



# GREAT WESTERN RESEARCH *focus*

Since its inception, Great Western Research [GWR] has set about promoting collaborations between the highest quality research groups and the most forward thinking businesses in the South West in order to support the growth of the region and to demonstrate just what is possible when academics and businesses collaborate. A world-class research partnership, formed via GWR, between the University of Bristol and GWR Research Fellow Dr Neil Fox, is focusing on delivering an innovative solution to a very real problem.

## A Bright Future

As we consider the imminent decommissioning of our ageing nuclear power stations, and a question mark hangs over a viable, long-term replacement of the UK's electricity producing capacity, renewable energy is being increasingly favoured for its clean, practical and low cost energy production. It is estimated that renewable resources such as wind and wave energy in the UK will account for around 15% of input to the national grid by 2010.

Although lagging behind at present, solar power is rapidly becoming a major player in the worldwide energy market. With traditional photovoltaic modules expected to reach 10-20GW of new installations a year by 2010, and installed capacity of the heat based Concentrated Solar Thermal (CST) expected to increase fourteen-fold to 6400MW by 2012, the solar industry is undergoing a massive expansion.

In 2007 Neil Fox was appointed as a GWR Research Fellow based at the University of Bristol due to his experience in combining leading edge scientific thinking with commercially applied research. He immediately saw the potential of establishing the University of Bristol as a development

and research hub for the commercial exploitation of solar powered technology.

One of the lesser known solar technologies is termed 'concentrated photovoltaics' (CPV), which uses a variety of mirrors and lenses to concentrate the intensity of light falling onto the solar-cell material, allowing high energy densities to be channelled through small cell areas, thus improving their efficiency.

Neil's focus, which involves combining elements of the emerging CPV technology with thermionics, has drawn significant international attention due to its potential to convert heat to electricity at efficiencies much higher than traditional solar cells. This unique emerging nano-technology is different to traditional solar technology as the device contains microscopic diamond parts which heat up in the sun and then emit electrons, which can then be harvested to generate electricity. This process can be engineered to take place at much lower temperatures than conventional thermionic materials, with wide-ranging implications for using the technology in cooler climates to produce sufficient power from low levels of sun light.



*"[GWR] is about ensuring the sustainability of internationally-excellent research in the South West"*

*Prof. David Billington*



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Indeed, because the new solar panels are more versatile than conventional solar cells, and can utilise a larger proportion of the sun's energy (visible to mid-Infra-Red), the material costs involved in generating the equivalent power are substantially lower.

Neil has also established a partnership with Bristol based industry leaders Wind Prospect to match-fund Tomas Martin's GWR PhD Studentship, to research further advanced energy generation systems in solar technology in Neil's research group. The GWR PhD funding is enabling the team to gain an important understanding of the materials, and how they operate in the device technology.

With increasing international visibility of this research, Neil has also attracted substantial funding of 1 million Euros over the next 3 years from the energy utility supplier, E.ON - based in Dusseldorf, Germany. With further support from engineering company Bitworks in Cheltenham as well as the Bristol University's Research and Enterprise Department, Neil is now well positioned to turn his ideas into commercial reality.

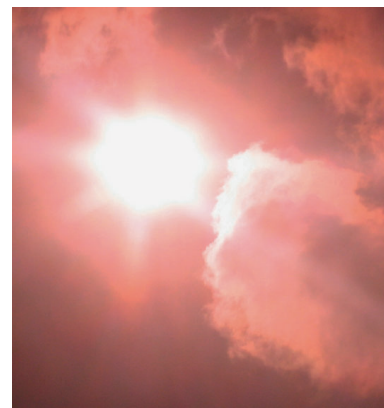
The University of Bath are also contributing their expertise in optical modelling to the program through Tomas's GWR link to Professor Duncan Allsopp, his associate supervisor in Bath. Through the availability of specialist facilities at Bath, the Bristol team will be able to evaluate some of the ideas for the optical concentrator platform on which the diamond-based, solar converter will be mounted.

As the final technology needs to be easy to construct and cost effective in its performance, MIT in Boston have kindly offered a concentrator system as a potential evaluation platform for the technology prototype.

Neil's team have been shortlisted in their bid for a Carbon Trust Award to use concentrated solar power in the UK. The proposed project will seek to demonstrate that concentrated solar power based on nanodiamond technology can generate electricity even in poor light, and also provide low grade water heating as a waste product of the generation process.

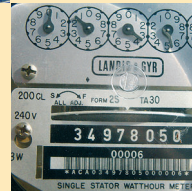
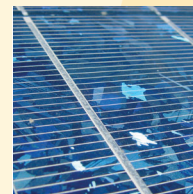
**GWR Studentships and Fellowships are stimulating the building of new partnerships with major research funders in the region, and thanks to GWR over £2 million of new public and private investment is being made into research projects in the South West of England.**

**The inspiration for the GWR concept is simple - "The intention is that it should increase interactions between University research groups and business, and therefore build capacity and attract more money for research," said Prof. David Billington, Executive Director of GWR - "It is about ensuring the sustainability of internationally excellent research in the South West and preparing the region for the technologies of the future, by investing in collaborative forward looking research programs."**



*All of the 3 year GWR Research Fellowships will be converted to permanent academic posts by the host University*

*GWR is a £14m collaborative project which funds 130 PhD Studentships and 20 Research Fellowships at universities in the South West of England*



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