

# Complexities influencing the introduction of Sustainable Transport Technologies

Lisa Garrity

Alternative Transport Energies Conference – Another STEP closer to a sustainable future

September 2006



# Overview

- Influences on the innovation process
- Aims of the demonstration project
- AcceptH2 Project
  - Partners
  - Objectives
  - Methodology
  - Results
    - Knowledge about Hydrogen
    - Perception towards Hydrogen
    - Acceptance of Hydrogen
    - Willingness to Pay for Hydrogen
- Infrastructure
- H2 Bus Drivers Perception
- Conclusions

# Influences on the innovation process

Technical

Operational

Economic

Political

Environmental

Social

# Aims of a demonstration project

- Building public awareness of the technology
- Building market confidence in the technology
- Gaining operational experience under realistic conditions
- Identifying and correcting any faults or limitations in the technology
- Providing a basis for full-scale production – gaining financial supporters, identifying markets, refining the design etc.

# Evaluation Studies – Perth Fuel Cell Bus Trial

Operations

Lifecycle Analysis

Industry Opportunities

Cost/Benefit

Public Perception

Systems Thinking

- holistic rather than reductionist; appreciation of complexities

# AcceptH2

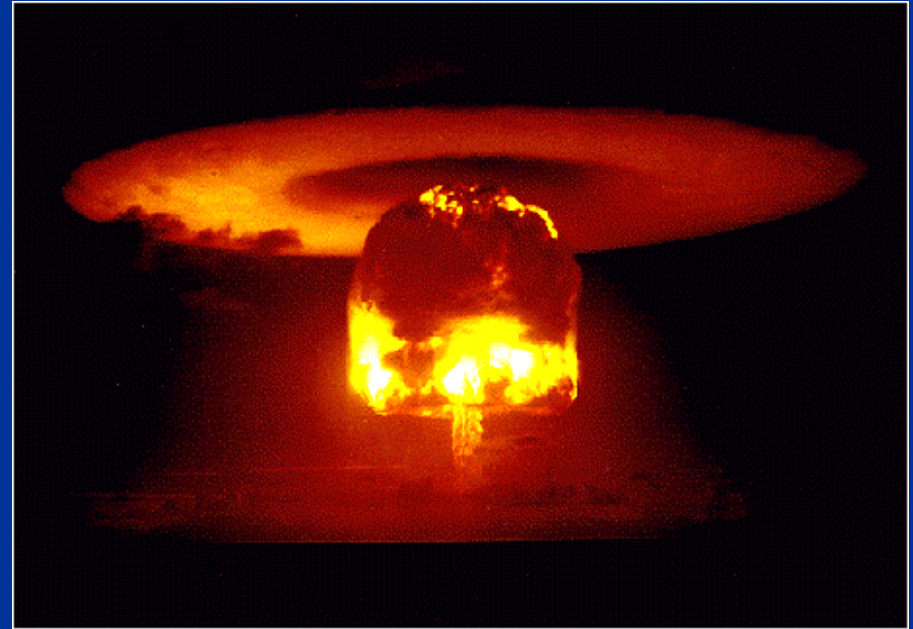
## Aims

- To assess public knowledge, perceptions, values and attitudes concerning hydrogen and fuel cell bus technology.
- To determine the public perception and economic preferences towards the use of hydrogen fuel cell buses across five cities: Berlin (Germany), London (UK), Luxembourg (Luxembourg), Oakland (California, US), Perth (Australia).

## Outcomes

- Identification and analysis of barriers to the introduction of H2 fuel cell buses
- Analysis of the effectiveness of Fuel Cell Bus Trials in influencing public knowledge, perceptions and attitudes towards the technology.
- Recommendations for information campaigns

# Public Perception



**Hindenburg, 1937**

Vidicom Media Productions [www.vidicom-tv.com/tohiburg.htm](http://www.vidicom-tv.com/tohiburg.htm)

**H-Bomb**

<http://www.bilderberg.org/hbomb.htm>

# Public Perception

- BP Ethanol, Queensland

“Driver fears force BP to quit ethanol”

"While BP's ethanol-blended petrol is a high-quality product which poses no threat to car engines, it makes little sense to offer customers a product when they are telling us they don't want it." *BP spokesman Peter MacCuspie*

"Public confidence in ethanol as a safe alternative fuel has been undermined by a scare campaign, but there is no reason why ethanol blends can't be a success when properly marketed as the safe, clean fuels they are." *Australian Biofuels Association Executive Director Bob Gordon.*

The Courier Mail 19 Feb 03

# AcceptH2

## Partners:

- Imperial College, London, UK
- L-B-Systemtechnik, Munich, Germany
- Saarland University, Saarland, Germany
- University of California, Davis, US
- AC Transit, Oakland, California, US
- Murdoch University, Perth, Australia
- Department for Planning and Infrastructure

# Methodology

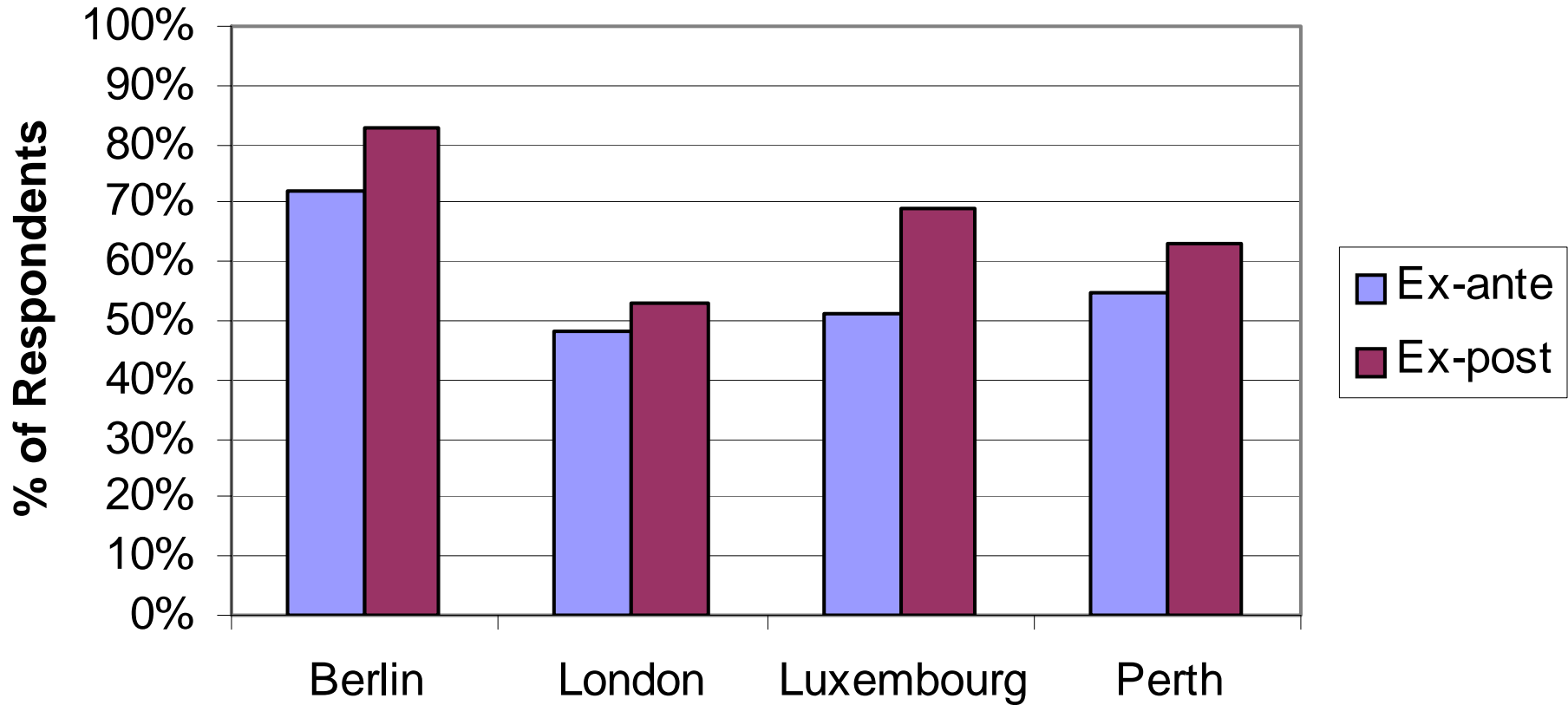
- 300 Perth residents surveyed before and ‘after’ fuel cell bus trial.
- 154 bus users and 146 non-bus users.
- 15 minute telephone interview.

Respondents asked questions about their:

- perceptions of current Transperth bus features;
- perceptions, awareness and attitudes towards hydrogen and fuel cell vehicle technology;
- willingness to pay for hydrogen fuel cell buses and;
- current environmental awareness, knowledge and associated behaviour.

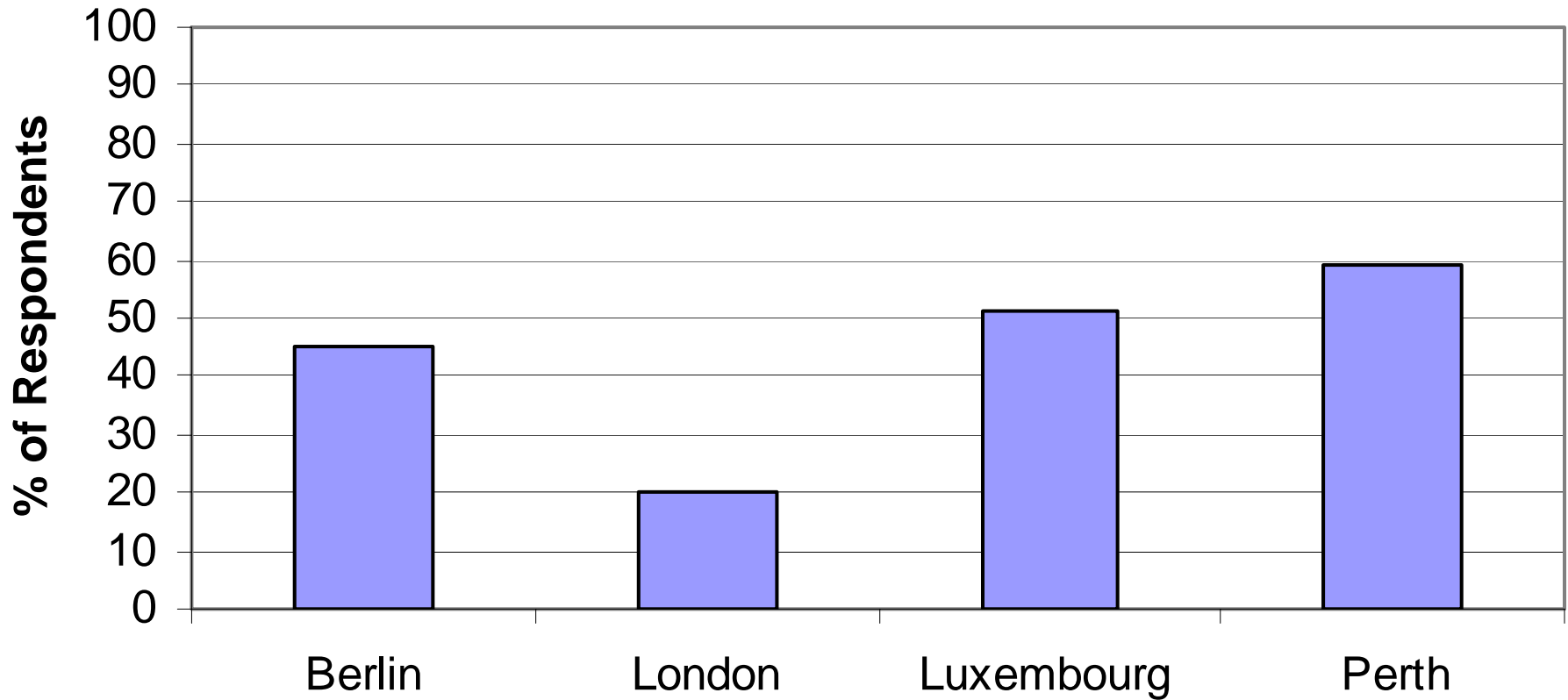
# Knowledge

## Knowledge about H2 vehicles



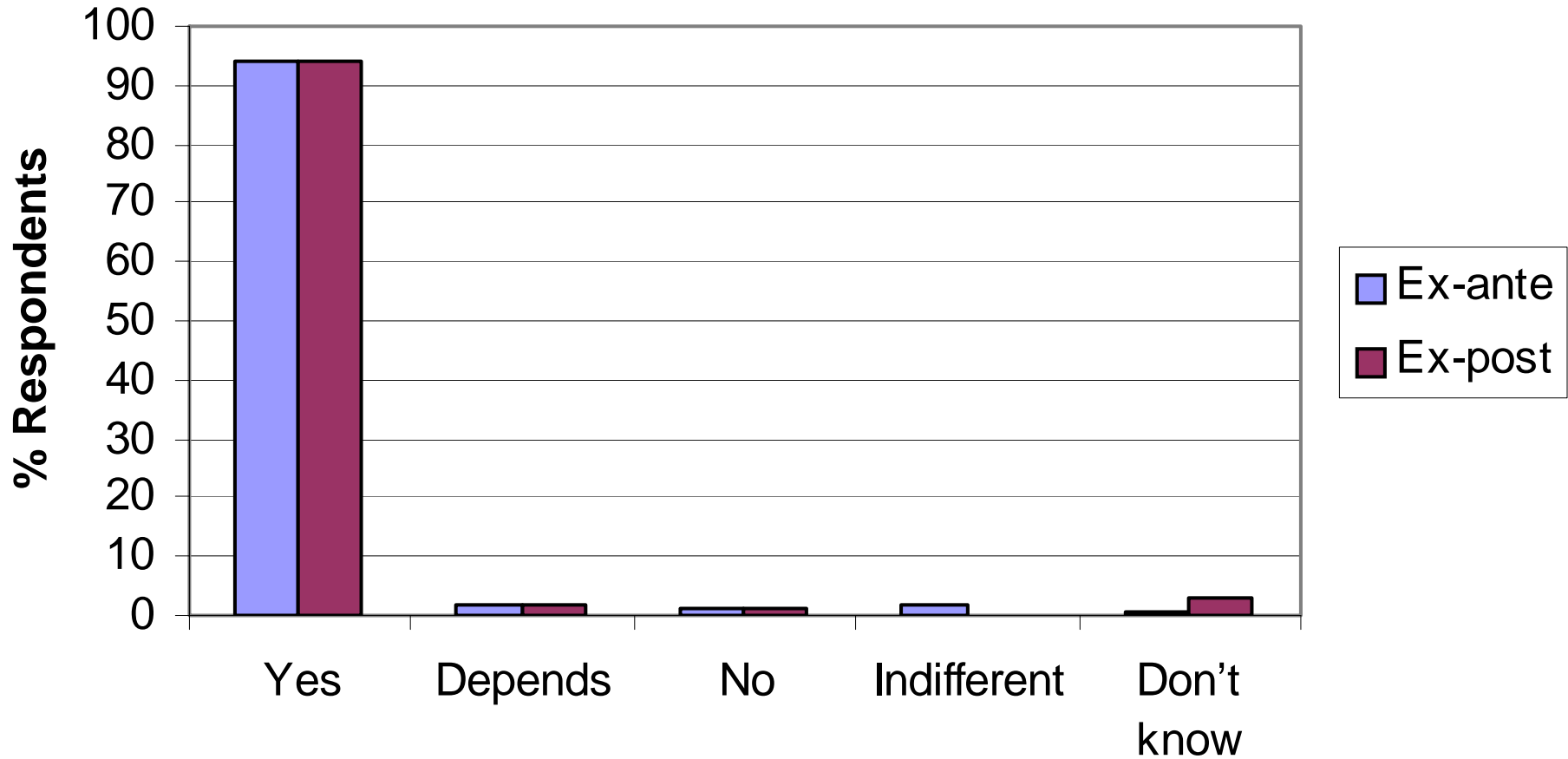
# Knowledge

## Knowledge about H2 bus trial amongst ex-post survey bus users



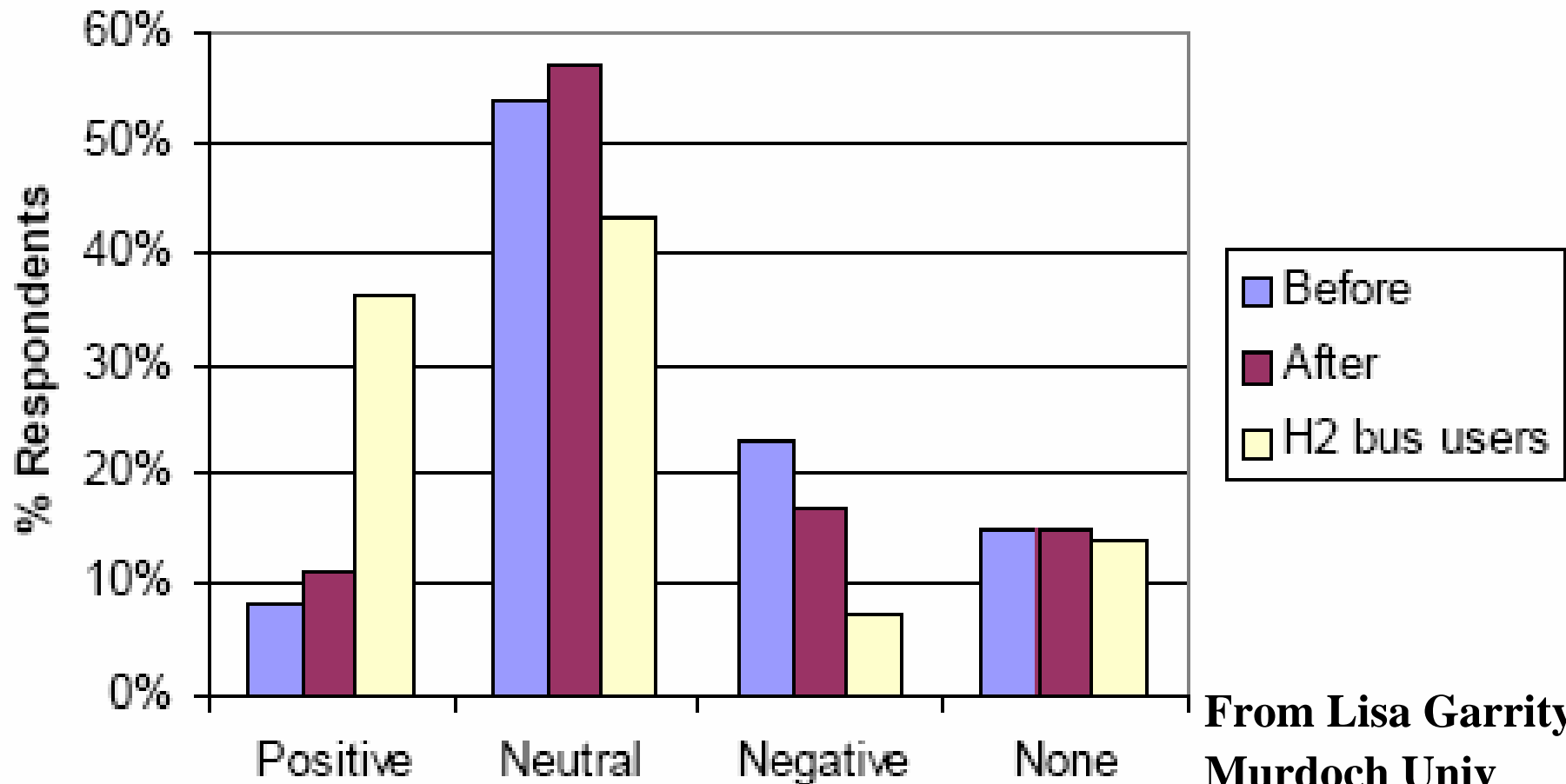
# Attitudes

## Support for Perth H2FC bus trial



# Perceptions

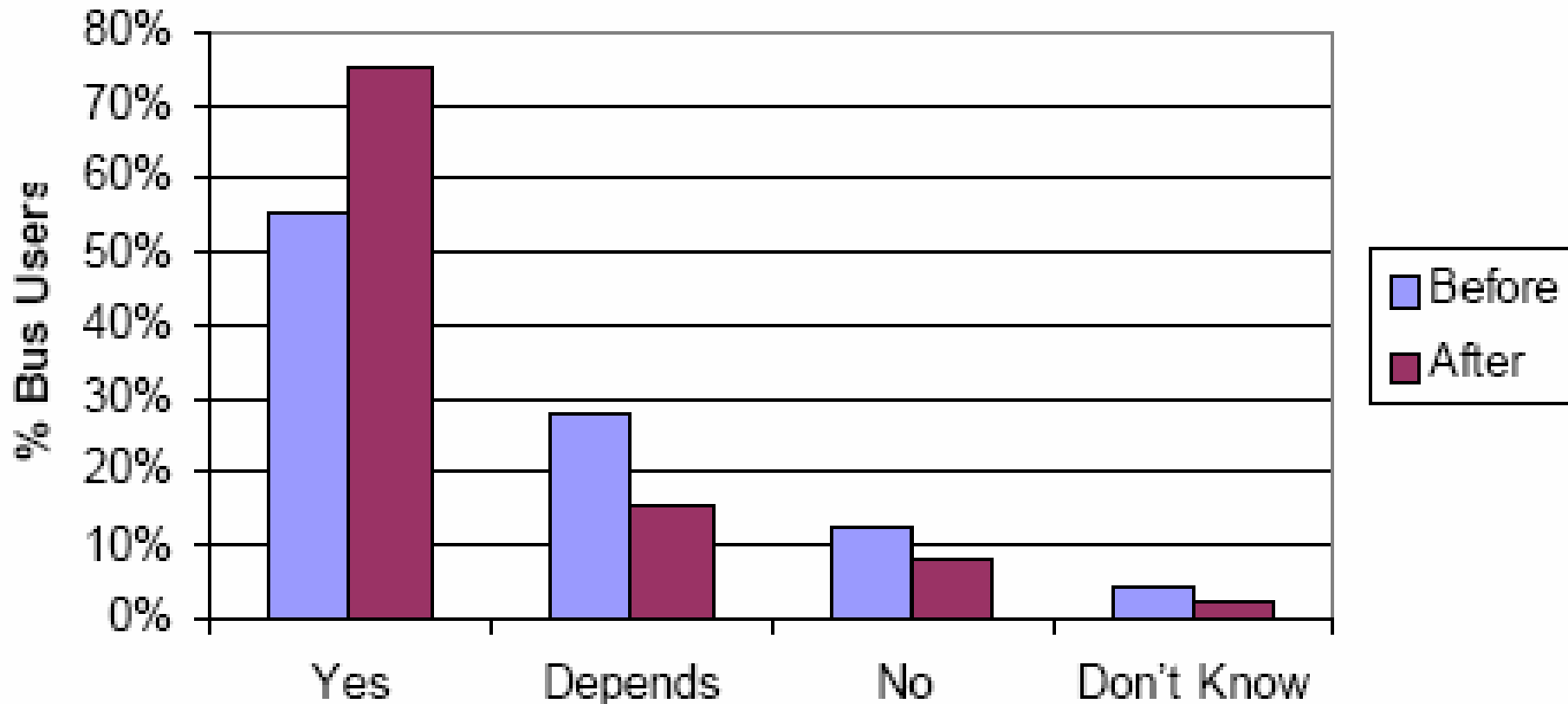
## Associations with Hydrogen



From Lisa Garrity  
Murdoch Univ

# Contingent Valuation

Would you support an increase in bus fare to enable the introduction of H2 buses?



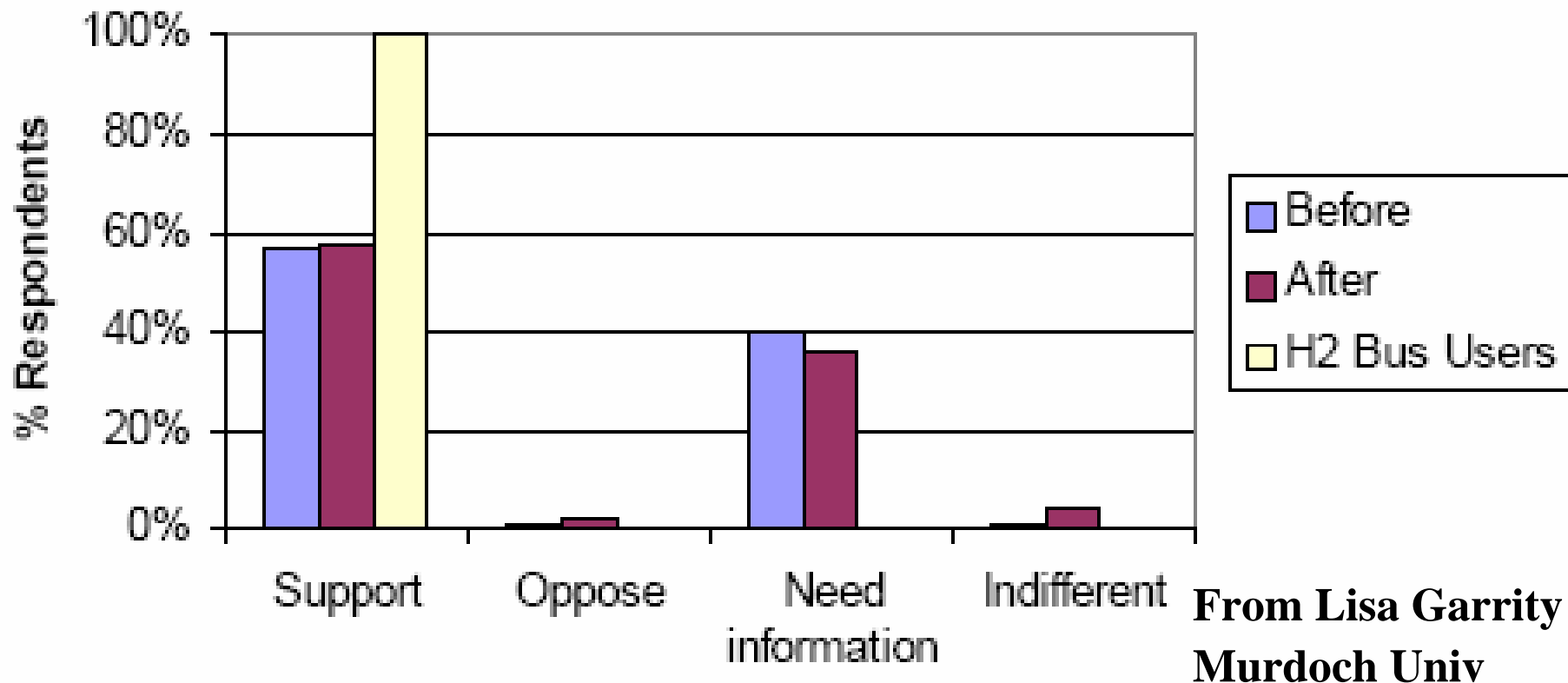
From Lisa Garrity  
Murdoch Univ

A man with a grey beard and glasses, wearing a red hooded raincoat and a high-visibility safety vest, is posing enthusiastically in front of a large green and white ship. The ship's name, "DON JUAN STOCKHOLM", is printed in bold black letters on its white upper section. The man has his mouth wide open in a joyful expression and is pointing towards the camera with both hands. The background shows a body of water and a distant shoreline under an overcast sky.

**DON JUAN**  
STOCKHOLM

# Attitude

How would you feel about H2 storage at your local petrol station?



# Attitude

- Individual Agitators
- Theoretical support for renewable energies may not reflect people's actual attitudes regarding their local area.
- Opposition sometimes also towards the company behind the application rather than the actual technology.

# Refueling Stations

## London

- “Despite government hopes that hydrogen and fuel cells could offer a carbon-free future after the oil runs out, local residents have stopped BP’s plans, fearing a Hindenburg airship-style explosion.” *The Guardian, 10 May 2004*

- “ ...we don’t know much about it at all, other than we used to make bombs out of this stuff.” *Local Hornchurch resident, Mike Dyer, Romford Recorder May 2003.*

- “My feelings are rather strong on this, I think it must be dangerous.” *Local Hornchurch resident, Stephen Kelly Romford Recorder May 2003.*

# Refueling Stations

## Washington D.C.

- “At first, the community didn’t want anything coming in.”  
Wanda Carter, President of the River Terrace Community Organisation.)
- George Smalley, spokesman for Shell Hydrogen, described the company’s failure to contact the neighbouring residents as “one lesson we learned.”

## Perth

- “Time-Bomb Alert on Hydrogen Depot”  
The West Australian June 2004 page 12.
- “Plan Fuels Debate: City to reconsider hydrogen base”  
Eastern Suburbs Community Reporter March 16 2004 page 1.
- “Hydrogen Station Fuels Row”  
Eastern Suburbs Community Reporter June 8 2004 page 3.



bp hydrogen



bp hydrogen



# Driver Perception of H2 FC Buses in comparison to Diesel and NG

- Driver comfort **better** than Diesel and NG
- Comfort for passengers?
- Drivability **better** than Diesel and NG
- Driver effort **same** as Diesel and NG
- Safety **same** as Diesel and NG (*one driver – worse*)
- Pollution, Noise, Smell **better** than Diesel and NG
- Acceleration, Speed, Power generally **worse** than Diesel but the **same** as NG
- Braking **same** as Diesel and NG (*one driver – better*)

# Public Comments to Drivers

## Sample of Public Comments:

- How much do they cost?
- How fast are they?
- Do we have to pay now???
- When are we getting more of these?
- Where does the hydrogen come from?
- This is the way of the future
- Oh, these are the buses that run on steam/run on water

# Conclusions

- Knowledge about H2 vehicles increased after the H2 bus trial, but still relatively low.
- Respondent's perceptions of hydrogen were slightly more positive after the trial.
- Widespread support for the introduction of hydrogen fuel cell buses, although many people would like to be better informed. Unconditional support increased after the H2 bus trial.
- Support derived from perceived environmental benefits - greenhouse gas and air pollution reduction.
- Results encouraging, although enough warnings to demonstrate the importance of a communication strategy as well as a technical strategy for the introduction of hydrogen and fuel cell technology.

# Conclusions cont.

- Translation of perception and attitude into behaviour – electric vehicle (novelty); perceptions of decision-makers (importance of lobbying, correct time, correct people)
- Importance of individuals – both heroes and agitators
- Importance of appreciating the complexities and social influences on the innovation of sustainable transport technologies

# Thank you for your attention

<http://www.acceptH2.com>

<http://www.dpi.wa.gov.au/Ecobus>

