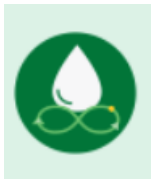
Plant power: bioenergy as a renewable resource

27th June 2019,
Royal Botanic Gardens, Kew, London (U.K.)

UNIVERSITY OF LEEDS



UNIVERSITE MARIEN NGOUABI

THE ROYAL SOCIETY

EPSRC
Engineering and Physical Sciences Research Council

ROYAL ACADEMY OF ENGINEERING

BBSRC

Innovate UK

Schedule

9:30 – 9:55	**Welcome** Registration and refreshments

Keynote speech by Dr Wilkin and country overviews

(Chair: Professor Jon Lovett)

10:00 – 10:10	**Professor Alexandre Antonelli**, *Director of Science, Royal Botanic Gardens Kew* Welcome
10:10 – 10:30	**Dr Paul Wilkin,** *Head of Natural Capital and Plant Health* Establishing a bioenergy programme at Kew
10:30 – 10:45	**Ms Mary Suzan Abbo,** *Director of the Centre for Research in Energy and Energy Conservation, Uganda* Overview of bioenergy in Africa
10:45 – 11:00	**Dr Saut Sagala**, *Resilience Development Initiative and Institute for Technology, Indonesia* Overview of bioenergy in Indonesia
11:00 – 11:15	**Dr Vishvanath Dalvi,** *Department of Chemical Engineering, Institute of Chemical Technology, Mumbai, India* Overview of bioenergy in India

11:15-11:30	**Coffee break** Posters and networking

Presentations: new international projects

Chair: Dr Olwen Grace

11:30-11:40	**Dr Andrew Ross**, *School of Chemical and Process Engineering, University of Leeds* Overview of the BEFWAM project
11:40-11:50	**Professor Anurag Garg,** *Indian Institute of Technology, Mumbai* Introduction to the British Council/DST food waste project
11:50-12:00	**Dr Consalva Msigwa,** *Dar-es-Salaam Institute of Technology, Tanzania* Overview of the HEP project
12:00-12:20	**Flash presentations**
12:20-12:30	**Ms Diane Myers,** *Independent Producer* Bioenergy for all

12:30-1:30	**Networking Lunch** Posters and networking

Keynote speech by Dr Grace and presentations on current international projects

Chair: Dr Andrew Ross

13:30 - 13: 50 **Dr Olwen Grace**, *Senior Research Leader - Integrated Monography*
Desert succulents as a bioenergy resource

13:50 - 14:00 **Dr Petros Aristidou,** *School of Electrical Engineering, University of Leeds*
Overview and initial results from the GCRF CRESUM-HYRES project

14:00 - 14:10 **Dr Betty Nabuuma,** *College of Engineering Design Art and Technology (CEDAT), Makerere University*
Overview and results from the ACERA project

14:10 - 14:20 **Professor John Blacker,** *School of Chemistry, University of Leeds*
Overview of the Innovate UK project and introduction to biotechnology

14:20 - 14:40 **Flash presentations**

14:40 - 15:00 **Coffee break**
Posters and networking

Keynote speech by Dr Gasson and presentations on bioenergy and biotechnology

Chair: Dr Petros Aristidou

15:00 - 15:20 **Dr Peter E Gasson**, *Research Leader - Wood & Timber*
Fuelwoods from the Brazilian caatinga

15:20 - 15:40 **Dr Ann Odaneth**, *DBT-ICT Centre for Energy Biosciences, Institute of Chemical Technology, Mumbai, India*
Opportunities for Biotechnology in India

15:40 - 15:50 **Dr Srinivasan Balachandran** *Visva Bharti University, India*
Biomass supply chains and Invasive biomass in India

15:50 - 16:00 **Professor Shibani Chaudhury,** *Visva Bharati University, India*
Socioeconomics consideration of rural bioenergy systems

Presentations on supporting doctoral training centres

Chair: Dr Petros Aristidou

16:00 - 16:10 **Mr James McKay,** *Manager of the Doctoral Training Hub in Bioenergy, School of Chemical and Process Engineering, University of Leeds*
Bioenergy Centre for Doctoral Training

16:10 - 16:20 **Dr Miller Camargo Valero,** *School of Civil Engineering, University of Leeds*
GCRF Water Security and Sustainability Hub and EPSRC Water-WISER Centre for Doctoral Training

16:20 – 16:30 **Final remarks from Professor Jon Lovett**

Project overviews

Creating resilient sustainable micro-grids through hybrid renewable energy systems (CRESUM-HYRES) *£1.2m Engineering and Physical Sciences Research Council (EPSRC) funded*

The project aims to enable the development of sustainable and resilient energy distribution grids in rural communities of the low and middle-income countries: Tanzania, Uganda and Republic of the Congo, where currently, at most, 10% of the rural population has access to electricity.

The research takes an integrated holistic approach, drawing on field data and experience in Africa to focus on actual needs and local realities. This ensures the development of micro-grid scenarios that can be applied to realistic situations. Taking this approach will lead to mini-grids designed to be maintainable, have good longevity with low cost, meet diverse community energy needs and be resilient to natural hazards.

Knowledge and experience drawn from the Indonesian Iconic Islands project (which looked at small-scale renewable energy on islands that can't be reached by large-scale energy infrastructure) will be transferred to the design and implementation of micro-grids in the African context.

Solar treatment of biomass for power generation using carbon slurries in hybrid renewable energy systems (ACERA) *£1.2m Royal Society-Department for International Development (DfID) funded*

This project aims to tackle the challenge of universal access to clean modern energy in sub-Saharan Africa, using two readily available energy sources: sunshine and biomass.

This project is novel because it seeks to overcome the major renewable energy constraint of storage of solar power through solar treatment of biomass and using the stored treated biomass as a fuel for electricity generation.

As part of the Royal Society's Capacity Building for Renewable Energy in Africa initiative (ACBI), the project is designed primarily for capacity building, containing a major element of training through PhD student development and research exchange. The project also seeks to enhance gender-balance in renewable energy capacity.

Bioenergy, clean water from invasive aquatic macrophytes (BEFWAM)
£1.7m Biotechnology and Biological Sciences Research Council (BBSRC) funded

Water Hyacinth grows in lakes, rivers and stagnant water and is a global problem which is causing considerable pressures on infrastructure, local economies and health. It is normally associated with poor sanitation and discharge of sewage into the water body which often has a number of detrimental effects.

This project will focusses on using invasive aquatic macrophytes (water hyacinth) and nutrient rich waste (manure, faecal sludge) in combination with immobilised microbial systems to facilitate the production of biogas, clean water and recovery of nutrients in developing countries.

The project has a focus on low-income countries (Uganda) and promotes knowledge transfer from mid-income (India) and high-income (UK) countries.

Education for renewables (E4R)

£1.2m, Royal Academy of Engineering funded (under the Higher Education Partnerships)

Access to electricity is directly correlated to higher economic activity, better access to education, and improved healthcare (UN, Human Development Report 2010). However, only 67.5% of the population has access to electricity with the rural areas at just 49.3% (Tanzania Energy Access Situation 2016 report). We have identified that the lack of engineering expertise and knowledge in the local workforce is one of the main reasons hindering sustainable energy development (slower adoption of new technologies, higher installation, operation and maintenance costs, etc.).

This project will tackle this problem by establishing the Renewable Energy Technology Centre (RETC). The institute will design and implement a sustainable energy education and capacity building programme that will directly benefit students, academic staff and renewable energy industry at a local and regional level. The centre will provide graduates with the necessary skills and knowledge to start their own business (SME) or be employed immediately by industry.

In the short-term, this will enhance the employability of graduates and reduce the training costs for industry. In the mid-term, the highly trained workforce will gradually help reduce the associated costs of renewables. Finally, in the long-term, it will accelerate the electrification in Tanzania and the region.

Economic non-food sugar from variable mixed solid waste for high value chemical products (MSW INDUK) *£360k Innovate UK funded*

This highly collaborative UK-India academia-industry project aims to translate into an India context existing technology for converting the biological fraction of mixed solid waste into non-food sugar that can be used in a wide variety of sustainable and biodegradable products such as binders in the construction industry, bioplastics, fermentation and pharmaceuticals.

The bio-waste in India presents problems of collection, segregation and unfavourable composition the project will develop new pre-treatments, better enzymes and a process adaptable to different bio-wastes and capable of generating energy to power the plant and sell. A focus of the project is to make the sugar for the right cost and quality. A pilot plant will be developed to produce to samples for target markets and production data suitable for investment cases into full-scale plants.

The project will impact upon waste collection people and methods, regional authorities and companies, to help reduce environmental burden, create wealth through new MSW plants, sale of non-food sugar, and develop biocatalysts and processes that can be used elsewhere in the world particularly developing countries.

Researchers and associated project members

Professor Jon Lovett *(CRESUM-HYRES, ACERA, BEFWAM)*
Chair of Global challenges, University of Leeds, UK

Dr Andrew Ross *(CRESUM-HYRES, ACERA, BEFWAM)*
Associate Processor in Energy and Resource Recovery, University of Leeds, UK

Professor Kang Li *(CRESUM-HYRES)*
Chair of Smart Energy Systems, University of Leeds, UK

Dr Petros Aristidou *(CRESUM-HYRES, HEP)*
Lecturer in Smart Energy Systems, University of Leeds, UK

Dr Miller Camargo Valero *(BEFWAM)*
Associate Professor of BioResource Systems & Associate Director of water@leeds, University of Leeds

Professor John Blacker *(BEFWAM, MSW INDUK)*
Professor, University of Leeds, UK

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Project and Communications Officer, University of Leeds, UK

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Mr Nick Davison *(ACERA)*
Bioenergy CDT postgraduate researcher, University of Leeds, UK

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Ms Nina Rangel Ortiz
PhD candidate, University of Leeds, UK

Mr Doug Bray
PhD Researcher (Bioenergy), University of Leeds, UK

Ms Jessica Quintana Najera
PhD student in Chemical and Process Engineering, University of Leeds, UK

Mr Jaime Borbolla Gaxiola
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Ms Poppy Cooney
PhD researcher, University of Leeds, UK

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Managing Director, Centre for Research in Energy and Energy Conservation (CREEC), Uganda

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PhD student, Centre for Research in Energy and Energy Conservation (CREEC), Uganda

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Dr Consalva Msigwa *(CRESUM-HYRES, ACERA, HEP)*
Principal Investigator of HEP & Co-investigator of ACERA, Department of Electrical Engineering, Dar-es Salaam Institute of Technology (DIT), Tanzania

Ms Mwaka Juma *(ACERA)*
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Research student (PhD), Université Marien Ngouabi, Congo-Brazzaville

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Electrical engineer, Tanzania Electrical Supply Company (TANESCO), Tanzania

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Professor, DBT-ICT Centre for Energy Biosciences, Indian Institute of Technology, Mumbai, India

Dr Gaurav Nahar (*BEFWAM)*
Technical director, Defiant Renewables, India

Ms Diane Myers
Independent Film Producer, University of Leeds, UK

Delegates from the Royal Botanic Gardens, Kew

Professor Alexandre Antonelli, Director of Science
Dr Paul Wilkin, Head of Natural Capital & Plant Health
Dr Colin P Clubbe, Head of Conservation Science
Dr Olwen Grace, Senior Research Leader, Integrated Monography
Dr Aaron P Davis, Senior Research Leader, Plant Resources
Dr Peter E Gasson, Research Leader, Wood & Timbers
Dr Charlotte Seal, Research Leader, Comparative Seed Biology
Dr Steven P Bachman, Research Leader, Species Conservation
Dr Shahina Ghazanfar, Research Leader, Identification & Naming (Asia)
Dr Viswambharan Sarasan, Research Leader, In Vitro Biology
Richard Gianfrancesco, Senior Science Officer, Education & Communications

Dr Rosemary J Newton, Career Development Fellow, Islands
Dr Anne Visscher, Career Development Fellow, Comparative Seed Biology
Dr Sylvia Phillips, Honorary Research Fellow
Dr Jemma Taylor, Research Fellow, Useful Plants

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Linda Pegg, Horticulturalist, Gallery & Garden Explainer

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Oliver Ellingham, PhD Student
Vanessa Stevens, MSc Postgraduate Student, QMUL
Bingyu Li, MSc Student
Charles Shi, Diploma Student, Horticulture
Noor Al-Wattar, Science Intern
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Gemma Muller, Science Intern