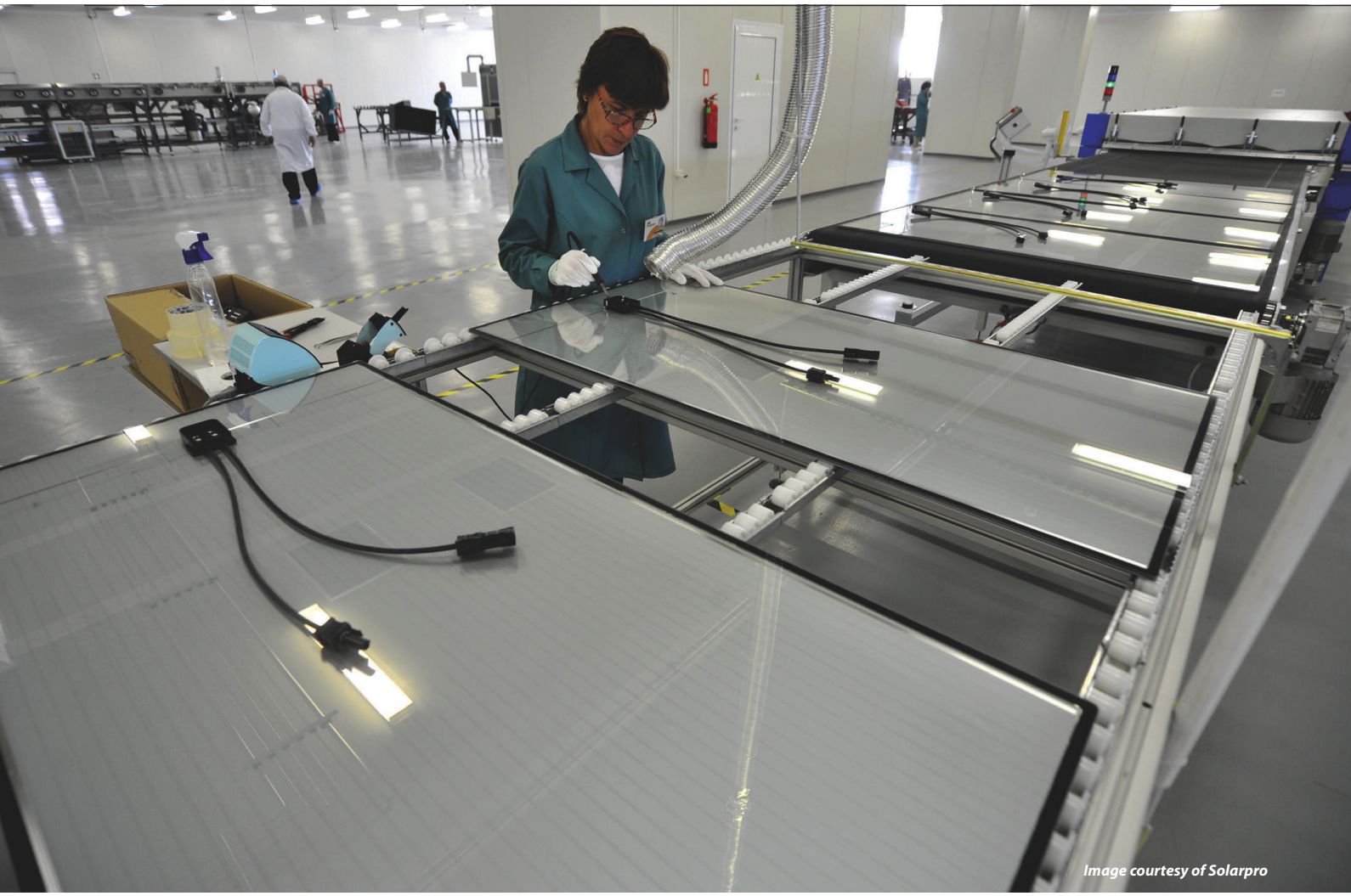


Image courtesy of Solarpro

Who got the money? – running the funding gauntlet

MANY RENEWABLE ENERGY COMPANIES HAVE RUN THE GAUNTLET FROM ORIGINAL IDEA TO INITIAL FUNDING TO INSTITUTIONAL FUNDING. OVER THE FOLLOWING PAGES WE PRESENT FOUR CASE STUDIES:

- Two UK marine energy companies, **Pulse Tidal** and **Green Ocean** share their funding history;
- **BNRG**, an Irish solar company expands into Eastern Europe;
- And from eastern Europe itself, we profile **Solarpro**, a Bulgarian company.

EU grant of €8 million takes Pulse Tidal's system into major funding league

UK-based Pulse Tidal is gearing up for an ambitious multi-million pound investment deal having recently secured a grant of €8 million from the EU's Technology Research and Development Fund (Framework Programme 7).

Pulse has opened talks with major investors seeking to fund its first fully commercial tidal energy generator, a 1MW system to be commissioned in 2012 in UK waters and set to provide electricity for up to 1,000 homes. This will be the next step in the young company's progress towards full commercial operation in a global market with a predicted annual income of over £6 billion.

Getting started: in the garage

Pulse began life in the garage of former teacher Marc Paish who was adapting a children's peddle boat to produce its own energy. This led to an investment from his teaching colleague Howard Nimmo, who also secured the company's first £2.5 million in grants and private equity.

The new EU grant has come at the end of a second funding round where Pulse had planned to raise up to £500,000 – but in fact secured £765,000. Now chief executive Bob Smith, BP Solar's former chief development officer, is now gearing up for international VCs coming to the table.

He says: "Investors are talking to us because they see that tidal power can be an important part of the future energy mix. They like our solution because it has potential to be more cost effective than the tidal turbines being developed by others.

"Our system operates like an aeroplane wing, which is moved up and down by tidal currents. This approach sweeps a greater volume of water than competitive designs, and hence produces more power from each machine. And more power means better economics."

"Our approach is particularly useful in shallow waters, where installation and maintenance costs are dramatically reduced. This has been attractive to investors from the outset."

Marubeni funded start-up Pulse

Pulse's first funding round, in 2007, saw the start-up company secure £2.5 million through investment from Japanese trading giant Marubeni, IT Power, Life-IC and the Viking Fund, along with some individuals and UK government grants.

This enabled Pulse to deliver the first fully predictable electricity generated by tidal power in shallow waters, which came ashore on the banks of the Humber estuary in North East England in May 2009. The 100kW prototype showed that predictable energy can be produced close to shore where it is needed, reducing the investment required to install, connect and maintain devices compared to those in remote locations.

Big hitter partners in supply chain

Rather than expand the company as its funding has grown, the small core team of Smith and co-directors Paish and Nimmo have recruited a selection of heavy-hitting supply-chain business partners, each bringing their own expertise to Pulse.

Show me the money: *"Investors are talking to us because they see that tidal power can be an important part of the future energy mix", says Pulse Tidal's Bob Smith.*

Smith explains the thinking behind the partnership: "Investors have confidence in my renewables market experience because of my time at BP Solar, and in Marc and Howard as they got the system to where it is today. But what really impresses investors is the team we have built around us; keeping our own costs low while accessing world-class expertise and supply-chain depth."

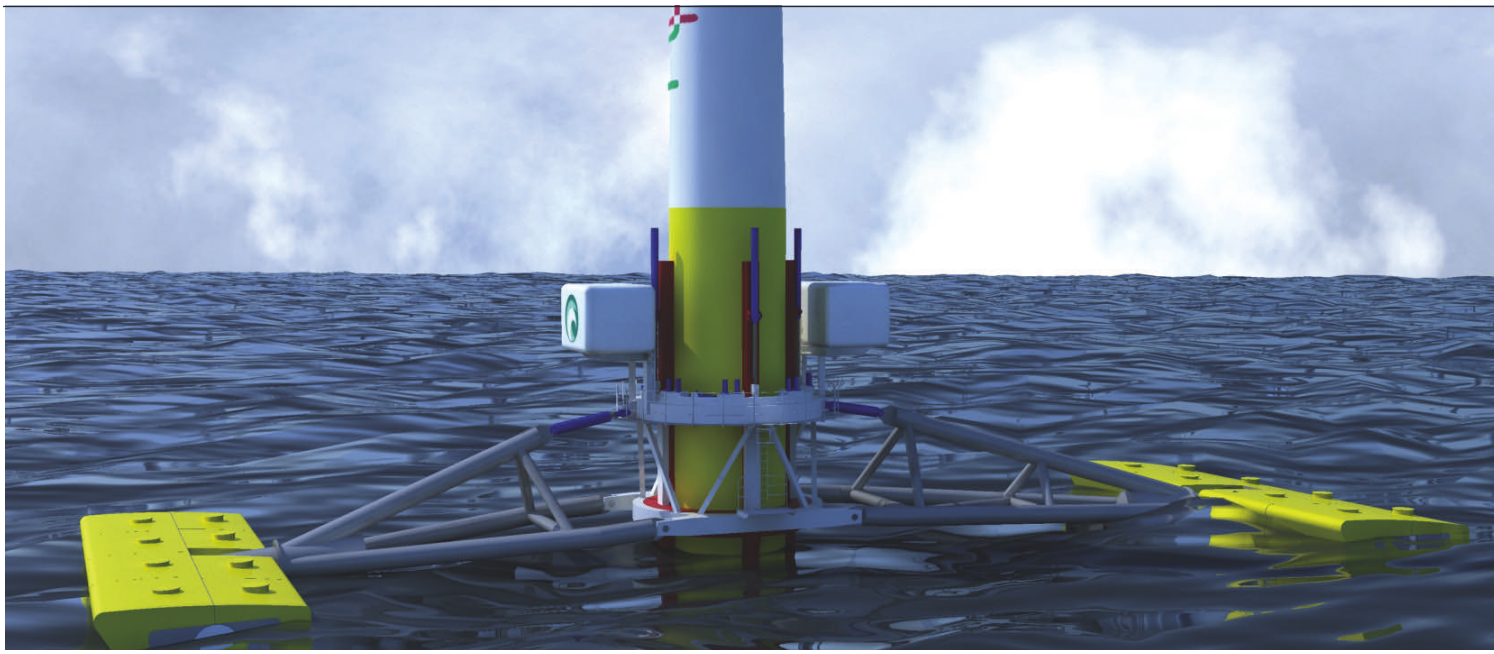
The project team brings together all of the skills needed to develop and supply the commercial Pulse product: Bosch Rexroth for hydraulics, Herbosch Kiere for installation, DNV for certification, IT Power for engineering, Niestern Sander for construction, the Fraunhofer Institute for control and electrical systems and Gurit for composites.

Smith adds: "With this team, our proven technology and our €8m grant financing, we have all the ingredients to deliver a step-change in tidal power economics.

"The next step in our financial life is helped by the fact there is great excitement around tidal power as a whole. This helped us surpass our last funding requirement and the momentum has carried forward into our next, much larger funding round."

According to the latest industry figures [*figures from 'Cost of and financial support for offshore wind`, a report for the Department of Energy and Climate Change published by Ernst and Young on 27 April 2009*] with offshore wind energy costing up to 14p per kWh to produce, the Pulse system will be more cost effective than offshore wind after only 100MW has been installed. Certainly Smith is confident that tidal energy is set to surpass wind as the most economic and predictable source of offshore power.

"Offshore wind is being seen as ugly, maintenance-heavy and far away," says Smith. "Whereas the Pulse system is invisible and, being close to shore, has lower maintenance costs. In negotiating our match-funding this is being seen as a key point."



When the concept of Ocean Treader was first realised and Green Ocean Energy was established in 2004, the company secured a £34,768 SMART grant for innovation from the Scottish government.

And so on to the latest step in Pulse's financial history. The €8 million EU grant which has been awarded to the Pulse Tidal team along with its seven supply chain partners will fund 50% of the development of the full-scale commercial generator. The remaining 50% will be provided by private investment. Importantly, recent improvements to the EU funding process mean that 40% of the grant has arrived at the start of the project. This provides cash for the project to begin immediately, and gives Pulse more time to secure matching funds.

Mum's the word – technology start-ups still reliant on family investment

– By Graeme Bell, CEO, Green Ocean Energy

The renewable energy industry in the UK has been buoyed this year with pledges of government support aiming to cement the country's position as an international leader within the sustainable energy sector. And while this has been positive news for companies who are already well on their way to commercialisation, for those who are not as far advanced, the challenges remain largely unchanged. Namely, how do you attract investment in a concept that, without financial backing, cannot be proven to work?

The answer inevitably lies with company directors themselves who often have to take on the majority of the financial risk – and asking friends and family to do the same. When the concept of Ocean Treader was first realised and Green Ocean Energy was established in 2004, the company secured a £34,768 SMART grant for innovation from the Scottish government.

The SMART scheme supports SMEs during research and development stages of projects which are considered to represent a significant technological advance for UK industry. This grant enabled the company to further develop the theoretical concept for Ocean Treader but was a drop in just a drop in the ocean in term of the full amount required.

Over the next 18 months the company continued to try to raise funds from both private investors and also from public sector sources. The next major breakthrough came in July 2007 when Bob Craig, an angel investor, provided funding to build the 1.50 scale prototype. This was shortly followed by investment from Andrew Bissell, another angel investor, as well as investment from family and friends. As with many other new start companies, we raised the money ourselves with little assistance by speaking to as many people as we could.

Major milestone

This first phase of funding was a major milestone for the company and marked the start of our journey along the investment trail. George Smith, Chief Technology Officer of Green Ocean Energy and inventor of the devices, recognised the importance of having a dedicated financial expert on the team who could develop the necessary links with investors both within the private and public sectors and I joined the company in August 2008 as a consultant, primarily to raise finance for the business.

During 2008, the company found its first major industry backer when Npower supported the feasibility study of Wave Treader, our unique wave energy convertor which attaches to the base of an offshore wind turbine. The investment package totalling £60,000 helped us to build confidence among the wider investor community and generate widespread awareness of Wave Treader and Ocean Treader within the energy sector.

Our next step was to push ahead with developing and building relationships with private investors and public sector funding organisations. This was achieved by speaking with people who we already knew and also contacting companies on the Scottish Enterprise Co-Investment and Co-Venture Fund list. Given the current economic climate, it has not been easy to secure funding from venture capital and private equity sources so we have also been in discussion with various angel investor syndicates.

In the last year we have also made a concerted effort to speak to as many industry representatives from utility companies, offshore wind developers and large energy companies who could assist in providing a test site for Wave Treader. We did this in as many ways as possible by setting up one to one meetings with key personnel, attending seminars and conferences at a national and international level, and through a far reaching PR and communications programme. This has also helped to significantly raise the profile of the company both within the public and private sectors.

The results

We are now beginning to see the results of those efforts and recently secured a major investment package valued at more than £250,000 which combined £100,000 of Scottish Enterprise seed funding with £150,000 of additional investment from both new and existing backers. We have also been shortlisted as one of the top 15 technology companies to watch through a process being run by Connect Scotland. As well as this, we are now in constructive talks with several major energy companies about deploying a full scale Wave Treader prototype on one of their offshore windfarm sites.

Looking to the year ahead, our key focus is securing between £4-5m of investment to enable us to manufacture, install and test a full scale Wave Treader prototype before heading to full scale commercialisation in 2013. Moving closer to the market launch will bring its own set of financial challenges but I am sure that we will successfully deal with these when they arise.

It has required a huge amount of hard work, determination and support from friends and family to reach the point where there is genuine interest and support throughout the business community and public sector for our technology and for the benefits it can bring to the UK's sustainable energy targets. Next year will be pivotal for Green Ocean Energy and one where we will relish the upcoming challenges.

If it were easy, everyone would be doing it!

– By Neil Holman and David Maguire, BNRG Renewables

PV project development is probably one of the businesses for the recession. Government-guaranteed, high-yielding, long-term streams of income are just perfect for the recession battered, risk-averse investor. Couple that with sharply falling capital costs, strong public policy support and a lack of investment alternatives and the project developer is on to a sure fire winner. Yes? Well, in reality, yes and no.

BNRG Renewables was set up to develop PV projects in central and south-eastern Europe. In 2006 the Greek government introduced its Renewable Energy Law which contained quite possibly the most generous package of incentive for PV developers ever introduced. The incentives included a 20 year, inflation-adjusted, feed-in tariff of €0.40/kwh on the mainland and €0.45/kwh on the islands (there is an additional tariff for €0.05/kwh for projects under 100kWp). To cap it all, there was an investment subsidy of 40%.

In spite of the country's reputation for bureaucracy and inefficiency, the lure of PV development in Greece seemed irresistible so, with the aid of our local partner, Dimitris, we began to brief ourselves on the Greek renewables market. The licencing, planning and permitting systems were complex but there was a "fast track" procedure for sub-100kWp projects. Already, by early 2007, the regulator was issuing licences in the northern prefectures, so the system was obviously working. We assembled a portfolio of sites on the islands of Crete and Rhodes, all of which are to be held on 24 year leases, and engaged an Athens-based consultant to see our applications for 100 kWp permits through the system.

The mother-lode and the "fast track"

A portfolio of small projects on Crete and Rhodes could be considered the "mother-lode" in terms of PV development. In addition to the feed-in tariff of €0.50 and the 40% investment subsidy, there was solar radiation of almost 1,800hrs/m2/year in Crete and over 1,900 hours in Rhodes. If the benefit of the subsidy is taken into account. equity IRRs of over 50% were achievable.

The applications were submitted in August and September 2007. By November the Greek electricity regulator, RAE, which issues licences, announced that they had been overwhelmed with applications from Crete and that there would be delays. Applications from the Dodecanese Islands, including Rhodes, would be processed only after they had finished with Crete. We sat back and waited.

Most of the Crete permits were issued in August 2008, one year after the applications had been submitted. The Rhodes permits were issued in September 2009! Once you hold your PV permit you must apply for environmental clearance. Even for a PV park of a couple of thousand square metres you must obtain clearance from, wait for it, the Department of Classical Antiquities, the Department of Byzantine Antiquities, the Department of Modern Antiquities, the Forestry Department and the Agriculture Department.

This set of clearances will give you an environmental permit. With this you submit your application for a construction permit and connection agreement. We expect Rhodes to be through the system by the end of December and most of Crete to be fully permitted by February 2010. That, in a nutshell, is the Greek "fast-track" procedure. You really do not want to hear about the slow one.

In mid year we were made an attractive offer for our PV portfolio. After prolonged negotiations we accepted. Mistakes can be a business asset if you learn from them. Our biggest mistake was to go for the most attractive locations, which is like starting your annual leave on the weekend of a public holiday. The traffic will always be worse and it will take you twice as long to get to your destination.

One hundred kWp PV plants in northern and central Greece have been up and running since early 2008 and performing well. Their tariff is 10% less than in the islands and their solar radiation may be 10% less than Crete but they have two years' income under their belts.

Earlier this year, the government ordered RAE to complete the processing of *all* applications for bigger projects by the end of 2009. However, there was a change of government following the October election, and, at the time of writing, the implementation of this order seems to have been put on hold. This is causing concern because a 5% tariff degression (a descent by stages or steps) will kick in from February 2011 followed by further 5% degressions every six months until August 2014. In addition, there are strong rumours that the new government will either abolish or severely curtail the capital subsidy.

So where does that leave BNRG Renewables in Greece? We're sticking in there with a clearly focussed policy of acquiring fully permitted mainland sites of 1 mWp or greater when they become available. The likely abolition of the subsidy and the upcoming degressions should bring down the price of permitted sites. The FIT can take a couple of 5% degressions and still leave Greece one of Europe's most attractive territories for PV development. But it is likely to remain a bureaucratic basket case and that is why we will only work with projects that have cleared at least 98% of their permitting procedures.

Looking at other markets

While waiting for our Greek projects to be approved we began to look for other suitable territories. By spring 2008 it was too late to start anything in Spain while a close look at France suggested that bureaucratic hold-ups were widespread. Italy looked as if it would become overrun with developers. In keeping with our policy of looking for the less obvious, we went to Bulgaria.

The Bulgarian 2007 Renewable Energy Law introduced a tariff of €0.366/kwh with a power purchase period of 12 years. By 2007 standards the €0.36 FIT was mid-table but the 12 year power purchase period compared poorly to Greece and Italy (20 years) and Spain (25 years).

We were extremely fortunate to find a Bulgarian partner, Konstantin Panayotov, a Plovdiv-based developer who had already begun to look at diversifying from property to renewables. Although new to PV, Konstantin and his team do not need to be told anything twice and we began to develop a business model that would work for PV development in Bulgaria. BNRG Bulgaria was incorporated late last year and is a 50/50 partnership between BNRG Renewable and Konstantin.

In November 2008 the government responded to the unenthusiastic uptake from PV developers and increased the feed-in tariff to a respectable €0.386/kwh and doubled the power purchase period to 25 years. Bulgaria has a refreshingly efficient licensing and permitting system, there are few unforeseen hold-ups and the whole process should complete in eight to nine months. The problem in Bulgaria is grid access.

The grid mostly dates back to the Communist era and there has been little investment for 20 years. In parts of the country it is overloaded. Land is cheap but comes in very small parcels so it is quite an art to put together megawatt size plots.

So far we have acquired sites with 10MW of grid access and these should be through the permit process by January or February 2010. We are already in advanced negotiations with a potential JV partner to build out and sell these projects. We are now in the process of assembling a second portfolio of land for 10MW of projects and hope to have the purchases complete by February. Once these sites are fully permitted we have a number of offers from potential JV partners and end-investors. It is our intention to start acquiring land for a further 20MW as opportunities arise during 2010.

2009 has not been an easy year to finance early stage PV projects in a start-up territory. Banks have been retreating to the familiar and Bulgaria is not an easy sell to UK and Irish investors. The outgoing government had a deservedly bad reputation for corruption and had a massive €500 billion in investment aid withdrawn by the EU.

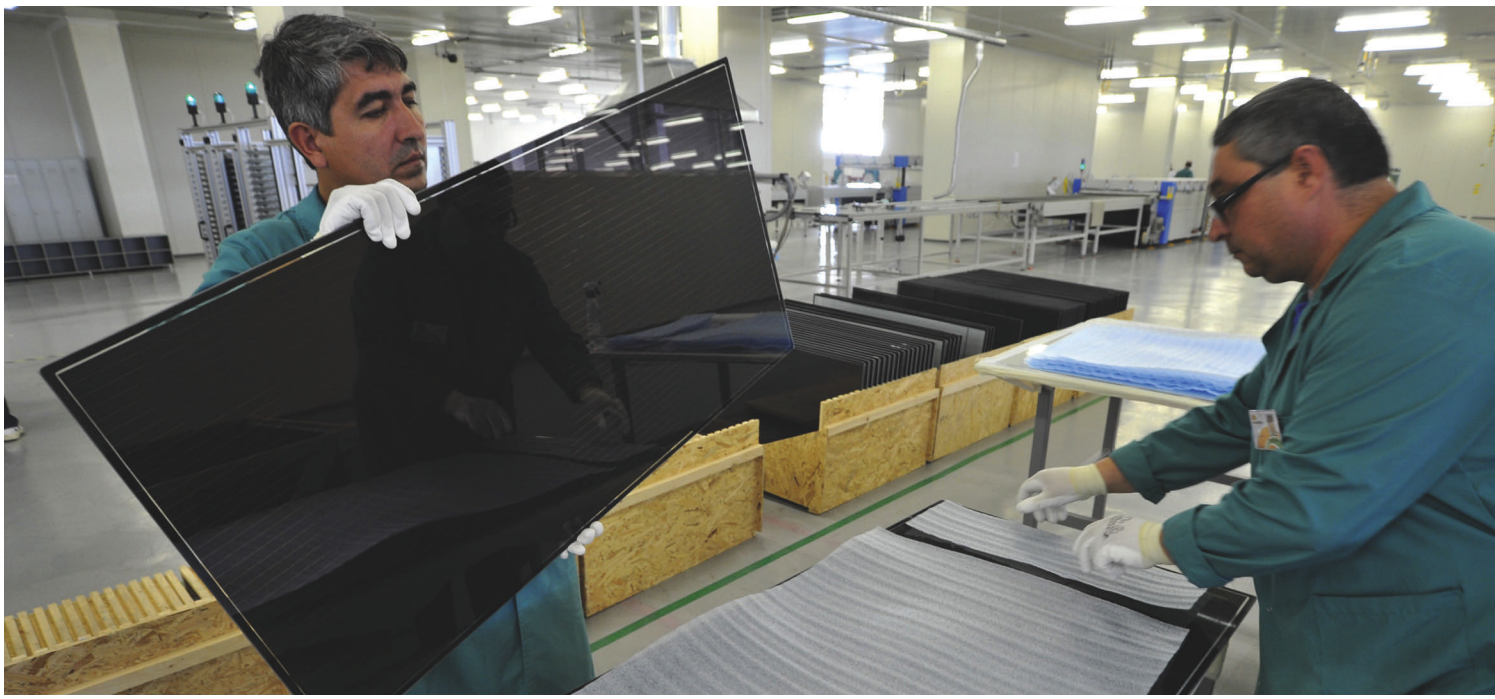
In July a new government, headed by Boyko Borisov, was elected on an anti-corruption, pro-business and pro renewable energy ticket. They have already taken significant steps to clean up Bulgaria's image. A number of high-ranking officials have been relieved of their posts and a number of members of the previous administration are under investigation. This news takes a while to percolate through to the investment community and in the meantime the company has been funding operations and site acquisitions largely from its own resources.

What next for BNRG Renewables? There is plenty of work left to be done in Greece and Bulgaria where market changes will bring new issues to test us. In Bulgaria the grid will soon hit the limit of its capacity to absorb new projects and it is rumoured that in 2011 new wind and solar developments will required to contribute to the cost of strengthening the grid. In Greece, following the likely issue of the larger project licences in early 2010, there will be chaos in the market and wildly unrealistic asking prices for permits before the reality of the forthcoming degressions kick in and prices settle down in the third quarter.

Already we are looking at neighbouring countries in the region. There are strong rumours that a feed-in tariff package for PV will be introduced in Romania early in 2010. Turkey introduced a feed-in tariff programme in April 2009. New countries bring new challenges. As we said at the beginning, if it were easy, everyone would be doing it.

Bulgarian solar company comes out of the shadows
– By Elizabeth Block

As an exit strategy, it may hold the speed record for southeastern Europe: **Solarpro**, Bulgaria's first and only manufacturer of solar PV, is to float on the Bulgarian Stock Exchange, fewer than three years after its founding in late 2007 – and one year after it started manufacturing thin-film PV



The upstart offspring, Solarpro, is headquartered in Sofia and is the largest solar panel manufacturer in the Balkans, with planned capacity of 18 MW annually. Three production lines are planned, with two currently operational.

Bulgaria: the renewable energy scene

Bulgaria has a population of about 7.5 million GDP per head reached about 10,000 euros in 2008, compared with about 35,000 euros for the UK. However, in the past seven years, Bulgaria's annual GPD growth has exceeded 5% while inflation remains under control. While the credit crunch has hit Bulgaria's public sector finances hard, and has led to fears of a recession, so far the economy is doing better than other accession member states.

The country's EU targets for renewables are relatively ambitious: 11% of gross energy consumption after 2010 and 16% after 2020 – higher than Britain's. So far Bulgaria has taken major legislative steps to meet the quota, leading to a boom in entrepreneurial interest and stated intentions for more than 10,000 MW of renewable energy projects. As this is more than three times Bulgaria's installed capacity in renewables as of the start of 2008, there is a good deal of scepticism about this figure which would actually exceed the targets.

The introduction in 2009 of a feed-in tariff for solar panels (previously only applicable to wind projects) has attracted a host of local and international solar park developers to the Bulgarian market.

Most of the increase in renewable energy production is expected to come from wind and solar sources and biomass as there is little space left for hydro developments. Hydropower, currently estimated at around 2,600 MW, constitutes most of Bulgaria's installed renewable capacity. However, with an estimated wind power capacity of 2,200-3,400 MW and a good climatic and agricultural profile for development of solar and biomass projects, the country is well on the road to diversifying its renewables portfolio.

panels. As announced by Alfa Finance Holding, the parent company, Solarpro will be known as Solarpro Holding as of early 2010.

In the near term, funding from the capital markets will be sought. Shareholders of Kaolin AD, which currently holds the controlling interest in Solarpro, will be presented with the opportunity to exchange shares of Kaolin AD with shares of Solarpro Holding following its listing.

Nikolay Berov, CEO of Solarpro, said: "This is a major step for Solarpro. We recently connected our Yankovo project to the grid with an installed power of 1.019 MWp and expect to complete the project up to 2.4 MWp by the end of the year. We hope to make excellent progress as Solarpro Holding and expect Solarpro to act as a driver of a regional cluster for clean energy technology."

To date, Solarpro has operated, as it were, in the shadow of Kaolin AD, an Alfa subsidiary. But as a newly quoted company, Solarpro will henceforth stand alone.

The original Kaolin company was established in 1924 to exploit kaolin mining deposits near what is now the town of Kaolinovo. The mining of kaolin in Bulgaria was nationalised in1947. With the fall of the Berlin wall in 1989, the enterprise took steps toward becoming a private company. Full privatisation took place in 2000, and later the explicit understanding formed that Kaolin AD was, among other industrial pursuits, to become a leader in thin film Si PV modules production in Europe and in solar power plant system integration in Bulgaria.

The parent company of Kaolin AD is Alfa Finance Holdings, one of Bulgaria's leading industrial and financial groups, with three main business lines: financial services, real estate and industrial minerals. The group also invests in logistics, construction, telecommunications and clean energy sector.

The Group is actively involved in projects in Bulgaria and southeastern Europe (Albania, Greece, Macedonia, Romania, Serbia, Turkey and Ukraine). The group employs more than 3,000 people and manages assets exceeding EUR 1.5 billion.

Solarpro – integrating the supply chain

The upstart offspring, Solarpro, is headquartered in Sofia and is the largest solar panel manufacturer in the Balkans, with planned capacity of 18 MW annually. Three production lines are planned, with two currently operational.

One of the first projects is a PV power plant in the village of Yankovo, Shumen District. It went into operation in mid-2009 with 2.4 MWP capacity and modules produced by the company.

The plan is for Solarpro to act as a driver of regional cluster for clean energy technology and production establishment.

The company designs and mounts PV panels on facades and roofs. Building Integrated Photovoltaic Panels (BIPV) provide two major advantages: electric power from the sun and a modern and enviormental architectural element on the building itself.

Solarpro's main activities are design and production of thin film PV modules and project development and system integration of PV power plants. In regard to solar power plant projects, it offers:

- design
- administrative servicing and documentation; assistance in obtaining licences
- installation and maintenance
- simulation of solar radiation with production of energy for specific terrains.

According to the plans, Solarpro will focus on producing PV panels and setting up solar power stations. A second unit will involve the production of technical equipment needed for the first production line. A third unit will cover solar power development projects. As a result of the synergy generated, it is expected that costs per unit of installed capacity will fall, as well as consolidation of the entire added value within the process of setting up PV power stations.

In other words, integration of the supply chain is critical to the strategy. Thus the new PV power plant, known as North-East 1, uses thin-film amorphous-silicon PV panels made by Solarpro in a new factory in Silistra. North-East 1 delivers energy to E.ON's electricity distribution grid. Once full capacity is reached, the power plant will have nominal power of 2,404 kWp.

Why thin-film amorphous-silicon PV? According to Berov, "this technology requires much less investment per unit of installed capacity than other distributed solar technologies, thus providing higher yield."

He added: "Another advantage is that thin-film amorphous-silicon panels have excellent performance in low intensity of sunshine and diffuse light, which makes them effective for cloudy weather. These panels also perform better than conventional crystalline modules when operating at high ambient temperature."