THE UNIVERSITY OF SYDNEY

SCHOOL OF ELECTRICAL AND INFORMATION ENGINEERING

IEEE Advancing Technology for Humanity

A RELIABILITY LOOK AT ENERGY

Prof Way Kuo, President of City University of Hong Kong

ABSTRACT

Energy is one of the critical contemporary issues facing humanity. While modern society and our quality of life depend on energy consumption, for electricity generation, transportation, industrial output and maintaining homes and business buildings, for example, the problems that arise from energy consumption, such as global warming and environmental degradation, are posing challenges to the sustainability of the environment we live in.

I refer to the spectrum of different kinds of energies as the “rainbow energies”: hydropower, fossil (coal, oil and natural gas), nuclear, wind, solar, biofuel and others (geothermal, ocean energy and marsh gas). All have strengths and weaknesses in terms of efficiency, safety, reliability, environmental impact, reserves and economic value. Selections of energy combination and the assessment of the safety and environmental friendliness of a particular energy have to be undertaken by looking at “life cycle” pollution of an energy source, environmental impact, and the sustainability of the energy source, and the financial and non-financial risks that people have to face.

Admittedly, renewable energies, including solar PV, wind, hydropower, geothermal, tidal, biomass, have witnessed rapid development in recent years worldwide, particularly in some Asian countries, to curb emissions that cause climate change. And yet, wind power production still only constitutes 4% in the global power mix and solar PV represents 1%, while fossil fuels remain at a stable and dominant position of around 65%, especially coal, the main culprit for greenhouse gas emission, which represents 43% of the fossil fuels, even though the coal-fired generation share of total electricity production is declining. Any discussion of energies today cannot neglect the contribution of nuclear energy as one of the key reliable base-load powers, even though it has been a controversial topic ever since it was adopted for commercial purposes in the 1950s for fear of radiation leaks produced in a major nuclear accident and concerns about the long-term treatment of nuclear waste.

We should not forget, at the same time, that 35% of the world’s population has no, or extremely limited, electricity resources and yet it has to bear the consequences of any energy combinations adopted by the rest of the world.

In a word, only a rational analysis of the relationship of energy and the environment will give us a clearer picture. In order to address the problem of energy and environmental protection, we need to pool together the wisdom of different disciplines and carry out inter-domain cooperation.

SPEAKER'S BIOGRAPHY

Way Kuo is President of City University of Hong Kong. He is a Member of US National Academy of Engineering and Academia Sinica in Taiwan, a Foreign Member of Chinese Academy of Engineering and Russian Academy of Engineering as well as a Fellow of the Institute of Electrical and Electronics Engineers.

Before joining CityU, Professor Kuo was on the Senior Management team of Oak Ridge National Lab and served as Dean of Engineering at the University of Tennessee and Head of the Department of Industrial Engineering at Texas A&M University. He received PhD in engineering in 1980 from Kansas State University, and BS in nuclear engineering in 1972 from National Tsing Hua University, Taiwan.

Professor Kuo specializes in design for reliability of electronics systems. His footprints can be found in many modern electronics products. Among other well recognized technical books, his popular science book Critical Reflections on Nuclear and Renewable Energy has created an impact since its publication in 2013 by Commonwealth Publishing Group in Taiwan. The book has been translated into English, Japanese, French, Russian and Korean, published in Massachusetts, Tokyo, Paris, Moscow and Seoul, respectively. This book has also been published in Hong Kong and Beijing in both traditional and simplified Chinese under different titles.

His recent book on higher education: Soulware within Higher Education was published in 2016 by three publishing houses in Hong Kong, Taipei and Beijing simultaneously, which is a rare phenomenon.

Tuesday 3 October 2017

1pm - 2pm
Electrical Engineering Lecture Theatre 2 (Rm 450), Level 4
Electrical Engineering Building J03, The University of Sydney

After the talk, there will be tour of the Power Engineering Lab - modern teaching facility for Power Engineering students.

The talk by Professor Kuo & tour of the Power Engineering Lab are supported by IEEE NSW Section and they are parts of the activities for IEEE Day, 3 October 2017.

FURTHER INFORMATION

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