



PhD Project(s) for inclusion on the UCD-Brazil Science Without Borders Website.

Principal Investigator details:

Name: Dr Phil Hemmingway & Dr Mike Long

Dr Phil Hemmingway has obtained first class honours Bachelor of Engineering (Civil) and Doctor of Philosophy (PhD) degrees from University College Dublin, Ireland. His Doctoral research involved the investigation of ground properties for ground source (geothermal) energy systems. Phil has published a range of technical papers and has been invited to speak about his research at national and international conferences. He has gained significant industry experience working in the energy section of one of Irelands leading engineering consultancies. His industry experience lies primarily in the areas of major energy infrastructure development (wind farms, electricity transmission etc.), project management, risk analysis, national and local policy formation, bioenergy and sustainable design.

Phil currently lectures on the Sustainable Energy and Green Technologies Masters course in the School of Biosystems Engineering at UCD, and is also a guest lecturer at Cork Institute of Technology. He is a technical reviewer for the American Society of Civil Engineers (ASCE) and the Encyclopaedia of Agriculture, Food and Biological Engineering.

Dr Mike Long holds a first class honours B.E. (Civil) degree and a MEngSc degree from University College Cork and a PhD from University College Dublin. Since 1996 he has been at UCD and is a Senior Lecturer in the School of Civil, Structural and Environmental Engineering teaching and researching in soil mechanics and geotechnical engineering. His particular areas of interest concern the engineering behaviour of natural soft soils and in particular peat

and the construction of deep excavations in urban areas and more recently utilisation of shallow ground for geothermal purposes. He has published more than 40 journal papers on these topics. Before joining UCD, Dr Long worked for consulting engineers, mostly Ove Arup & Partners, as a geotechnical engineer in Ireland, the United Kingdom and Singapore. He was responsible for the management of various large projects and several staff. He has particular experience in site investigation, foundation design, soft ground engineering and deep basement and embankment construction.

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<http://scholar.google.com/citations?user=53DmFYkAAAAJ&hl=en>

<http://www.ucd.ie/eacollege/csee/staffmembers/mikelong/staff,98254,en.html>

Project Title: Development and Optimisation of Shallow Geothermal Energy Testing Methodologies

A closed loop ground source energy (or geothermal energy) system operates by exchanging heat with the sub-surface via a circulating heat carrier fluid flowing around piping infrastructure which is buried in the ground. Accurate determination of input parameters is of critical importance in the design of these systems. Thermal response testing is currently the most common way of evaluating site thermal parameters for medium to large scale shallow geothermal energy projects.

A thermal response testing (TRT) rig has been developed by researchers at University College Dublin and has the ability to measure the average thermal conductivity along the length of a borehole heat exchanger; the borehole thermal resistance associated with a particular borehole and can give an indication as to whether or not a groundwater flow exists across a site. This project will investigate and develop low-cost adaptations to current geothermal site investigation practices and data evaluation methodologies in order to make the best possible use of data from such testing operations. For example, investigation of the possibility of determining the thermal conductivity of specific geological layers rather than the average conductivity along the length

of the geothermal borehole heat exchanger, and investigation of data evaluation methodologies in order to reduce the amount of data required for accurate characterisation will be performed. The successful student is expected to have the opportunity to modify aspects of existing design software / design methodologies to take account of the effects of multi-layered thermal conductivity measurements.

The successful student will be co-supervised by Dr Phil Hemmingway and Dr Mike Long who will help the student to develop a strong publication record during their Doctoral studies, ensuring that the student will be well-placed to get to take up employment in the rapidly growing geothermal energy sector.

Renewable Energy, Engineering & Practical Technologies