Further information

The Solar Thermal Research Group in the Research School of Engineering is pleased to announce there are four job opportunities available to contribute to research on a number of ANU-led projects. These projects are sponsored by the Australian Renewable Energy Research Agency (ARENA), Australian Research Council (ARC) and through a Collaborative Research Agreement with the industry partner Vast Solar Pty Ltd.

The position/s will be based at the ANU. However, as there are collaborations with each project, there will be times whereby the appointee/s will be required to travel domestically periodically for on – site research purposes and collaborations with industry partners and researchers at other institutions.

Details of each of the four positions are identified below as to what experience and capabilities is required/desirable for each position to work on the projects. The positions are defined by the objectives/milestones of the projects, but depending on the capabilities and experience of applicants there is flexibility to vary the successful appointee/s role.

In applying for 1 or more of the positions, applicants are to describe their capabilities/suitability across each of the position/s they are applying for against selection criteria point 3 at either Academic Level A or Level B. Concurrently position 4 is also open as a Research Officer ANU Officer Level 7 which is advertised separately.

- Position 1: Requires a mechanical / optical engineer, with experience in ray optics, programming ability in common languages (e.g. Python, C, C++) and aptitude for practical and experimental work. The appointee will have the ability to analyse complex mathematical problems, preferably related to radiative heat transfer or similar. In addition, the appointee will have multi-disciplinary engineering research experience and an aptitude for practical and experimental work. This position will involve working on:
    - ASTRI Heliostat Cost Reduction: structural/optical modelling of sandwich panel mirror heliostats, integrating wind tunnel data to examine aerodynamic impacts on structural and optical performance of heliostats.
    - ASTRI Receiver Performance and ARENA Bladed Receivers with Active Airflow: integrated optical, thermal and mechanical analysis of solar receivers with various geometries, interaction with heliostat field layout and design, radiative heat transfer analysis, optimisation of receiver design under various materials and performance constraints. Ray tracing. Thermography. Experimental testing of prototype receivers. Model validation using experimental data. Exergy analysis. Use of the ANU High-Flux Solar Simulator.
    - Vast Solar Collaborative Research Project: multi-disciplinary research of an applied nature with topics yet to be defined in conjunction with the industry partner. May include topics such as experimental-led analysis of performance of high-temperature optical absorber, characterisation of mirror panel quality and optical analysis, analysis and interpretation of Vast Solar's pilot-plant performance data.

- Position 2: Requires a mechanical / thermal engineer with strong experimental experience, heat transfer and thermo-mechanical modelling ability (e.g. computational fluid dynamics, finite element analysis) and aptitude for experimental data analysis & interpretation. This position will involve working on:
    - ASTRI Receiver Performance, ARENA Bladed Receivers with Active Airflow, ARC Linkage. Contribute across all aspects of thermal design of receivers on these two projects, including coordinating an experimental test program for small-scale (1-10kW) receiver prototypes, and development and use of test-loops for liquid sodium and sodium boiling. Experimental data analysis & interpretation, thermo-mechanical, and heat and mass transfer modelling of solar receivers, preferably experience modelling with computational fluid dynamics, finite element analysis, validation of

simulated data with experimental results. Modelling and/or experimental two-phase boiling flow would be advantageous.

- Vast Solar Collaborative Research Project: multi-disciplinary research of an applied nature with topics yet to be defined in conjunction with the industry partner. May include topics relating to sodium process, equipment and instrumentation design, and safety relating to sodium systems.

- Position 3: Requires a process / mechanical / systems engineer with strong numerical modelling background such as chemical process modelling, energy systems modelling, system dynamics and control with strong interest in numerical methods, thermodynamics/heat transfer and applied renewable energy systems design. Experience in computer programming, preferably with a range of languages (Python, Modelica and C/C++) will be considered favourably. This position will involve working on:
  - ASTRI System Modelling: participating in a collaborative energy system modelling project using the Modelica (OpenModelica) framework, working with a wide range of researchers to incorporate next-generation solar thermal energy components into overall system models, optimising the efficiency of the overall system and guiding the improvement of the various components based on system-level observations. Exergy analysis is a likely component. Techno-economic analysis is an important aspect of the optimisation. There is the opportunity to develop improved numerical methods including optimisation and model order reduction, for example where detailed models of components are based on high-cost computational fluid dynamics models. This role requires a research engineer with strong interest in numerical methods but also with a strong desire to work in a collaborative mode on a range of applied problems.

- Position 4: Requires a mechanical engineer, with experience in product design, development, use of CAD modelling and drawing skills and preferably structural modelling skills using finite element analysis software, prototyping and testing including research and development of novel technology. This role will involve working on:
  - ASTRI Heliostat Cost Reduction - heliostat concept development: Working on this project will be seen as an applied research role based around design and development of a new heliostat 'sandwich panel' heliostat concept including testing of heliostat sub-systems and components, design and testing of heliostat prototypes, CAD modelling and drawing, and structural analysis incorporating wind tunnel data. Will work closely with partners at CSIRO including with solar tracking and control systems. Strong industry engagement focus.
  - ASTRI Heliostat Cost Reduction - mirror facet development: Working on this part of the project will be seen as an applied research role based around development of new heliostat mirror panel concepts using sandwich panel composite structures. The role includes significant hands-on prototyping and experimental work building and testing mirror panel structures, development of high-volume manufacturing methods, training in and use of optical characterisation methods to measure mirror quality, preferably finite element analysis experience for structural analysis and optimisation of the mirror panel design, durability testing, and close collaboration with researchers at Flinders University and a South Australian industry partner.
  - ARENA High-temperature solar thermal energy storage via manganese-oxide based redox cycling: the role in this project is to lead mechanical design and construction of the solar reactor, including CAD modelling and drawing, and managing procurement and assembly of the reactor.
  - As well as the above project roles, the appointee will have responsibility within the Solar Thermal Group for management of the Big Dish solar thermal facility and workshop, which will include ensuring WHS procedures are followed for research at these facilities, including dish operation and use of the workshop.

The appointee/s will support and contribute to research in the below mentioned projects and will primarily report directly to the Chief Investigators against each project as required.

- ARENA-funded Australian Solar Thermal Research Initiative (ASTRI) projects:
    - "Heliostat Cost Reduction" Chief Investigator: Dr Joe Coventry (ASTRI Node 1)
    - "Receiver Performance" Chief Investigator: Dr Joe Coventry (ASTRI Node 1)
    - "System Modelling" Chief Investigator: Dr John Pye (ASTRI Node 2)
- ARENA-funded "Bladed Receivers with Active Airflow". Chief Investigator: Dr John Pye.
- ARENA-funded "High-temperature solar thermal energy storage via manganese-oxide based redox cycling". Chief Investigator: Dr Wojciech Lipiński.
- ARC-funded Linkage Project with industry partner Vast Solar "Thermal transport in multi-phase flows for concentrating solar applications". Chief Investigator: Dr Wojciech Lipiński.
- A Collaborative Research Agreement with industry partner Vast Solar. Chief Investigator: Dr Joe Coventry.

Positions 1, 2 and 4 will be primarily supervised by Dr Joe Coventry. Position 3 will be primarily supervised by Dr John Pye.

All appointees will split their time across a number of the projects which will vary throughout the life of the projects depending on individual project requirements.