

## Indian Scientist Presents Innovative Research in Biomass Energy

On 17 July 2009 UNU-ViE hosted Prof. H.S. Mukunda of the Combustion, Gasification and Propulsion Laboratory, at the Indian Institute of Science, Bangalore, who presented his biomass research at the UN campus in Bonn. He met with representatives of UNU-ViE, UNU-EHS, UNU/ZEF and IHDP who gave an overview of their activities.



*Prof. Mukunda presenting his research.*

The presentations focused on the Dialogue for Sustainability, StEP - Solving the E-Waste Problem, the energy component of the project on Sustainable Land Management in the High Pamir and Pamir-Alai Mountains, and the human dimensions of global environmental change.

Prof. Mukunda introduced the participants to biomass energy research at the Combustion, Gasification and Propulsion Laboratory (CGPL) which, in addition to frontier work in aerospace propulsion, is involved in innovative research and developmental activity in the field of bio-resource.

Besides fundamental studies, the laboratory has developed techniques of gasifying a wide range of biomass, including agro-residues. These techniques have been perfected into small independent power plants, which could serve the thermal or electricity needs of industries or rural societies.

Prof. Mukunda, former Professor at the Department of Aerospace Engineering, graduated in Mechanical Engineering in 1963 from Mysore University, completed his Masters in Aeronautical Engineering in 1965, and his PhD in engineering sciences in 1970 both from the Indian Institute of Science.

### **Research and Technology Development**

In the 1970s he concentrated on the research and technology development in the areas of combustion and rocket propulsion. While the efforts to do frontier research in combustion and some aspects of rocket propulsion continued, the research efforts were extended to include understanding and developing technologies towards biomass based energy devices later.



*Prof. Mukunda and UNU in Bonn staff.*

One of the unusual features has been to take up challenges from industry, both from within and outside the country, and resolve them without sacrifice to basic research. In the aerospace area, technology

development of hybrid rockets was addressed and research was conducted to understand the combustion behavior in these systems.

In recent times his interest is in the area of hypersonic propulsion. In the industrial area, the technology of stress relieving of vessels of large size was developed by Prof. Mukunda and his colleagues at a national level and several aspects of the same problem were successfully addressed in a research study. In the energy area, the technology development of gasifiers, combustors and stoves based on bio-resource have been completed for many applications.

The advancement of technologies has also resulted in technology transfer to industries in India, Switzerland, and Japan. His current interests include extension of the gasification technology as well as other thermal conversion techniques to modern stoves and combustors, waste-to-energy for urban solid wastes and e-wastes.

### **Awards**

A Fellow of the Indian Academy of Sciences, and the Indian Academy of Engineering, Aeronautical Society of India, he received the following awards: Om Prakash Bhasin award for energy (1994), Life Time Achievement award of Solar Energy society of India (1998), Excellence in academic research of the Indian Institute of Science (1994), and the Academic Excellence award from the Defence Research & Development Organisation (DRDO), India, for the contributions to propulsion system developments of missiles (2003). Further, Prof Mukunda was awarded with: the Distinguished Alumnus award of the Indian Institute of Science (2005), the Rajyothsava Award of the Government of Karnataka (2005), and the Sir M. Visweswariah award for science and technology of the Government of Karnataka (2006). Prof. Mukunda is a member of the International Science Panel on Renewable Energy (ISPRES), a part of the International Council for Science (ICSU).