

# Solar for Housebuilders



A Technical Briefing From  
The Solar Trade Association



# Solar on New Homes

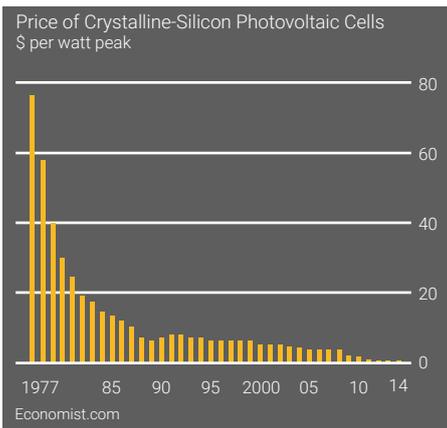
The Solar Trade Association believes that solar is a perfect partner for housebuilders looking to economically deliver good looking, low carbon homes for modern house-buyers. Solar is a fast-moving technology, and sometimes challenging even for those working in the industry to keep up with. This briefing covers recent developments that impact housebuilders.

## Since you Last Looked at Solar....

### Costs Have Fallen

As global production of solar PV has grown, the cost of the cells and panels has fallen dramatically. Scale economies have also driven down the cost of 'balance of system' components such as electrical inverters.

A volume market has encouraged innovation in fixing systems. Dedicated products to work with different roof coverings speed installation and low-ballast flat roofing systems reduce loads on the roof structure. A skilled workforce has developed, leading to significant efficiencies in installation.



### Reliability is Proven

There are concerns in the construction industry and government about the energy 'performance gap'<sup>2</sup> between houses as-built when compared to the 'as-designed' calculations. By contrast, there is a growing body of evidence<sup>3</sup> that, if anything, the Standard Assessment Procedure (SAP) underestimates the energy yield from solar.

Over recent years, solar has proven itself to deliver the energy savings it promises, and to do so reliably. Complaints received by the Renewable Energy Consumer Code averaged less than 1% of all solar PV installations over the period 2010 – 2014, a period which included very rapid deployment during successive cuts to the Feed in Tariff. Independent assessment of the performance of PV panels by Sheffield University<sup>4</sup> showed that 98% of installed systems worked according to their specifications.

### More Aesthetic Options are Available

Integrated solar products that replace traditional roofing materials look more like an intended part of the building design and less like a 'bolt-on'. Suppliers of roof integrated solar, including a number of home-grown manufacturers in the UK supply PV roofing materials in a range of different formats.

The Solar Trade Association has produced a booklet – [Stunning Solar](#)<sup>1</sup> – that showcases aesthetic solar design.

The solar industry in the UK has developed MCS012 testing to ensure that such products comply with building regulations on wind resistance, weather tightness and external spread of flame.



## Less Roof Area is Needed

As more efficient solar cells become available, the power output of each panel increases, and less of the roof needs to be given over to solar for a given annual energy output.

The industry has relentlessly pursued higher efficiency and over the last decade the average power output of solar panels entering the market, measured in Watts-peak (Wp), has increased by 2-3% every year<sup>5</sup>. In 2010 a typical domestic installation would have been made up of 220Wp panels. By 2014 this had risen to 250Wp. While the 250Wp panel has become something of an industry standard as it divides neatly into 1kWp, panels at 275Wp are commonplace today and many manufacturers of standard-size panels are approaching 300Wp.

## Technical Solutions to Partial Shading are Available

The emergence of micro-inverters and power optimisers in solar design have reduced the effect of shading on solar arrays. These electrical devices are fitted to each individual panel and consequently when one panel is shaded it does not affect the performance of the whole system. These innovations enable solar to be installed on complex shaped roofs or between dormer windows.

## Customer Demand has Risen

There are now more than a million homes in the UK with solar (4% of all homes), most of which have chosen to install solar as a retrofit. That's made up of around 800,000 homes with solar PV and 200,000 homes with solar thermal.

Solar regularly tops the polls of the most popular form of energy, with an approval rating over 80% DECC's public attitude tracking survey<sup>6</sup>. Solar provides homeowners the 'feel-good' knowledge that a significant amount of their energy use is met from their own roof, visibly saving them money.

Evidence that solar adds value to homes is also beginning to emerge. A survey by Barclays<sup>7</sup> found that solar was in the top five technologies that homebuyers are looking for, and could add £2,000 to the value of a property. GoCompare<sup>8</sup> also placed solar panels in the top ten UK home improvements. A recent authoritative US study across eight states showed an average sales premium of \$4,000/kW for homes fitted with solar PV (covering both new build and existing homes)<sup>9</sup>.



## New Approaches to Cost-Optimal House Designs Have Emerged

Understanding how to use solar in cost-optimal home designs has taken housebuilders a while to get to grips with. Not only have the rapid price reductions for solar made it challenging to keep track, but its price-performance curve differs from those of other energy saving measures. Fabric-based measures tend to follow a law of diminishing returns where the next improvement in energy saving needs the addition of progressively more insulation. By contrast, the larger a solar system you use the cheaper the CO<sub>2</sub> savings become.<sup>10</sup>

| Size of PV Array                | kWp                     | 0.5    | 1.0    | 2.0    | 4.0    |
|---------------------------------|-------------------------|--------|--------|--------|--------|
| Installed Cost (newbuild, 2016) |                         | £1,000 | £1,500 | £2,400 | £4,600 |
| Carbon Saving                   | kgCO <sub>2</sub> /yr   | 221    | 441    | 882    | 1,765  |
| Cost of Carbon Saving           | £/kgCO <sub>2</sub> /yr | £4.53  | £3.40  | £2.72  | £2.61  |

The implications of this unusual price curve are:

- There may be a combination of solar and fabric measures that is more cost effective than fabric alone.
- If energy modelling suggests that you need a small solar system, you should also explore the total cost of a larger solar system combined with savings elsewhere.
- The cost optimal combination of solar and fabric will be constantly changing as the costs of solar decline.

STA members are reporting that more housebuilders, energy assessors and architects are requesting prices for a range of sizes of solar system, indicating that they have understood the opportunity solar offers to optimise overall construction costs.

# Electric Vehicles and Battery Storage are on the Charge

The energy system of the future is emerging before our very eyes, and it's going to change the way people live. It will be made up of distributed renewable electricity generation coupled to battery storage (both stationary and in electric vehicles). The pace of change of this transition is already catching out legislators and energy companies alike.

The home of the (very near) future will generate its own power, store it for evening use, and provide a power hook-up for electric vehicles. The UK fleet of electric vehicles will store excess power from the grid during sunny or windy periods and release the power back into the grid at times of peak demand. Solar and storage is a match made in heaven.

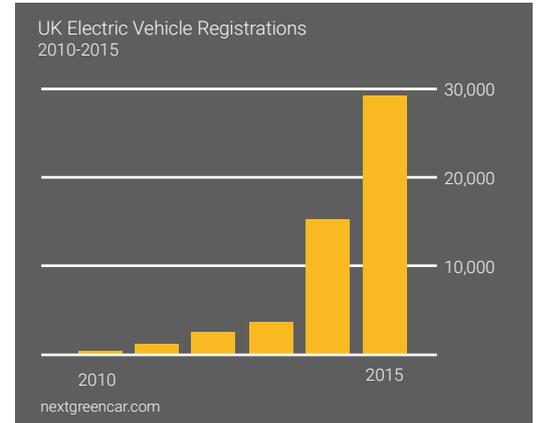


Image: Tesla

## References and Further Reading

1. <http://www.solar-trade.org.uk/stunning-solar/>
2. <http://www.zerocarbonhub.org/current-projects/performance-gap>
3. [http://www.microgen-database.org.uk/uploads/zinnia/files/UK\\_PV\\_Annual\\_Yield\\_2013.pdf](http://www.microgen-database.org.uk/uploads/zinnia/files/UK_PV_Annual_Yield_2013.pdf)
4. <http://www.sheffield.ac.uk/news/nr/microgen-sheffield-solar-farm-alastair-buckley-photovoltaic-1.223530>
5. Siemer, J and Knoll, B "Still More than Enough" Photon International feb2013 p73.
6. <https://www.gov.uk/government/collections/public-attitudes-tracking-survey> : up to Wave 13 at which point DECC stopped asking about individual energy sources.
7. <http://www.barclays.co.uk/digital-homes>
8. <http://www.gocompare.com/press-office/2016/top-uk-home-improvements/>
9. Summary factsheet: [https://emp.lbl.gov/sites/all/files/lbnl-6942e-fullreport-factsheet\\_0.pdf](https://emp.lbl.gov/sites/all/files/lbnl-6942e-fullreport-factsheet_0.pdf) Full report: <https://emp.lbl.gov/sites/all/files/selling-into-the-sun-jan12.pdf>
10. For more information on this see: <http://www.solarblogger.net/2015/08/fabric-first-but-not-second-and-third.html>

## Solar Trade Association

53 Chandos Place, London. WC2N 4HS  
0203 637 2945  
[enquiries@solar-trade.org.uk](mailto:enquiries@solar-trade.org.uk)  
[www.solar-trade.org.uk](http://www.solar-trade.org.uk)  
[@thesolartrade](https://twitter.com/thesolartrade)