative to BAU)
12 month aggregated demand	1,189	11.8%
Peak month	190	19.4%
Capacity	104	10.6%



# Verified savings

## Large businesses (trial case)

### The Project:

- A convention Centre
- Lighting upgrade



### M&V

IPMVP Option A: measured power input and light output, estimated operation hours

	Electricity (kWh)	Savings %
Savings	62,563	72%

# Verified savings

## Government buildings (trial case)

### The project:

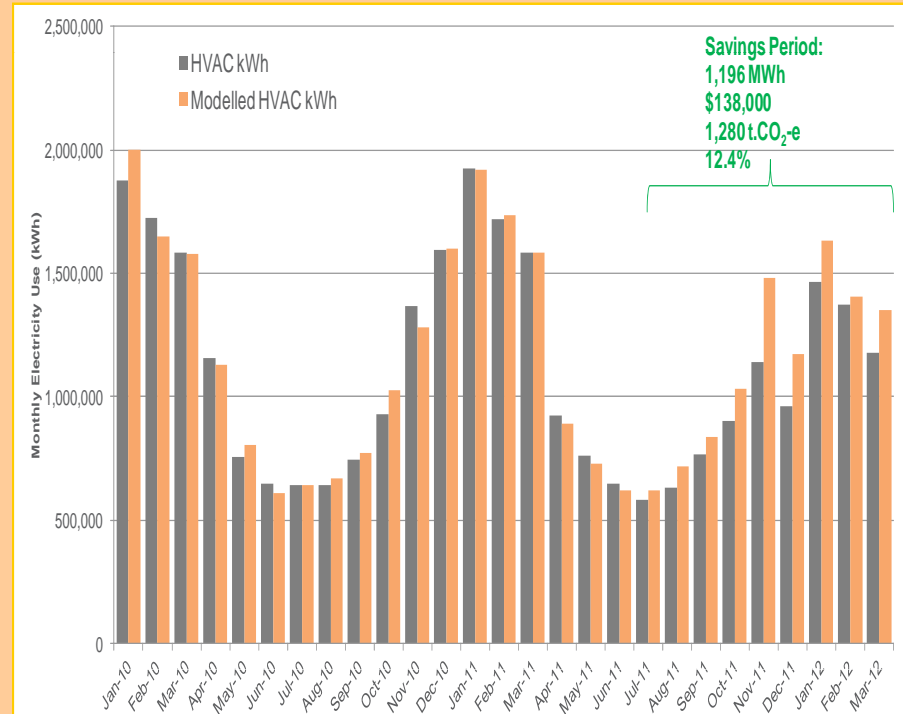
- A public hospital
- Chillers upgrading



### M&V

- IPMVP Option B/C;
- Boundary: chilled water plant

Energy saving (kWh)	% saving @ boundary	% saving whole site
1,196,680	12.4%	3.6%



# Behaviour change measured

## Home Power Saving Program

- A small saving, likely attributable to behaviour
- High saving variability - potential for behavioural change

## Energy Efficiency for Small Business Program

- 2012 survey: 50% participants implemented opportunities without rebate
- High saving variability - potential for behavioural change

## Energy Saver Program

- 2012 survey: >50% participants took further actions not covered by the program

# Current activities

## Saving verification

More projects, new dimensions

- Homes, small businesses – larger sample, in-depth analysis
- Medium-large businesses – more M&V trials
- Government sites – M&V via capacity building
- Hot water system replacement – research, knowledge developing

# Current activities

## M&V Guide

### Measurement & Verification Operational Guide

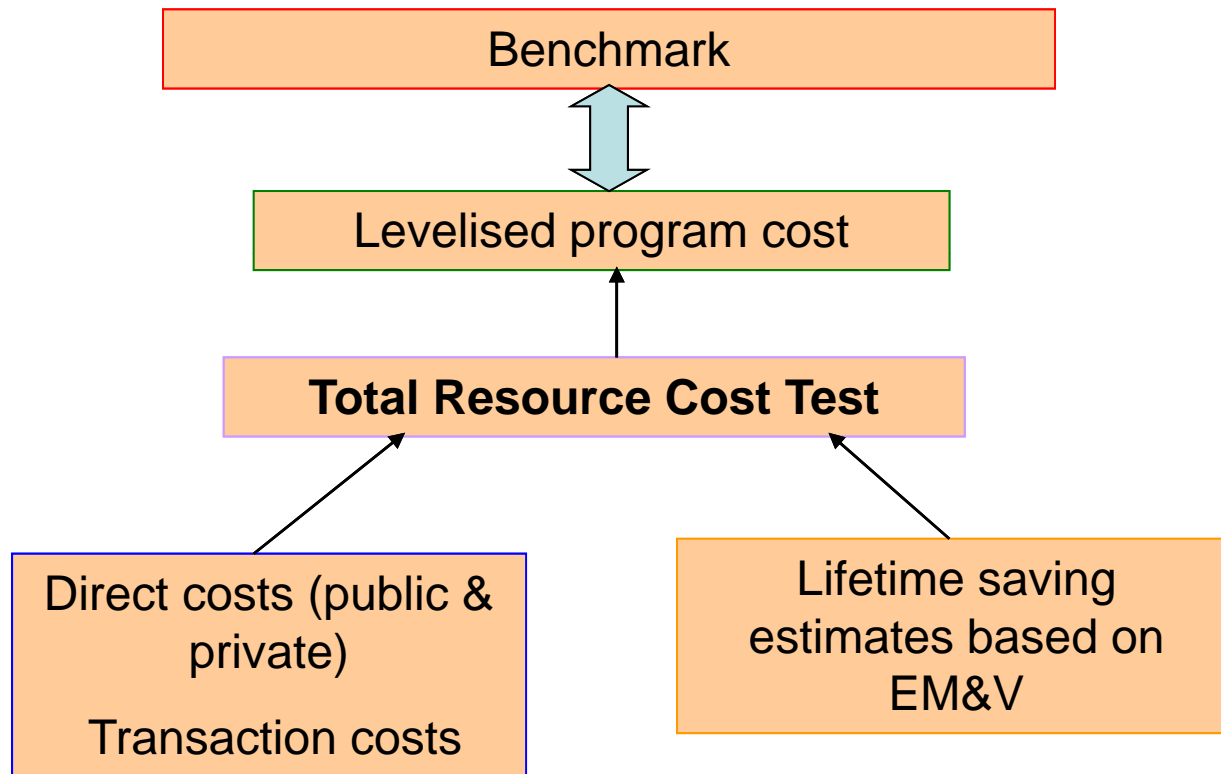
On OEH website today!



<http://www.environment.nsw.gov.au/climateChange/MVOperationGde.htm>

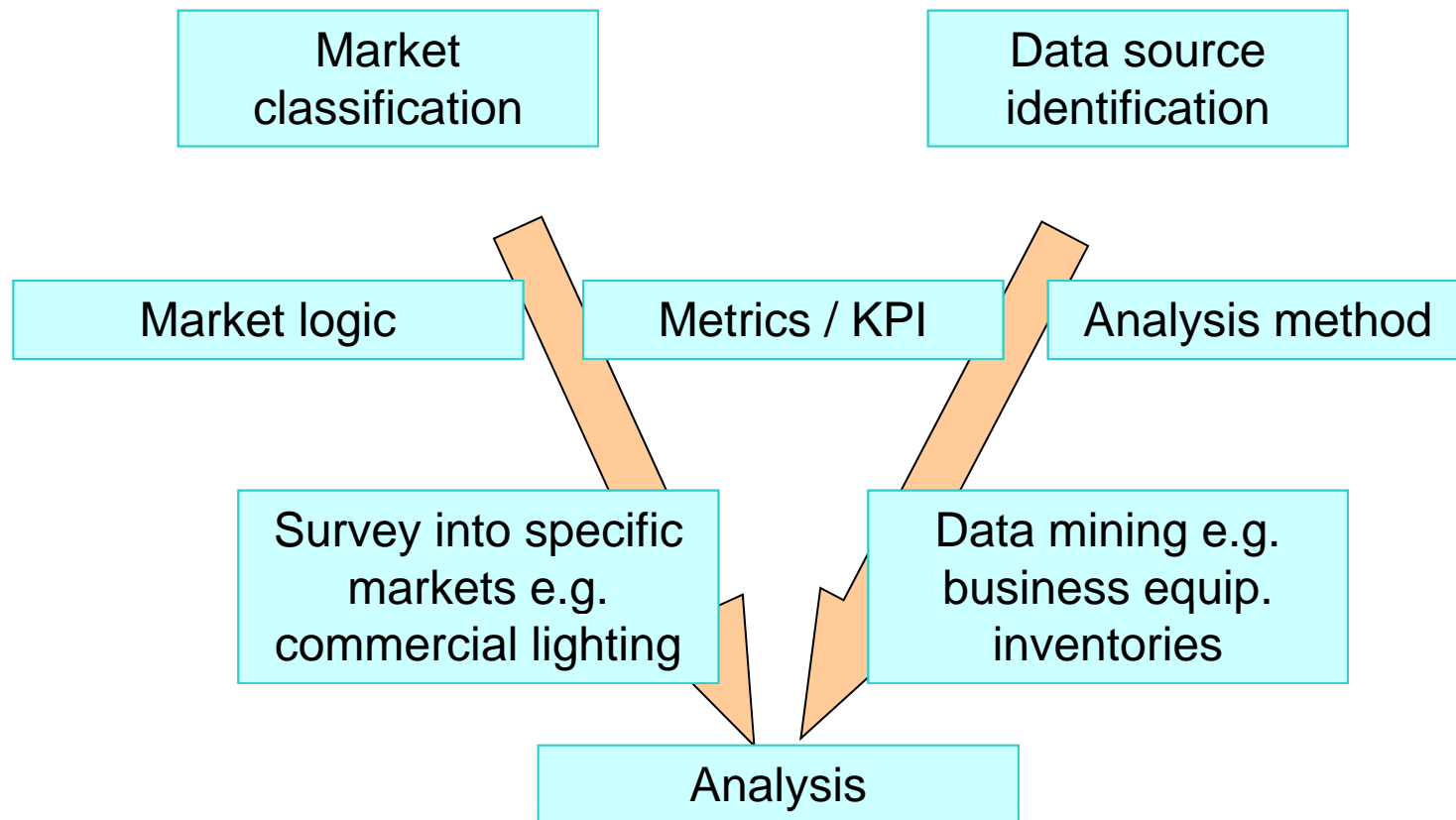
# Current activities

## Cost-effectiveness analysis



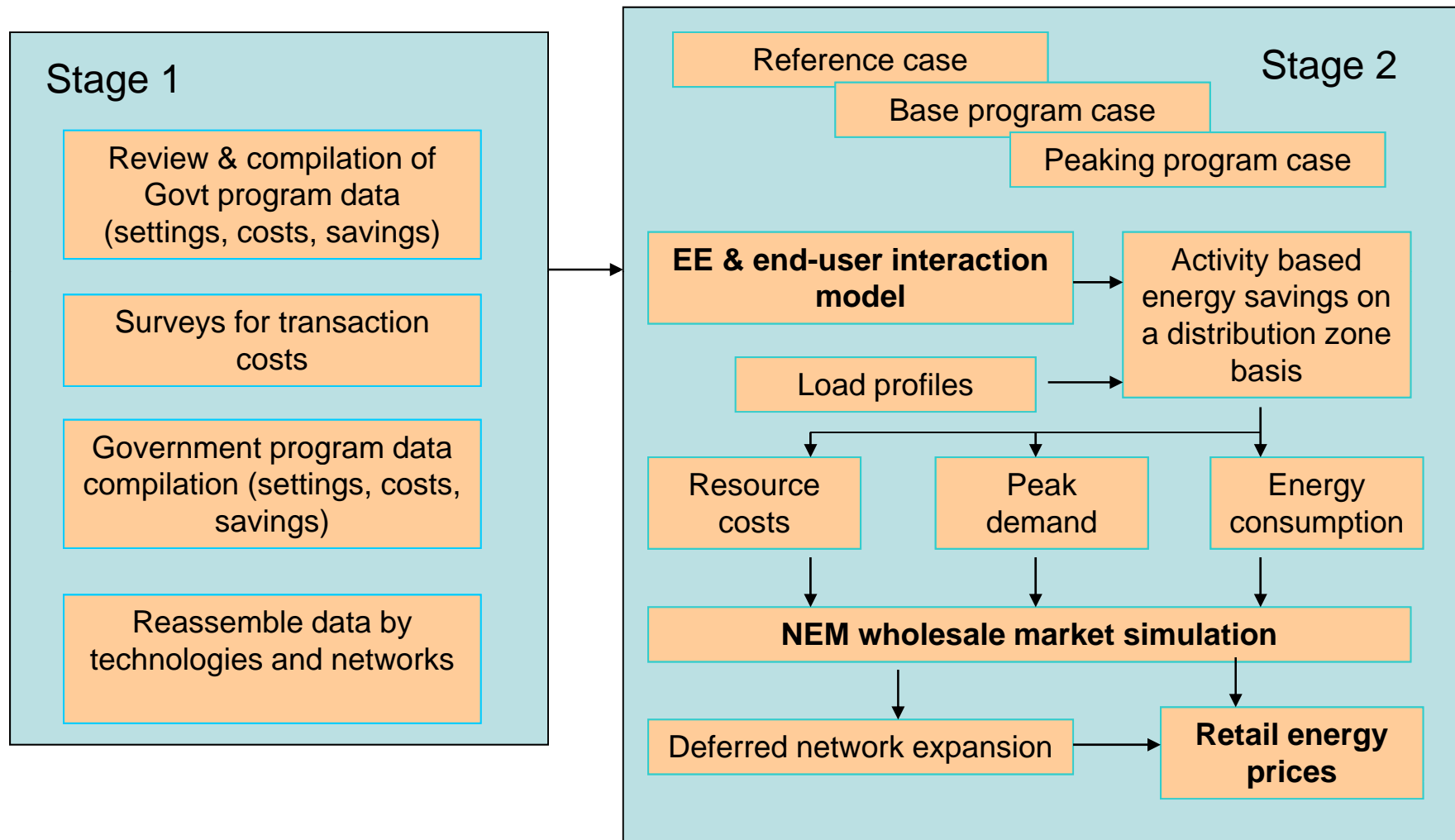
# Current activities

## Market transformation analysis



# Current activities

## Energy market modelling



# Observations from stage 1 evaluation

- Well on track to deliver expected outputs
- Savings are real from verified participants, sites and projects
- Verified savings from hardware are commensurate to level of interventions
- Savings are cost-effective against benchmark
- Behaviour & culture changes are observable in participating businesses, indicative in participating homes
- Potential for significant householder behaviour change through more intensive engagement
- Evaluation findings are providing evidence for policy development