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Attitudes of Australian Businesses and Householders towards Distributed Energy

2008 International Energy Workshop

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Outline

1. IG project overview
2. Survey of householders
3. Survey of businesses

1. The Intelligent Grid Project

- What is IG ?
  - The Intelligent Grid is a future vision for an electricity network that balances supply and demand to the benefit of consumers and utilities, so that it minimises CO_2 emissions, minimises losses, minimises prices to consumers, and maximises efficiency.
- How can it be achieved ?
  - Through the use of Distributed Energy (DE) resources, with small-scale generation (including renewables) located close to loads, paired with demand management technology.

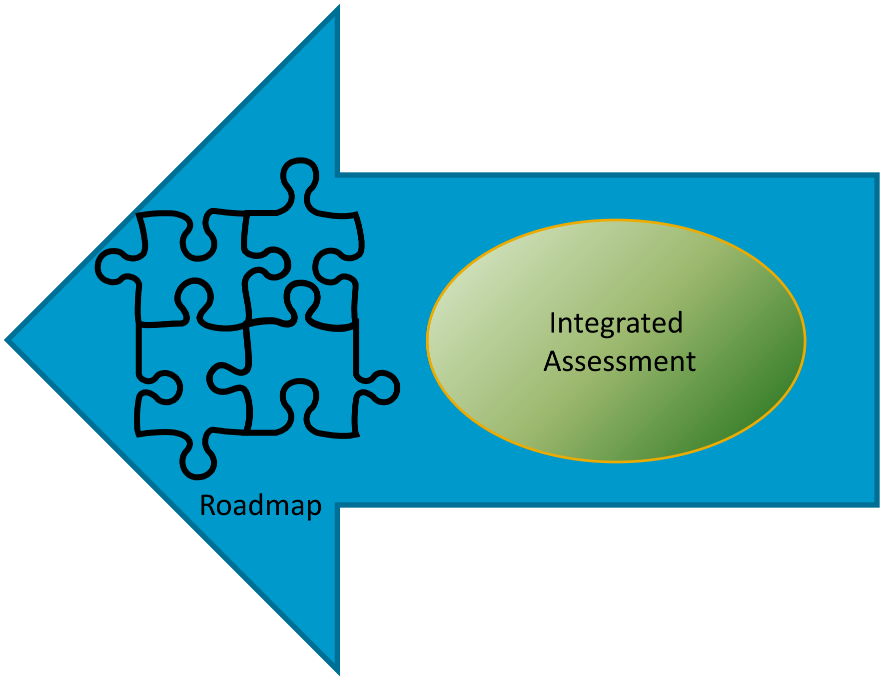
The Intelligent Grid Project

- Aims
  - To deliver a compelling fact-based argument for DE to meet substantial greenhouse emission reduction targets for Australia.
  - DE is seen as an option for early action while large-scale technology is being developed
- Outcomes
  - Identification of economic, environmental and social factors that inhibit or encourage the uptake of DE.
  - Evaluation of the overall $ and CO_2 benefit that DE can provide in an Australia-wide context.

Intelligent Grid: Overview

Value Chain

- Generators
- Retailers
- Networks
- Politicians
- Policy makers
- SME's ✓
- Domestics ✓



Technical Simulation
Power systems modelling,
NEM bidding analysis
Technology characterisation

Economics
Peak pricing, CO_2 trading
Asset investment,
Network pricing

Environmental
GHG and pollutant emissions
Resource use and LCA
Air quality

Social
Consumer acceptance
Perception and value
Drivers for adoption

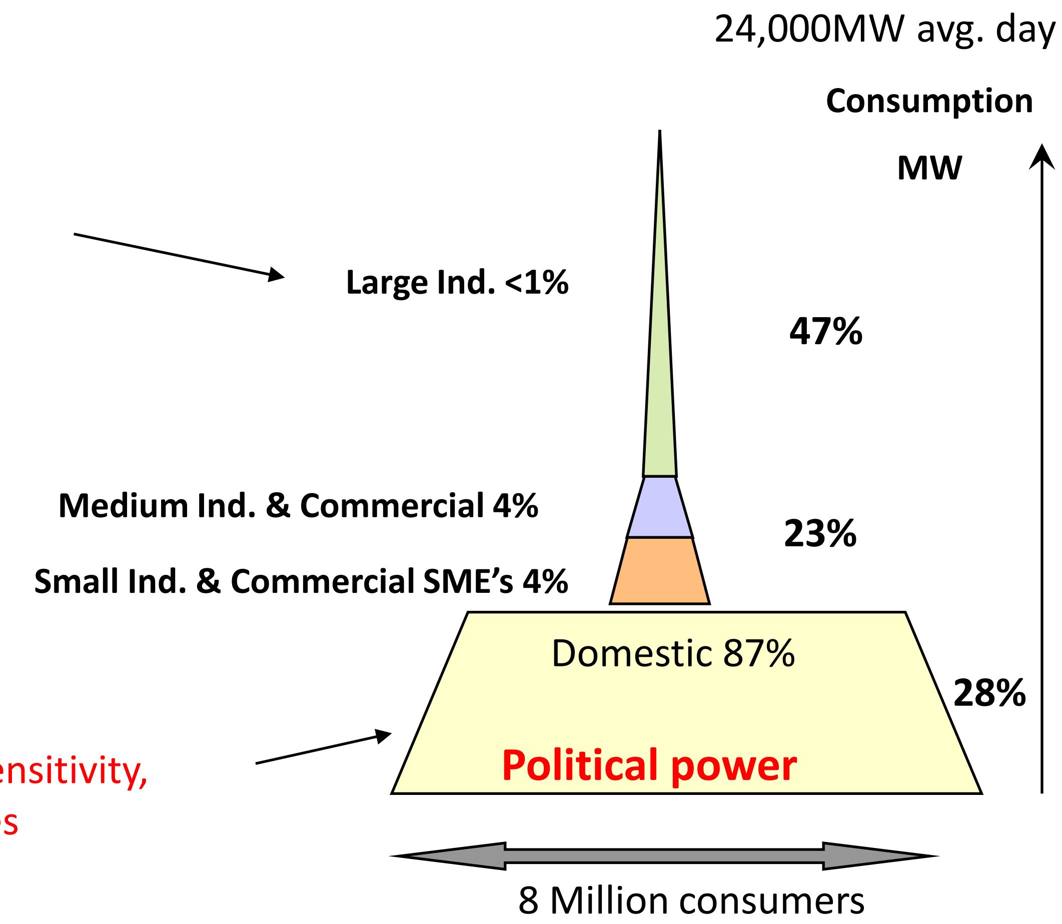
Intelligent Grid: Our targets

Already improving efficiency, emissions.
use of WH, Lowest energy prices

Already improving efficiency.
Energy bill not large

Poor efficiency, no emissions sensitivity.
Low energy prices

Few efficiency measures, no emissions sensitivity,
Peak power, resistant to energy price rises



2. Survey of Householders

- Method
  - Survey was developed with reference to psychological theories
  - Survey assessed knowledge, beliefs and attitudes, as well as acceptance of distributed generation and demand management technology
  - Printed surveys were posted to 8000 people across Queensland, NSW, Victoria and South Australia
  - An online version of the survey was also produced and promoted
- Sample
  - 2022 surveys were returned
  - A broad cross-section of individual and household characteristics represented, including age, income and education level, size and type of household and level of electricity consumption.

Findings

- Overall, about 55% of those surveyed were prepared to accept distributed energy technology
- Demographic predictors:
  - Younger, higher income, better educated families with children are more likely to accept the technology
- Other predictors:
  - People with higher levels of knowledge, and more pro-environmental beliefs were more likely to accept the technology

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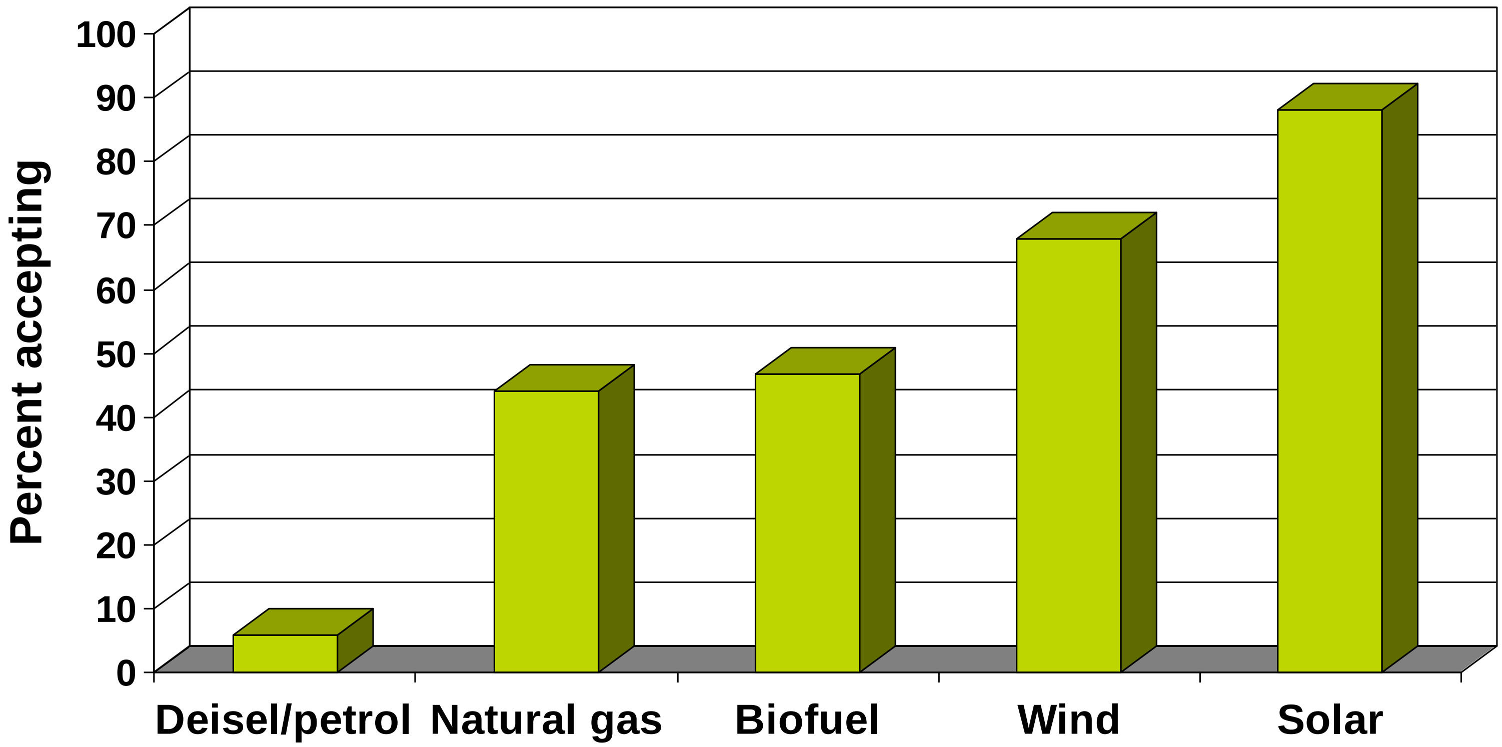
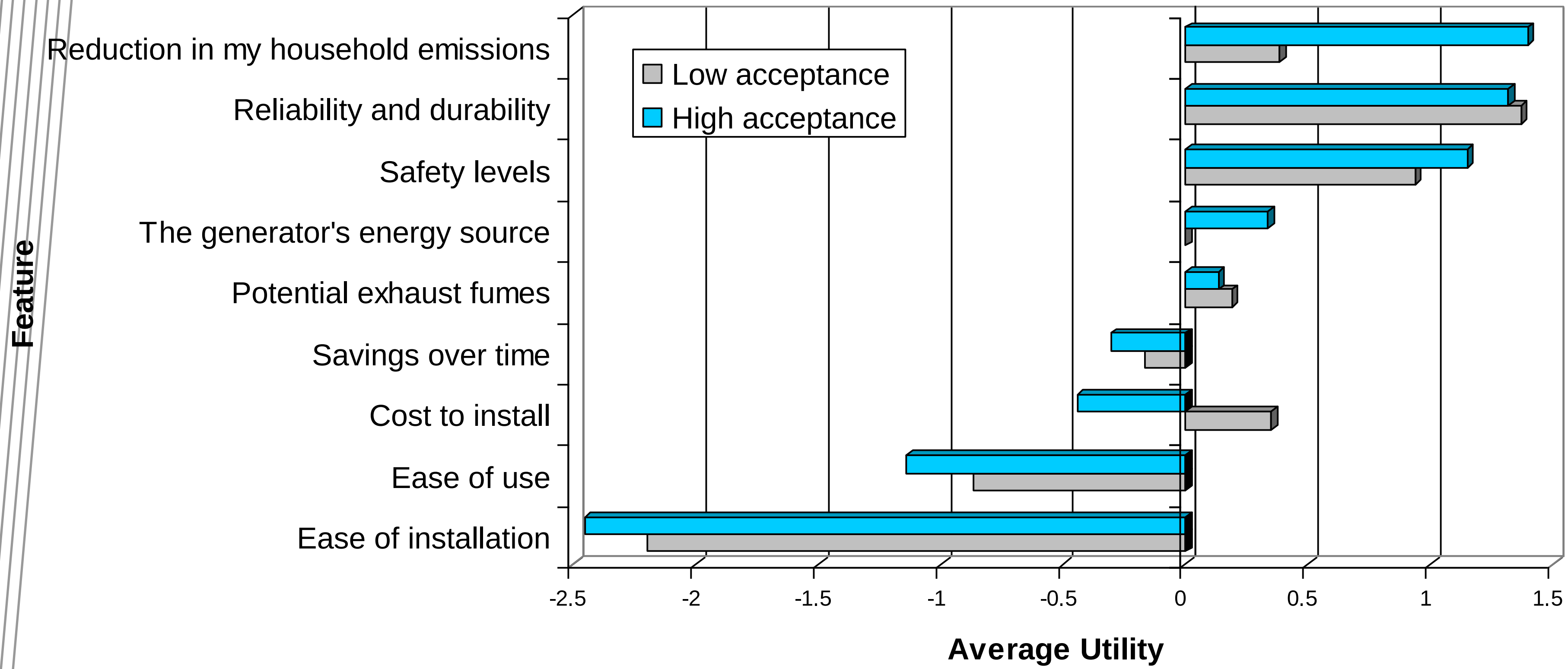
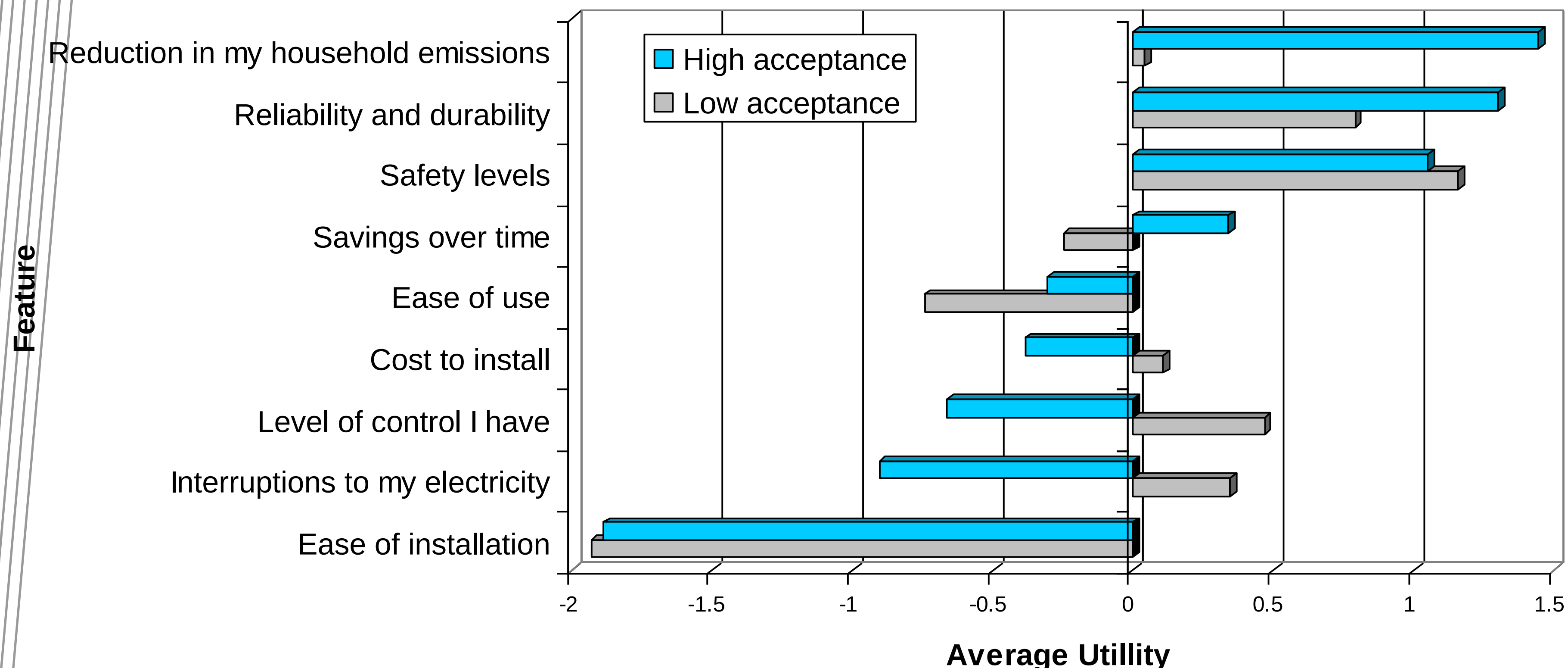
Acceptability of energy sources



Importance of Features of Distributed Generation



Importance of Features of Demand Management



Barriers to acceptance and behaviour change

- Electricity
  - Low knowledge and low involvement
  - Current low cost and high availability
- Distributed generation technology
  - Low knowledge and low exposure
  - High current costs
- Climate change
  - Lack of understanding
  - Denialism

3. Survey of Businesses

- A web-based survey of organisation's attitudes towards distributed energy technology
- The survey assessed:
  - General characteristics of the organisations and respondents
  - Reactions to descriptions of distributed generation and demand management technology

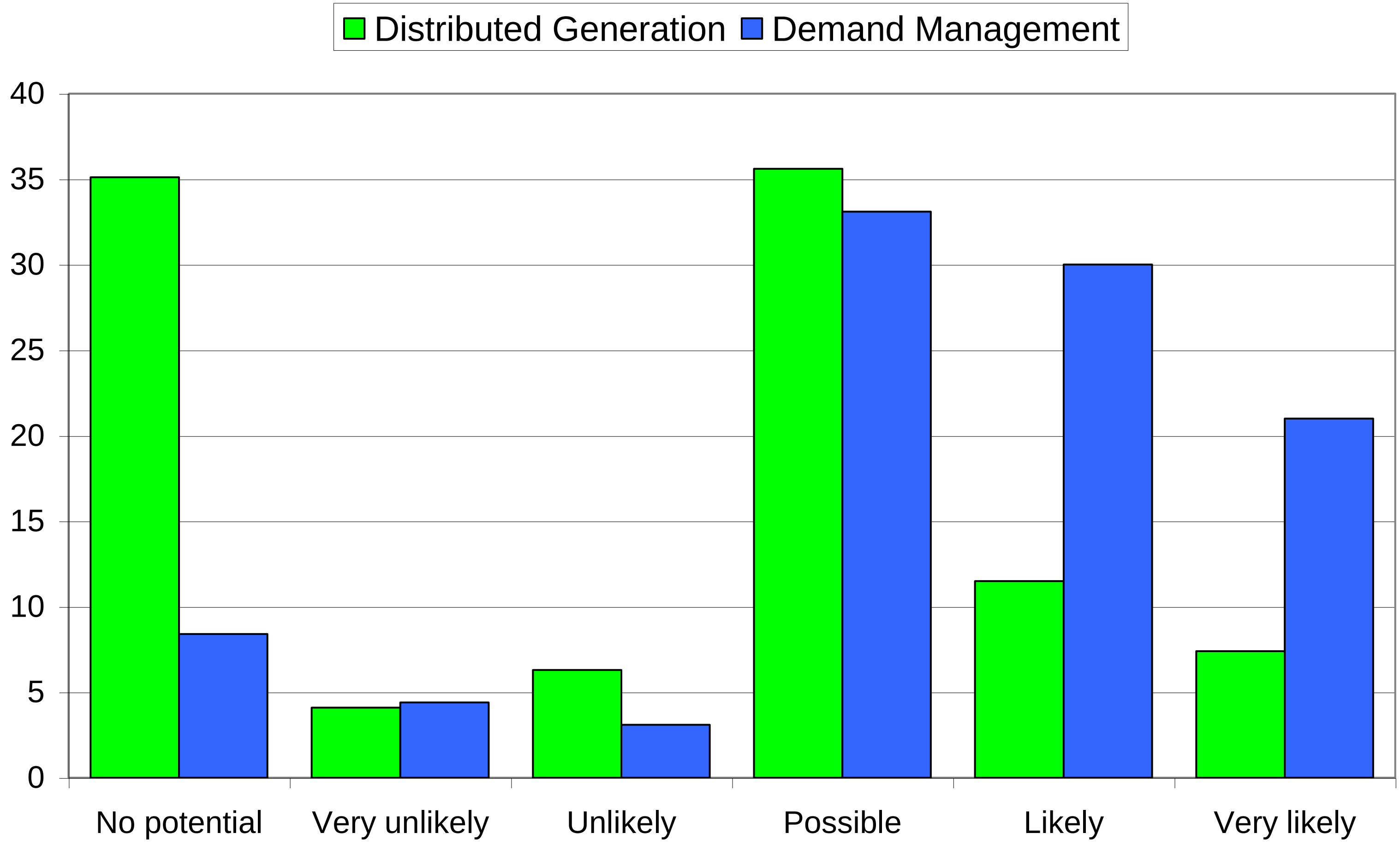
Survey Sample

- Completed surveys were received from 462 organisations in New South Wales, Queensland, South Australia and Victoria.
- A wide variety of organisation types were represented, including:
  - Government administration and defence
  - Manufacturing
  - Finance and insurance
  - Education
  - Health and community services

Survey: Background Measures

Measure	Range	Median
# of Employees	2 – 5000	140
Annual Turnover	$100k - $3b	$30m
Annual cost of electricity	$123 to $37m	$109k
Electricity intensity	0.01% to 11.4%	3.5%

Acceptance of Distributed Generation and Demand Management



Acceptance of Demand Management

- 51% of organisations thought that adoption was likely or very likely
- Acceptance was higher for organisations with:
  - More staff
  - Higher turnover
  - Higher electricity costs
- Acceptance of demand management appeared higher for mining, construction, and health and community service organisations, and lower for accommodation, cafes and restaurants, personal and other services, and agriculture, forestry and fishing.

Acceptance of Distributed Generation

- Only 18.9% thought adoption was likely or very likely
- Acceptance was higher for
  - Larger organisations (staff numbers, turnover, electricity cost),
  - Electricity intensive organisations (electricity cost as higher percentage of annual turnover)
- Acceptance appeared higher for mining, health and community services, and manufacturing
- Acceptance was lower for construction, finance and insurance, and personal and other service organisations.

Preferences in relation to these technologies

- For both technologies, improved efficiency, safety, and reliability/durability were all rated as important, while ease of installation and potential government incentives were rated as least important.
- Interruptions to supply were also rated as an important concern for demand management.
- Respondents with higher acceptance rated energy efficiency as more important and cost to install as less important than did those with lower acceptance of the technologies.

Comparing preferences between organisations and householders

Sample	Demand management	Distributed generation
Organisations	Energy efficiency Safety levels Interruptions to supply	Safety levels Energy efficiency Reliability and durability
Householders	Reduction in emissions Reliability and durability Safety levels	Reliability and durability Reduction in emissions Safety levels

Barriers/drivers to adoption: Contextual issues

- Approval
  - approval from government regulators and building/site owners (if organisation is leasing)
- Support
  - government incentives
  - understand links to existing state government programs
  - recognition via reduced rates from electricity retailer
- Distrust/Need for Proof
  - A trial or demonstration version of the system
  - Proof of savings / guarantee of return on investment
  - Uncertainty regarding costs / maintenance / delivered benefits

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Barriers/drivers to adoption: Organisational issues

- Site Unsuitable
  - Unsuitable for tenants in shared/leased space
  - Building structure not suitable or too small
  - Location (CBD, residential area) unsuitable
- Scale
  - Base load is too large / too small
- Relevance
  - Organisation already has a similar system in place
  - Could replace a number of separate devices (DM)
  - Links with sustainability policy / community recognition / environmental credentials

Barriers/drivers to adoption: Product issues

- Costs
  - Up front costs
  - Time to return on investment/savings over time
  - Ongoing maintenance & staffing costs
- Performance
  - Reactivity, accuracy, compatibility with existing systems, ease of use
- Environmental issues
  - Potential exhaust fumes / emissions
  - Noise levels

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Engagement Outcomes

- An example case study
  - A Partnership model
    - Four major industries
    - Local community (via sustainability group)
    - Local council
    - State government
    - Federal government
    - CSIRO
  - Participants surveyed as for SME’s
  - Key differences
    - Government incentives and reliability (higher)
    - Potential exhaust emissions and fuel type (lower)

Next steps

- Integration of social metrics to economic modelling
  - Influencing learning curves
- Integration of social metrics to technical modelling
  - Informing decision making and spatial (demographic) modelling analysis
- Stakeholder mapping and social network analysis
  - Mapping key players and policies relevant to DE
- Stakeholder interviews
  - Ascertain key drivers and inhibitors for DE

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Thank you

Description of distributed generation

Imagine a small and silent electricity generator installed in your house, which could produce some or all of the electricity your household used. Depending on the type of generator you installed, the generator might run off diesel/petrol, natural gas, biofuel, wind or solar power. During periods of peak electricity demand, the generator would provide electricity for major appliances at your house (like the refrigerator, air conditioner, pool pump, and hot water system). The generator would be backed up by the normal electricity supply if your house needed more power, and it could sell electricity back to the power company if it produced more power than you needed. A controller in the generator would make decisions about when to switch between the generator and the normal electricity supply.

- The generator would cost you $5,000 to $10,000 to install
- Depending on the power source used, the generator might produce some exhaust fumes
- Your household's greenhouse gas emissions would reduce by around 50%
- Your total power bill (the electricity bill plus the cost of running the generator) would be about 20% less than your current electricity bill
- You would get bonus payments from the power company for excess electricity your generator produced

Description of demand management

Imagine a small computing device installed into your house, an "energy manager" that could measure your household's electricity consumption and receive information from the power company. It could work out the best times to switch on and off some major appliances at your house (like the refrigerator, air conditioner, pool pump, and hot water system) so your electricity consumption would be well managed with minimal effect on your lifestyle. By watching a display, aided by warning signals to draw your attention to it, you could then act on your energy manager's advice by switching off your appliances, or it could switch appliances on and off automatically. A menu-based interface (a bit like an ATM's) would enable you to control the energy manager so it took your preferences into account.

- The energy manager would cost you $300 to $500 to install
- The energy manager would only turn off important appliances (like the refrigerator) for short periods
- Your household greenhouse gas emissions would reduce by 10% or more
- Your electricity bills would reduce by around 10%
- You would get bonus payments from the power company when your energy manager automatically switched off appliances during periods of peak electricity demand