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Fakulteit / Faculty: Engineering	Departement / Department: Mechanical and Mechatronic Engineering			
Afdeling / Division: Design & Mechatronics / Mechanics / Thermo fluids / <u>Renewable Energy</u> (energy and the environment)				
Navorsingsveld / Research field: Concentrating Solar Power(CSP) research for the application in a solarized air (Brayton) and steam (Rankine) cycles				
Algemene beskrywing van navorsingsveld: General description of research field: Concentrating Solar Power (CSP) with cost effective large scale thermal energy storage is a technology with the ability to provide base-load power at low cost and is thus of particular relevance for a future national grid with a high renewable energy penetration. A fundamental part of an air cycle central receiver technology is a receiver capable of effectively transferring concentrated solar radiation onto a pressurized air stream. Such a technology has been developed at Stellenbosch University (SCRAP receiver) and further improvements are required. Parabolic troughs represent a highly bankable mature CSP technology at the threshold of fully unsubsidized economic competitiveness in the electrical power generation market.				
Lys van onderwerpe/List of topics:	MEng (Structured)	MEng (Research)	PhD	Funding:
1. CFD modelling of ambient air flow through a concentrating solar power (CSP) receiver structure. Optional additional modelling of forced convection heat transfer.		X	X	(to be arranged)
2. CFD modelling of natural convection of a concentrating solar power (CSP) receiver absorber tube in interaction with neighbouring absorbers.		X	X	(to be arranged)
3. CFD modelling and experimental validation of geometric solutions to enhance heat transfer through jet impingement cooling for a concentrating solar power (CSP) receiver technology.		X	X	(to be arranged)
4. Survey and synthesis of known and to be developed techno-economic options to enhance the profitability of parabolic trough CSP plants.	X	X		(to be arranged)
5. Survey and synthesis of known and to be developed solar thermal chemical storage options for CSP plants.	X	X		(to be arranged)
6. Investigation into the state of the art and development of options to overcome challenges pertaining to direct steam generation in parabolic trough CSP plants.	X	X		(to be arranged)
7. Assess the availability and reliability of the crucial thermal energy storage (TES) system including related heat transfer fluid (HTF) of an operational SA CSP plant in comparison to world best practice to provide the optimal solution that balances capital and life cycle costs with plant availability, power production and hence revenue.		X		(to be arranged)
Spesifieke voorvereistes / Specific requirements: Some of the above topic entail acquiring and utilisation of advanced level CFD expertise.				