Research Topics in Renewable Energy for 2020

CENTRE FOR RENEWABLE & SUSTAINABLE ENERGY STUDIES

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Faculty: Engineering	***Department:*** Mechanical and Mechatronic Engineering	

Division:
Design & Mechatronics / Mechanics / Thermo fluids / Renewable Energy

Research field:

1) Axial flow fans for cooling systems
2) Micro gas turbines
3) Supercritical CO2 compressor specification

General description of research field:

1) The use of direct dry-cooling in power generation systems is a means of ensuring sustainable water usage. The efficient operation of the axial flow fans that form part of such an air-cooled system is essential for a well-performing system. These research topics (topics 1 and 2) focus on the design, testing and analysis of axial flow fans for these systems.
2) The use of micro gas turbines (MGTs) for the propulsion of aerial vehicles or solar thermal power applications hold specific advantages. The two related topics below are as follows:
    a. Incorporate a heat source into the existing micro gas turbine compressor test facility. Upgrade the test facility to run the large compressor test bench.
    b. Incorporate an additional electrical heat source into the existing solar/hybrid gas turbine loop. The gas turbine loop is existing and the heat source, along with the combustor (existing) has to be built into the loop.
3) The use of supercritical CO_2 as working fluid for power generation cycles. Current investigations seems to indicate very specific compressor pressure ratio requirements for recuperated sCO_2 loops. This thesis will specifically investigate this requirement further.

List of topics:	**MEng** ***(Structured)***	**MEng** ***(Research)***	**PhD**	**Funding**
1. Design of an axial flow fan for a unique cooling application.		X	X	project funding available
2. The performance of the 24 ft. installed MinwaterCSP axial flow fan.		X	X	Project funding available
3. The development of a test facility for a micro gas turbine compressor stage – incorporating a heat source and large compressor test spec.		X		limited funding available
4. The development of a micro gas turbine for solar-hybrid application – incorporating a “solar” heat source.		X		Limited funding available
5. The specification of a compressor for a recuperated supercritical CO2 loop.		X	X	Limited funding available

Spesifieke voorvereistes / *Specific requirements*:
Thermofluids 344, Computational Fluid Dynamics.