

# Theme 2: Low-carbon development

## Abstract:

With rapid industrialisation worldwide, the global energy demand is increasing at an unprecedented rate. While we continue to improve the efficiency of energy conversion systems and develop renewable energy sources, the amount of fossil fuels being used to support an ever growing demand for electricity is tremendous. Fossil energy sources such as coal, natural gas and oil are high in energy densities and still relatively low in price, and thus, the use of fossil fuels will unfortunately continue into the foreseeable future. While we will eventually run out of these fossil fuels, we are running out of the environment even faster.

Economic, societal and technological conditions vary dramatically around the world, requiring dedicated solutions across a broad spectrum of technologies. In developed countries, where infrastructure is extensively present, emission reductions can come from a combination of retrofitting of existing buildings to increase their efficiency to a progressive switch to renewable sources of energy. On the other hand, countries where industrialisation is proceeding at a very fast pace, high capital costs and a lack of more advanced technologies is pushing towards adoption of more polluting options. An example is the massive expansion of coal-fired power plants in India, South Africa or China. At the other end of the spectrum are countries in Africa and Southeast Asia where limited pre-existent infrastructure and complex socio-economic conditions require low cost and often decentralised solutions.

In this complex context, the topic of low carbon development covers a very broad range of technologies and research areas, from carbon dioxide capture to low carbon building to decentralised renewable energy production. A mix of all of these technologies is needed to address the complex issue of climate change and its long ranging consequences around the world.

## Session Co-Chairs:



**Prof Davide Mattia** is a Professor of Chemical Engineering at the University of Bath and a past Royal Academy of Engineering Research Fellow. His research is focused on environmental nanotechnology, the design of materials at the nanometre leading to large-scale processes that require fewer resources, produce less waste and consume less energy. The work of his research group is articulated around three areas, reducing the cost and energy consumption of water treatment processes; the development of environmentally sustainable industrial processes; and the direct conversion of carbon dioxide to chemicals and fuels.

**James Van der Walt** is a social entrepreneur and engineer. In 2011 he quit his job as a software engineer in Ireland striving to do something more meaningful with his life. In 2012 he moved back to South Africa and founded Ugesi Gold, a social business with the vision of giving the power of tomorrow to those who are powerless today. He took the basic premise of the business to Stellenbosch University to research the idea thoroughly. In 2013 he completed his masters in mechanical engineering specializing in renewable energy. The product of his thesis was the SolarTurtle. Today the first pilot is up and running in the rural Eastern Cape where it is providing electricity to a school with over 2000 students, none of whom have electricity at home.



## Speakers:



**Maria Chiara Ferrari, University of Edinburgh:** Maria-Chiara is a lecturer in Chemical Engineering at the University of Edinburgh. She received her PhD from the University of Bologna, Italy. Since 2011 she established the research and experimental facilities for membranes for gas separation in Edinburgh. Her research focusses on carbon capture processes and natural gas purification with both experimental and modelling studies.

**Mbali Mabaso, Engineers without borders:** Mbali was involved with Engineers Without Borders (EWB) from 2011 at the University of the Witwatersrand, joining the national committee of Engineers Without Borders (EWB) South Africa as the Head of Young Professional Membership until 2015. She is currently undertaking a Masters at Stellenbosch University investigating how to model renewable energy technologies for the South African energy system at a national and municipal level.



**Maryam Imani, Anglia Ruskin:** Maryam is a Chartered Civil Engineer who worked in industry as Civil Engineer before returning to academia. Currently, she is a Lecturer in Water Systems Engineering at Anglia Ruskin University. Her research interests include sustainability, resilience and optimisation of water & wastewater infrastructure, integrated modelling, system smartness and artificial intelligence.

**Morwesi Ramonyai, Borena Energy:** Morwesi is an impact entrepreneur with a passion for advancing renewable energy for productive use as a solution to the energy poverty problem. She is an experienced Renewable Energy Developer & Businesswoman. Her latest innovation, Watt-A-Woman seeks to achieve economic inclusion of rural women as co-owners of community based mini-grids

