# Position Details

## CSIRO Early Research Career (CERC) Postdoctoral Fellowship– CSOF4

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| The following information is for applicants | |
| Advertised Job Title | CSIRO Siegfried Richard Wagner Early Career researcher in Alternative Energy Sources Postdoctoral Fellowship in Optimisation and Control of Energy Systems |
| Job Reference | 75632 |
| Tenure | Specified Term of 3 years full-time or part-time equivalent  Part-time or full-time available |
| Salary Range | AU$88,163 to AU$96,573 pa (pro-rata for part-time) + up to 15.4% superannuation |
| Location(s) | Newcastle, NSW |
| Relocation Assistance | Will be provided to the successful candidate if required |
| Applications are open to | * Australian/New Zealand Citizens and Australian Permanent Residents * Australian temporary residents currently residing in Australia (visa sponsorship may be provided to eligible onshore candidates) |
| Position reports to the | Team Leader of Power Systems and Controls in the Grids and Energy Efficiency Program |
| Client Focus – Internal | 70% |
| Client Focus – External | 30% |
| Number of Direct Reports | 0 |
| Enquire about this job | Contact Nariman Mahdavi Mazdeh via email at [Nariman.Mahdavimazdeh@csiro.au](mailto:Nariman.Mahdavimazdeh@csiro.au) or phone  +61 2 4960 6085 |
| How to apply | Apply online at <https://jobs.csiro.au/>  Internal applicants please apply via **Jobs Central**  If you experience difficulties when applying, please email [careers.online@csiro.au](mailto:careers.online@csiro.au) or call 1300 984 220. |

### Role Overview

**CSIRO Early Research Career (CERC) Postdoctoral Fellowships** provide opportunities to scientists and engineers who have completed their doctorate and have less than three years relevant postdoctoral work experience.

The Siegfried Richard Wagner CSIRO Early Research Career Postdoctoral Fellowship in Alternative Energy Sources funding provides an Australian Post Doc to engage with science and technology research that offers significant potential for emission reduction and benefit to Australia.

These fellowships aim to develop the next generation of future leaders of the innovation system through:

* A differentiated career development program to deliver capability excellence and breadth across all facets of the national innovation system.
* Research training via strategic research and development projects with a clear focus that will deliver real impact through science and engineering excellence;
* An innovative culture supporting the development and demonstration of original thinking and expertise leading to peer-recognition; and
* Opportunities to develop skills and experience in collaborative research teams to effectively work within national and global multi/transdisciplinary and multi-stakeholder environments.

CERC Postdoctoral Fellows **are appointed for three years or part time equivalent.**

In this role, you will develop new power network data sets, scenarios and optimization methods to enable the trans- and intercontinental uptake of renewable energy through an Australian supergrid. The Fellow will create new science, software and technology to optimally design and operate safe, reliable and efficient lower-emission electricity grids in the future.

Driven by inexpensive solar and wind energy technology, electrification of heat (natural gas for cooking and heating) and chemical feedstocks (hydrogen, ammonia etc.) is expected to increase. This will lead to vastly higher electricity generation and consumption than is known today. Power networks allow us to bridge the distances between load and generation centres, allowing us to capture renewable energy where it can be harvested most effectively and with the least impact. Furthermore, at continental scales, east-west connections effectively can buy you additional solar hours, e.g. when the sun is rising in the east, the west coast of Australia is still in the dark, but it can access solar energy through a long-distance power network (vice-versa in the evening). If the network spans the continent or more, it also limits risks related to ‘Dunkelflaute’, also known as the simultaneous lack of availability of solar and wind. Finally, there are opportunities to export electrical energy to load centres in Singapore and Indonesia, where the deployment of large-scale solar is harder than in Western Australia. There has been a preliminary analysis of the options, however, it is not well-understood how a supergrid for Australia, connecting the NEM (East coast) and SWISS (West coast), should be designed – considering AC and DC power transmission technologies - to enable resilient and inexpensive access to electric power.

### Duties and Key Result Areas:

The Fellow will develop methods for analysis and control of network systems at a continental scale and beyond.

The main research objectives are

* + Develop **scenarios** for high-probability very-large-scale (>>1GW) solar and wind farms across Australia coast-to-coast to inform on likely locations.
  + Develop optimization-based **methodologies** **and tools** in Julia/JuMP for resilient network expansion planning to find expansion options within Australia and beyond, e.g. for least-regret, maximum renewable uptake, minimum energy cost or minimum network reinforcement scenarios across AC and DC network technologies.
  + **Compare and weigh** different expansion options in terms of technical and economic benefits from the perspective of various power system stakeholders.
  + Explore **compatibility with Global Grid concepts**.

Under the direction of senior research scientists and engineers, the Postdoctoral Fellow will:

* + Focus on **modelling** the problem at hand, and deliver scalable solutions using off-the-shelf solvers (Ipopt, CPLEX, …). Collaboration with algorithm-focused researchers is encouraged.
  + Implement these models in **a sustainable research-grade software stack** in Julia, with version control, unit testing, documentation and continuous integration.
  + Carry out innovative, impactful research of strategic importance to CSIRO that will, where possible, lead to novel and important scientific outcomes.
  + Recognise and exploit opportunities for innovation and the generation of new theoretical perspectives, and progress opportunities for the further development or creation of new lines of research
  + Utilise design thinking methodology to plan and prepare research proposals, and apply non-academic impact methodology to research projects
  + Carry out research investigations requiring originality, creativity and innovation
  + Proactively undertake development to grow effective researcher capabilities to support career goals.
  + Adhere to the spirit and practice of CSIRO’s Code of Conduct, Health, Safety and Environment procedures and policy, Diversity initiatives and Making Safety Personal goals.
* Other duties as directed.

[**The CERC Postdoctoral Fellow learning and development program**](http://www.csiro.au/en/Careers/Student-and-graduate-programs/Postdoctoral-fellowships)is developed between the CERC Postdoctoral Fellow and their CSIRO supervisor. The program will focus on enhancing the Fellows’ capabilities to the level expected of an independent researcher and will include on-the-job and course-based development encompassing:

* Discipline-specific techniques and protocols
* Professional growth
* Project management
* Communication and influencing skills
* Working and collaborating with others

## **Required Competencies:**

* **Teamwork and Collaboration:** Cooperates with others to achieve organisational objectives and may share team resources in order to do this. Collaborates with other teams as well as industry colleagues.
* **Influence and Communication:** Uses knowledge of other party's priorities and adapts presentations or discussions to appeal to the interests and level of the audience. Anticipates and prepares for others reactions.
* **Resource Management/Leadership:** Allocates activities, directs tasks and manages resources to meet objectives. Provides coaching and on the job training, recognises and supports staff achievements and fosters open communication in the team.
* **Judgement and Problem Solving:** Investigates underlying issues of complex and ill-defined problems and develops appropriate response by adapting/creating and testing alternative solutions.
* **Independence:** Recognise and makes immediate changes to improve performance (faster, better, lower cost, more efficiently, better quality, improved client satisfaction).
* **Adaptability:**Copes with ambiguity or situations that lack clarity. Adapts readily to changing circumstances and new responsibilities (which may include activities outside own preferences) in the interests of achieving team objectives. Recognises the need for and undertakes personal development as a result of changes.

## **Selection Criteria**

#### Essential

*Under CSIRO policy only those who meet all essential criteria can be appointed.*

1. A doctorate (or will shortly satisfy the requirements of a PhD) in a relevant discipline area, such as operations research, computer science, mathematical modelling, power systems engineering, control systems engineering, applied statistics, or equivalent.

Please note: To be eligible for this role you must have **no more than 3 years** (or part time equivalent) of postdoctoral research experience.

1. Demonstrated understanding and research experience on theoretical and practical aspects of power network modelling and mathematical optimisation.
2. Experience with Julia/JuMP, Python/Pyomo, AMPL, GAMS, PowerModels(ACDC) or alike, in the context of the implementation of optimal power flow, expansion planning and/or unit commitment models or alike.
3. High level written and oral communication skills with the ability to represent the research team effectively internally and externally, including the presentation of research outcomes at national and international conferences.
4. A sound history of publication in peer reviewed journals and/or authorship of scientific papers, reports, grant applications or patents.
5. A record of science innovation and creativity, including the ability & willingness to incorporate novel ideas and approaches into scientific investigations.

## **Desirable:**

1. Experience with distributed version control (git), issue tracking (github, JIRA), unit testing, continuous integration, documentation compilation and hosting.
2. Experience in adapting, and building on, nontrivial code bases that other researchers developed
3. Experience contributing to open-source scientific research code bases
4. Remain productive, positive and resilient in complex, ambiguous and/or uncertain environments.
5. **The ability to work effectively as part of a multi-disciplinary, potentially regionally dispersed research team, plus the motivation and discipline to carry out autonomous research.**

To be appointed as a CERC Postdoctoral Fellow within CSIRO, candidates are required to have **submitted** their PhD at the time of commencement, as a minimum requirement, if PhD conferment has not been obtained. If a candidate has submitted, but their PhD has not yet been formally attained, the starting salary will be CSOF4-1 ($85,361). Upon CSIRO receiving written confirmation that the PhD has been awarded (within a six month period from commencement date), the salary will be increased to the negotiated level and the difference will be back-paid to the Officer’s start date.

Special Requirements

Appointment to this role may be subject to conditions including provision of a national police check as well as other security/medical/character clearance requirements.

* The successful candidate will be asked to obtain and provide evidence of a National Police Check or equivalent. Please note that people with criminal records are not automatically deemed ineligible. Each application will be considered on its merits.
* The successful candidate may be required to undertake a pre-employment medical examination prior to commencement.
* If the successful candidate is not an Australian Citizen or Permanent Resident, they may be required to undergo additional security clearances, which may include medical examinations and an international standardised test of English language proficiency (i.e. IELTS test).- https://ielts.com.au/

**Our value proposition**

We want CERC Postdoc Fellows to join our world class science, engineering and digital teams to solve big, complex problems that make a real difference to the future of Australia and the world.

You'll get to work with some of the most talented minds in their fields, not just in Australia, but in the world. At CSIRO, we spark off each other, learn from each other, trust each other and collaborate closely to achieve more than we could individually.

CSIRO Early Research Career (CERC) Postdoctoral Fellow Experience Employee Value Proposition (EVP). Find out more [here](https://www.csiro.au/en/careers/postdoctoral-fellowships)!

## **About CSIRO:**

We solve the greatest challenges through innovative science and technology. To find out more visit us [online](http://www.csiro.au/)!

CSIRO is a values-based organisation. In your application and at interview you will need to demonstrate behaviours aligned to our values of:

• People First

• Further Together

• Making it Real

• Trusted

Find out more about CSIRO [Energy](https://www.csiro.au/en/Research/EF)