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## **Building professionals' and homeowners' perceptions of the NSW Building Sustainability Index (BASIX) - an overview**



Planning &  
Infrastructure

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# Introduction: Survey of BASIX stakeholder perceptions and household impacts

This document summarises the research findings and outcomes of the 2011 research study report “Building professionals’ and homeowners’ perceptions of the NSW Building Sustainability Index (BASIX)”. The study project was commenced by the University of New South Wales (UNSW) and completed by the University of Canberra. The Project Manager for the study was Dr Patrick Zou, Professor and Head of Building and Construction Management, Faculty of Business, Government and Law, University of Canberra. Dr Zou transferred to the University of Canberra from UNSW during the study.

The main aim of this research was to conduct a review and evaluation of the efficacy of BASIX through the views and perceptions of users and occupants of BASIX compliant houses.

The BASIX scheme, introduced in 2004 is a mandatory planning instrument for reducing energy use, greenhouse gas emissions and potable water use in all new homes across NSW.

Using online questionnaires to collect data, the survey sought to answer:

- How do building professionals perceive BASIX?
- What are householders’ current behaviours, perspectives, and perceptions in relation to energy and water savings and consumption?
- What future improvements can be recommended for BASIX?



**82 BASIX building professionals and 504 householder survey questionnaires were completed**

Two separate surveys, one for building professionals and one for householders (referred to as the householder survey), were conducted to obtain data.

The building professional users of the BASIX tool were asked for their perceptions of how well BASIX has performed to date and how it has impacted the industry.

Householders were asked about their perspectives on residential sustainability as well as how they used fixtures, systems, and appliances to better understand how energy and water consumption is actually allocated in homes built before and after BASIX.

## Building professional survey outcomes

Building professional users were asked to rate and suggest improvements to the quality of assessment guidelines and processes, technical efficacy and usability.

The survey was conducted in May 2011 via an online survey platform housed by University of New South Wales and invitations were sent via email to persons accredited to certify that new homes had met their BASIX commitments. The survey was also made available for completion by other professionals. The following table shows that the respondents had significant experience with BASIX:

### Profile of building professional survey participants

Average period of time in sustainable development	11.0 years
Average number of BASIX buildings certified or otherwise involved with	109.1 buildings
Average period of time engaged with BASIX	5.6 years (maximum is 7)



## **Key findings from the building professional survey**

**Overall, BASIX was considered to contribute positively to national sustainability by reducing residential energy and water consumption, but there was some dissatisfaction with its assessment guidelines and usability.**

- BASIX was considered to have had a positive impact on building insulation and installation of non-electric hot water systems.
- Low-water landscaping was perceived to be least effective in BASIX, and difficult to audit.
- Some concern was expressed over a lack of integration and that BASIX did not fully reflect market practice and stakeholder values.
- A number of respondents also expressed dissatisfaction with the usefulness and effectiveness of supporting resources in BASIX, especially the case study and monitoring reports.

**BASIX is perceived to have influenced professional rather than householder behaviour.**

- The survey responses indicated that BASIX design choices are likely to be made by professionals rather than requested by households.
- Effective BASIX implementation was seen to rely on the knowledge and attitudes of designers and architects, and was hindered by considerations of construction costs and a lack of motivation for better design.

**The clarity of assessment terminologies, definitions, and certification procedures are the most important factors in determining satisfaction or dissatisfaction of building professional users with BASIX assessment guidelines and processes.**

- For overall satisfaction with BASIX resources, the usefulness and effectiveness of the helpline and customer services appeared to be the most important factor.



## **Key suggestions from the building professional survey**

**Motivate users to exceed minimum targets set in BASIX.**

- Suggested incentives included a counter showing monetary savings from exceeding minimum targets in BASIX.
- Greater emphasis on home landscaping to meet BASIX targets should be encouraged.

**Improving the communication of BASIX achievements and value.**

- BASIX sustainability achievements are reported in case studies and monitoring reports, but the usefulness of these resources was ranked as low. This suggests that the BASIX assessment guidelines and procedures may need to be clearer, to have better outcomes reporting and to be more widely disseminated.

**Construction material costs and the knowledge and attitudes of architects and designers are perceived to be the biggest influences on effective BASIX implementation.**

- To address perceptions in the market that sustainable construction materials are not cost effective, a number of respondents suggested that BASIX could collaborate with other stakeholders and government bodies to develop incentives, regulation or awareness programs.

**The specific types of improvement the building professional respondents would like to see in BASIX include:**

- ✓ providing more comprehensive explanation of BASIX terminologies
- ✓ providing more options representing up-to-date technologies
- ✓ improving the DIY thermal comfort assessment tool to ensure it achieves intended sustainability goals
- ✓ integrating BASIX with national sustainability requirements, particularly Building Code of Australia (BCA) requirements
- ✓ incentives and better communication to motivate willing sustainable house design, rather than seeing BASIX as a problem for building professionals to work around
- ✓ sustainability assessment on a life-cycle time span (eg including material choices or embodied energy in the construction and design process).

## Householder survey outcomes

The householder survey collected data on physical and socio-demographic features of the houses, householder behaviour, and their perspectives on sustainability measures.

The householder survey was made available on-line and was open to any participants, but used mail drops (through Australia Post's service) to target householders in 'hot-spot' areas with high concentrations of BASIX certified homes.

Numerous local councils helped to promote the survey via links on their websites or in e-news releases. The following table shows the typical profiles of responding households:

## Profiles of participating households

Criteria	Most common response	Frequency	Percentage
Home type	Detached or separate	450	89.5%
Also a business?	No	439	87.1%
Location	Regional NSW	266	52.7%
Owned or tenant	Owner	398	79%
Year built	Before July 2004	343	68.1%
Number of storeys	1 storey	399	79.2%
Number of bedrooms	3-4 bedrooms	417	83%
Number of bathrooms	2 bathrooms	255	50.8%
Major changes since construction?	No major changes	285	56.8%
Household pattern	Children and adults (no seniors)	226	44.9%



## **Key findings from the householder survey**

**Lower bills from reduced energy and water consumption were considered the most important benefit from sustainable households.**

- Surveyed households had a high incidence of multiple refrigerators /freezers (mean=2.17), televisions (mean=2.18), and computers (mean=2.19), indicating that energy consumption from these appliances is likely to be significant.
- The results also showed that although only about half of all households used air-conditioning for cooling (51.4%), these households had on average 1.9 air-conditioning units each.

**Alternative gas and solar fuel sources featured prominently across the state, but were most common in BASIX households.**

- In the pre-BASIX houses, only 14% of households were using gas instantaneous, and 0.9% chose solar gas boosted as the energy source for hot water systems. However, of the houses that received a BASIX certificate, 47.9% were using gas instantaneous, followed by 9.4% using gas storage, and 5.2% using solar gas boosted.

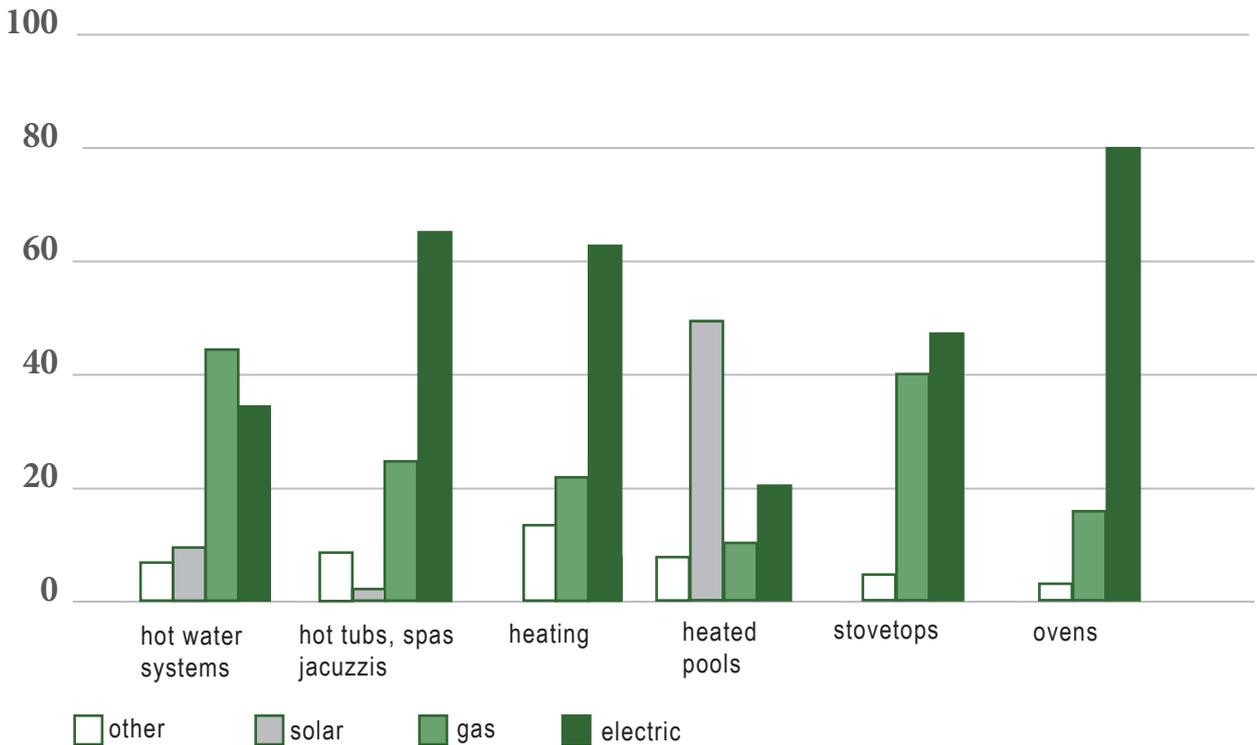
**Lower emission gas and solar fuel sources featured prominently in most pre-BASIX and BASIX households.**

- Semi-detached or terrace houses, units, town houses and duplexes were more likely to use electricity as the main type of fuel for kitchen cooktops.
- BASIX homes built after July 1, 2006, most often chose natural gas as the main type of fuel for kitchen cooktops.
- About half of the pre-BASIX households (42.2%) chose natural gas as their fuel for stovetop burners, comparing to 79.2% in the BASIX houses
- However, gas fuel for heating appears to be decreasing in favour of electric air-conditioning - more than half of the homes built after July 1, 2004 were using central (ducted) air-conditioning systems for heating, whereas in houses built before July 1, 2004, gas fixed flued heaters featured fairly equally alongside central systems and portable heaters.

**Energy used for heating and cooling appeared to decrease in newer, BASIX homes.**

- The later a home was built, the higher householders perceived the quality of indoor thermal insulation quality.
- Householders in homes built after July 1, 2006 tended to use less air conditioning in summer and heating systems in winter compared to those in the houses built before that time.

## Proportion of electricity and alternative fuel use in householder system selections



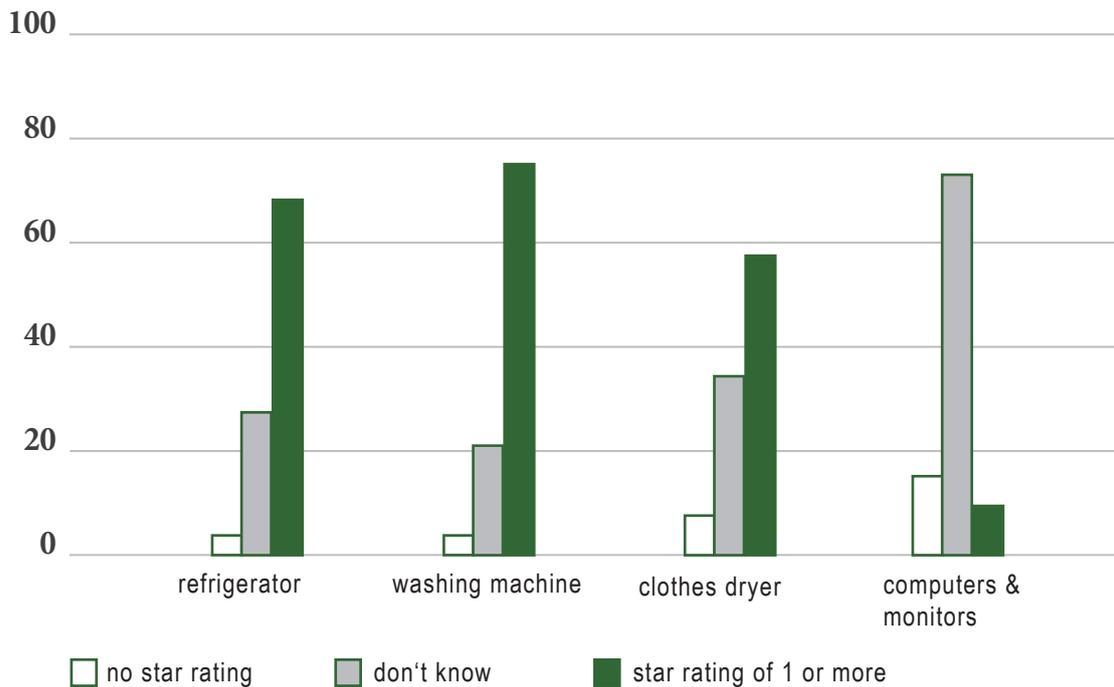
**Most households had multiple refrigerators, televisions and computers.**

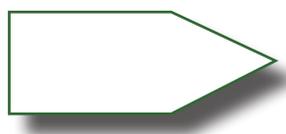
**Respondents exhibited awareness of ways to improve household sustainability, but were often unaware of appliance efficiency ratings, or owned unrated appliances.**

- More than three quarters (75.9%) of the householders knew more than two ways to reduce household impact on the environment, indicating some level of householder awareness and education on sustainability.
- The most commonly cited methods to reduce impacts were using energy efficient bulbs (35.4% of responses), solar power (35.4%), and switching appliances off at the wall (31.4%).

- There was no significant difference between different groups (year of construction and income) regarding this knowledge.
- However, a large number of householders were unable to identify their refrigerator, clothes washer or dryer ratings, or owned unrated appliances. Almost all householders did not know the energy star ratings of their computers or had unrated computers (89.3%) and 54.5% did not know the Cooling Efficiency Rating of Main Air-conditioning.

## Appliances with star ratings





## Key suggestions from the householder survey

Note: some suggestions from the survey may be outside the remit of planning and building regulation.

### **Promote opportunities for sustainability improvements, by reducing perceptions of high material costs and improving government incentives.**

- Many households exhibited a high awareness of, or had already implemented, a number of key sustainability improvements, particularly the use of energy efficient bulbs, gas hot water, or avoiding idle 'standby' power use by switching appliances off at the wall.
- However, a number of potential improvements scored poorly, which may be due not just to a lack of awareness, but also due to high cost or a lack of government incentives (the two major perceived hindrances to achieving sustainable households). Underperforming areas reflected in the survey included:

Performance glazing,  
Energy efficiency in outdoor lighting, and  
Appliance efficiency.

### **Raise the BASIX target to take account of increased emissions from new sources.**

- A number of respondents noted that the proliferation of multiple fridges, computers, air-conditioners and televisions may be countering some of the emissions reductions achieved by BASIX. However, it would be difficult to include some of these appliances in BASIX commitments.
- Raising the energy target may be a viable means to ensure the success of BASIX is not undermined by the increased energy consumption from these sources.

**Include outdoor lighting in BASIX.**

- Each household had on average 4.5 outdoor lights, but only 30.3% were identified as energy efficient. Assessing outdoor light bulbs and dedicated fittings in BASIX could improve the penetration of energy efficient bulbs for outdoor use.

**Improve BASIX tutorials and support materials to focus on areas where sustainable choices do not appear to be widely taken up.**

- BASIX support materials used to assist in meeting BASIX targets could direct specific attention to sustainable choices that could be more widespread, such as using gas for cooking and heating.

## **Acknowledgements**

### **University of New South Wales**

This project was commenced at the University of New South Wales (UNSW) under the project management of Dr Patrick X.W.Zou, then Associate Professor and Program Director, Construction Management and Property, Faculty of Built Environment. Many staff at UNSW provided the research team with help and support; in particular: Professor Alec Tzannes, Dean of Faculty of Built Environment; Professor Allan Peters, Deputy Dean of Faculty of Built Environment and Head of School; Professor Bill Randolph, Associate Dean (Research) of Faculty of Built Environment; and staff at the University's legal office, grant management office and financial office.

### **University of Canberra**

After being transferred to University of Canberra (where Dr Zou continued to manage the study, having been appointed as the University's Professor and Head of Building and Construction Management), the project received support and help from that University, in particular: Professor Lawrence Pratchett, Dean of Faculty of Business, Government and Law; Dr Don Fleming, Associate Dean (Research) of Faculty of Business, Government and Law; and staff in the Research Service Office and in the Faculty of Business, Government and Law.

### **NSW Department of Planning and Infrastructure**

The project was supported and partly funded by the NSW Department of Planning and Infrastructure. The Department's ePlanning Branch provided technical advice and support to the research team throughout the project.

### **Contributors**

Several people made direct contributions to the research and the project report, including Dr Benson Lim at UNSW who developed the draft survey questionnaire; Dr Rebecca J. Yang at Deakin University who undertook initial analysis of the data and drafted contents related to the householder survey (ie Chapter 3); Ms Tingting Cui, who was employed as a research assistant by the project and undertook initial analysis of the data and drafted contents related to the building professional survey (ie Chapter 2); Ms Fatima Afzal, who was employed as a research assistant by the project, and helped in the data collection process; and Mr Nicholas Landreth, who was employed as a research consultant and proofread the report.

Also acknowledged are the numerous local councils and the Association of Building Sustainability Assessors (ABSA), who provided support and helped in the process of data collection; and all of the respondents who participated in the questionnaire surveys.

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