

On the brink of a bright future?

Insights on the UK solar photovoltaic market

Between January and April 2010, PricewaterhouseCoopers¹ LLP (PwC) conducted research into and analysis of the solar markets across Europe.

Key findings

- Current installed solar capacity is small – Britain is a decade behind the leading European countries
- Some important building blocks for growth are now falling into place – recently introduced feed in tariffs have the potential to kick start growth
- PwC expects significant growth in capacity in the medium term – capacity could reach 1,000 MW by 2015
- The UK solar industry is not geared up for this growth – this is especially true for downstream, e.g. installers
- In order for the UK industry to fully benefit from the solar potential, significant investment in training, scale and professionalisation is necessary
- The industry will transform from a cottage industry, driven by consolidation and new entrants

1. "PricewaterhouseCoopers" refers to PricewaterhouseCoopers LLP (a limited liability partnership in the United Kingdom) or, as the context requires, the PricewaterhouseCoopers global network or other member firms of the network, each of which is a separate legal entity.

Summary

Over a period of 3 months, PwC interviewed 25 companies across the UK solar value chain, conducted research into the UK and European solar markets and formed a view on the future potential of the sector for the UK.

Status quo

- Solar PV represents only 0.3% of renewable energy in the UK installed today.
- Current solar capacity in the UK is just over 32 MW – this makes the UK 11th out of 27 European countries and means the UK is at least a decade behind the largest European countries such as Germany.
- The majority of UK installations are small domestic panels – (no larger than 3KW). In France and Germany, like the UK, domestic installations dominate PV capacity, while in Spain and Italy, large-scale solar farms are more common.

A new dawn?

- Recently introduced feed in tariffs (FiTs) have the potential to kick-start the roll out of solar in the UK.
- FiTs have been highly successful in continental Europe at driving rapid increases in solar PV market, In many European countries annual installations increased in excess of 300% in the first year of feed in tariffs.

Capacity roll-out

- UK industry observers we spoke to anticipate a potential five-fold rise in solar PV installation in the UK in 2010 as a result of FiT.
- PwC estimates that installed capacity could reach close to 1,000 MW by 2015 and c.5 GW by 2020 – this would bring UK capacity in 2020 to levels reached in Germany today.

What does this mean for UK industry?

- The UK solar industry is not geared up for this growth – especially downstream participants such as installers.
- PwC believes that the industry will professionalise, consolidate and new entrants (including foreign entrants) will drive the sector forward.
- In order for the UK to fully benefit from solar potential, investment in infrastructure, skills and training will be required.



Recommendations for market influencers

Industry

Upstream

- Identify your key channels to market and segments (domestic, commercial, free standing) and invest in developing these.
- Invest in building a strong brand across all main channels.
- Develop strategic alliances with a range of installers to strengthen channels to market.
- Consider creating a branded accreditation scheme for installers to help build confidence with consumers.

Downstream

- Invest in people to make sure that you have the quality and range of skills you will require.
- Build relationships with utilities and local authorities to develop your channels and drive volume.
- Develop educational material for consumers and increase efforts to raise awareness of solar PV and FiTs locally.

Government

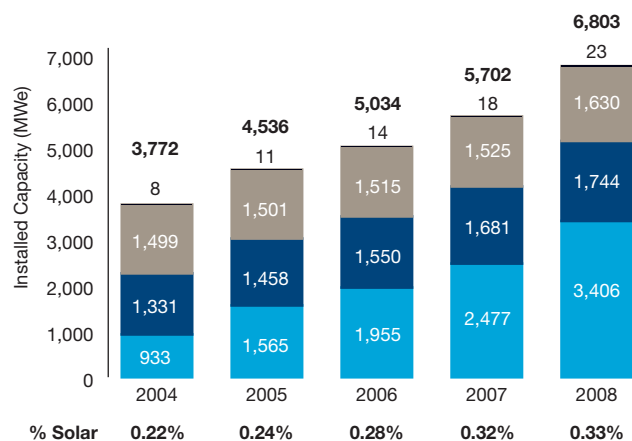
- Review the market and FiTs frequently to ensure that an appropriate level of investment is made in a sustainable manner.
- However, create a stable environment by reducing uncertainty regarding funding levels.
- Follow through on the measures announced in the Home Energy Management Strategy, particularly around facilitating consumer financing and education.
- Continue to promote renewable energies and micro generation to the UK public.

Financial institutions

- Solar PV is coming of age, identify strong players and invest.
- Develop a product portfolio to ensure that opportunities around FiTs are exploited.
- Work with consumers, industry and other bodies to ensure the process for receiving assistance with capital costs is as simple as possible.

Only 0.3% of the UK's renewable energy is generated by solar PV – this compares to c. 50% from wind energy

Installed capacity of renewable electricity sources in the UK 2004-2008



CAGR 04-08

Solar PV	28.7%
Hydro	2.1%
Biomass	7.0%
Wind	38.2%
Total	15.9%

Source: DUKES, UK Government Renewable Energy Strategy July 2009, BWEA

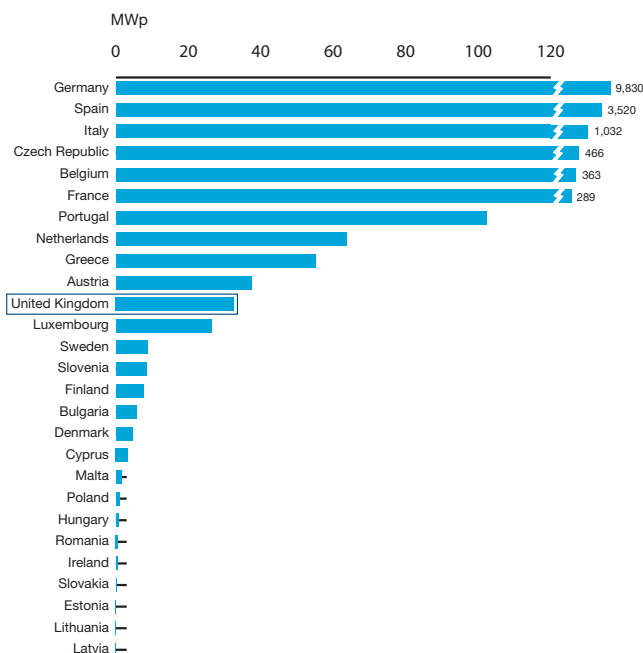
- The government has a target of over 30% of electricity from renewable sources by 2020 in order to meet the legally-binding EU requirement of 15% of total energy from renewable sources by this date.
- The most significant driver of renewable electricity generation to date has been the Renewable Obligations placed on the electricity suppliers. Under these obligations each supplier is required to present to Ofgem Renewable Obligation Certificates (ROCs) equivalent to a fixed percentage of their total annual production.
- Power generating companies had three options for complying:
 - Produce the renewable electricity themselves.
 - Buy ROCs on the open market or acquire through contracts with independent generators.
 - Pay a penalty.

PwC point of view

- Until recently, all technologies attracted the same amount of ROCs. This promoted roll-out of the lowest cost technologies, i.e. onshore wind.
- Whilst the Renewable Obligation has been an effective way to increase the UK's electricity supply from renewable energies, it failed to capture a significant proportion of the potential from solar PV.
- Recent banding of ROCs is now stimulating other technologies such as offshore wind.

Current solar capacity in the UK is 32MW – this makes it 11th out of 27 European countries and means the UK is over a decade behind the leading European countries

Cumulative installed PV capacity of European nations, 2009 (MWp)



The installed capacity of solar PV in the UK was approximately 32MW in 2009 with annual capacity additions of c.4-5 MW until 2008.

2009 was a strong year with 10MW added. However, this compares to 3,300MW added in Germany and 579MW in Italy.

UK solar PV capacity development is at least 10 years behind that of Germany.

The majority of UK installations are small (no larger than 3kW) and are located on domestic premises. The type of installations is driven by the incentive structures and varies across Europe. For example, Spain and Italy have a large number of solar farms, while in France and Germany domestic installations have a larger share. The predominance of domestic installations in the UK is however particularly pronounced and was in large part driven by early adopters.

PwC point of view

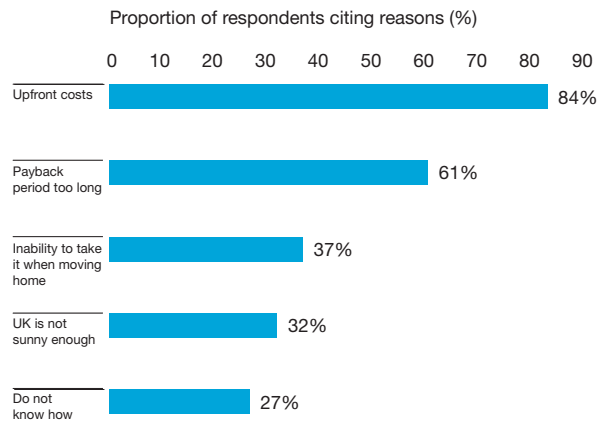
We believe that widespread roll-out of solar PV in the UK was held back/slowed by a number of specific factors:

- Renewable Obligation – As outlined previously, until recently the ROC system was not designed to drive solar PV. Recent banding has the potential to promote solar PV – however only on a large scale. It is not suitable for domestic installations;
- Planning restrictions – limited structure and no unified approach to solar PV added risk to development; and
- Complexity of funding – funds have been in place at national and local levels since 2002 (e.g. DTI Clear Skies Demonstration Project and Low Carbon Buildings Programme). However, these initiatives provided limited support for initial capital costs and access to these funds was complex. Additionally, an easily accessible mechanism to monetise generated energy was not available. This has particularly held back users and private consumers for whom initial costs are a key concern.

While a number of structural factors have hindered the roll-out of solar PV, we believe that this may be about to change.

Monetary and educational barriers prevent roll-out on a similar scale to continental Europe

Reasons given by UK public for not installing solar PV (2007)



Source: Solarcentury

- Monetary considerations were by far the greatest reasons stated by the UK public that prevented them from choosing to install solar PV.
- The original Government scheme allocated limited funding to each installation and was not structured in the most effective manner to allow domestic installation:
 - The grants were relatively modest, with a maximum value of £2.5k regardless of the size of the system (above 1.25 kW), meaning that the payback period was typically in excess of 15 years and was longer the larger the system installed.
 - Without an income stream it is more difficult to gain financing for a project and hence the greatest barrier to solar PV uptake were the upfront costs (typically in excess of £10k even after a grant).

- The next most significant and easier to address barriers are caused by a lack of knowledge:
 - The majority of the UK has insolation at similar levels to those found in Germany, the world's largest solar PV market, so it is a myth that the UK is not sunny enough for solar PV.
 - Consumers are also confused by the difference between solar thermal and solar PV technology.
 - Additional information and promotion, similar to that provided by the Energy Savings Trust, would enable consumers to access the technical information and assistance that they require more easily.

'Education and awareness of consumers could be a blocker in the market – awareness of PV and its capabilities is fairly low, and it will be a slow build-up unless large companies market the scheme'

[Dr Iain Dorrity, Crystalox](#)

Very few companies operate in the upstream area of the value chain. The downstream area of the value chain is highly fragmented



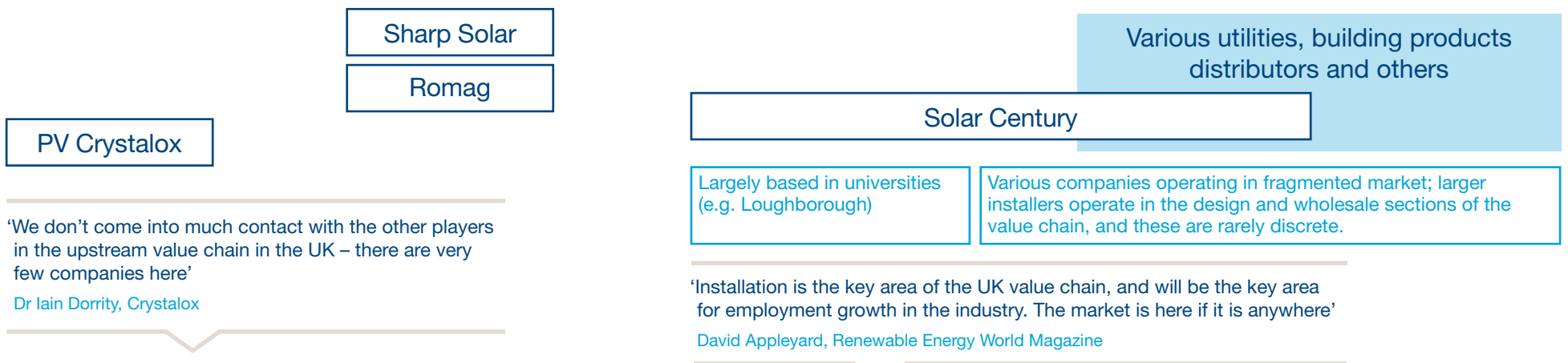
Upstream

Technical, comprehensive, capital intensive, pushed by R&D and production capacities. UK companies are specialised and generally operate in discrete sections of the value chain.

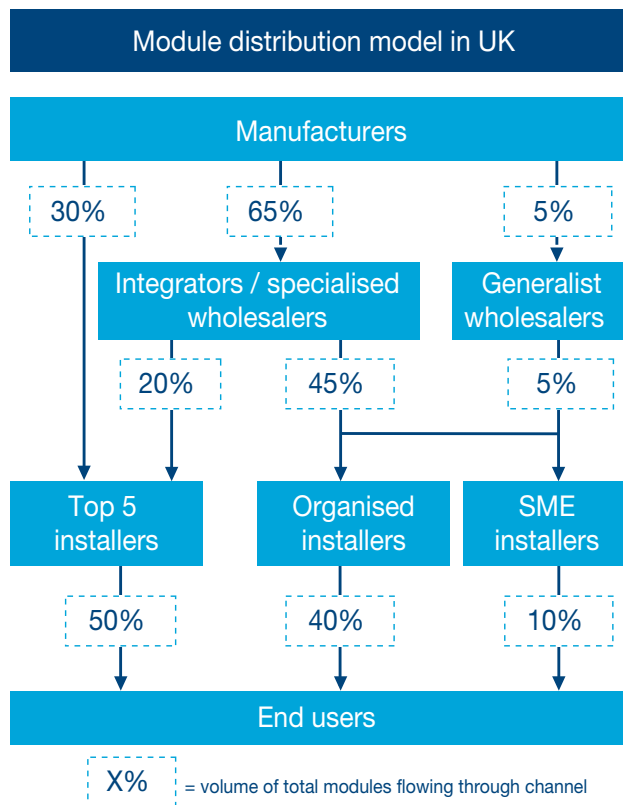
Downstream

Manual, local, potential service provider. Low barriers to entry in installations, but growth cannot be not easily industrialized because of fragmentation.

Some large players and their area of specialisation in the value chain



Wholesale and kit-building is an important route for module distribution in the UK, with larger design and installation companies frequently supplying 2nd or 3rd tier companies



Manufacturers deal only with the largest UK installers, as only these companies have a sufficiently strong cash position.

‘Smaller companies do not have the cashflow, the reputation or long-term relationships to deal directly with manufacturers. If a company has under £1.5m in turnover then it is probably too small to deal direct’

Kerry Burns, Solar Sense

The majority of UK companies deal with integrators or specialised wholesalers, often operating under an associate relationship where enquiries are relayed to ‘preferred installers’ who buy modules from the company. This model may become increasingly common in future years.

‘We have an associate relationship with companies. They sign up to standards set by us, and we hand retrofit home installations over to them if they purchase our kits’

David Edwards, Solarcentury

‘We have designed 10 different kits which cover 90% of the UK housing market, and we supply to smaller partner companies. The wholesale market will develop further into a classic manufacturer > distributor > wholesaler structure with different tiers of installers below this’

Kevin Knapp, Ecolution

‘An increasing number of companies are moving to the position where they are large wholesalers but not installers. The margins are lower but the business model is simpler, and if the volume is there in the market it may be an attractive place to be’

Jonathan Bates, Photon Energy

Source: PwC Interviews, PwC Analysis

Major companies and organised installers are engaged in building kits for players in lower tiers of the installation market. Few pure 'wholesale' companies operate in the market

	1 Very Large (Top 5) Installation / wholesale companies	2 Organised (>10 people) Installation & design capability / wholesale capability	3 Mom & Pop (<10 people) Discrete and smaller-scale installation / wholesale activities
# Players (in % of total)	<5%	15-20%	80-85%
Market share (in % of total)	c.50-60%	c.35-40%	c.10-15%
Wholesalers/ system design consultants	Major companies Solarcentury	Rare, due to dual installations / wholesale focus (or solely installations focus) of majority of mid-sized companies	Small wholesalers, primarily operating on local level Midsummer CCL Components Ltd PV Pro
Installers with kit-building capability	Major companies Segen Solar Technologies Ecolution Dulas	Experienced installers, with capability to design systems / construct kits for smaller local players Photon Energy Solar Sense	Not covered
Installation companies	Not covered Largest players in the installations market all have some form of kit distribution capability	Experienced installers, with capability to design own systems Chesterfield Solar Southern Solar	Small installers (c.1-4 people), often installing as part of a wider range of building activities

Source: PwC Interviews, Company Reports and Websites

Note: Company names represent example companies and do not cover all players in each market segment; segment in which company is displayed represents primary area of activity, although companies may operate across more than one segment.

To address some of the issues that held back the market, the Government has introduced Feed in Tarrifs (FiTs) and is considering the introduction of Pay As You Save financing schemes

FiTs and green loans – a new dawn?

- **Feed in tariffs (FiTs)** – While sometimes controversial, FiTs have proven to stimulate rapid roll-out of renewable technologies in other countries. The introduction of a generation and export tariff in the UK has the potential to drive significant growth in the market through 2020;
- **Support for upfront costs** – Raising the capital for a new system and the high likelihood of moving home before receiving the benefits has hindered the domestic market. In its 'Home Energy Management Strategy', the last Government set out its intention to amend banking regulation to allow loans secured on the FiT income to be linked to the house and not an individual. In the interim, some banks (e.g. Co-Op) are already offering loans secured on the FiT income stream linked to individuals. Government / banks will need to resolve the difficulties of up-front funding in order to support market growth.

PwC point of view

The current state of the UK solar market FiTs are the most appropriate tool, given that:

- it is difficult to encourage retrofit installations using a purely regulation driven policy;
- the tariff rates are appropriately tailored towards the domestic sector due to the relative efficiency of micro generation (a higher level would have served as a stronger stimulus for the market); and
- FiTs can kick-start the industry to bring it to a sustainable installed capacity, experience and cost base.

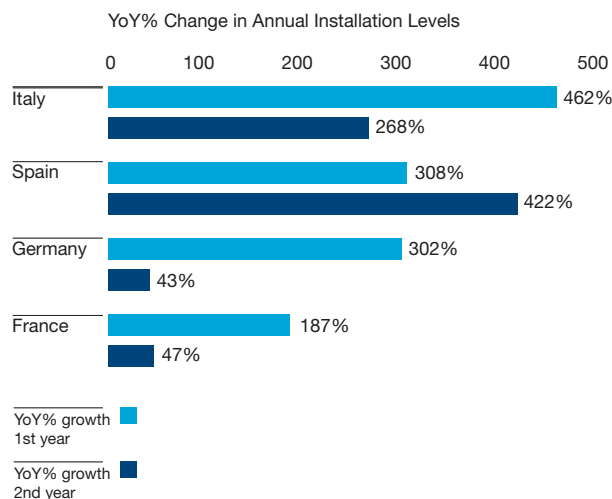
Addressing the financing upfront costs will be critical to roll-out and should be a priority for government, funding bodies and financial institutions.

Action area	In place?	PwC point of view
Regulation for energy industry	✓	Previous legislation of utilities tended to drive larger scale and cheaper renewables (most notably wind). The new Renewable Energy Strategy combined with HEMS places a greater emphasis on the utility companies to assist in the deployment of renewable technologies at a building-by-building level
Regulation for planning	✓	The Code for Sustainable Homes combined with local planning regulations are increasingly requiring the use of microgeneration on domestic and commercial buildings. Whilst there is no stipulation on how the energy / carbon restriction can be achieved, solar PV performs strongly in most areas
Regulation for installers	✓	The MCS scheme, combined with any changes / strengthening originating from HEMS, should give consumers confidence that the installer they have chosen has the required skills to choose and install the correct technologies for their project
Adequate incentives / IRR	✓	The implied IRRs (and payback periods) achievable on solar PV installations in the UK compare favourably with levels known to have stimulated markets in other countries, and are geared towards domestic installations. Domestic IRRs of around 10% compare favourably with other investments
Financing for upfront costs	—	The commercial banking sector and Government have indicated a willingness to support/facilitate costs but the timeframe and extent remain to be finalised
Stability & confidence in ongoing support	—	Changing Government attitudes and the rather patchy funding provided in the past has reduced both consumer and industry confidence. The Government must be seen to provide consistent, considered support in future in order to allow the industry to thrive
Training support	—	Relatively few UK firms have achieved MCS status to date. Industry believes the content needs to be bolstered and differentiation made between skills for domestic installation vs large commercial installation
Education	—	Some sources of information available but consumer knowledge is still limited. HEM Strategy proposes significantly improved information for consumers but these are not yet implemented

Source: PwC Analysis, PwC interviews

FiTs have been highly successful in Continental Europe at driving a rapid increase in the solar PV market

Impact of Solar PV Feed in Tariffs in European Countries in Years After Production



Source: IEA, UK Photovoltaic Manufacturers Association, solarfeedintariff.co.uk, PwC Interviews

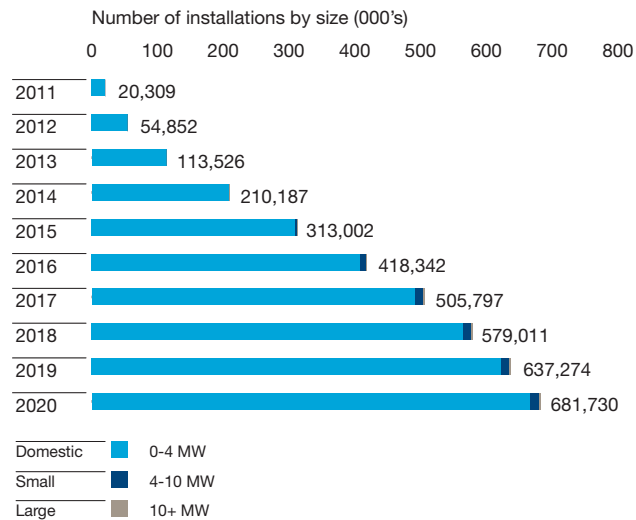
- FiT schemes have been highly effective in increasing the uptake of solar PV in other countries.
- These schemes are most mature in Germany, France, Spain and Italy.
 - Annual installations increased in excess of 300% in all but France in the first year of FiT introduction.
- UK industry observers anticipate a potential 5 fold rise in solar PV installations in the UK in 2010 as a result of the FiT.
- The payback achievable on solar PV installations in the UK compare favourably with levels known to have stimulated markets in other countries.
 - A typical homeowner can expect to achieve an average IRR of 7-9%. Higher levels are achievable when combined with grants or for particularly efficient systems/locations.
 - Commercial building owners or investors in small installations will achieve lower rates of return in the region of 5-7%, with correspondingly longer payback periods.
- This is unlikely to hamper demand from the commercial sector due to increased focus on corporate social responsibility, but could reduce interest from system investors depending on the movement of system prices and UK interest rates over the next 12-18 months.

‘If the Feed-In Tariff scheme is simple to understand and government opts to increase the tariff [it did but not as much as some had hoped] then I think the annual installation total of 8MW as it currently stands could rise to 20, 30 or even 40 MW for the rest of this year... The second year is when things will really start to motor forward, and I think we could see up to 100MW’

[Ray Noble, Renewable Energy Association](#)

Clear intention to exploit the potential of domestic rooftops

DECC forecast of cumulative installations by size by year (2011-2012)



Source: DECC

- It is the Government's intention that the vast majority of installations are in the Domestic (0-4kW) market.
- In DECC's forecast, domestic installations account for almost 98% of total installations in 2020.
 - Installations of 4kW-10kW (Small) account for the majority of the remainder.
- The sheer number of domestic installations to be completed means that the greatest amount of effort will have to be devoted to this sector.
- However, there is likely to be a significant increase of large installations.
- This will support both smaller installers and larger design / wholesale companies seeking to dedicate themselves solely to larger projects (admittedly some of which will be large collections of smaller installations e.g. new housing estates).

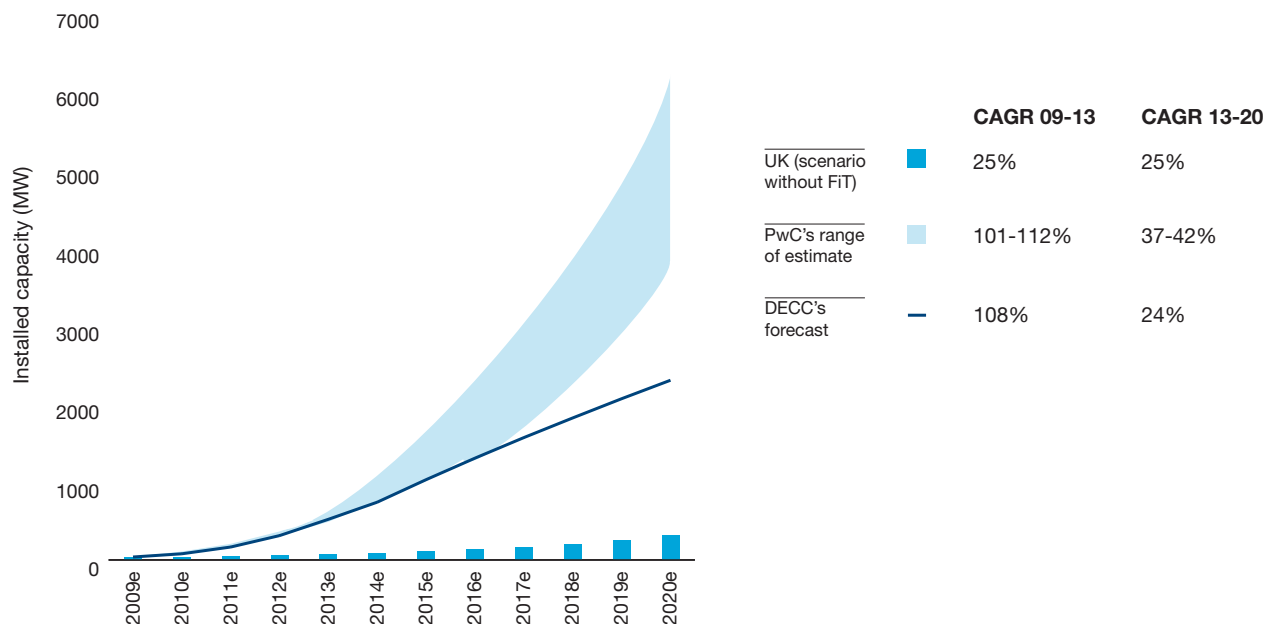
'Solar farms seem an unlikely development to me – they won't form a big part of the UK industry. The FiT is structured toward domestic installations and I expect market growth to reflect this'

[Jim Kenney, Chelsfield Solar](#)



We believe that the potential installed capacity in the UK is between 4 and 6 GW by 2020. This is higher than DECC's current estimate and more in line with industry views

Forecast cumulative installed PV capacity in the UK (2009e-2020e)

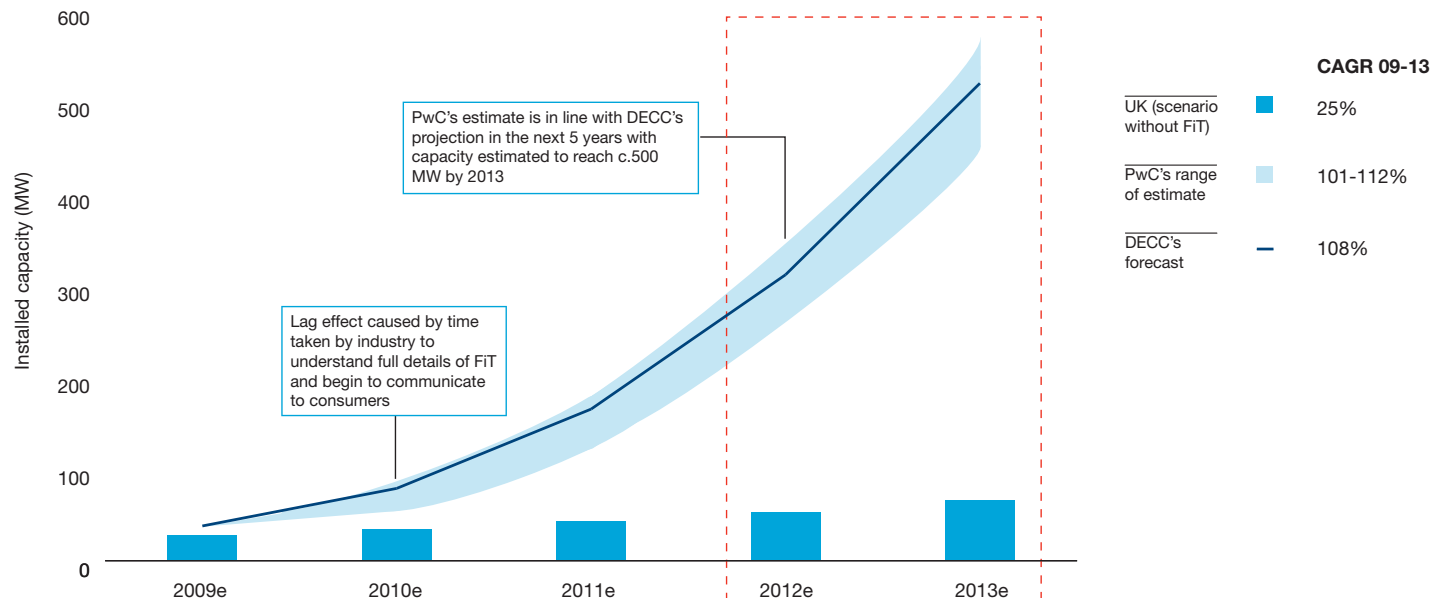


Source: IEA, EPIA, Government Websites, PwC Analysis

- PwC has built its market forecast by considering the growth rates, IRRs and other characteristics of European countries with established FITs, in light of the UK FIT rates.
 - Most emphasis was placed on developments in the German, French, Italian and Spanish solar markets.
- We expect that the FIT and other incentives will drive significant growth in the future, after a small delay whilst the industry gears up for the changes.
- Given the experiences of other countries, demand is likely to outstrip DECC's projection by 2015.
 - This is partly caused by DECC applying a straight line post 2015, rather than a standard penetration curve which we believe is a more realistic uptake profile.
- The range of our forecast is intended to capture uncertainty relating to a number of factors:
 - Availability and terms of financing for consumers.
 - Investment in the industry from financial institutions, corporates and overseas investors.
 - Speed and quality of training of skilled staff.
 - Preference of consumers for a particular technology.

Despite the long-term growth potential, we believe that the growth in the number of installations until 2011/12 will be limited as awareness spreads and the industry begins to make the necessary adjustments

Forecast cumulative installed PV capacity in the UK
(2009e-2013e)



Source: IEA, EPIA, Government Websites, PwC Analysis

Note: UK (scenario without FIT) is a 25% year on year growth rate based on a weighted average of the previous 4 years of growth

This growth will change the industry fundamentally

The industry will cease to be a 'cottage industry', with significant expansion likely in the future

'The industry is right at the beginning in terms of levels of maturity: it is just moving away from being a cottage industry. The main players of today will not necessarily be the main players of tomorrow... and I can see smaller 'cottage' companies having to become very specialised high margin companies in order to survive in the market'

Andrew Lee, Sharp Solar

'The market environment is very favourable. Companies are able to scale up quickly, and new entrants to the market are very common, Right now people in the industry are hugely optimistic'

Kevin Hard, Evoenergy

'Installation of basic systems will become more and more commoditised. Companies who were previously achieving margins of 30-40% for this kind of work will not be able to sustain this in the future'

Jonathan Bates, Photon Energy

The market will become more sophisticated with more complex products and a greater focus on accountability

'We are developing an offering of 'soft' products for the market – finance and insurance products. The finance product is a joint offering with a bank to cover to up-front costs of installation, and we are also looking at a roof-lease models for commercial premises. These kind of products will be important to the development of the market'

David Edwards, Solarcentury

'The Feed-In Tariff will alter the market because of its focus on revenue generation. The systems being installed will need to be the right ones in order to generate a return, and there will be much greater accountability in the market. Customers, particularly for large-scale developments, will want to be sure that systems have been modelled and what the precise return will be. If this is not achieved when the system is up and running then installers will be liable'

Kevin Knapp, Ecolution

However, there is a concern that there are too few certified installers to meet potential demand

Skill shortages in the UK are widely acknowledged

‘The bottleneck of installers will be a problem for the UK market. It may limit levels of installations in the short term’

Iain Dorrity, Crystalox

‘The lack of electrical-mechanical engineers and designers for more complex, larger-scale projects will have a significant impact on the market’

Jonathan Bates, Photon Energy

Increased levels of training and new entrants to the market could ease this in the short term

‘We have set up training schools precisely because there is not enough installation capacity to cope with the growth expected in the market. We offer accredited City & Guilds courses for existing companies in the building trade, and we have seen huge levels of interest’

Peter Creasy, Eco Solar Equipment

‘Potential entrants to the market are taking note of the lack of installation capacity – they will buy smaller installers in order to get MCS accreditation’

Ray Noble, Renewable Energy Association

However, the industry is concerned that the quality of training & speed of expansion could lead to falling standards and client dissatisfaction

‘There is a danger that a lack of experience in the market will result in some badly designed systems. MCS accreditation can be achieved on the basis of a single installation of a 1-1.5kW system, and then an installer could theoretically be responsible for the installation of a highly complex 300kW multi-face system. Also the accreditation only applies to a company, so individual installers may be under-experienced for the jobs they are involved in’

Kevin Webster, Romag

‘Smaller installers cannot buy kits from us unless they are accredited or have been on a training course [to ensure that quality standards are maintained]’

Kevin Knapp, Ecolution

New entrants in the UK solar PV market are likely, primarily in the downstream segment of the value chain

PwC point of view

- The industry will need to adapt and develop quickly to ensure that as much of the opportunity in terms of job and value creation is captured within the UK.
- Companies that have been successful so far have benefited from investment in order to fund expansion.
- Further investment will be required in order to train for and fund the rapid expansion expected.
- New entrants are likely to expand into the UK in coming years. We believe that this will be true across much of the value chain, but downstream in particular.

Upstream

Cell manufacture will remain more cost effective in the Far East and is unlikely to be moved to the UK. However, while demand for modules can be met through European plants and shipments from the Far East in the short- to medium term, we believe there may be an opportunity for capacity additions/new module assembly plants in the UK in the longer term.

In our view, the UK solar downstream industry would also benefit in a scenario where demand will be served entirely through imports.

Downstream

As demand grows, the downstream segment will grow significantly in terms of revenues and fragmentation before it will consolidate around current market leaders as well as potential new entrants.

Such new entrants will include utility companies and large retailers (likely to focus on opportunities in the domestic market) as well as construction companies who will focus on commercial scale installations, potentially as part of wider developments.

Consolidation is also likely to be driven by professional solar developers who will seek out stable and established partners in the UK.

We believe that the most attractive areas of the value chain will be in the design and installation of large systems (on commercial premises or groups of houses (whether new build or community projects)) and wholesale of equipment to smaller installers. This requires capital, but there appears to be some hesitancy within the UK financial institutions about investing in the solar PV market, which leaves the door open for further mergers & acquisitions or foreign investment.

Potential new entrants

Module assembly plants

‘Solar cells made in gigawatt scale plants in China can be sent across for module assembly in the UK. Sharp are already doing this in their Wrexham plant. The UK can capitalise on this trend due to its immature industry’
Ray Noble, REA

Chinese module suppliers

‘I have started to buy from China for two reasons – lead times and price. I am not sure how the quality will compare but I won’t know that until they are here’
Andy Rankin, Midsummer Energy

European installers / distributors

‘German, Italian and Spanish companies may enter the larger scale installations market. There will be greater opportunities in this area due to higher margins and a lack of engineers and designers in the UK market’
Jonathan Bates, Photon Energy

Utility companies

‘The bigger utility players will need to publicise the FiT and the UK market. Customers know and trust these brand names, which is positive’
Iain Dorrity, Crystalox

Construction companies

‘Building industry firms want new sources of profitable revenue, and the PV market is attractive’
Andrew Lee, Sharp Solar

Large retailers

‘Tesco is working with Sharp and Solarcentury on supplying kits to the UK market. They now need a network of installers’
Kevin Knapp, Ecolution

Conclusions: The most significant opportunities in the solar PV market exist in the design and installation of (large-scale) projects and in the wholesale of standardised kits for smaller installers

How will the industry change?

- Installation will continue to be the focus of the UK industry. The downstream value chain will need significant short- and medium-term development to cope with demand for domestic and commercial installations. Consolidation and rapid expansion of companies will occur and new entrants (e.g. utilities companies and retailers) will move into the market.
- The upstream value chain should change its supply structures in order to benefit from this growth, particularly in the area of module manufacture. Capacity expansion may be an opportunity in the longer term.

Which areas of the industry are the most interesting?

- Design and installation of large-scale projects will become more attractive as the public and private sector focus more on reducing energy usage and establishing 'green' credentials. The focus on ROI encouraged by the FIT will result in attractive opportunities for those companies capable of high quality design and implementation.
- Companies operating in wholesale of standardised kits for smaller installers will benefit from the rapid growth of domestic installations. Those with established networks of installers and the capacity to refer basic installations will be in a particularly strong position.

What does the industry need to do in order to succeed?

- Investment will be key to the success of the UK industry. Sub-scale companies in the downstream value chain require investment in order to build presence in the market and to significantly increase overall levels of installations. Companies should also consider the benefits of alliances and partnerships and aim for increasing sophistication of business models, particularly in the area of wholesale / distribution.
- Training of installers will need to be developed. Companies need more opportunities to access training, and programmes must specialise in different sizes of installation in order to ensure high quality standards.



The outlook for UK solar PV is positive, but all stakeholders have a role to play

Consumers

Awareness and education: understanding of available technologies, how to install and suitability of PV for the UK

- Consumers have little understanding of the various renewable technologies available to them and how to differentiate between them. Solar PV can be perceived as not suitable for the UK because 'it is too dark'
- Government plans for consumer education should help in general but will not focus on solar PV in particular

Funding upfront costs: upfront costs of design and installation have often prevented capital constrained consumers

- Interested consumers have previously had difficulty funding the upfront costs of solar PV. This issue will need to be resolved quickly in order to support market growth
- Now that the FiTs are set and likely rates of return are known, movement in the financial sector should resolve this issue quickly (as seen in other countries)

Government

Consistency of policy and prioritisation: uncertainty caused by inconsistent or changing Government policy

- Government policy has previously indirectly prioritised centralised large scale renewables investment
- Changes to the incentives will encourage microgeneration but investment by the industry could be limited if certainty over the future consistency of support is not achieved

Consumer loans: Changes to loan structures to allow loans linked to system / property rather than person

- A key requirement to drive microgeneration is facilitating the provision of loans secured on the installation and not individuals
- Majority of installations will survive the current property owners so it is important that the Government changes financial legislation as it has outlined in the HEMS

Industry

Access to capital: most companies will require an injection of capital to permit required levels of growth

- Companies are likely to require additional cash to fund training, working capital and CAPEX if they are going to capture the growth potential in the market
- Our interviews suggest that the banks might be hesitant about providing capital to established firms even. Corporate or overseas investment could be required

Lack of workforce skills: Potential shortage of qualified labour force

- Relatively few installation companies have earned MCS accreditation and individuals with significant detailed design or large installation skills are lacking
- Interest from other sectors and former construction workers should help alleviate the worst of the bottlenecks but highly skilled resource is likely to remain constrained

Source: European Commission Joint Research Centre, UK Government Renewable Energy Strategy July 2009, PwC Interviews

Key: Timeframe over which roadblock likely to be resolved

■ Short term ■ Medium term ■ Long term

Who to contact

Daniel Guttman

Daniel is a Director and leads PwC Strategy's Renewables & Cleantech team

Daniel has over 9 years experience in advising corporate and private equity clients in a variety of transactions and strategy development across a range of industries.

He focuses on components, systems and services across the value chain and provides corporate and business unit strategies, investment appraisal and commercial due diligence.

Recent renewable experience includes:

- Solar: Establishment of a Solar PV plant in Italy; disposal of a supplier of aluminium into the solar thermal industry; strategic review of a leading supplier of solar thin film manufacturing lines.
- Wind power: Disposal of one of the largest suppliers of composites for wind turbine blades; acquisition of a leading supplier of wind turbine components; assisting a major South-East Asian engineering firm in entering the wind turbine market; acquisition of two leading suppliers into the offshore wind-turbine foundation market.
- Other: Strategic review of a supplier of speciality powders including ceramics used in the production of solid oxide fuel cells; review of a major service provider into the geothermal energy market.

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Charlotte Mitchell

Charlotte is a Manager in PwC Strategy's Industrial Products team

Charlotte has over five years' experience in consulting, in both the technical engineering and strategy fields. She works in PwC Strategy's Industrial Products practice and focuses on renewable energy and cleantech. Her particular area of interest is Solar PV and she has spent significant time in developing a view on opportunities in this sector in the UK and Europe.

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