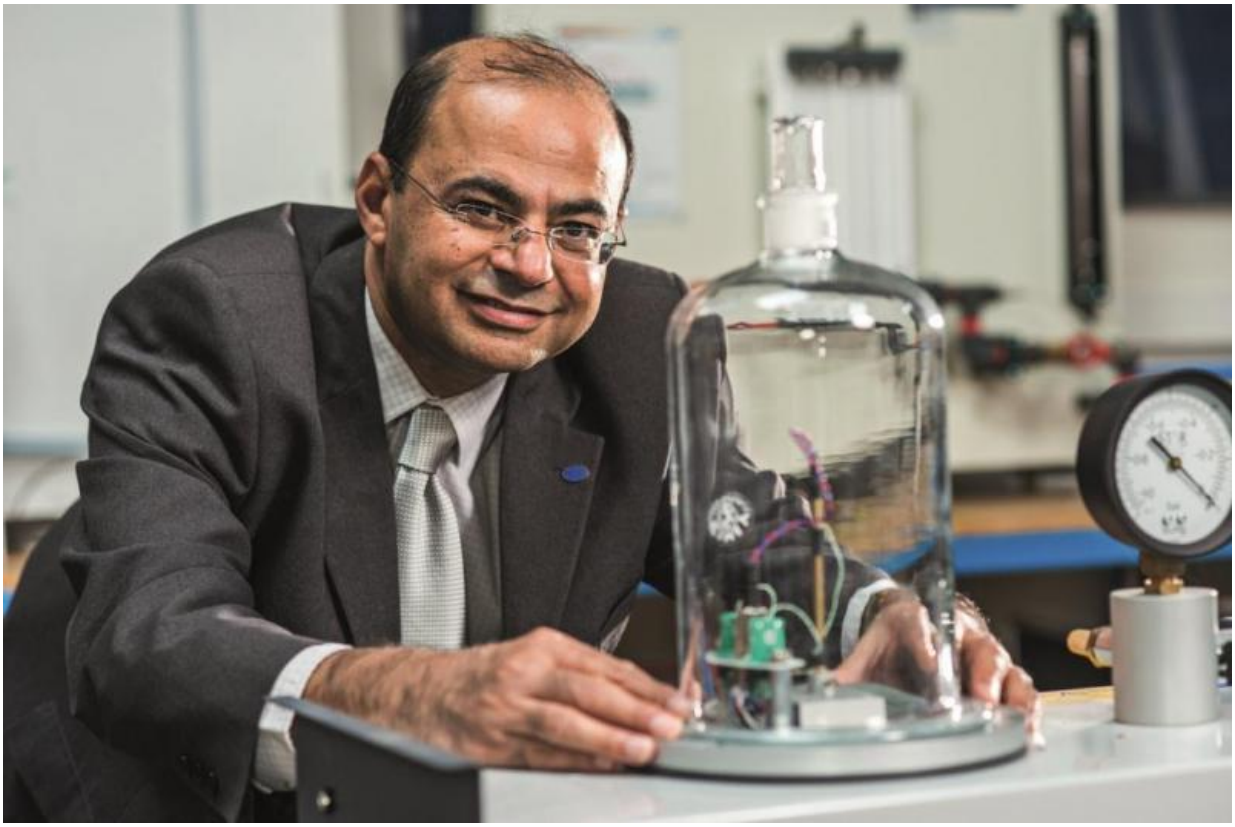
Developing reliable renewable energy sources

July 25 2016



Dr Zulfiqar Khan. Credit: Bournemouth University

As the world's population continues to grow, so does our consumption of natural resources. Many of these resources are non-renewable, so research into renewable sources of energy is vital. Research led by Bournemouth University's Dr Zulfiqar Khan is tackling this issue through reducing corrosion, improving heat transfer and fluid dynamics,

and using nano coatings to enhance surface effiencies in renewable energy systems.

The European Union's (EU's) Renewable Energy Directive states that the EU should be producing 20% of its energy from renewable sources by 2020; a challenging target for any country. Dr Khan's research is a direct response to this initiative and to the challenge of finding sustainable and renewable ways of meeting our future energy needs. His research is supported by a team of PhD students, many of whom are part funded by industry.

One of his major areas of focus is developing solar thermal technology, which is available abundantly due to its nature. "Currently, we are very reliant on Solar Photovoltaic for our solar panels, but we do not have a large supply of the materials used, so using it won't be sustainable over a long period," explains Dr Khan. "I am developing a means of using readily available and sustainable materials in solar panels, which will help our future energy use. I am also looking at ways to move away from standalone panels to integrating them within standard building practices."

Dr Khan explains the different components in the system: "There are four parts to this system. One part focuses upon generating heat for colder climates, while within warmer climates it focuses on generating electricity. The third part of the project looks at thermo-fluids, with the aim of improving the efficiency of fluids within the solar energy system. The final part will be the integration of heat recovery system from waste."

At the moment Dr Khan and his team of three PhD students are testing the system for generating electricity in warmer climates. Funding from Future Energy Source Ltd. has allowed Dr Khan and his team to set up labs in Poole, which include a scale model of the solar thermal system – an invaluable tool for testing. The first phase of heat generation in cold

climates is nearly at the point of being commissioned, while the third phase of testing thermo-fluids will begin in early 2016.

The very nature of the programme and its complexity means that an interdisciplinary approach is vital. Dr Khan's research combines materials sciences, nano coatings within the field of surface engineering, heat and fluids within heat transfer and thermodynamics, and storage and corrosion engineering. "It is the combination of several subjects and disciplines which guarantees the delivery of objectives of this very challenging and exciting programme, which will put BU in particular and the UK in general on the international map as a leader in developing clean energy technologies," says Dr Khan. "This is why we shouldn't shy away from other disciplines as it can bring huge benefits and opportunities to research which will give it originality, significance and reach."

The research and its interdisciplinary nature has the potential to make a significant difference to society as it presents a solution to one of the biggest challenges now facing us – how to meet our current and future energy needs. "I think we can learn to do without many things, but without energy, life as we know it would not be the same," says Dr Khan. "With our current levels of consumption and the non-renewable sources we are using, our energy sources won't last forever. If we look to the future, our energy reserves used at our current rates will last us perhaps another 50 – 60 years for oil and gas, and coal another 100 years. What are we going to do when that runs out?"

More information: H.U. Helvaci et al. Mathematical modelling and simulation of multiphase flow in a flat plate solar energy collector, *Energy Conversion and Management* (2015). DOI: 10.1016/j.enconman.2015.09.028

Provided by Bournemouth University