Solar PV Panels

A talk by
Ham and Petersham Street Champions
Solar PV Panels

An Overview: Chris

Photovoltaics

PHOTO = Light
VOLTAIC = Electric
Solar PV panels capture the sun's energy and convert the sunlight into electricity.

On-Rooftop PV  In-Rooftop PV

Images from SolarMicrogeneration.co.uk
Solar PV panels capture the sun's energy and convert the sunlight into electricity.

PV Tiles
(conservation area)

Flat Roof PV

Images from solarcentury.co.uk and engenius.co.uk
In House PV Equipment

- Solar PV panels
- Inverter (turns AC to DC)
- Isolation switch
- Generation meter
- Distribution board
- Your existing electricity meter
- And your new hand-held PV monitor
Definitions

1 kWh "kiloWatt hour" = 1 Unit

Example
If a 1 kW kettle is on for 1 hour then it uses 1 kWh = 1 unit
If a 2 kW iron is on for 2 hours then it uses 4 kWh = 4 units

1000 W = 1 kW
If 5 lamps are 100W and are on for 5 hours they use :
(5 lamps x 0.1 kW) x 5 hours = 2.5 kWh = 2.5 units
1 kWp “kiloWatt peak”

A PV system capable of producing 1kW of power at its maximum

Panels are rated in Wp. 1000 Wp = 1 kWp

10 panels x 200 Wp each = 2,000 Wp = 2 kWp total system

But solar panels produce varying amounts of electricity depending on how much light there is. The kWp rating is just a measure of capacity. Typically, over the course of a year…

1kWp (South) will generate 800-900 kWh of electricity per year

2kWp will generate twice that
What is the Feed In Tariff (FIT)

1. The FIT pays you for the electricity your panels generate. The *Generation Tariff* = 43.3p/kWh

2. You save on the electricity that you have not needed to buy from the grid = 12.5p/kWh

3. Any electricity that is not used within your house is exported. You are be paid 3.1p/kWh. The *Export Tariff*
How much do you get?

This means that you receive/save 55.8p if you use the electricity you produce or 47.4p if you don’t use it.

The FIT is both index linked and guaranteed for 25 years.

“Don't think solar panels are just about...saving the planet, they can save you serious hard cash.”

Martin Lewis, MoneySavingExpert.com
Solar for free??

Some companies offer free panels in return for the FIT.

Your savings will still be in the order of around £52/year (per kWp installed)
…but you’ll be missing out on around £366/year (per kWp installed) without the FIT.

Figures from energysavingtrust.org.uk are for each kWp installed.
Solar PV systems don’t require planning permission if they are on a pitched roof and do not protrude more than 200mm above the roof surface.

Panels on flat roofs or on any roof in a conservation area will need planning permission.
Solar Orientation: how much energy?
Solar Orientation: how much energy?

<table>
<thead>
<tr>
<th>TILT degrees</th>
<th>West</th>
<th>South</th>
<th>East</th>
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<tbody>
<tr>
<td>90</td>
<td>87</td>
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**Best:** Facing South at 20-40°

5-10% loss if low pitch or SE/SW

10-15% losses if East / West

Image from energysavingtrust.org.uk
## Guideline PV Costs & Savings

<table>
<thead>
<tr>
<th>Technical &amp; Performance</th>
<th>Cost</th>
<th>Annual Benefits &amp; Savings</th>
<th>CO₂ Savings</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Cost inc VAT at 5%</td>
<td>Feed In Tariff Revenue</td>
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<tr>
<td>Size</td>
<td>Area m²</td>
<td>Generation kWh</td>
<td>£6,370</td>
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<tr>
<td>1.52</td>
<td>8</td>
<td>1292</td>
<td>£7,640</td>
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<tr>
<td>1.9</td>
<td>10</td>
<td>1615</td>
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<td>2.28</td>
<td>12</td>
<td>1938</td>
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<td>2.66</td>
<td>14</td>
<td>2261</td>
<td>£9,833</td>
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<tr>
<td>2.85</td>
<td>15</td>
<td>2422.5</td>
<td>£10,449</td>
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</tbody>
</table>

Costs and savings provided by Ardenham Solar Energy August 2011
Solar PV Panels

Case Study 1: George and Zoe

6-Panel system
Installed early 2009
New Road
Solar PV Panels

Case Study 2: Edmund

10-Panel system
Installed September 2010
Mornington Walk
The Good:

• Near perfect south-east facing location
• Easy two-day installation of panels (done in atrocious weather)
• Install and forget (so far)
• On track to receive about £900 FiT payments in the 12 months to September

• House ‘energy neutral’ on sunny days – so consumption is falling as well

• Over 1.8MWh generated and over 1.4 tonnes of CO₂ avoided
The Less Good:

- The need for two separate electricians to visit (DC and AC)
- The onus is on us to submit (unaudited) FiT readings every three months – no reminders
- June and July not as sunny as hoped!
Solar PV Panels

Case Study 3: Justine

12 Panel system
Installed December 2010
Wates Estate
Why Solar Panels?

• My contribution to ‘saving the world’ – 1 tonne of carbon a year!
• Saving money on electricity
• Good investment on my savings
How does it work?
The details...

Power (KW)

Time

Electricity Bought As Normal

Exported to Grid

Free Generated Electricity

Max. Solar Energy

Electricity Used

PV Generation

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The sums

- Cost to install 2.1KWP panels = £10,000
  - Free electricity from solar energy generated
  - Any excess that isn’t used in our house is exported back to the national grid
  - Energy company pays for each kWh generated (FiT) and this is guaranteed for 25 years
Inverter

- In the loft
- Converts PV generated DC electricity to AC and connects to the existing circuit
Electricity meters
Feed- in Tariff

• Every 3 months
  – Since installed in December 2010
    ▪ 16 December 2010 = 0kWh = £0
    ▪ 16 March 2011 = 255-ish kWh = £269.20
    ▪ 16 June 2011 = 1016.7KWh = £372.04
  Aug 20 = 1640kWh
  ▪ 16 Sept 2011 = Next reading ?
Imeasure readings

For week ending 7th August, 2011 your household emitted 23 kg CO₂

www.imeasure.org.uk
Introducing….The Sunnyboy!
Power today

Power yesterday

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Revenue

CO2 avoided

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Solar PV Panels

Case Study 4: Jon

8 Panel system
Installed December 2010
Cowper Road
My motives:

• Concern for the environment
• Legacy
• Cost-effective
• Support from Green Streets project
• Subsidy/ discount of £2,700
• Interest-free loan
• Highest level of Feed in Tariff
Home energy consumption

- 2010: 2,400 kW hours electricity.. £410
  4,500 kW hours gas..... £230

- Solar Panels
  generating 1,380 kWh per year
  £570 + £20 + £200 = £790
  System cost: £8,250

- Payback ....about 10 to 11 years?
South-facing roof
The frame is fitted
8 panels installed
Isolator and generation meter
Cloudless day

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Cloud comes and goes
Electricity use vs generation

Month

KWhours

January March May July September November

Electricity used Solar

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Good and bad experience

- Good price
- Big company – gives confidence
- Well-known panel manufacturer (Sharp)
- Quick workers

- Lack of experience
- Communications
- Wrong inverter
- Meter not connected correctly
- Incorrect meter for house
- Incorrect certificate
- No explanation of how to claim
Trinity Village, Bromley
65 panels
Thank you

8 panels
More on solar tiles

A popular make of solar tile is C21e and a good guide to solar tiles and solar slates is available from the SolarCentury website.

Other installers and products do exist, please check GreenBookLive and do shop around.

www.solarcentury.co.uk/installers-and-roofers/products/solar-tiles/
Useful Links

GreenBookLive.com for certified installers in your area:
www.greenbooklive.com/search/scheme.jsp?id=117

The Energy Saving Trust have a very good guidance:
www.energysavingtrust.org.uk/Generate-your-own-energy/Solar-electricity

Friends of the Earth guide is also recommended reading:
www.foe.co.uk/resource/factsheets/feed_in_tariffs.pdf
Thank you
We are happy to take your questions?