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editor's view

By david ridsdale, editor-in-chief

Energising the industry

Energy will be one of the main global drivers for the foreseeable future and will also be one the major flash points between corporations and the sustainability movement. This is more than just electricity production where solar and PV technologies reside and will involve every aspect of how we manufacture and use energy. There are many reasons that industries are doing this and most of them have a for and against camp making the entire process seem rather messy and cumbersome. Like most industries the energy market will stumble and trip forward to a consensus that will be borne of necessity as much as design. Or at least it will if industrial history is any guide.

Renewable energy sources will play a major role within energy development. This is assured now as the growth of such energy has passed the point of a passing fad. Even if we wanted to continue down a fossil fuel path, established cities are discovering that their infrastructure is not able to keep up with the increase in energy demand. Without alternatives to nationally controlled energy grids there is simply not enough room for expansion. This factor alone will ensure that reliable stand alone localised energy production will become a greater part of the energy mix. Developing cities have the luxury of hindsight in their



comparison of other cities and are actively planning for renewable energy in the mix along with expandable infrastructure.

The UK is no different than other parts of the global energy market and the realities of a national grid unable to expand with intermittent and renewable energy for much longer puts pressure on policy makers to improve the infrastructure or begin to decentralise the control of power generation. The most likely future outlook for the UK market will be hundreds if not thousands of electrical power plants

around the country rather than control by a handful of powerful players. This necessity is one of the key growth factors for the PV market as one of the most reliable and cost effective methods of adding new energy to the market. It also helps that it is perfect for developing localised off grid energy production.

Solar is only one part of the renewable challenges the energy market faces and it will surely hold a place at the global decision making table but how much influence it can develop, which will influence growth, remains to be seen. Integration of solar and PV technology in new build is a key change that industry can influence that will impact on industry perception. Relying on retrospective inclusion will only take you so far.



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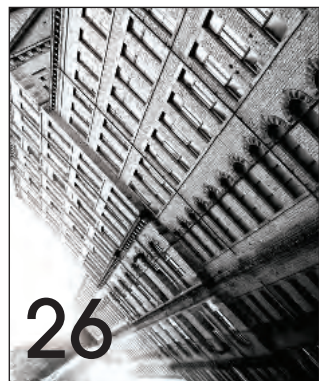
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NextEnergy solar fund announces IPO

NEXTENERGY SOLAR FUND, a newly incorporated Guernsey company focused on operational solar photovoltaic assets located in the United Kingdom, has announced its intention to launch an initial public offering.

The Company is targeting a raise of £150 million by way of a placing and an offer for subscription of Ordinary Shares. The Company will seek to provide investors with a sustainable and attractive dividend that increases in line with RPI over the long term and an element of capital growth through the re-investment of net cash generated in excess of the expected target dividend.

Applications will be made to the Financial Conduct Authority (the "FCA") for the Ordinary Shares to be admitted to the premium segment of the Official List and to the London Stock Exchange for such Ordinary Shares to be admitted to trading on the London Stock Exchange's Main Market for listed securities and to the Guernsey Financial Services Commission for the Company to be declared a registered closed-ended investment scheme.

It is expected that a prospectus will be published, and that the placing and the offer for subscription will open, in February 2014 and that the IPO will close and trading in the Ordinary Shares will commence in March 2014. Cantor Fitzgerald Europe is acting as financial adviser and lead bookrunner and Shore Capital is acting as sponsor and joint bookrunner, in relation to the IPO.

The UK Government has declared solar PV a key technology in meeting its binding EU target commitment of generating 15 per cent. of its energy needs by 2020 from renewable sources. The NEC Group estimates an investment requirement of c. £11.5 billion to reach the UK Government's mid-range scenario for solar PV deployment by 2020.

The Company is targeting an RPI-linked annual dividend of 6.25 pence per Ordinary Share with a target first year dividend of 4 pence per Ordinary Share,



and aggregate returns to investors over the long term that equate to an unlevered IRR of between seven and nine per cent. after fees and expenses, based on the issue price of 100 pence. The UK regulatory framework for solar energy is designed to encourage significant investment and Renewable Obligation Certificates provide predictable, long-term subsidised revenues linked to RPI.

Commenting on the announcement, Michael Bonte-Friedheim, CEO of Next Energy Capital Limited, said, "The UK solar market has come of age as an investment proposition, offering long-term stable returns with RPI linkage while helping the UK achieve its renewable energy targets."

"We will utilise our experience in developing and constructing PV

plants and our unique in-house asset management capabilities to maximise the operating, technical and financial performance over the long term. For investors, this will help drive dividends and capital growth."

Given the pipeline of opportunities we are securing, we will be able to deploy the proceeds from the IPO within a short period after Admission and subsequently expect to grow the asset base."

Kevin Lyon, Non-Executive Chairman of the Company said, "We believe that the Company offers a highly attractive opportunity for investors seeking yield and inflation protection."

"The Company specifically chose to concentrate on one technology and one country only, which coupled with the team's professional approach and specialist expertise in solar and in the UK will deliver superior risk-weighted returns to investors.

We are fortunate to be working with the NEC Group, which as an asset manager in the solar industry gives the Company an advantage in the sourcing and development of investment opportunities."

Bluefield solar announces eighth large scale plant purchase

BLUEFIELD SOLAR has announced that it has entered into binding contracts to acquire its eighth large-scale solar plant. In total, the Company has invested into UK based solar plants with a combined capacity of 92MW Peak. The Company has now committed c.85% of the IPO proceeds in the six months since the Company was listed on the London Stock Exchange. The Company raised £130 million in July 2013.

Solarcentury will build the Kent based plant and will then warrant its performance for an initial period. It will undertake the ongoing operation and maintenance of the plant under a separate agreement. The Company can confirm that, based on

the existing committed projects and the terms agreed on this portfolio, it remains on course to deliver against its target dividend of 4 pence per ordinary share in relation to the first financial year ending 30 June 2014, and 7 pence per ordinary share in respect of the Company's second financial year, with the intention of this rising annually with RPI thereafter.

Bluefield Partners LLP the Company's Investment Adviser, will seek to outperform that return by active management strategies across the invested portfolio. The Company is insulated from development risk by the contractors taking full responsibility for the construction and delivery of the plants.

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Push energy secures large scale solar funding

RENEWABLE POWER BUSINESS, Push Energy, has secured £1.5 million funding to develop large scale, ground-mounted solar farms in the UK. The Colchester-based firm is developing field-scale solar farms on carefully selected sites throughout the UK. The company is vertically integrated, with its subsidiary Push Build providing an in-house engineering design and procurement contractor (EPC) capability.

To date, Push Energy has secured grid connections for approximately 300MW of sites, of which 20MW have so far received full planning approval.

The funding round was led by the Low Carbon Innovation Fund (LCIF), a venture capital fund managed by specialist energy and environment merchant bank, Turquoise International.

Stuart Bradshaw, CEO at Push Energy, comments: "We are very pleased with the funding we have received through the LCIF. The investment will enable us to develop more field-scale solar farms which will help play a substantial role in achieving the UK government's renewable energy targets."

Francis Wright, managing director at



Turquoise International, which oversees the LCIF fund, adds, "Push Energy is a responsible renewable company that seeks solar farm sites by working in partnership local planners and landowners. The vertical integration allows the business to retain control over the whole process, ensuring complete quality control, and we wish them every success following this latest investment."

LCIF is a venture capital fund which is managed by Turquoise International on behalf of the Low Carbon Group at the University of East Anglia and supported by the European Regional Development Fund (ERDF).

It has more than £20m of ERDF funding that will be combined with some £30m of private sector capital to generate more than £50m of low carbon investments.

Renesola to supply isolux corsan projects

RENESOLA has announced an agreement to provide Isolux Corsan, with 57MW of Virtus photovoltaic modules for installation in three commercial PV projects in the United Kingdom.

According to the terms of the agreement, ReneSola will deliver 57 MW of Virtus PV modules with an average power output of 250 W. The modules will be installed at projects in Cornwall, Dorset, and Norfolk in the United Kingdom. ReneSola began delivery in December 2013 and the three projects are expected to connect to the grid in March of this year.

"We are proud to deepen our relationship with Isolux Corsan, a leading EPC with stringent requirements for its partners," said Mr. Xianshou Li, ReneSola's chief executive officer. "This collaboration follows our successful partnership with Isolux Corsan regarding another UK solar project at the end of last year, and will help us solidify our local market share while building long-term relationships with leaders across the solar industry. The modules for these projects will be manufactured by OEMs in Poland and India, which follows our strategy of increasing use of OEMs in select markets."

BBIP acquires over 20MW solar assets from Anesco

ANESCO has announced the sale of solar assets with a combined generation capacity of over 20MW to BBIP (Balfour Beatty Infrastructure Partners LP). The fund has acquired three further solar PV sites based in Radstock and Culm Head in Somerset and Codford St Mary in Wiltshire.

The sites will be managed by Anesco through its monitoring and maintenance service AnescoMeter, as part of a 20 year agreement. The service ensures the panels continue to generate at their optimal capacity, with any issues quickly rectified.



Adrian Pike, CEO of Anesco, commented, "We're delighted to have switched on another three solar farms for BBIP, which makes a total of six that they have purchased from us. Our strategy to develop sites in the winter months and build them in summer/autumn has paid dividends due to the unforeseen weather conditions".

This agreement is the second time BBIP has acquired operational UK solar projects from Anesco. In March 2013 the group made its first investment, which included purchasing three sites with a combined capacity of almost 20MW from Anesco. The latest sale sees BBIP making its 10th acquisition of ground mounted operational UK solar assets.

Rob Gregor, managing partner for BBIP, commented, "We are pleased to deliver on our strategy of building out a diversified, operating and defensive portfolio asset for the BBIP fund."

Naked Energy secures €1.3 Million of grant funding for virtu hybrid solar

THE DEPARTMENT OF ENERGY & CLIMATE CHANGE (DECC) has awarded solar hybrid manufacture, Naked Energy €1 million through its Energy Entrepreneurs Fund to assist in the development of its solar technology. The focus of the funding will be on optimising production processes accelerating Virtu toward commercial launch.

Virtu is a hybrid solar technology providing combined heat and power. The technology has gained significant interest from around the world and the Naked Energy team are eager to bring this exciting product to market.

"We are delighted to receive this award and vote of confidence from DECC, in what is a highly competitive space," said Christophe Williams, Founder and CEO of Naked Energy Ltd.

"The funding will have a dramatic impact on our progress, as we are now able to secure additional talent to our team and partner with some of the best scientific and academic partners in the country," Energy and Climate Change Minister Greg Barker said, "Innovation is vital for the

move towards a low carbon economy and it's great to see so many entrepreneurs rising to the challenge. I wish the winners every success with their projects."

In addition the company has secured a further €300,000 grant from The Climate-KIC, which is Europe's largest public-private innovation partnership, working to address the challenge of climate change. The company is an affiliate partner and continues to be a part of their 'acceleration program' to drive the business towards commercial success.

Now that Naked Energy has secured funding the company is accelerating towards its first pilot projects. The projects will see Virtu installed in selected locations to demonstrate the versatility of the modular collectors in both temperate and high insolation geographies generating thermal and electrical energy for domestic and commercial applications. Small-scale production is scheduled to begin in mid 2014 with larger volume activity set to start in 2015.

Christophe Williams, is candid about how he sees the future, "The opportunity is



The DECC EEF award was presented to Christophe Williams (NE CEO) by Ian Ellerington - Head of Innovation Delivery DECC at a Solar Workshop held at Imperial College, hosted by the Grantham Institute.

crystal clear. Despite the consolidation taking place in the worldwide solar marketplace the future is very bright, literally. Generating clean, unlimited power from the sun is more than viable, its imperative as part of a sensible long-term energy mix.

Virtu captures over four times the energy of a conventional PV panel and once we reach scale will be priced very attractively. We have a highly scalable business and a worldwide market. It is difficult to keep under the radar with such an exciting proposition; we hope our potential customers can continue to be patient."

Conergy snaps up Wirsol in the UK

CONERGY has announced that it has acquired Wirsol Solar UK for an undisclosed sum. The deal includes a solar farm portfolio totalling around 100MW in the UK as well as employees. 50MW of the portfolio are ready to be built and the first projects are already under construction. Solar plants with another 50MW are in the development phase. These are expected to be ready to be built in the course of the year.

The move means that Conergy, which was bought by Miami-based Kawa Capital Management in October last year, has expanded in the UK. In November 2013, Conergy sold a 90MW solar farm portfolio that the company had developed together

with a local partner to an investor. At the same time, Conergy secured exclusive construction rights for the entire portfolio, meaning that it has more than doubled its project pipeline with the acquisition of Wirsol Solar UK, based in Pulborough, West Sussex, around 80 kilometres south of London.

"The UK is one of the most exciting growth markets for Conergy, especially for the development and the construction of turnkey PV plants. We have a leading position in this market with our project pipeline including solar farms totaling around 200MW", said Alexander Gorski, COO and CEO Europe of the new Conergy holding company. "Together with

Kawa Capital Management as our owner, we aim to build our core businesses organically and through acquisitions."

The new ownership structure with Kawa enables Conergy to grow and expand dynamically on a global scale as well as to extend the company's offerings to include financing.

"In addition to our build expertise, we plan to further strengthen our activities in the project development and financing", said Gorski. "After the growth markets in Asia and North America, we are in a position to successfully implement this strategy also in Europe with the target to further expand such investments."

Yingli and Trina capitalise on consolidating market to grab market share

CHINESE SOLAR photovoltaic (PV) manufacturers Yingli Green Energy and Trina Solar have emerged as the clear market leaders within the solar PV industry, shipping more than 5.8 gigawatts (GW) of solar PV modules in 2013. During the last six quarters, Yingli and Trina increased total market share from 12 percent in the second quarter (Q2) of 2012 to nearly 15 percent at the end of the fourth quarter (Q4) 2013, according to findings in the latest NPD Solarbuzz Module Tracker Quarterly report.

“Yingli and Trina embarked on an aggressive shipment strategy, over the past eighteen months,” according to Ray Lian, senior analyst at NPD Solarbuzz. “With the global PV manufacturing segment focused on reducing costs and controlling expenses, there was a clear window of opportunity for market share gains. These two companies have capitalized on this opening with meticulous precision, and they are now poised to become the first multi-gigawatt module suppliers driving the next phase of strong end-market growth.”

The top 20 leading solar PV suppliers shipped a new record level of modules in Q4 2013 of 7.6 GW, marking the first time that the top 20 suppliers have broken through the 7 GW barrier. The Q4 2013 shipment volume from the top 20 companies grew by 44 percent compared to Q4 2012 and 9 percent compared to Q3 2013. The top 20 PV manufacturers now supply 68 percent of the global solar PV industry.

During Q4 2013, eleven of the top 20 module suppliers achieved new quarterly shipment records. In particular, Yingli and Trina both exceeded 800 megawatts (MW) of shipments in Q4 2013, with Yingli setting yet another record of more than 900 MW. Over the next few quarters, these two companies will compete to become the first PV module supplier to reach the unprecedented 1GW mark for quarterly shipment volume.



Yingli and Trina have now increased their combined trailing-twelve-month (ttm) shipment volume, from 2.4GW at the end of Q2 2012, to 5.8GW at the end of Q4 2013. The 62 percent increase in shipments in just 18 months is a key factor behind the companies' combined market share gains.

The average selling price (ASP) of the top-20 grouping was once again flat (\$0.72 per watt), with module pricing remaining stable for three consecutive quarters. ASPs have only declined by 3 percent since Q4 2012, compared to the staggering 35 percent annual decline during the previous 12-month period.

Eleven of the top 20 module suppliers now have ASPs between \$0.6 per watt to \$0.7 per watt. Higher ASPs are still being achieved by high-performance module suppliers, SunPower and Panasonic, and other premium-brand suppliers, like SolarWorld, Sharp Solar, and Kyocera.

Within the top 20 PV manufacturers, the Chinese supplier grouping decreased its silicon and non-silicon module costs to \$0.55 per watt during Q4 2013; Jinko Solar was the first major supplier to break below the \$0.5 per watt threshold. More than half of the top 20 module suppliers now have blended costs below \$0.6 per watt. Consequently the average gross margin for top 20 module suppliers has increased from approximately 10 percent in Q2 2013 to 15 percent in Q4 2013, having rebounded significantly from a low of 1 percent, back in Q3'12.

Recycle centre will handle PV module recycling

SAPERATEC GMBH has commissioned an industrial pilot plant for the recycling of composite materials at its headquarters. Saperatec has developed the patented process especially for the processing of plastic-plastic and plastic-aluminium laminates. In addition to processing packaging materials and beverage cartons, the plant is also able to recycle automobile glass or photovoltaic modules.

Thanks to sophisticated micro-emulsions, Saperatec offers a completely new possibility to separate composite materials and, thus, to recover the individual components as clean secondary raw materials. The entire separation process is realized inside the plant: from treating the composite material in the micro-emulsion, via the washing of the separated materials all the way to the recirculation of the micro-emulsion and sorting of the individual fractions thus obtained.

“Per year, composite materials with a value of more than a billion Euros are thrown away. With a recycling quota of 100 per cent, our wet-chemical process provides for a sustainable raw materials industry”, said Saperatec's managing director, Jörg Dockendorf.

“With this plant, which can process up to 500 tonnes of composite material waste per year, we are proving the readiness of our patented process”, explains his co-managing director, Sebastian Kernbaum.

The company will soon begin working on customer-tailored projects. For this, Saperatec will license the process for industrial plants at the customer and provide the appropriate micro-emulsions.

Lightsource emphasises local involvement

BRITISH SOLAR FARM developer and operator, Lightsource Renewable Energy, is returning to Alington and Yelverton Village Hall to announce revisions to their design for a solar farm in the area. This follows local concern about a new project in the region.

Information packs were sent out to residents highlighting the changes that reveal that an entire field has been removed from the plan, and a more secluded field to the north has been included instead. The revisions mean the solar farm is now further away from the residences of Yelverton, as well as the two public footpaths to the south and east.

Conor McGuigan, Planning and Development Director at Lightsource Renewable Energy, commented, "We distributed our initial plans to residents in November last year, and held a Community Information Evening at the village hall to meet residents in person and collate their feedback. This was a fruitful exercise and our Planning team has since been able to take on board the points raised, and produce a proposal."

"There were other concerns which we have also tried hard to address, including the access route for delivery vehicles during the installation phase. Our teams looked into the possibility of accessing the site from Loddon Road to the north, rather than through Yelverton village. Unfortunately it looks like this would be unsafe – Loddon Road is a fast A-road and having HGVs turning onto it at this point would create a hazard for other road users. Having said this, we are positive that we can put plans in place to keep traffic disruption to a minimum.

The solar farm would only take about 8 weeks to install, with deliveries staggered throughout, averaging about 6 per day along the route which HGVs currently use to access the poultry farm. We will implement a traffic management plan throughout the installation to ensure we avoid deliveries at peak times. Once the solar farm is in place, it would only be



accessed by staff about once per month in regular cars or 4x4s - this should cause no inconvenience to residents at all."

If the proposal goes ahead, the solar farm at Avenue Farm will produce more than just green energy. As well as powering over 2,000 households, the plans also reveal that sheep will graze amongst the panels, and a wild flower meadow will be sown around the perimeter to improve habitat prospects for birds, bees and insects. New hedgerow planting will help to screen the farm from the wider area and will also strengthen wildlife corridors and re-establish historic field boundaries. "Mammal gates" in the fencing will allow small mammals to enjoy the solar farm area and pass through it undisrupted.

These activities mean that the long term care of the solar farm area requires more than just technical expertise, and Lightsource is calling for local businesses to provide their input.

Conor continues, "Solar power is a dependable source of energy, and farming it creates a great opportunity to establish a sustainable local supply chain. There are many ways people can get involved - from the point of design right through to construction, fencing, and enhancing habitats for local wildlife."

Lightsource is currently seeking the expertise/involvement in this scheme from the local area. There is also a call for wildlife enthusiasts to participate as solar farms provide excellent opportunities to enhance biodiversity in the local area. Other local jobs to be created include security, storage and logistics businesses, fencing experts and landscapers specialising in local/native species.

REC Solar to focus on commercial PV

REC SOLAR has announced the separation of its commercial and residential operations. Continuing under the name REC Solar, the company will focus solely on bringing commercial-scale solar projects to businesses, federal agencies and utilities nationwide.

"Since 2001, REC Solar has earned a reputation for customer service and high quality system development in the commercial sector, underscored by our growing national footprint and repeat high-profile customers," said Angiolo Laviziano, board member of REC Solar. "The commercial market is projected to grow upwards of 40 percent in 2014, and this business division will strengthen REC Solar's leadership position in the space."

REC Solar recently welcomed new CEO Paul Detering, who brings to the company nearly a decade of expertise in the commercial solar market. Detering previously served as CEO of Tioga Energy, a solar electric system developer and provider of power purchase agreements (PPAs) for commercial, non-profit and governmental customers.

"The commercial and residential solar businesses are built upon fundamentally different models, with unique customer bases and disparate sources of capital," said Paul Detering, CEO of REC Solar. "With this decision, REC Solar can better serve the needs of our commercial solar customers moving forward."

REC Solar has completed more than 100 MW of commercial and industrial solar projects for a range of customers, including IKEA and federal government agencies like the Department of Veterans Affairs, as well as utilities, municipalities and agricultural facilities.

China Sunergy sells UK solar farm

CHINA SUNERGY has announced that it has completed the sale of a solar farm project to Lightsource Renewable Energy. The project, located in the southwest of Cornwall in the United Kingdom was connected to the grid at the end of March of this year and now generates enough local green electricity to power over 1500 households. The project was completed on land that has traditionally been farmed with a rotation of cattle and crops. Whilst the area used for energy generation covers only 10% of the farm area, income from the project will provide the farm owners with funds to make other areas of the farm more productive, including improved machinery, fencing and hedgerows. The agricultural output from the whole farm will remain similar to the pre-development scenario.

At the end of 2012, China Sunergy announced that it had started to invest in two UK solar farms, with an installed capacity of five megawatts-peak (MWp) each. Both solar farms were completed within just 3 months installed with the Company's own high efficiency polycrystalline modules. The large scale application of solar panels (solar farms) is quick and does not harm the ground where it is installed on. The sale of this first UK project marks a major milestone for the Company in relation to its downstream business, and also strengthens its confidence in investing and developing a project pipeline in other markets. As to the other 5MW project, the Company currently expects to have it accomplished in 2014 Nick Boyle, CEO of Lightsource commented, "We are delighted to have completed this deal with China Sunergy and believe that this project, like our many others, will once again boost the rural economy in this area as well as allow further biodiversity. We applaud China Sunergy for their hard efforts and look forward to more deals with them in the future."

"The sale of this Project highlights China Sunergy's pioneering spirit, as we are the first Chinese developer to fully complete a downstream project lifecycle, having invested, developed, constructed, operated and now sold a ground-based solar PV project in the UK," Mr. Stephen Cai, CEO of China Sunergy, commented, "The accomplishment underlines our forward-thinking strategy, as well as our customer's confidence in our reliable quality, deep expertise, and execution capabilities. We will work harder to bring out more high quality projects in the future."



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PLATINUM GmbH, based in Wangen im Allgäu, has now expanded its R3 product range to include two new devices. The R3-M2 and R3-S2 allow the maximum rating in the power spectrum from 5 kW to 16 kW to be utilised to the full in three-phase operation, making them ideal for partially shaded roofs, roof/garage combinations and problematic east-west- and north-south-facing roofs. Both of these new products are equipped with two MPP trackers and are manufactured by Diehl Controls. The transformerless, three-phase high-performance PLATINUM® R3-M2 inverter featuring a patented DUAL-X® MPP tracker is available since June. The second boost MPP tracker is designed for up to 6.8 kW and makes the R3-M2 a flexible solution for complex situations such as roofs fitted with an odd number of modules. It is suitable for an output range between 9 kW and 16 kW.

The new PLATINUM® R3-S2 – the optimum solution for small and medium-sized systems – is available since September. This inverter, which is equipped with two independent MPP trackers, can already be used from 5 kW AC for a wide variety of configurations. Both MPP trackers are designed for up to 6.8 kW. Offering 98.5% efficiency, the R3-S2 easily achieves the maximum performance levels that characterise the R3 family – high efficiency guaranteed! Of course, the PLATINUM® R3-S2 is equipped with all the features offered by its big brother, the R3-M. For example the DIVE® technology for increasing efficiency in the lower power output range ensures that these small, three-phase inverters collect optimum yields even in the early morning and late evening.

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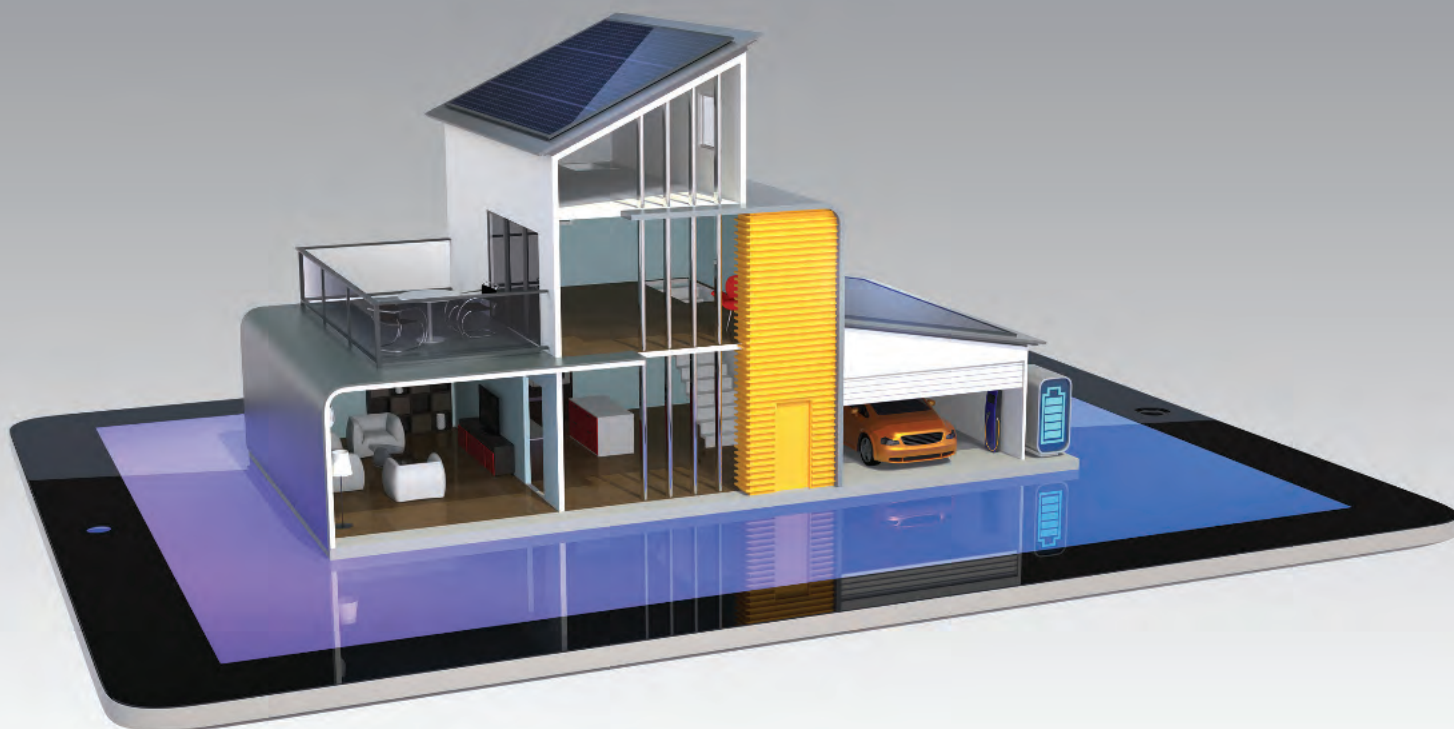


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Looking to the **future**

Solar-based energy production is changing as we move towards a future where energy production will be localised. Self-consumption will require a high level of energy management. Solare Datensysteme describe some of the results of their research into current and future requirements.

THE CURRENT METHOD of supplying electricity through the UK is via the national grid network providing a continuous supply of power. It is not the most efficient method of electricity delivery and the infrastructure capacity will be reached faster than energy demands. Solar is growing rapidly but still only makes up less than one percent of national electricity production. The future for solar energy will be self produced power in either a domestic or business setting.

Solar energy still faces resistance to uptake in some areas and part of this is due to a competitive energy market clouding information with competing solutions. Moving to self consumption can be concerning to some home and company owners but this is often due to a fear that their consumption practices will have to be fundamentally changed.

Solare Datensysteme has looked at these issues and developed an energy management system that is sold under the Solar-Log brand. They found that reservations towards self-consumption could be minimized when an understanding of the concerns is developed into the solution. Many people assume that self consumption means minimizing electrical usage and possibly running out of supply if an appliance is accidentally left on. The Solar-Log system automatically controls electrical devices and appliances with robust and dynamic technology changing the energy usage dynamics allowing little surface change to how households and businesses operate.

The main task of the Solar-Log is energy management and to monitor yields achieved from generating electricity from PV arrays. This is common to all solar energy management systems.

Solar-Log, like some of its competitors, records the power consumption from individual devices. The company has released new versions of the Solar-Log device and with an eye on the future offers automatic control over devices and appliances and can remotely control when devices are on and off.

Enhancing the future

An effective energy management system not only has to control the production of electricity, but also the consumption by turning electrical appliances and devices on and off at the right time. This is accomplished by employing a power meter with the Solar-Log acting as the control unit.

The power meter measures and records the current amount of power consumption that is then transmitted real-time to the Solar-Log. The current power production and consumption level data is transformed into an easy to read graph. Based on the levels in the graph, one can quickly see if there is enough irradiance to turn on an electrical appliance or device manually.

Having an integrated power meter as an alternative to an external meter reduces installation time and saves initial capital costs. The developments in the updated versions go a step further

and not only records the total power consumption but has the capability to record individual appliances and devices. Therefore a Current Transformer (CT) that can be directly connected to the Solar-Log Meter for measuring consumption. The Solar-Log has multiple Smart plugs that can measure the power consumption of any devices connected to the socket and send this data. As a result, every individual power socket connected with a smart plug or devices measured with the CTs can be displayed in the graph with the total consumption. So the consumption can then be analysed in greater detail than simple overall energy usage.

With this sort of data access, modern energy management systems can automatically turn off and on appliances such as heat pumps with a pre-configured threshold programmed into a photovoltaic plant's peak power production. Several electrical appliances and devices can be automatically turned on to ensure that power during this peak does not go to waste.

In addition to threshold values, profiles can be customized with additional parameters such as time of day and minimum operating time. The appliances are monitored and controlled via networked smart plugs. Air conditioning systems are ideal devices for self-consumption and power management. The



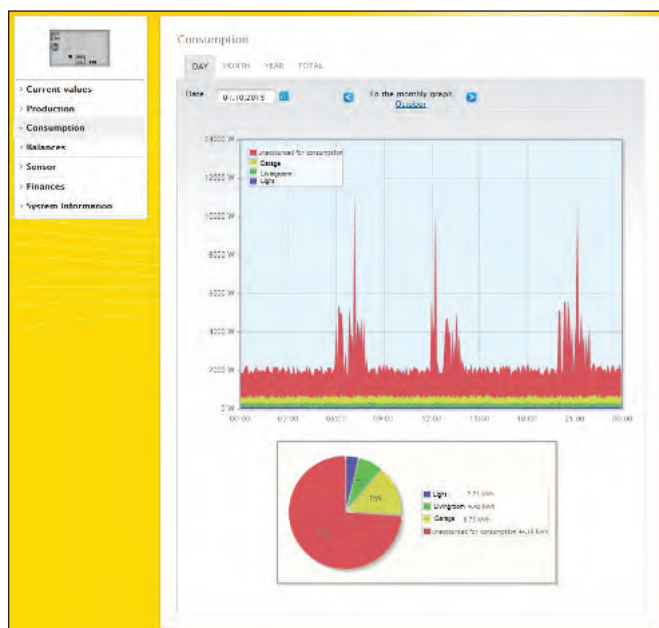
Solar-Log system has settings for when it should be turned on automatically and sets a temperature to be maintained.

Practical implementation

In practice such energy management configuration can allow the consumer to control devices such as water heaters and ensure they turn on at the start of the day when PV is being produced and can remain active throughout the day when PV is at its peak. If the solar power production increases during the day, additional appliances such as air conditioners can be automatically turned on. It is possible to configure the time when the water heater turns on regardless of the amount of PV production. In this case, conventional electricity is obtained from the grid. This function can be applied to days with limited or no sun, but also to days with changing weather conditions. As soon as there is not enough PV power to meet the current needs, power is obtained from the grid.

Managing the PV energy that is fed into the grid is becoming more important. The regulations on how much energy can be fed into the public grid generally differ from country to country and change depending on a range of circumstances. This is why it is necessary that the PV power producer can control how much of the yield is fed into the public grid and how much is used for self-consumption. As an energy manager, the Solar-Log system has an adjustable reduction rate (x%) option, specifically designed for regulated grid feed. This allows the amount of feed-in power to be adjusted to any percentage of the plant's power output. The remaining energy being produced is available for self-consumption. The Solar-Log is capable to adjust the inverter production accordingly.

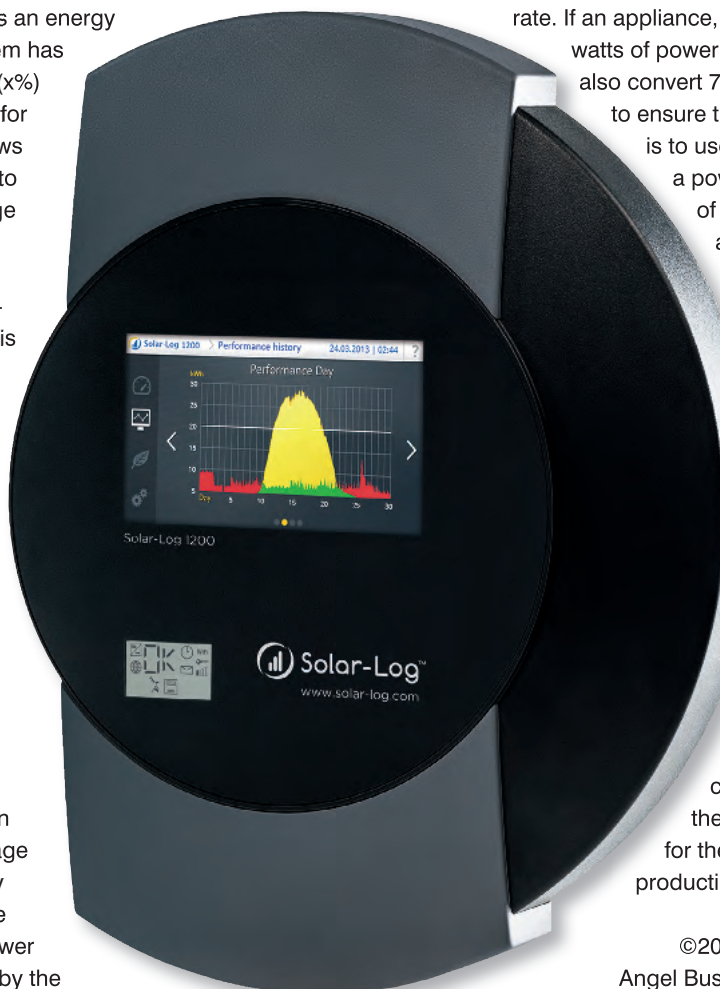
Jochen Laun, Head of Marketing & Product Management at Solare Datensysteme GmbH, explains the benefits, "When the amount of electricity that is fed into the grid is limited to a certain percentage (X%) of the DC output, the amount of self-consumption needs to be calculated since the reduction rate is based on the percentage at the feeding point. It is okay for inverters to generate more AC power, as long as that power is used for self-consumption by the



respective household or company." The following example demonstrates the advantages: A plant with 10 kWp has to be limited to a maximum output of 5 kWp with the 50% reduction rate. If an appliance, such as pump, that uses 2000 watts of power is turned on, the inverter could also convert 7 kWp into AC power. All you need to ensure that only 5 kWp is fed into the grid is to use Solar-Log in combination with a power meter. With the capability of Solar-Log to control electrical appliances and devices you get most out of your PV plant at all time.

Solare Datensysteme has introduced three new models of the Solar-Log Monitoring system. The Solar-Log 300 and Solar-Log 1200 are for small domestic installations and medium-sized plants.

In addition, the Solar-Log 2000 is for large-scale PV plants. The new models come with important enhancements, that are not only relevant for the current UK market but preare the market here and elsewhere for the evolution of solar towards self production of energy consumed locally.



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Supermarket solutions

Renewable Resources carried out an innovative installation of solar PV across 210 arrays and 197 Sainsbury's stores throughout the UK.

RENEWABLE RESOURCES (Energy Solutions) Ltd were selected by UK Supermarket chain Sainsbury to install PV on 197 stores across the UK.

The project, which began in 2011 and continues to date, was to become one of Europe's largest solar commercial projects and the company installed 23.7MW over five phases with a total of 8,400tn of CO2 savings over the full programme.

The main benefit of installing PV for Sainsbury's supermarkets onto the roofs is electricity, which is used by the store. With the government pain Feed in Tariff the company also receives a revenue stream which at current prices is around 20% more than the current price of the electricity that they buy.

Sainsbury's supermarkets now host the largest solar array in

Europe - enough to cover around 26 football pitches, or if placed side by side would span five marathons or 680 laps of the London 2012 Velodrome.

Step by Step

Phase one and two of the project centred on 118 PV Installations at three pilot stores with over 7MWp installed capacity, generating 4,800MWh of 'Green Electricity' annually.

Over these phases alone more than £1million of FiT income was created for the company with 2,500 tonnes of annual carbon savings. Renewable Resources (Energy Solutions) Ltd completed 57 stores of 50kWp in Phase 1 (2.85MWp) and 53 stores of 50kWp and 150kWp in Phase 2 (3.65MWp).

With success in the first stages and energy needs progressed



On the 150kWp arrays that Renewable Resources (Energy Solutions) Ltd completed, the drop was from 30.7p/kWh to 19p/kWh and from this level it was reduced even more, to 12.9p/kWh and then to 11.5p/kWh.

The race was on to finish the required installs before the March deadline. Sticking to a very tight deadline Renewable Resources were able to install all 115 stores as planned before the March deadline. In doing so it saved Sainsbury's over £26million of revenue with all arrays eligible for the higher FiT rate.

Onward and upward

Phase 3 of the programme took place from April 2012 to July 2012 with installed capacity of 8MWp at 52 PV installations generating 6,400MWH of Green Electricity annually, and resulting in 2,800 tonnes of yearly carbon savings.

The FIT tariff was reduced again at the end of July but luckily the work at the 52 stores had been completed by that date again providing savings by completion within the timeframe available.

Phase 4 of the PV Roll-out programme took place between February and March 2013 with a further 19 PV installations on 100kWp to 250kWp systems, with 3.2MWp installed capacity

Phase 5 is continuing now and is at 20 stores on 100kWp systems and over with more than 3MW installed capacity.

Saving contract

The Sainsbury's contract has been crucial to Renewable Resources growth and the company, which is based in New Lanark, Scotland, and Milton Keynes, last year reported a tenfold increase in turnover from £2m in 2011 to £21m in 2012. Predictions are that this will rise to £25m this year.

The company is at the heart of the UK solar panel industry and it has a network of hundreds of contractors installing solar panels throughout the country. Its other customers include Rolls Royce and Heathrow Airport, with around 80% of the revenue booked from commercial and business customers.

The company has allowed its success to foster a positive return to society and is engaged in a number of charity projects, including taking solar to Malawi when it installed solar modules at a school in the African country in conjunction with humanitarian organisation Spirit Aid.

Technical outcomes

Renewable Resources designed and tailored each system to each store's specific roof and energy requirements. Mounting kit was chosen to best suit the particular roofs and Renewable Resources used different photovoltaic panels, either thin film, or poly-crystalline depending on the location and needs.

The company used Solyndra thin film panels on 113 installations and all the other installations were with polycrystalline panels. These panels are more efficient than thin film and a bit less efficient than the mono-crystalline ones.

Sainsbury's requested greater involvement. The initial six month programme that was to service 80 stores quickly became a 115 store programme which Renewable Resources was expected to finish in only seven weeks.

Starting at the end of October Renewable Resources installed 57 stores by the first week of December 2011. That left 53 stores / 4MW to complete by the end of February 2012.

External concerns

With the programme in full swing and financial expectations understood, the UK Government reduced the FIT tariff twice. In March it completed its original reduction for 50kWp arrays from 32.9p/kWh to 15.2p/kWh - and followed it up with another reduction from the new level of 15.2p/kWh down to 13.5p/kWh.



They are produced from a piece of silicon consisting of many crystals and this mis-alignment can help in some circumstances, because the cells might work better from light at all angles. Also, polycrystalline panels are cheaper per square metre, compared to the mono-crystalline panels, making the installations more cost effective.

Renewable Resources at all times sought to find the best cost-effective solution for its client without compromising on quality.

The solar PV modules perform better when mounted at an angle, so in the case of the flat Sainsbury's roofs the PV modules are mounted at an angle of 10 degrees, using specially designed mounting kits that would ensure a number of advantages including minimum ballast requirements with no need to penetrate the roof. There was a low maintenance requirements reducing future costs.

The company ensured there was no obstruction to the roof drainage and no stresses on the roofing membrane. Efficient roof utilisation with maximum energy yield was determined for each individual array and maximum output was obtained from each panel due to an effective cooling method.

On the metal Sainsbury's roofs, the PV modules are mounted on each roof, following the slope of the metal deck roof. The mounting kits in this case ensure cost efficiency, fast installation, flexibility, protection from water ingress and corrosion

Challenging solutions

A number of crucial challenges were presented to Renewable Resources that the company had to meet head-on. Not least were the Feed-In Tariff deadlines which, as stated previously, the Government changed regularly and frequently. Subsequently the company faced increasingly changing and tight timescales.

Renewable Resources will continue to maintain, monitor and evaluate performance of the installation to ensure return on investment. The installation became a significant element of Sainsbury's 20 by 20 Sustainability Plan, which aims to reduce carbon (CO₂) emissions, provide a sustainable solution for long-term energy security and protect from future rises in energy costs.

To enable the systems to be installed Renewable Resources had to carry out surveys of the physical space to ensure it could fit the units without any shadows, while leaving existing roof walkways and maintenance paths undisturbed.

The roof structure also needed to be tested for load bearing to ensure that it would hold the system. The company worked harmoniously with planning and landlords to ensure it was able to fit the units without challenges

The standard colleague and retail engagement was required to be completed and it had to work with logistics and close the store loading bays off so that it could safely crane the panels onto the roofs – this needed a seven-hour delivery window

Crane lifts had to be organised well in advance to lift all required equipment on the store's roof and the larger systems (100-250KWp) needed to be tested to ensure that the electricity being generated could be safely fed into the system and more importantly be isolated should an engineer need to complete work on the local grid. It's no good turning off all power, only to find the PVs still generating power.

Throughout the project the company worked in tandem with the Sainsbury's team to ensure it was completed to our mutual satisfaction and Renewable Resources rightly remains proud of its achievement and involvement in something so significant and of this scale.

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Largest English solar plant: high efficiency factor ensures success

It took just eight weeks to build the largest solar power farm in England which supplies over 7,500 households with power. The plant near Wymeswold, close to the city of Nottingham, is highly efficient, and central inverters from LTI ensure maximum efficiency and continuous availability.

England is currently experiencing a solar boom. Solar modules with an output of 520 megawatt were installed in the first quarter of 2013 alone. The most spectacular project is based on the site of a former airfield that is now used as a public racing track. Six different open spaces between roads accommodate a solar power plant with 130,000 solar modules and a 33 megawatt output. Cost came to approximately 35 million pound.

At the behest of SAG, the German company LTI developed the inverters for the plant which play a key role in converting the resulting energy into alternating current. A total of 24 PVmaster stations are used with an AC output of 1.22 megawatt each. In addition to a medium-voltage transformer and medium-voltage switchgear, each station includes four PVmaster central inverters.

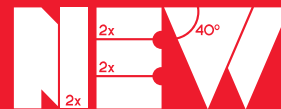
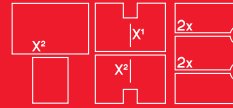
The crucial element is their efficiency factor of over 98 percent – an outstanding value that guarantees maximum electricity feed-in and a rapid return of investment. The installation is also very robust, because its power electronics are liquid-cooled very efficiently in a closed circuit. For planners, investing in LTI technology turned out to be a particularly smooth solution as the PVmaster stations are compact ISO containers that can be shipped to England easily and take up little space.



A VPN internet connection is used to monitor how efficient this technology is working, and the installation is controlled from the office. The planners are satisfied – this solution is highly efficient and future-proof, an important contribution to the alternative electricity market in England.



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UK leads Europe in PV recycling move



The global PV industry has created a chain of materials that will one day be discarded. A great deal of effort has gone into preparing for that day and February the 14th makes the date for mandatory compliance under EU law. Jan Clyncke, Managing Director of PV CYCLE Association looks at how the PV industry is adapting to the upcoming change citing the UK as a leading force in the change.

IT'S NO LONGER just a green thing to do: starting in February the collection, transport and recycling as well as its related financing and administration of discarded end-of-life photovoltaic panels is EU law. One of the most significant changes in the European photovoltaic sector in recent years, it's the result of the new WEEE (Waste Electrical and Electronic Equipment) Directive adopted two years ago by the European Union.

The EU decided to include the PV sector in what has worked well for PV CYCLE and in other industries: the so-called Extended Producer Responsibility. "PV Producers" – all firms or individuals manufacturing, selling, reselling or importing PV modules in an EU-country – are now responsible for disposing and recycling panels in all Member States in which they operate, and those obligations are likely to differ significantly from country to country.



Valentine's Day deadline

The WEEE Directive Recast of 2012 introduced the general norms under which each Member State should regulate the recycling of waste electrical and electronic equipment, including photovoltaic panels, after 14 February 2014.

The United Kingdom has been the first Member State to implement such legislation, in advance of such deadline. A national law was presented to the Parliament on 10 December 2013 and came into force on 1 January 2014. Also in late 2013, the Italian and Flemish (Belgium) Governments adopted their draft regulations which are expected to be confirmed before the February deadline.

Although other EU countries may not meet the deadline and it will take them a few more months to get up to speed, WEEE will remain subject to the PV sector in 2014 and onwards.

From voluntary to mandatory

The WEEE legislation brings significant changes as it implies Producers of PV modules to mandatorily organize and finance the waste management of their used products. Including PV modules in the Directive has ensured that the entire sector will have to participate in the waste management of PV panels. A novelty for those companies not yet affiliated with a voluntary scheme.

A result of intensive information campaigning of the PV recycling industry, PV Producers will not have to bear a share of the costs of other consumer products included within the WEEE regulation, which at the moment are being recycled in much higher numbers than PV modules with their +25-year lifetime. Recycling of panels will grow significantly only in ten or twenty years, when large

quantities of new panels installed during the last decade will arrive at the end of their lifespan.

This important achievement, however, does not exclude PV companies to take up a number of other responsibilities connected with WEEE compliance:

- Register in all EU countries they are considered to be producer in
- Periodically report the PV modules they sell to the national WEEE registers
- Organize and finance the treatment of their PV module waste – individually or via an accredited collective scheme
- Inform the end customers on how they must dispose of their PV modules
- Inform treatment facilities of their product's composition and the potential use of hazardous materials
- Mark their products with a crossed-out wheelee bin

Compliance

An important requirement that PV producers need to take into consideration is national WEEE compliance. In most countries, Producers will now have to subscribe to take-back and recycling schemes recognised by the national governments in order to put PV modules onto these countries, as is the case in the UK, France, the Czech Republic or Spain.

In France for example, the transposition of the WEEE directive is expected to be finalised by mid-2014 and PV companies need to register with an accredited scheme. As expected under a legal framework, WEEE sets strict deadlines and mandatory requirements: If producers fail to register with an accredited scheme in due time, they will have to retroactively pay a fee based on the number of PV modules placed on the market between the entry into force of the legislation and their registration. Additional penalties might arise should they not respect the deadline for signing up to a scheme.



Germany and Italy, today's biggest PV markets in Europe, are expected to allow for both industry-managed and individual take-back and recycling schemes, leading into competition amongst those offering WEEE-compliance services but also a more complex compliance procedure.

Experienced advice

As today's leading PV take-back and recycling scheme active throughout Europe, PV CYCLE has been preparing for different scenarios in all European countries. We have decided to implement ad hoc national strategies in each Member State a long time ago. In the last two years, PV CYCLE has opened several offices, and appointed country representatives, which offer the Producers affiliated to our programme a local partner to work with.

In the UK, for example, PV CYCLE UK is the only accredited PV-focused Producer Compliance Scheme, solely representing the local PV Producers with in-depth PV recycling experience. The Spanish office in Madrid opened in December 2013. Over the two previous years, PV CYCLE has opened Italian and German offices. In France and Belgium, we are currently preparing for the creation of own entities and official recognition under upcoming national WEEE law. In addition, PV CYCLE has also been developing new partnerships with local service partners with a view to meeting the objective of best adapting to national laws, once available. In the Czech Republic, for example, our partner Retela was accredited early 2013 and has been collecting end-of-life modules ever since.

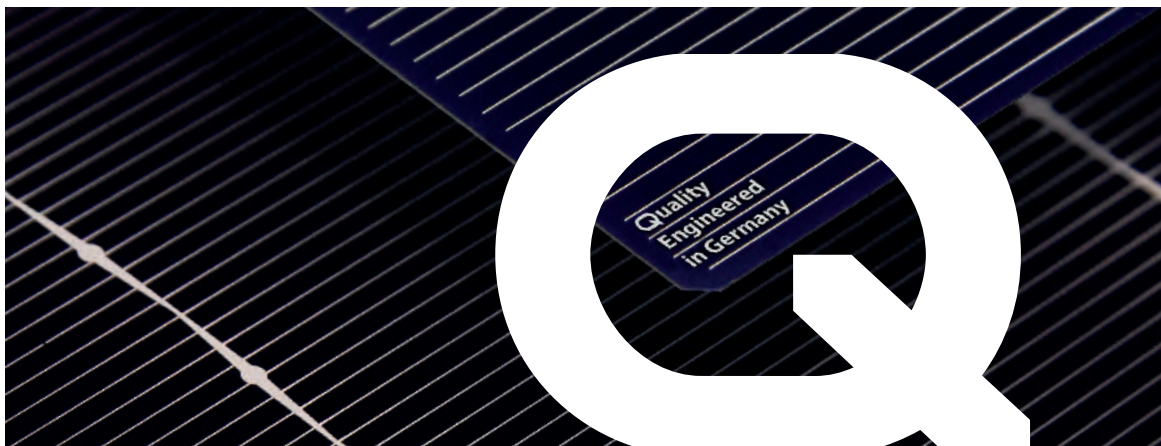


Legislative realities

Throughout all countries, however, we have been working alongside the Ministries of Environment and other related authorities to help ensure that upcoming regulations take into account the specificities of PV modules. Though national WEEE might still seem a long way to go in each EU Member State, the time has not stood still for PV CYCLE and its members. The future of solar panel recycling in Europe is being decided in 2014; so let's all make sure that the entire photovoltaic sector is well prepared for what the next stage on the road may bring.

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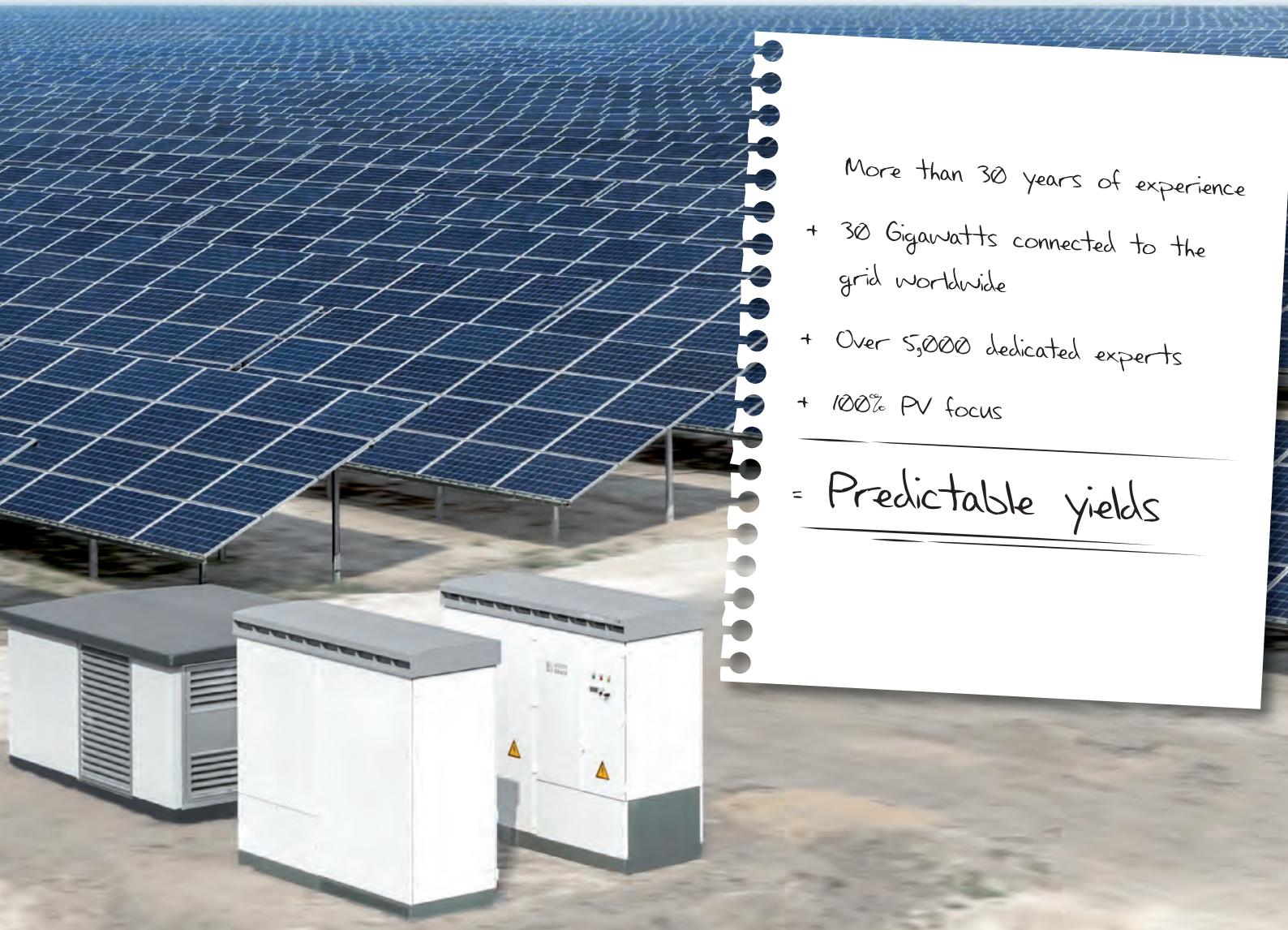
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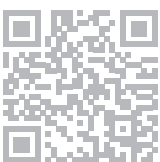
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ENERGY
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Local solar strength

Infinity Innovations is a UK based company that develops and manufactures its own PV modules and products and has done so in the UK for a number of years. Solar UK asked Jake Findlay, Sales Director of Infinity Innovations about the new patented product called the Stealth Energy PV Tile.

INFINITY INNOVATIONS is a company with directors and employees with extensive experience in developing and supplying solar and PV products. The company has extensive expertise in the design of PV systems and is working with a number of R&D facilities to develop and introduce products and brands to the U.K. market. Infinity Innovations has been selling product in the UK for a number of years and develops its own products for market.

The Stealth Energy PV Tiles are wholly owned and patent by Infinity Innovations. We asked Findlay how the company approaches manufacturing their own product.

A The company manufactures the tiles using highly developed equipment incorporating many new and ground breaking techniques. Some of the design features, such as predrilling holes for simple installation, demonstrate the radical approach brought to promoting performance and looks of the tiles. All design is done in the UK and the company maintains control of the entire manufacturing process.

Q Your recently announced product Stealth Energy tile is a different concept than your other offerings. What was the motivation to develop such a product?

A The motivation for developing the Stealth Energy PV Tile is that solar panel products are unattractive to the eye when attached on the roofs of domestic properties. The technology is tremendous in terms of free electricity generation, but the aesthetics have not yet been given enough priority in a commercial sense.

The boom in uptake for solar power has made the use of solar panels to generate free electricity an everyday concept. solar PV manufacturers have been in a race to produce cheap solar panels for the global market which has been in constant overdrive for the last 3-4 years. Somewhere around the world a market has been about to reduce some subsidy which has caused constantly renewed surges in demand creating shortage in other areas.

The Salt Mill, Titus Salt's Fac Salt Mill, Titus Salt's Factory, Saltaire, Bradford, West Yorkshire

Standard solar panels are manufactured as cheaply as possible, and then used in a wide range of installation scenarios. Some are put in fields as solar farms, or attached to roofs of factories, or on top of domestic properties. The panels design does not change, the same panels in the fields are the same panels as installed on the roofs of houses. So there has been no need to invest in the aesthetics of using PV for domestic installations, only how cheaply the panels can be produced.

Q The stealth tile has a number of patented aspects in the design. Can you tell us about the key points of the design and the benefits it offers including the materials used in manufacturing and expected output of the finished product?

A The Stealth Energy PV Tile has taken existing PV panel manufacturing techniques, and enhanced many of these areas in order to develop a high efficiency frameless panel. The panel is frameless, lightweight, and has pre-drilled holes in each of the four corners to facilitate simple strong installation. All areas relating to the physical attributes such as efficiency, strength and weatherproofing have been redesigned, developed and fully tested and accredited.

Q The industry is awash with novel ideas and technology. What do you feel makes this product different?

A As the technology matures and financial support mechanisms, such as feed in tariffs or subsidies come down to more sustainable levels globally, the benefits of the technology itself needs to continue to grow. Therefore it is critical that new novel ideas are developed to constantly make better use of the free electricity generated. The biggest breakthrough will be when genuine storage for the electricity we generate is developed, as energy could theoretically become a 'self-sufficiency' concept in the domestic situation.

The Stealth Energy PV Tile focuses on the aesthetics of the initial generation of solar power, and offers almost 'hidden solar



generation' by subtly blending the PV into a traditional roof covering. Once generating, we welcome all the novel uses of this free electricity!

Q The UK market has developed very quickly and often the focus is where the largest returns are. Currently it is focused on large scale but your product is firmly targeted to the domestic market. How do you see the UK domestic market and what are your expectations for the market and your product?

A There is no doubt that the cost of energy is climbing at an unaffordable level. Electricity consumption is growing, but electricity costs are growing faster. As new 'novelty' products increasingly appearing, the ability to directly benefit from domestically generated solar is becoming more important. Feed

The Stealth Energy PV Tile has taken existing PV Panel manufacturing techniques, and enhanced many of these areas in order to develop a high efficiency frameless panel. The panel is frameless, lightweight, and has pre-drilled holes in each of the four corners to facilitate simple strong installation

in Tariffs still support domestic solar as a good investment for the present, and undoubtedly a future-proofing investment for the years to come.

The building of new houses is at last on the move, along with domestic renovations. Achieving building codes for new build houses is most simply achieved by incorporating solar PV as part of the construction criteria, and this market more than any, is looking for a cost effective method of incorporating solar PV in a way which compliments the looks of a property.

Q You have mentioned that a key motivator was the unattractiveness of traditional PV on rooftops. There are other products addressing this area. What will the stealth bring to the market that potentially comparable products provide?

A Stealth Energy PV Tiles have been developed to enhance performance along with the looks of the finished product. Existing solar tiles have often been developed to fit uniquely with specific types of traditional roof coverings.

The key advantages to the Stealth Energy PV Tiles are the performance of the tiles. Each tile is 50w, and consists of highly efficient monocrystalline cells which have an average cell efficiency at a leading 19.2%. The module efficiency for the installed tiles is 14.2% meaning that this is leading output per square meter for any tile effect product. It cannot be overlooked that the Stealth Energy PV Tile system brings a new level of pricing to the tile solution. In developing a product based on looks and performance, we have also achieved a tile product which rivals all standard in-roof systems on price, and introduces a significantly more cost effective solution for any tile based installation.

Q PV in the domestic market has mainly been retro fitting current roofs but you seem to have a strong focus on new build. What sort of cost benefits could end users expect from having PV integrated in a new build?

A The Stealth Energy PV Tile takes the best components from many existing systems. It sits flush to the roof for the most discrete appearance similar to in-roof systems and solar tiles. It uses a lightweight yet very strong mounting system to allow good heat dissipation for optimum operating efficiency similar to a standard on roof system, and uses leading efficiency mono cells on an all-black backing for optimum performance and subtle looks. The significant benefits of Stealth Energy PV Tiles are performance, aesthetics and price. The Stealth Energy PV Tile system will directly challenge all the existing solar PV forms which aim to offer improved aesthetics to standard panels on a

mounting system. We believe that apart from the performance and the aesthetics, Stealth Energy PV Tiles are the strongest priced tile solution on the market.

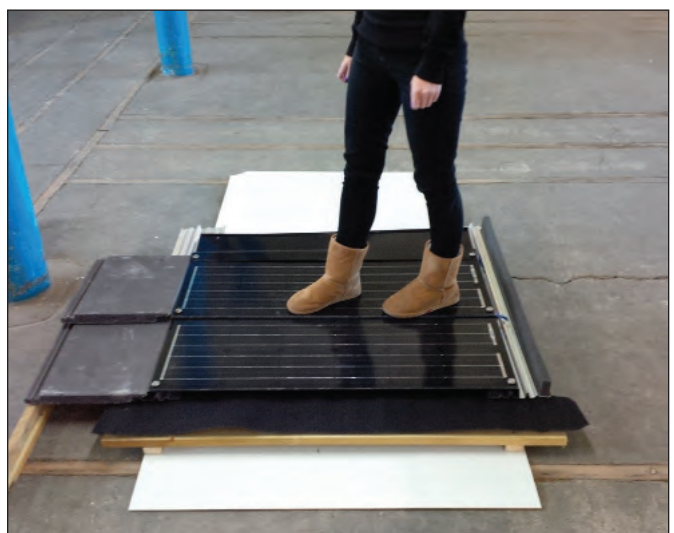
Q Integrating PV into a rooftop can lead to other issues such as leakage, weight bearing problems and can make maintenance on the roof area difficult. How does your product deal with such issues and does it allow home owners access to other parts of the roof for regular maintenance?

A I would agree with this, and the U.K. is experiencing more and more weather which is testing all factors of weatherproofing. In this regards I would support the new initiative introduced by the MCS to bring in standards for the mounting systems for solar PV. To this end the Stealth Energy PV Tile mounting system will be fully accredited by the MCS for the factory production control aspect, and through BRE testing, which covers wind uplift or strength testing, weather proofing, and fire.

The Stealth Energy PV Tile is lighter than a standard roof covering, so we perform positively on issues relating to weight, and though we do not advocate it, this product can be walked on it is so strong. All aspects relating to strength and weatherproofing have been engineered into both the tiles and the mounting system, which is unique to the Stealth Energy Tiles.

The 50w tiles are small compared to a standard panel (0.36 m sq per panel), and can be installed standard columns, or with a stepping shape to optimise awkward roof spaces. For on-going maintenance, a single tile from any installation can be removed retrospectively should this be necessary.

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Can the **FiT** continue to provide momentum?

The UK solar industry began to thrive when government subsidies jump-started a burgeoning industry. Since then the industry has gone from strength to strength to become one of Europe's leading lights. Every time the government changes the scheme or tinkers with other renewable subsidies the industry holds its breath and calculators come forth to discover the real impact changes bring.

THE UK INDUSTRY is like every other PV market in Europe in that it was jump started from humble beginnings with generous Feed in Tariffs. Like other regions the UK government made an attempt to reduce the initial FiT scheme retroactively but lost that ability in a much publicised legal action brought by the industry. This has meant that the UK is now one of the few early solar adopters that has not retrospectively altered FiT offerings.

Although the financial consequences hit hard at the time the long term has seen the development of a strong UK market for solar and PV. The government now likes to highlight the lack of retrospective changes as a positive.

Ever since that court defeat in 2012 the UK government has constantly tinkered with the FiT and other renewable schemes as it tries to balance the desire to become the greenest ever UK government with the realities of the same government pushing forward with an intense austerity drive.

Mainstream UK media is presenting a number of stories of people worried that solar is not a positive investment any more. There has been an increase in local communities complaining about large scale PV developments.

To counter this negative view, Energy and Climate Minister Greg Barker stated in an interview that returns from PV investment remained higher than a pension fund. This led to a flurry of reports supporting or denying his claim. The more reputable sources agreed with his perception in the short term but there

was a murkiness for the long term forecast due to the lack of transparency of what policy changes were still to come for the industry.

FiT enough on its own

The UK Feed in Tariff scheme is one of the strongest in Europe and provides long-term returns for investors. The UK is expected to become the largest PV market in Europe - for the first part of this year at least. The schemes have allowed both domestic and business consumers to reduce bills and earn money by selling excess energy back to the grid.

The government has continually revised the rate of returns from the FiT schemes from the original 43.3p per kilowatt down to 16p. For some potential customers the reduction appears a huge loss of return. The government argument has been that the cost of PV cells and modules have dropped dramatically enough that the FiT cuts were required but there was also the fiscal pressure of faster initial uptake than expected.





A concern for some in the industry is that the government is too focused on cell and module prices. While it is true there has been a price drop, the softer elements of installation such as inverters, and mountings have not reduced at the same pace.

Most agree that the crux of Barker's recent comments regarding investment were basically correct and solar remains an excellent financial opportunity, in addition to the national environmental goals being met through cleaner energy sources.

There are still those that like to paint a picture of a declining domestic market but growth remains robust despite policies that lean towards support for arrays above 10kW. The domestic market growth has not eased except for a dip in 2012 following the last FiT adjustment but this can be explained by the flurry of installations completed before the change rather than a post-consequence of the changes. In fact the UK domestic market continues to grow with 500 000 installations below 10kW.

Despite all the negative stories in the media, the public appear to continue to support solar and with impressive levels of sunshine last summer consumers were treated to even greater returns than expected only fuelling a word of mouth reaction that should continue to spur industry growth in this sector.

Large scale returns

The UK solar industry has seen roller coaster growth and the group that has suffered the most has been the companies that were enticed into the market by the initial generous government subsidies and returns hoping to grab market share.

The reality was that the industry was soon oversubscribed and many smaller companies have struggled to survive. The last FiT cuts became the nail in the coffin for many companies that had been hoping to join in the gold rush that was promised for the solar industry.

At the height of the solar boom there were more than 3500 registered installers for 1500 jobs available in any given week in the UK. The writing was on the wall but the government stood back and let the industry deal with its own consolidation. This has meant that larger companies, often with an international parent company, were able to weather the changing market place while focusing on the segments they wanted to develop.

Many of the businesses that closed were UK based and often small to medium enterprises (SMEs) - two areas of UK manufacturing that the government was supporting. There are a number of companies that still hold ill will to government sources more interested in balancing books than helping local industry initiatives. The government can rightly point to positive industry growth and how they have fostered the impressive results.

With greater uptake for the generous FiTs the government expected outlay already exceeded expectations so the government looked to new mechanisms to spur industry growth. Many of the policies implemented benefited large scale projects and larger companies were able to take advantage more easier than the SMEs felt they were able to.

One of the concerns for smaller ventures was that the changing policies were too complicated to keep up with and too expensive to meet policy expectations. MCS certification costs were cutting into results and then the Green Deal required accreditation that often covered the same ground. With MCS costing small firms £5000 a year the process was becoming burdensome and costly forcing more small businesses out of action.





The situation has become an issue for the government with the MP for North East Cambridgeshire, Steve Barclay submitting a number of Parliamentary Questions and additionally has written to the Minister at the Department for Energy and Climate Change to request an explanation as to why the process and costs have not been simplified, especially for SMEs.

Maintaining momentum

The solar industry in the UK is no longer a singular entity of opportunity and can now be viewed in the three categories of small, medium and large-scale PV opportunities. This does not simply mean the size but the methods and materials with unique approaches for each sector. Each section is now under the impact of different sets of government policies with Renewal Obligation Certificates (RoCs) geared toward the larger utility end of the scale. The Green Deal is a more complex set of policies designed to encourage a bigger picture view of energy consumption with interaction of technologies matched with energy saving elements.

For some companies keeping up with the changing opportunities is too time consuming and with larger players having internal divisions to keep pace with the policy opportunities, some smaller players feel there is not a level playing field. Added to these concerns is the industry wide concern that current policies will not allow the industry to get anywhere near the proposed 20GW by 2020 (or 22GW according to some versions). Not because of a lack of technical prowess but the looming reality of a electricity grid than can only cope with 10GW of this extra input.

With all these issues at hand the government is currently presenting further changes to policies that will impact across the industry.

The first major change will be the Renewal Heating Initiative (RHI) to be launched this spring. The initiative covers air & ground source heat pumps, biomass and solar thermal, which is a key reason to the increased interest in hybrid solar panels that can benefit from the RHI and the FiT.

Only time will tell what the changes mean from the Green Deal, RHI and upcoming changes to the FiT and RoC schemes and more policies on the way. The industry is keen to maintain the strength and resilience that has been shown. Over the last few years there has been a concerted effort to develop a roadmap to guide the industry but more people are beginning to ask who the changes are helping and how or when will the government provide policies that will enable goals to be met.

There is no doubt that every government faces the balancing act of austerity with energy goals but there seems to be a need for a simpler approach so companies can meet the requirements of policy expectations without damaging their own business. A clearer message will help alleviate fears. The business of providing energy is changing and the UK solar industry is in a strong position to benefit from providing energy needs for the future.

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Planning for austerity

The UK government has run an austerity programme with a view to balance the national books at a time they have also embarked on the most ambitious national carbon reduction plan in the world. One council is looking to tackle both subjects with the introduction of solar to the council properties.

LEICESTERSHIRE COUNTY COUNCIL, which has to save £110 million from its budget by 2018, has announced proposals that include the installation of 600 panels on council buildings.

At the moment, the council spends more than £1.5 million per year on energy bills and just less than half of this is spent on County Hall alone. As energy consumption levels are so high according to national rules, the council is also taxed £600,000 per year in carbon reduction payments to the Government.

In order to tackle such a huge budgetary cut for a regional council there are plans to reduce costs from within the council's own costs rather than burden constituents any further.

The council proposes to invest around £1 million from next year's capital programme. This will be funded by asset sales and grants and they are looking at a number of renewable options to ensure long term cuts of energy costs to the council and therefore the people of Leicestershire.

The plans announced by the Tory led council include the installation of 600 solar panels on the roofs of buildings at County Hall. This would be followed by further solar installations on a number of other council buildings, including the library and office premises in Coalville. The council also proposes to heat County Hall with a wood burning bio-mass boiler and to make other improvements to windows, lighting and the way buildings



are occupied to reduce bills. The proposed should save more than 400 tonnes of carbon emissions per year.

Deputy leader Byron Rhodes, cabinet member for resources, said: "At a time we have to save £110 million, it makes sense to put our own house in order and do what we can to cut energy bills. "Our ambitious plans will pay for themselves in terms of lower energy bills and incentive payments from the Government. They also support our intention to reduce the council's carbon footprint."

However, the Conservatives have been accused of adopting energy-saving measures they rejected a year ago when they were proposed by County Hall's Liberal Democrat opposition.

Liberal Democrat leader Simon Galton said, "This announcement is a surprise to us, as last time we proposed solar panels be installed on Council property the Tories were very hostile to it. At the time they refused to listen, but perhaps the need to make such savings has forced them to become a bit more open minded."

"This is a good start but we can't rest on our laurels. The County Council needs to continue to find efficiency savings to protect vital services and climate change represents a threat to our very way of life. We will be investigating to see what further measures can be taken to save taxpayer money through green investment."

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Solar research centre for **Wales**

Swansea University is developing its already impressive renewable energy research projects with the addition of a solar energy research centre.

A NEW, WORLD-CLASS solar energy research centre to support the growth of the solar industry in Wales, and headed by one of the world's pre-eminent solar energy research scientist, has been launched by Swansea University after being awarded £6 million from the Welsh Government's Sêr Cymru programme.

Edwina Hart, Minister for Economy, Science and Transport has welcomed Professor James Durrant from Imperial College London, as the Sêr Cymru Solar Energy Research Chair who will lead the new Sêr Solar initiative based alongside Swansea University's SPECIFIC at the Innovation and Knowledge Centre (IKC), Baglan Energy Park.

SPECIFIC is an Innovation and Knowledge Centre (IKC), led by Swansea University has a pilot production unit that will develop functional coated steel and glass products to incorporate into existing and new buildings, enabling walls and roofs to generate, store and release energy. The £20m, five-year project at SPECIFIC, one of six IKCs in the UK, is backed by £10m funding from the Engineering and Physical Sciences Research Council (EPSRC) and Technology Strategy Board. A further £2m funding from the Welsh Government recognises the IKC's strategic nature and potential economic impact, giving it added impetus.

Kevin Bygate, chief executive of SPECIFIC said "What we are achieving at the Baglan Bay Innovation and Knowledge Centre is of global significance. It has the potential to create a range of renewable energy applications which will be available commercially within a few years.

Welsh support

The Sêr Solar initiative is funded as part of Sêr Cymru programme which is the Welsh Government's £50 million programme designed to enhance research capability in Wales by attracting world leading scholars and their teams to Wales. Researchers from Imperial College London, which is home to the UK's largest research group dedicated to the development of new solar technologies, and including leading solar energy researcher Professor Jenny Nelson, will join with Welsh researchers to form the research centre which will be led by Swansea University and includes Bangor University and the Welsh School of Architecture.

New staff appointments at the University will create a world leading capability in scalable solar energy technologies The overall aim of the Sêr Cymru Solar team is to create a solar energy research centre to deliver world leading scientific research and to support the growth of new solar industry in Wales.

The Sêr Cymru Solar team is expected to work closely with the SPECIFIC project. SPECIFIC will use the pilot line facility to scale up research ideas to make and develop scalable solar applications with a view to creating clean, green high value products of a global standard. This collaboration between academia, industry, research and students will progress the research from the laboratory bench to the factory floor and will pave the way for rapid commercialisation and the creation of a major UK industry.



Pictured (l-r): Prof James Durrant, Edwina Hart, Minister for Economy, Science and Transport and Chris Weirman, Engineering Manager at the Ser Solar facility

A solar future for Wales

Solar energy has been recognised as being a practically limitless source of energy for the future, with the solar energy incident on the planet in one day being enough to power our energy needs for the next quarter of a century. Edwina Hart, Minister for Economy, Science and Transport, said: "I am very pleased to welcome Professor Durrant to Wales and Swansea University, where his experience and knowledge will help create a world class research team in the field of solar energy.

"The Ser Cymru programme is helping us deliver our commitment to developing science and innovation in Wales, which as an important driver in economic growth. This research in the field of Low carbon energy will also help us meet our commitments to reducing carbon emissions and tackling climate change."

Chief Scientific Adviser for Wales, Professor Julie Williams said: "I am delighted to see the second appointment under the Ser Cymru programme. Professor Durrant has an international reputation for research excellence and a wealth of experience in his field and I look forward to seeing him build a world class research team at Swansea University."

Professor Durrant said: "Solar energy is already big business, with over \$140 billion invested globally last year. This investment by the Welsh government offers a fantastic opportunity to accelerate the pipeline from materials discovery through to commercial manufacture, and thus put Wales, and the UK, at the heart of the growing solar revolution."

Professor Dave Worsley, Research Director of the SPECIFIC project said: "This is the first step in creating a world leading research group in solar energy and scale up."

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EPSRC awards funding to Bristol led research

A Bristol led research project receives £2 million for research into new materials for photovoltaic solar cells.

A UNIVERSITY OF BRISTOL-LED research project which aims to develop new active materials for photovoltaic solar cells based on abundant and low cost elements has been awarded £2 million funding by the Engineering and Physical Sciences Research Council (EPSRC).

The study 'Photovoltaic Technology based on Earth Abundant Materials (PVTEAM)', led by Professor David Fermin in Bristol's School of Chemistry, is one of four research projects to be

awarded a total of £10.3 million by the EPSRC. Each project aims to find safer, more sustainable alternatives to many of the raw materials used by manufacturing industries.

The Bristol-led research aims to replace key elements – such as gallium, indium, cadmium and tellurium – used in the manufacture of photovoltaic solar cells, while also implementing processes compatible with large-scale manufacturing. As these elements have low abundance, high costs and high toxicity, finding alternatives to them represents an extraordinary opportunity.

Professor Fermin said: "The aim of this programme is to lay the foundations of sustainable thin-film photovoltaic technology based on Earth-abundant materials and scalable manufacturing processes. This will be achieved by developing processes and production technologies for materials and material systems to a level they can be taken up by manufacturing industries.

"PVTEAM will specify a carefully selected range of chemical compounds (chalcogenides and oxides) as substitutes to proven commercial materials. Using a multi-level screening approach, we will incorporate the best performing candidates into established solar cell architectures."

The consortium involves five universities (Bristol, Bath, Northumbria, Swansea and Loughborough) with state-of-the-art infrastructure for material development and characterisation as well as for device fabrication, testing and integration into photovoltaic modules.

Material processing will be based on facilities available at the Sustainable Product Engineering Centre (SPECIFIC), which will be in charge of designing scale-up strategies and preparing techno-economic assessment.

The PVTEAM industrial partners, Tata Steel, Pilkington NSG and Johnson Matthey, have a worldwide footprint on materials for the construction, coating and chemical industries.

The consortium also includes SMEs, M-Solve and Semimetrics, which will provide means for the exploitation of new PVTEAM technologies in module fabrication and metrology.

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Roof top PV performance

Viridian Solar carries out energy performance research for in-roof PV after noticing lack of research.

It's common knowledge that solar PV module performance reduces as temperatures rise. It follows that rack-mounted above roof systems should out-perform in-roof systems, but by how much? More and more customers want the reduction to energy bills that solar PV brings, but many aren't willing to compromise the looks (and re-sale value) of their home. In-roof systems offer an alternative that ticks the box on aesthetics for many people at a price they are willing to pay, but how big is the trade-off on energy yield?

Researchers at Viridian Solar in collaboration with the University of Cambridge Engineering Department and Enphase Energy have investigated and now the solar industry has a credible answer to this question.

"A review of the literature revealed little in the way of published work in this area," commented Dr. KT Tan, Technical Director at Viridian Solar, "The relationship between the operating temperature and power output of photovoltaic modules is well-understood, but not so the impact of different installation methods on operating temperature. We will be submitting a full

paper outlining our results to a peer-reviewed journal and hope to be published later this year."

The experimental results have been summarised in a new briefing document, . The group found that solar modules rack-mounted above a pitched roof would produce only 3% more energy yield than in-roof mounted Clearline PV modules over the course of 12 months of UK weather.

Stuart Elmes, CEO of Viridian Solar commented: "Clearly, for some situations an extra 0.3% return on investment due to energy yield will matter, but for many customers minimising the visual impact on their building will be more important. As an industry at least we now have facts to present to potential customers so that they can make an educated choice."

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UK public not moved by energy efficiency

A recent survey carried out by the Institution of Engineering and Technology (IET) suggests that despite government and industry push for energy efficiencies and renewable options, most UK householders remain woefully ignorant about energy options and only a quarter are considering any type of energy efficiency measure. The survey highlights that an alarmingly low proportion of people plan to take any action to make their homes more energy efficient during 2014.

The survey, for the IET, shows just nine per cent of people are considering installing solar panels. Only six per cent are likely to have their home cavity wall insulated and only nine per cent are likely to install double glazing.

Meanwhile, heat pumps, which use heat from the ground or the air rather than burning fuel to generate heat, are only being considered by five per cent of households. Some of these measures are



relatively expensive, which may explain why people are reluctant to adopt them, But even LED light bulbs, which are a simple and low cost energy efficiency measure, are only being considered by one in four (25 per cent) of home owners.

The results highlight the need to do more to ensure that Government support, which is currently available through the Green Deal, incentivises home owners to make energy-saving improvements to their homes.

Marjan Sarshar from the IET said: "People are not planning to spend money on energy efficiency because the returns are too intangible and the long term Green Deal loan remains with the house.

"The Government needs to make energy efficiency measures more accessible. They could be incentivised in a similar manner to the Government's policy on cars whereby more energy efficient cars pay less tax. "A substantive reduction in Council Tax, which would remain with the property to add to its value, would encourage the uptake of Green Deal. "In this way the householders would see the tangible benefit and would be more likely to respond by making their own investments."

The survey, of 2,011 adults aged 16-75 in Great Britain, was carried out by Ipsos Mori on behalf of the IET.

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Sunny music to inspire aid

UK based jive and swing band, The Jive Aces, have launched a new version of the classic song – Bring me Sunshine – in support of SolarAid's work distributing solar lights in Africa. The international development charity is also being supported by the UK government who are matching all donations made to SolarAid.

Bring me Sunshine has been launched to spread some sunshine during the wet winter months in the UK. SolarAid's Chief Fundraiser Richard Turner explains: "The headlines of the past few days say it all; people in the UK are fed up with the winter blues. But whilst we put up with the wind and the rain in the UK there are families in Africa switching on solar power for the first time. We hope that this video will bring a smile to your face and that the 'feel good' feeling of helping others will help brighten your own day. Once you've donated, make sure no-one is left out in the cold by sharing it with friends and families too!"

Lead singer from The Jive Aces Ian Clarkson says, "Bring Me Sunshine is one of our all-time favourite songs and we very happy that Solar Aid are using our version for this great cause



The Jive Aces help charity SolarAid and the UK government to spread some sunshine during the dark winter months.

and to help spread the sunshine in both the UK and Africa! We love the ground breaking work that SolarAid are doing and were astounded something so simple as a small solar light could have so many immediate benefits, and give a brighter future to people in need."

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SolarMax Sputnik Engineering AG S1910/11 Stand: S1920/21

SolarMax has been active in the UK PV market since 2011, achieving success in the residential, commercial and utility-scale sectors. The continuing expansion is a testament to the company's bold ambitions to drive forward business growth in the important UK market.

The investment in the UK team has also been matched by significant investment in product development, with a number of exciting, Swiss-quality inverter solutions due to be launched in 2014.

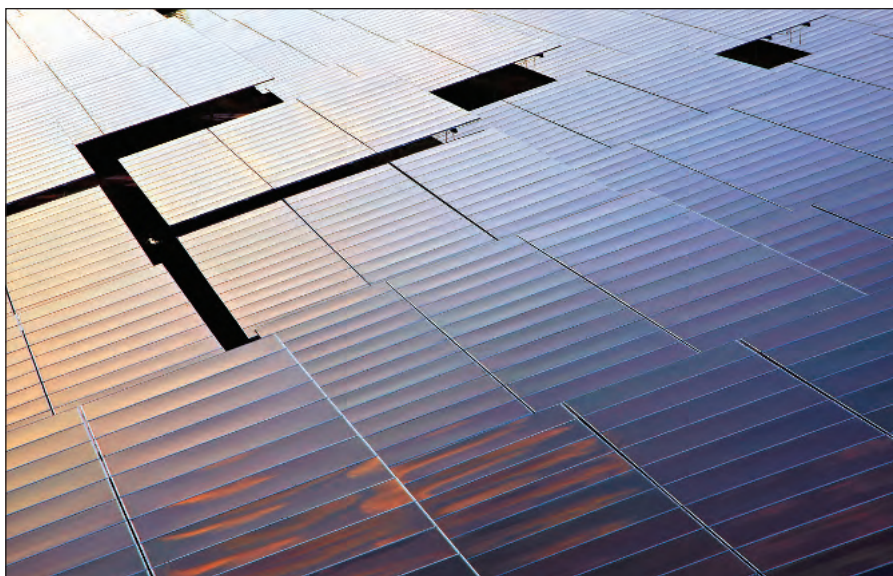
In recognition of the increasingly important distributor sales channel, Andrew Lycett joins as the UK Distribution Manager; the existing Key Accounts team is also further strengthened by the arrival of two additional, experienced Key Account managers, Erica Westmore and Steve Bingham.

Additionally SolarMax will present the new HT series string inverters for commercial and industrial solar plants.

The SolarMax HT series will be available in three models: 30 kW (30HT4) and 32 kW (32HT4) output each with four MPP trackers, and 32kW (32HT2) output with two MPP trackers. Thanks to the multi-tracking concept, the optimum operation of each individual part generator is guaranteed, even with highly complex system configurations and partial shading.

The gaps between the rows of the individual modules can be reduced to increase the yields from the available surface area. The large input voltage range and IP65 protection class provide additional flexibility when planning the plant.

HT inverters are designed for quick and easy installation. The high output density and compact dimensions minimize the space required for the installation whilst



also reducing AC wiring, thereby further lowering installation costs. If external DC switches and surge arresters are required, the 32HT2 model comes with the additional functionality of a terminal box which can give further cost efficiencies for plant engineers.

The HT series are also equipped with the latest communication and monitoring solutions, and are easily incorporated into the MaxView web portal for location-independent plant monitoring.

Solar power plants on commercial and industrial roofs have great potential

to become the new hope of the solar industry. According to market analysis published by IHS in December 2013, more than half of the newly built plants in Europe in 2014 will be in the commercial sector - a trend that is only set to increase.

The SolarMax HT series provide a highly flexible and efficient solution for these plants delivering low system costs and high performance yields.

The SolarMax HT series will be exhibited alongside a large range of other SolarMax products and services at Ecobuild.

Klober Ltd Stand: N540G

Klober is a roofing sector market specialist in the supply of underlays, tile and slate vents, airtightness and solar installation accessories. Exhibiting alongside the NFRC there will be two demonstrations each day on the use of airtightness products in relation to CSH and BREEAM performance. SAP calculation and condensation risk analysis services are available to support use of

specialised products which include tapes, sealants, sealing collars, vapour control layers and roofing underlays. In addition to being used for roofs, such accessories can also be used to seal wall penetrations and membrane tears.

Ecobuild will also see the launch of a Permo underlay for low pitch roofs, Permo RS SK2 extreme.



Power-One, A Member Of The ABB Group Stand: S2120

Power-One, a member of the ABB Group and the world's second largest designer and manufacturer of photovoltaic inverters will present its extensive portfolio of PV inverters and monitoring systems for landlords and home owners at Ecobuild. Power-One will show select PV inverters, such as the new three-phase TRIO-5.8/7.5./8.5-TL-OUTD and the well-known TRIO-20.0/27.6-TL-OUTD string inverters as well as the single-phase string inverters PVI-3.0/3.6/4.2-TL-OUTD and UNO-2.0/2.5-I-OUTD. Apart from this strings-inverter range, Power-One will also display its innovative AURORA MICRO-0.25-I and AURORA MICRO-0.3-I micro-inverters as well as its monitoring solutions for residential PV installations.

The TRIO-5.8/7.5./8.5-TL-OUTD are Power-One's smallest transformerless string inverters.

With an output of 5.8, 7.5, and 8.5kW respectively, the devices benefit from a redesigned topology used in other TRIO models. They ensure high conversion efficiencies of up to 98 percent across a wide input voltage range. Both, the TRIO-7.5 and the TRIO-8.5, feature two independent MPP trackers (MPPTs), offering maximum installation flexibility for optimal energy harvesting. Thanks to their robust IP65 enclosure, the three-phase string inverters are suitable for unrestricted outdoor use. A sliding front panel makes installation and maintenance quick and easy. Moreover, a graphic display allows for quick connection, parameter setting, and functional control.

The string inverters TRIO-27.6 and TRIO-20.0 are the suitable for large roof top applications on commercial or municipal buildings by contrast. With an output of 20.0kW and 27.6kW, two independent MPPTs, and an efficiency rating of up to 98.3 percent, the three-phase string inverters offer more flexibility and lower



wiring cost to installers who have large installations with varying aspects or orientations than its smaller predecessors.

"With the TRIO-5.8/7.5./8.5 we have closed the gap within our residential product portfolio and ensure the availability of excellent, high performing inverter solutions from small residential to large commercial rooftop installations with an output range of 5.8kw to 27.6kW," said David Lowen, Local Sales Manager for PG Solar, UK, at ABB.

PVI-3.0/3.6/4.2-TL-OUTD and UNO-2.0/2.5-I-OUTD complement the typical number of rooftop solar panels, Power-One's PVI-3.0/3.6/4.2-TL-OUTD single-phase string inverters are suited for average size family homes: these rugged outdoor inverters have been designed as completely sealed units to withstand the harshest environmental conditions as well as to provide home owners with an energy efficiency rate of up to 96.8 percent due to two independent MPP trackers.

Developed for the average-sized rooftop installation, the UNO-2.0-I and UNO-2.5-I are Power-One's latest and smallest

single-phase string inverters. Both units benefit from the company's proven high performance technology. The series offers some differentiating features, including a special built-in heat sink compartment, a front panel display system, and an efficiency rating of up to 96.3 percent. Their wide input voltage range also qualifies the PVI-3.0/3.6/4.2-TL-OUTD as well as the UNO-2.0/2.5-I-OUTD for low power installations with reduced string size.

The AURORA MICRO-0.25-I and AURORA MICRO-0.3-I micro-inverters are especially suited for small, residential installations as they minimize efficiency losses from partial or temporary shading, panel mismatching or module differential ageing. With an output of 300W and 250W respectively, these products offer a broad DC input voltage range, an extended MPP DC voltage range as well as best-in-class efficiency ratings of up to 96.5 percent. Moreover, a rugged outdoor enclosure, a HF isolation and electrolyte-free capacitors allow for unrestricted use under any environmental conditions and further increase the product lifetime and long term reliability.

Power-One's monitoring device has been specifically designed for the use with the company's MICRO micro-inverters: CDD connects them to the internet in a simple and quick way.

Without any additional wiring, the monitoring solution allows the monitoring of up to 30 module inverters or power optimizers using wireless communication technology.

Via Power-One's web-based monitoring portal, plant operators and installers can control the performance of their PV system in real-time and detect failures rapidly.



REDtip solar mounting systems

Stand: S2336

As the IP owner and producer of mounting systems for solar technology, REDtip develops innovative mounting system for the UK photovoltaic industry. The ethos is based on providing installers with products that both save time and money on the roof.

We work with skilled distribution channels who can provide local support on how best to use our range and logistics so you do not have to hold stock.

REDtip are designed for the UK market and manufactured to ISO9001 standards. Because imported roof hooks are designed for foreign roofs it's no surprise they don't fit UK roofs and cost more time to fit. We have a growing range covering pitched roof, flat roof, and solar thermal, all with the same quality of design. REDtip speeds up installation, reduces aggravation and saves money while of course ensuring a secure, weatherproof fixing.

Hanwha Q-Cells

Stand: S2040

Hanwha Q CELLS is part of the South Korean Hanwha Group offering a wide range of high quality PV solutions "Engineered in Germany" – from solar cells and modules to solar system solutions and power plants from its headquarters in Thalheim (Germany).



Hanwha Q CELLS has a unique setup of R&D and production enabling the company to develop technologically leading products and innovative manufacturing methods. The cell production sites in Malaysia and the module production line in Germany are the core of manufacturing. In addition, the company converts its high-efficiency solar cells into modules in cooperation with certified contractors in Europe and Asia.

Enphase Energy UK

Stand: S2240

Enphase are pioneers of the microinverter, with over 4 million units shipped to date.

The company says their system increases energy production, simplifies design and installation, whilst improving system uptime and reliability. With an all AC approach it also has the benefit of reducing fire safety risk, and it provides a platform for intelligent energy management. The Enphase Microinverter System connects each solar panel to a microinverter and monitors them through our intelligent, web-based software. You can view your system performance through MyEnlighten, an easy to use interface that you can customise with your own photos and text. You can access MyEnlighten through your PC, tablet or smartphone to keep track of your solar investment 24/7.



Natural Sparx

Stand: S2156

Rexel Energy Solutions focuses purely on providing solutions within the energy sector. We offer unrivalled expertise and access to cutting-edge technology that will transform your business, save energy and costs, and reduce your carbon footprint. NaturalSparx.co.uk is our online store for the Professional Renewable Energy installer. Stocking all quality branded products including Photovoltaic Solar Panels, Solar Thermal, PV Kits, Invertors, Heat Pumps, Roofing equipment, Biomass and much more.

Saint-Gobain

Stand: N750

Saint-Gobain provides solutions for all areas of the built environment – whether it's the construction of a new housing estate, school, hospital or office development or the renovation of existing homes. Our breadth of solutions, combined with our expertise and experience make us THE reference brand in delivering solutions for sustainable habitats.

We are constantly innovating to make homes more comfortable, cost-efficient and sustainable worldwide. Our solutions span from self-cleaning windows and photovoltaic glass to smart insulation systems, water supply systems, solar solutions and building materials distribution.





Lightsource Renewable Energy Ltd

Stand: S2035

Lightsource Renewable Energy Limited is the UK's busiest solar energy generators. Lightsource develop, operate and maintain the largest portfolio of high quality photovoltaic systems on land and roof space in the UK. Founded in 2010, the company has made rapid progress over the past three years, reaching a total of over 316 MW of operational projects completed to date and a growing team of over 170 experienced solar engineers, planners, and project managers.

Lightsource provide fully funded solar PV solutions to property owners wishing to source an attractive rental income from their land or gain significant reductions in electricity bills by exploiting unused roof space.

Lightsource Renewable Energy recently completed its 80th solar farm project in UK. The project is located just off Wheal Alfred Road in Cornwall is the latest solar farm project to join the Lightsource 300 Megawatt-Peak UK operational portfolio currently generating green electricity to power over 100,000 UK households.

The solar farm has been developed on approximately 15 acres of low-grade agricultural land. The large grassy avenues between the rows of panels allows for sheep grazing, keeping the land area in agricultural production.

Kareen Boutonnat, Managing Director for Lightsource Renewable Energy comments:

"We have a significant appetite for development, a healthy pipeline of projects and a pool of trusted EPCs. As the UK's leading solar energy generator our experience attracts other developers wishing to sell sites or project rights to us as they can be assured the solar farm will be installed responsibly and operated to a very high standard."



"We close deals quicker than any of our competitors because of our full service capability in-house and we are looking to double our operational portfolio in the next year" Kareen continues. In addition to the on-site benefits of biodiversity and planting, the local parish council will also receive a community benefits package of just under £30,000.00 per annum for 10 years.

Ben Cosh, Managing Director for TGC Renewables comments: "Solar power is revolutionising the UK's electricity generation mix as the EU increases its targets from 20% CO2 reduction by 2020 to 40% by 2030"

João Cunha, Country Manager for Martifer Solar in the United Kingdom comments: "We are proud to have founded a trusted relationship with Lightsource Renewable Energy and look forward to continue growing our already established presence in the UK. The utility scale solar farm project in Cornwall is one of our first EPC-only projects in the UK, which demonstrates Martifer Solar's capacity to perform along the entire value chain—from Project Development and EPC to O&M Services."

K2 Solar Mounting Solutions Ltd

Stand: S2046

As a manufacturer of mounting systems for solar technology, K2 Mounting Solutions develops innovative system solutions for the international photovoltaic industry. Many years of experience and our attention to service make K2 Mounting Solutions a pleasant partner in the field of solar mounting systems. International customers appreciate the quality of our reliable framing systems for use on sloped roofs, flat roofs as well as ground mounted and special projects.

The K2 Group, a medium-sized company with 140 employees, is one of the leading innovators in the photovoltaic industry. Mounting systems for solar technology have been designed in K2's product development department since 2004 and are continually upgraded and implemented.

Motivation and team spirit shape the international workforce which provides excellence in our European subsidiaries and in the USA on a daily basis.

Energno Ltd

Stand: S2001

Energno Ltd manufacture products that help people with renewable energy systems realise the full benefit of their generated power.

There is a complete product set, with flagship products being Wattson Solar Plus electricity monitors and Optimersion intelligent immersion controllers.

All products are designed, tested and approved in the UK.



SAJ Solar Stand: S2020

Guangzhou Sanjing Electric Co., Ltd. (SAJ Solar) is a high-tech enterprise committed to bringing green energy to the world.

Founded in 2004, SAJ Solar is committed to R&D, manufacture and sales of solar inverters, solar pumping system and frequency inverters globally.

The companies main products are: Sununo-TL series single-phase inverter, Suntrio-TL series three-phase inverter, Sunbrid series hybrid inverter, solar pumping system and frequency inverter for industrial control. SAJ also provides monitoring solutions, both local and cloud-based, to meet diverse demand of customers. SAJ Solar is an



international corporation with more than 360 employees all over the world. With its headquarter in Guangzhou Science City, SAJ Solar has a subsidiary in Belgium and 19 branch offices in Asian Pacific, Europe.

Recently, SAJ Suntrio series solar inverters were used at a farm in Penybont, UK. The plant is now connected to the

grid with a total capacity of 150kWp and composed of SAJ Suntrio series three phase inverters with dual MPPT. Suntrio series inverters are now widely used both in domestic and commercial PV power plants. SAJ is highly praised by users not only because it's efficiency (max efficiency up to 98.1%), stability, easy installation, convenient motoring solution, but also service and technical support.

ET Solar Industry Limited Stand: S2236

Waxman Energy, is one of the UK's largest independent distributors of Solar Photovoltaic (PV) solutions preparing to exhibit at Ecobuild.

With strong links to some of the world's most renowned manufacturers, Waxman Energy offers solar modules from market leaders such as LG, Trina Solar, Phono Solar, BenQ and Hyundai. These modules will feature on the stand, as well as a diverse mix of solar PV accessories. Waxman will be taking some of their solar PV specialists and technical staff to give comprehensive advice on the variety of products they offer.

Waxman are also planning to launch a new online installer portal (www.waxmanenergy.co.uk) to enable customers to order and pay for products safely online, out-of-office hours and still receive prompt delivery.

One of Waxman Energy's newest products is a battery storage system for energy generated by solar PV, produced by Nedap of the Netherlands.

The PowerRouter can help store energy for later use and reduce reliance on grid energy. This Waxman believes will take them to the forefront of PV energy management solutions, helping both domestic and commercial customers gain more control over their power usage.

Waxman Renewables, also part of the Waxman Group, will be sharing the stand with Waxman Energy to showcase their range of renewable heat technologies. As the UK's exclusive distributor of Austrian manufacturer, TiSUN, Waxman Renewables will be presenting their solar thermal products along with biomass pellet boilers from WES and La Nordica, as well as heat pump systems by Dimplex and Daikin.

Renusol GmbH

Stand: S2325

Cologne-based Renusol is show casing the InterSole system at Ecobuild.

The company is seeing unprecedented demand for in-roof mounting solutions, particularly from the Netherlands and Great Britain.

The InterSole system is mounted directly onto the roof's thermal insulation layer, and consists of durable HDPE sheets that are secured to the roof battens like roofing tiles. These plastic sheets overlap like tiles, thus ensuring no water ingress. The solar modules are then mounted onto the sheets. Thanks to adjustable module clamps, almost all commercially available framed and frameless photovoltaic modules can be integrated into the roof. The InterSole system is suitable for roofs with a pitch of 15° to 60°. The ability to adjust the height of the mounting brackets allows the solar installation to be inserted harmoniously into the roof.



Fronius UK Limited Stand: S2015

Austrian inverter manufacturer Fronius is set to bring a host of product innovations to the market in the year ahead.

These include a solution for short-term energy storage, a compact central inverter and an entire product range for the residential sector underline the innovative advances from the quality leader. Furthermore, the experts from Fronius will support their customers with online training courses.

"We cannot wait to get going with the year ahead. Through our new products we are fulfilling the expectations of the market and inspiring our customers with innovations," explained Martin Hackl, Head of the Solar Energy Division, Fronius International GmbH.

The Fronius hybrid inverter is a core component of the "24 hours of sun" vision. With a maximum output power of 5

kVA, it enables unused energy produced by a PV system to be stored in a battery. This maximises self-consumption and represents a further step towards energy self-sufficiency. The device wins praise for its modular inverter and battery design as well as the individually variable storage capacities. Market launch of the device is scheduled for 2014.

The compact Fronius Agilo TL 333.0 and 400.0 central inverters are powerful central inverters developed for large-scale systems. Low transport and operating costs are delivered through the compact dimensions and clever system design inherent to this inverter series.

The IP 55 protection class confirms the robust design of the device. It has been optimised for connection to the medium-voltage grid and also provides interfaces for effective remote monitoring and remote control. With a maximum



efficiency of 98.6%, the device produces extremely high yields.

The inverters will go into production in the middle of 2014.

Krannich Solar Ltd Stand: S2110

Krannich Solar is a wholesale PV distributor with 22 branches worldwide and 18 years of international knowledge and experience.

By balancing international purchasing power with customer service, the team at Krannich Solar works in partnership with PV installers.

Krannich Solar are currently looking for an experienced PV sales person to join their dynamic team, based at the UK branch in Reading.

The full vacancy details are available here: <http://uk.krannich-solar.com/uk/company/news-and-media/article/article/could-you-be-our-next-bright-spark.html>



For further information or to submit your application please contact Diane Turner: T: 01189 668282 E: info@uk.krannich-solar.com

Jinko Solar Co., Ltd Stand: S2115

JinkoSolar is an innovator in the solar PV industry with production operations in Jiangxi and Zhejiang Provinces in China and sales and marketing offices in China, Germany, Italy, Switzerland, the United States, Australia, Canada, Singapore, Japan and South Africa.

JinkoSolar has built a vertically integrated solar product value chain, with an integrated annual capacity of approximately 1.5 GW each for silicon ingots, wafers, and solar PV cells, and approximately 1.8 GW for solar PV modules, as of September 30, 2013.

buildings, technology advances, energy storage and zero carbon inverters. There is a look at how to educate energy managers and consumers and technical demonstrations for a variety of solar and PV technologies.

Policy concerns

One thing the solar approach does reveal is how important government involvement remains to the industry. A quick look at the solar agenda shows attention to government subsidies and their impacts on various sectors. There are discussions on the perception of solar and how that impacts on the industry. Holding such discussions in the Ecobuild setting should remind attendees that all the industries present face similar tasks in terms of entering the established energy world. Competition is fierce as the energy markets continue their transformations.

Talks and seminars around the show's three days tend to be looking at how the energy market will make its transformation. Despite the activity and growth there is still a lack of clarity for how the energy markets will develop. Solar has the advantage of receiving a large share of media attention. Even though some of that coverage is negative it is at least in the public eye. Most sectors that receive more publicity like nuclear and fracking have

even greater PR concerns. A growing changing market offers many opportunities for a versatile technology.

One of the highlights of the event is the government's decision to take advantage of the crowds and launch the domestic Renewable Heat Incentive (RHI) due to be launched this spring. DECC is launching a roadshow at Ecobuild that will be designed to educate consumers and installers about the RHI scheme. Ecobuild will host a dedicated Renewable Heat Incentive (RHI) zone where DECC will be showcasing the whole house offer available under the RHI & Green Deal. With new tariffs and technologies expected for the non-domestic RHI, this zone will also cover the commercial opportunities on offer.

For the first time, with the non-domestic and the domestic RHI working in parallel, every building in Great Britain will be able to take advantage of the RHI. Applying to renewable technologies such as solar thermal panels, heat pumps, and biomass boilers, the RHI is expected to make a significant contribution towards the government's 2020 ambition of having 12 per cent of heating coming from renewable sources.

Industry concerns

Expect plenty of strong questions at many of the sessions as there is a real thirst for clarity in the UK solar industry. This is not just clarity from the government on how they intend to support the industry as it aims for 20GW by 2020 but also clarity from the current energy companies on how they intend to support the changing dynamics of the energy industry. Companies are seeking clarity from industry bodies that they are working to assist them fit into a bigger energy picture. And those interested in the energy market whether it be as investor, consumer or regulator want clarity that the solar and PV markets can deliver the renewable and sustainable energy that they promise.

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Integrating solar into the energy plan

Ecobuild brings the world of sustainable and renewable development to London and solar and PV seems to have found a place with better structure and last year's Solar Hub upgraded to Solar City.

THE BUSINESS OF ENERGY is changing and no longer is it a matter of controlling supply to society. Energy efficiency is as important as supply and consumption. Demand is now met with a variety of technologies and the multiple approaches means challenges are looked at with a wider view than simple energy supply. With the changing needs comes understanding that the solutions will be a mixture of approaches, technologies and the changing of embedded habits.

Ecobuild covers a huge range of technologies but all of them relate to the built environment and look for sustainable design and construction combined with energy usage. The cross fertilization of approaches and industries enhances solutions that

combine technologies and develops new approaches to existing ideas. The focus on the solar industry has changed over the last few years and although there may not be as large a presence as a few years ago but the approach is much more polished with a dedicated section called Solar City which will be held in the Energy Section and sponsored by SMA Solar.

There is a seminar programme that reflects the growth of solar as an energy source in a variety of built environments. The sustainable community holds a great deal of hope for solar as the long term goals of sustainable living is highly dependent on energy supply. The topics range from PV integration into buildings, market possibilities in schools and commercial



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31 March-03 April 2014, SNIEC, Shanghai
www.ecobuildchina.com

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www.ecobuild-india.com

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Southeast Asia

17-19 Sept 2014, PWTC, Kuala Lumpur
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Government announcements: The RHI road show
Solar City: Showcasing the industry
Up and coming: What and who to see