

## THE IMPACT OF SOLAR PANELS ON THE PRICE AND SALEABILITY OF DOMESTIC PROPERTIES IN OXFORD

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Energy efficiency is no replacement for a good location, being an appropriate size, the building being in good condition and all the other factors that influence buyers, however, it can play a role in influencing the value of a property (HM Government 2009, 33).

Studies into energy efficiency and micro-generation in the built environment tend to focus on the economic or environmental paybacks of installed technologies. However, as the opening quote suggests, features that reduce the energy consumption of a property may also play a role in influencing property value.<sup>1</sup> To date research into whether and to what extent energy efficiency and micro-generation technologies, such as solar panels, affect the price and saleability of properties has been limited and the assumption amongst property professionals has been that these installations do not affect the price or saleability of properties (Home Sale Network 2009; RICS 2010). This paper addresses the topic by reporting the results of a study which examined property buyer responses to solar panels and explored the expectations of householders and estate agents surrounding solar panels and value in domestic properties in Oxford.

Over the past decade literature on sustainable buildings has started to diverge from that solely focussed on technological issues and started to explore perceptions of the value of sustainable or 'green' features (Sayce et al 2010, p30). Choice based studies have suggested that individuals would be willing to pay up to 13% more for properties with certain energy efficiency improvements (Banfi et al, 2005) and around £2,380 for solar photovoltaics and £2,900 for solar thermal systems (Scarpa et al. 2010). However property valuation literature suggests that property prices are driven by demand and, as yet, there is little evidence to indicate increased demand for sustainable or efficient buildings (RICS 2010; Sayce et al. 2010).

The literature also indicates the pitfalls of determining how renewable and energy efficiency features affect the 'value' of properties, in particular the inability of both surveys and transaction data to represent actual value to consumers. However, the literature also identifies a clear need for research in this area. As a whole, information for consumers, professionals and policy makers on the link between property value and sustainability is currently insufficient and, as such, guidance for policy-makers on how to encourage investment in domestic energy efficiency and renewable energy measures is incomplete. In response to this a UCL study was undertaken, in partnership with Oxford City Council, to explore the link between installations of solar energy and value in domestic properties in Oxford. This paper reports the findings of this study.

### Hypothesis

The hypothesis of the study was that installations of solar photovoltaic and solar thermal panels add value to, or increase the saleability of, the properties in Oxford on which they are installed. The hypothetical 'value added' could be expected to be a function of:

- expected fuel savings per year (x)
- expected number of years during which savings will accrue (i)
- consumer discount rate (r)

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<sup>1</sup> This is also an assumption made in the government's Green Deal Impact Assessment (Department of Energy and Climate Change 2011).

These parameters can be expressed as net present value to the house buyer as:

$$NPV = \sum_{i=1}^n R / (1+r)^i - C$$

Where R = expected annual revenue, r = consumer discount rate, i = amount of years over which the savings will accrue and C = the initial cost. If we assume that the average Oxford house buyer stays in a property for 12 years (HM Government 2009), the average saving per year is £50 for a solar thermal system (EST 2010a), £190 for solar PV system (EST 2010b) and the capital cost to the house buyer is zero, we could expect solar thermal panels to add £341 to the value of a property and solar photovoltaic panels to add £1295.<sup>2</sup>

This calculation assumes that:

- the house buyer has reliable information on the savings associated with the solar panels
- the house buyer knows at the time of purchase how long they will stay in the property
- no other information or perception affects their decision, such as familiarity with the technology, association with 'green' issues, or the converse, or aesthetic opinions, positive or negative.

In reality the perceptions and associations a householder has regarding solar technology are likely to be as important, if not more important, to their purchase decision than the economic benefits. Furthermore, it would be wrong to assume that the influence of solar panels on house prices will always be positive; the study hypothesises that 'direction of travel' would be different according to whether the individual has positive or negative perceptions of and associations with solar technology.

## Methodology

A mixed methodological approach was adopted within the study. For the quantitative aspect, a questionnaire was designed to gather information on the attitude of potential property buyers towards properties with visible solar panels and explore what might influence their purchase decision. For the qualitative aspect, both estate agents and householders were interviewed using a semi-structured approach.

In order to gauge prospective buyers attitudes to the aesthetics of solar panels two images were used in the prospective buyer questionnaire; an evacuated tube solar thermal panel and a Mitsubishi solar photovoltaic panel. The questionnaires were distributed in hard copy and electronically to potential property buyers via eight participating estate agents. As an incentive to encourage participation respondents were offered entry into a prize draw for a £30 Marks and Spencer voucher. The average response rate was 4% made up of 7% of hard copies and 2% of e-mails. Responses were in-putted into a spread sheet to enable data analysis.

For the qualitative aspect, estate agents and householder were interviewed to gather their opinions of how solar energy installations affected the value of properties. Interview questions were designed to gather information from estate agents about properties sold with solar energy, explore their attitudes to renewable energy and gauge their opinions on client preferences. Members of staff at five estate agencies were interviewed and interviews were transcribed, read, reviewed and re-read, drawing out key themes and salient quotes from the data.

Householder interviews were designed to gather data from households with solar installations in order to gauge attitudes towards installations and property value. Questions were tailored to

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<sup>2</sup> i = 12, R (thermal) = 50, R (photovoltaic) = 190, C = 0. A private discount rate is of 10% is used therefore r=0.1.

reflect whether the householder had installed the panels themselves or had bought the property post-installation. Households were identified via the Oxford Solar Map, and by ad hoc visual surveys. Interviews were conducted by cold calling and as an incentive respondents were offered entry into a prize draw for a £30 Marks and Spencer voucher. Where householders were not in, or unavailable, a paper copy of the interview was left, 7% of these were returned by post. Households interviewed represented 33% of the known solar energy installations in Oxford.

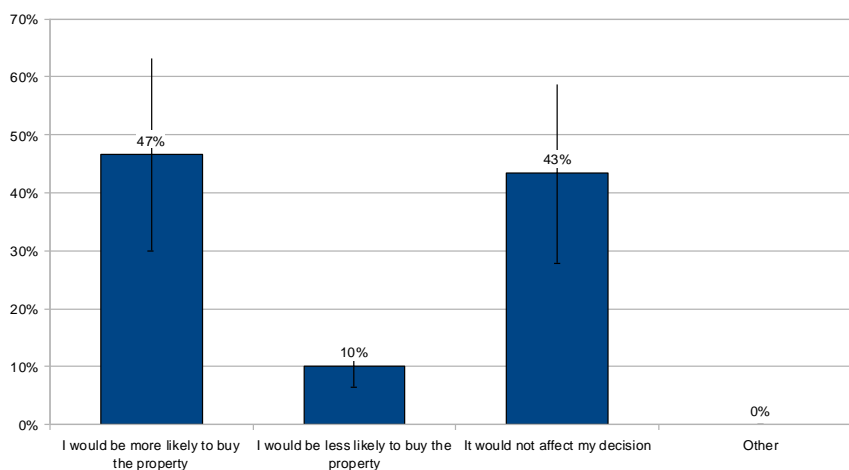
## Results

### *Questionnaire responses*

The study collected some evidence that solar panels increase the saleability of properties: responses to Questions 1 and 6 of the prospective property buyer's questionnaire showed that those more likely to buy properties with solar exceeded those less likely to buy them, see Charts 1 and 2. The difference between those more likely to buy and less likely to buy a property with solar is 37% for solar thermal and 17% for solar PV. This implies that, on aggregate, between one sixth and one third of householders would express a preference for a property with solar panels, in a like-for-like situation.

A significant proportion of respondents said the panels would not affect their decision to buy a property.<sup>3</sup> This suggests market signals from those with a preference for solar panels might be diluted by those who are ambivalent towards them, and therefore signs of increased saleability are likely to be marginal. The questionnaire responses indicated that the savings on fuel bills are a key selling point, followed by the property's reduced environmental impact.<sup>4</sup> Those who were less likely to buy properties with solar panels generally did not like the look of them.<sup>5</sup> Very few respondents said they would be less likely to buy property with solar because they didn't understand the technology or the benefits.<sup>6</sup>

*Chart 1: Responses to Q1: Would visible solar hot water panels, like those on the right, affect your decision to buy a property? (n = 30)*



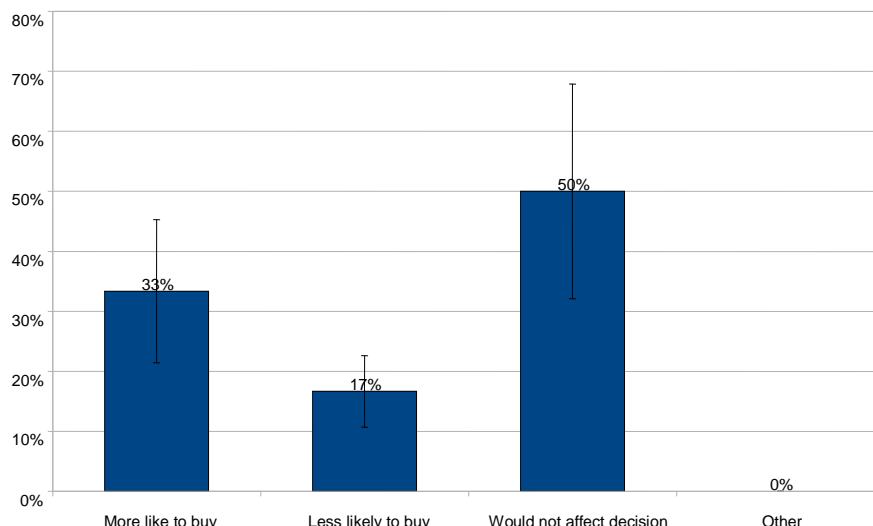
<sup>3</sup> 43% of all respondents stated that solar thermal panels would not affect their decision to buy a property. 50% of all respondents stated that solar PV panels would not affect their decision to buy a property.

<sup>4</sup> 43% of all respondents stated they would be more likely to buy a property with solar thermal panels because they would reduce the property's energy bills and 30% of all respondents said they would be more likely to buy a property with solar PV panels because they would reduce the property's energy bills. 17% of all respondents stated they would be more likely to buy a property with solar panels (PV or thermal) because of they would reduce the property's environmental impact.

<sup>5</sup> These people represented 13% of all respondents.

<sup>6</sup> 7% of all respondents stated they would be less likely to buy a property with solar thermal panels as they did not understand the technology and 3% of all respondents stated they would be less likely to buy a property with solar PV because they didn't understand the technology and 3% of all respondents, for both solar thermal and solar PV, stated they would be less likely to buy a property with solar panels as they did not understand the benefits.

Chart 2: Responses to Q6: Would visible solar electricity panels, like those on the right, affect your decision to buy a property? (n = 30)



The study uncovered little evidence that solar panels affect house prices; 17% of all respondents were willing to pay more for a property with solar thermal panels and 13% of all respondents were willing to pay more for a property with solar PV panels. Those willing to pay more for a property with solar panels would pay on average £1,500 more for a property with solar thermal, and £1,750 more for a property with solar PV.<sup>7</sup>

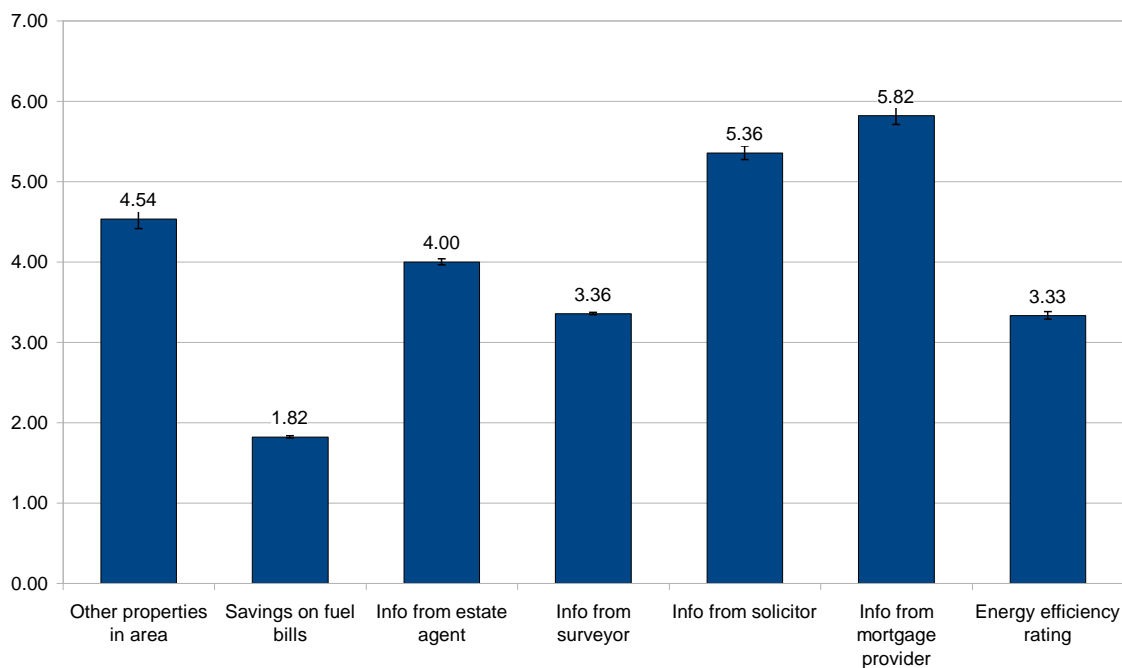
By multiplying this average extra paid by the percentage of respondents willing to pay more, it is possible to derive a figure which represents the average value added. For solar thermal this figure is £250 and for solar PV £233. The implication is that, if a number of properties with solar panels in Oxford were sold, an agent could expect to get, on average, around £250 extra per property. This result cannot be considered statistically robust however as it is based on a small number of responses.<sup>8</sup>

The most influential factor in purchase decisions on properties with solar panels was information about savings on fuel bills, see Chart 3, with 53% of respondents ranking this as the factor that would have the greatest influence on their purchase decision. Next most influential is knowledge of the property's Energy Efficiency Rating, then information from surveyors and estate agents. This supports the assertion that property professionals are “well equipped to assist in raising public [...] awareness” (RICS 2010, 10) and also tends to support assertions that Energy Efficiency Ratings and Energy Performance Certificates do in fact influence purchase decisions (EST 2009; NHER 2009).

<sup>7</sup> These amounts are the sum of the product of the percentage who selected price range by the central value of the range.

<sup>8</sup> It also assumes that those who stated that they are more likely to buy a property with solar panels, but were unsure of whether they would pay more for it (30% of all respondents for solar thermal and 27% for solar PV), would not pay more and those who stated they would be less likely to buy a property with solar panels (10% for solar thermal panels and 17% for solar PV) would not pay less. These assumptions cannot be tested without a more detailed study examining how intentions correlate with actions in home purchasing.

Chart 3: Responses to Q11: Please rank the following in order of the influence they would have on your purchase decision on properties with solar panels, 1 = Greatest influence, 7 = Least Influence? (n = 127)



#### Interview responses

In interviews most estate agents said that they believed solar panels did not affect the saleability of properties, either positively or negatively. A common explanation was that house buyers had a list of features they were looking for and that renewable energy installations were not included: “Property purchases are driven by need, for example the need for more bedrooms, so size, location and budget are the key factors” [Interview 3]. One agent stated that he thought solar might make properties less saleable amongst his clients: “In some areas... a property with solar panels might be more popular. However many of the properties we sell are large houses and solar panels would not be a big selling point. In fact some people might even turn their noses up at properties with solar panels” [Interview 2].

Agents who had sold properties with solar panels were unanimous in stating that, in their opinion, it had made no difference to the sale: “It didn't improve the viewing level but didn't deter them either” [Interview 5]. Only one agent said that solar panels would affect their valuation of a property: “We would take it into account, yes it's important to us” [Interview 4]. The majority however<sup>9</sup> said that solar panels would not affect their valuation. Where agents had sold properties with solar panels most<sup>10</sup> had not mentioned the panels on the property's particulars, one agent stated “I didn't consciously leave them off the properties information sheet. I just didn't think it would add value. With a house of this size [4 bedroom] the savings on the fuel bills will barely be noticeable” [Interview 2].

Householder interviews indicated that, to some buyers, solar panels were considered an asset; “It was a huge plus to me. I couldn't believe that the estate agents were so negative about them.” [32]. This supports the view that value may not be fully reflected by transactional evidence (Sayce et al. 2010, p18). Another householder stated, “We wouldn't have not bought [panels] but they're nice to have” [44]. This suggests that panels could increase property saleability but not price.

<sup>9</sup> 4 out of 5 stated that solar panels would not affect their valuation.

<sup>10</sup> 4 out of 5 did not mention solar panels in the property's information sheet.

There was some disagreement amongst householders as to whether solar panels would affect the value of their properties: many<sup>11</sup> of those who had installed solar panels themselves thought that the panels would increase the value of the property, however, all of those who had bought a property with solar panels were unsure as to whether they would add value or not. Half the householders who had bought properties with solar panels were given no information at all about them at the time, the remainder were either given the installer's details or a manual.

## Conclusions

The study concludes that demand for properties with solar panels in Oxford does exist amongst prospective homebuyers but it is not, at present, being translated into increased property values. Estate agents were largely negative or uncertain about the added value and saleability of properties with solar and, in the majority of cases, did not mention panels in particulars or factor them into valuations. This supports the assertion that a "vicious circle" exists around features that reduce energy consumption and property value (RICS 2010, 4); property professionals do not draw attention to features that reduce household energy consumption, such as solar panels, because they do not believe they will add value and therefore buyers do not get the opportunity to express preferences for them.

The study found considerable ambivalence towards solar panels with around half of the prospective buyers surveyed stating the presence of solar panels would not affect their purchase decision. Based on questionnaire and interview responses, the study hypothesises that this ambivalence may partially stem from a lack of information given to prospective buyers on the fuel bill savings associated with solar panels. Therefore the study suggests that providing information about fuel savings at, or before, the point of sale might increase the price or saleability of these properties. Finally the study suggests that Energy Efficiency Ratings and information from surveyors and estate agents could have an influence on prospective buyers purchase decisions and therefore that these could be appropriate channels for information about the savings from renewable energy installations.

## Full Report

The full study report can be accessed from:

<http://www.oxford.gov.uk/Direct/SolarValueStudyFinalReport.pdf>

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<sup>11</sup> 10 out of 23 of those who had installed solar panels stated they thought the panels would increase the value of the property

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