

CAREERS WITH STEM™ JOB KIT



CLEAN ENERGY SCIENTIST

Discover how you can power a brighter future with a clean energy career

SUPPORTED BY





Spark your career in science.

Rabecka Joseph chose to study a Bachelor of Science Advanced (Honours) at QUT, anticipating that it would lead to better work opportunities as a biological researcher after she graduates.

As a science-loving high school student, Rabecka was particularly drawn to QUT's emphasis on practical learning, real-world applications, student support and passionate STEM staff.

Now settled into her stride at QUT, Rabecka finds practicals to be the most challenging part of her course, and also the most beneficial. Opportunities to work with advanced technologies and future applications are inspiring and rewarding.

To discover more of Rabecka's story and learn about studying science at QUT, visit our website.

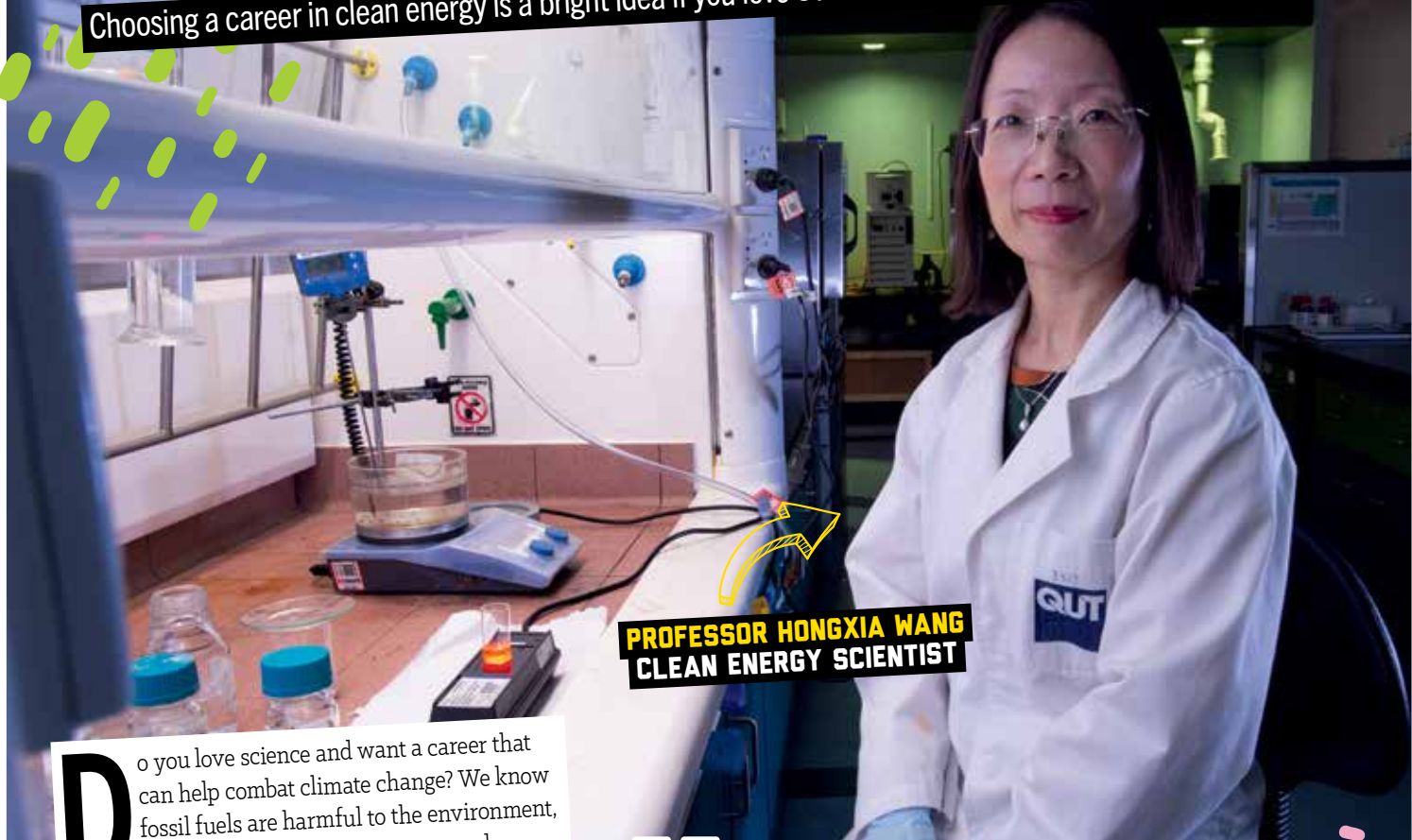
qut.edu.au/study-science-advanced

the university
for the real world



POWER A BRIGHTER FUTURE

Choosing a career in clean energy is a bright idea if you love STEM and are passionate about sustainability



PROFESSOR HONGXIA WANG
CLEAN ENERGY SCIENTIST

Do you love science and want a career that can help combat climate change? We know fossil fuels are harmful to the environment, so it's important to transition towards cleaner, renewable energy sources to power our economy into the future.

That's where you could come in. As a clean energy scientist, you'll be at the cutting edge of renewable and sustainable energy research, conducting experiments, collecting data and designing and testing clean energy solutions.

My own journey into this career started with a background in chemistry, then I did my PhD on next-generation solar cell technology, which exposed me to multiple new disciplines including physics and materials science.

A career as a clean energy scientist is not only rewarding – you'll be building a brighter, more sustainable future, after all – but also fascinating and diverse. You'll be working at the intersection of many different disciplines, such as chemistry, physics, materials science and engineering. That's

YOU'LL BE AT THE CUTTING EDGE OF RENEWABLE AND SUSTAINABLE ENERGY RESEARCH"

because transitioning to a clean energy economy will require a range of experts working together. With the pressing need to transition away from fossil fuels, there is plenty of demand in this field. You could work in a university lab, government research facility, or a private company – or perhaps you'll launch your own cleantech startup! Whether you're just starting to think about your career or are already well on your study path, this Job Kit is a valuable resource for anyone interested in this important and growing field.

Professor Hongxia Wang
Clean energy scientist, QUT

BACHELOR'S DEGREE ANALYTICAL CHEMISTRY,
CENTRAL SOUTH UNIVERSITY, CHINA

MASTER'S DEGREE, APPLIED CHEMISTRY,
CENTRAL SOUTH UNIVERSITY, CHINA

PHD, SOLAR CELL RESEARCH,
CHINESE ACADEMY OF SCIENCES

POSTDOCTORAL RESEARCH FELLOW,
DYESOL LTD

POSTDOCTORAL RESEARCH FELLOW,
UNIVERSITY OF BATH, UK

PROFESSOR, QUT

Check out [CareerswithSTEM.com](https://careerswithstem.com) for more insights, information, inspiration and advice about Clean Energy Scientist careers!

Cleaning up our future

As Australia gears up to meet its renewable energy targets, clean energy scientists will be the people powering the change

Ready to help transform the energy sector into a clean, green, non-polluting machine? Well, your timing couldn't be better. Australia is in the midst of a major energy makeover and we need all hands on deck to help us transition away from coal towards cleaner, more sustainable sources of power.

At the heart of this transition are clean energy scientists – the engineers, chemists and physicists coming up with solutions to the energy sector's three biggest challenges: generating power that costs less, is more reliable, and which helps combat climate change. No biggie, right?

The good news is that we're getting there. In 2021, renewable energy accounted for almost a third of Australia's energy production, which is equivalent to almost 16 million Australian homes being powered by clean energy! Given Australia's plan to increase that to 82 percent by 2030, the growth of this exciting sector is unlikely to slow down anytime soon.

Solar, wind, hydro, hydrogen, biofuels and batteries are all going to be important pieces of our clean energy future. So, no matter where your interest lies, there are plenty of pathways out there to follow if you're looking for a rewarding career. – Amelia Caddy

Pay day

Here's what you might earn in a clean energy gig:

Postdoctoral research associate: \$75K-\$103K

Electrical engineer: \$58K-\$119K

Energy analyst: \$51K-\$125K

Energy consultant: \$52K-\$90K

*Salaries from Payscale.com

SPOTLIGHT ON SOLAR

Australia is one of the sunniest countries on Earth, so solar energy has huge potential here. Over the last decade, the price of solar has come down by nearly 90%, but there's still plenty of room for improvement! Here are some of the ways clean energy scientists are contributing to the development of solar technology.

Chemists

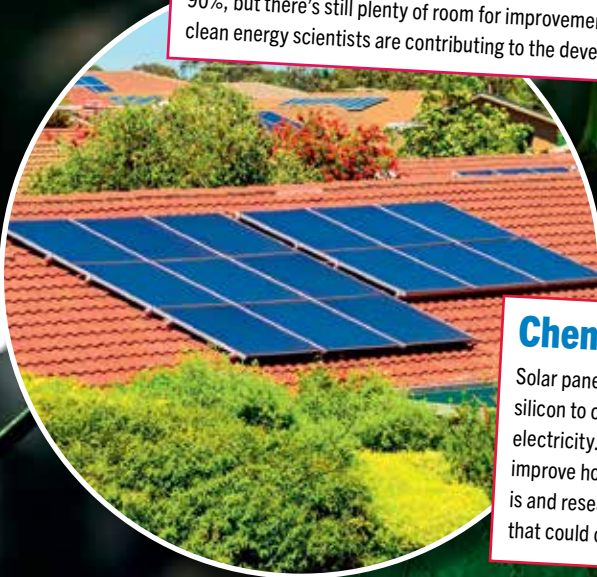
Solar panels traditionally use silicon to convert sunlight into electricity. Chemists are working to improve how efficient that process is and researching other materials that could offer better solutions.

Physicists

Physicists are working to improve the efficiency of solar panels and finding new materials with which to build them.

Engineers

Solar and electrical engineers have a role to play in all stages of the solar supply chain – from the manufacturing of equipment, to the design and maintenance of solar systems and their connection to the grid.



POWER UP YOUR STUDY PATH

HERE ARE SOME OF THE STUDY OPTIONS AVAILABLE AT QUT TO GET YOU ON THE ROAD TO YOUR CLEAN ENERGY CAREER.

UNDERGRADUATE DEGREES

- Bachelor of Engineering (Honours) (Chemical and Sustainable Process or Electrical and Renewable Power)
- Bachelor of Science (Chemistry or Physics)

DOUBLE DEGREES

Knock off two degrees for only one or two extra years to expand your career opportunities and make you an outstanding job candidate.

- Bachelor of Engineering (Honours) (Chemical and Sustainable Process) / Bachelor of Science (Chemistry)
- Bachelor of Science (Chemistry) / Bachelor of Information Technology
- Bachelor of Engineering (Honours) / Bachelor of Information Technology

POSTGRADUATE

If you're interested in knowledge and looking to pursue a career in academia, these postgraduate programs might be for you.

- Master of Engineering
- Master of Philosophy
- Doctor of Philosophy (PhD)



Workers wanted!

Australia is going to need to **scale up its clean energy workforce** big time in the decades to come. Estimates vary widely, but for future graduates the prospects are good no matter how you look at things – ranging anywhere from **12,000 new workers needed by 2025**, to up to three times higher if Australia becomes a major renewable energy exporter.



Where will you work?

Depending on what you choose to specialise in, you could end up working anywhere from government to academia, an energy consultancy or an engineering firm. Here are some big employers of clean energy scientists in Australia.

- The Australian Energy Market Operator
- Energy Queensland
- AECOM
- Ark Energy
- ABB
- Aurecon
- QUT
- Australian Renewable Energy Agency
- Department of Climate Change, Energy, the Environment and Water



POWERING CHANGE

FRESH OUT OF A DOUBLE DEGREE AT QUT, **KATE WATSON** HAS ALREADY LANDED A JOB USING HER ENGINEERING SKILLS TO HELP CREATE A MORE SUSTAINABLE WORLD

GRADUATE ELECTRICAL ENGINEER, POWER SYSTEMS CONSULTANTS

INTERN, AURECON ENERGY QLD AND PSC

VICE PRESIDENT, GENDER EQUITY IN ENGINEERING MAKES SENSE (GEMS)

BACHELOR OF ENGINEERING (HONOURS) (ELECTRICAL)/ BACHELOR OF SCIENCE (ENVIRONMENTAL), QUT

KATE WATSON
ELECTRICAL ENGINEER

Kate is fascinated with power – the electrical kind. “Energy has so many areas to improve in and it’s got such a huge carbon footprint that if we can clean it up, we can have a huge impact,” she says.

For Kate, the fascination began in 2016 when almost all of South Australia lost power after the state’s energy grid failed in a storm. She was in Year 11 at the time and considering future career options. Initially, she says, she was interested in environmental science, but the blackouts led her to believe she might find a more rewarding career helping to tackle the many challenges facing the energy industry – including its transition to clean energy.

“I decided the best way to feel like I was contributing to combatting climate change was to pursue a career in the power sector so I could directly contribute to finding solutions,” she says.

Since then, Kate has thrown herself into her chosen career path with gusto – studying a Bachelor of Engineering (Electrical)

(Honours) and a Bachelor of Science (Environmental) at QUT. For her honours thesis in 2022, she designed a new model for the Australian Energy Market Operator. That project, combined with no fewer than four internships, saw her graduate with an impressive resume and helped her secure her first job as a graduate electrical engineer at one of her internship placements, Power Systems Consultants.

CODING THE CURRENTS

Kate says there’s plenty of work out there for engineers wanting a career in clean energy. But if you’re looking to set yourself apart, the number one skill she recommends nailing is coding.

“There aren’t enough engineers out there who know how to code. I think that’s part of the reason why there are skill shortages in the industry.”

Whether it’s monitoring wind direction, speed and intensity on a wind farm, or managing electricity usage across Australia’s power grid, engineers are constantly collecting and analysing data. “There’s just too much information to be able to use it effectively without coding,” says Kate.

THERE AREN'T ENOUGH ENGINEERS OUT THERE WHO KNOW HOW TO CODE"



A day in the life of a... SOLAR ENERGY RESEARCHER

Le Pang is helping to improve the way we use the sun to generate electricity through his PhD at QUT

Le has an ambitious vision: of a world in which solar power is so efficient and accessible that fossil fuels are a thing of the past, and fewer wars are fought as a result. It's a vision he's prepared to dedicate his whole career to, and he's already made a good start.

As a second year PhD candidate at QUT, Le is using his background in chemistry to research cheaper and more efficient ways of converting the sun's rays into electricity. The family of materials he's working with, Perovskite, could even be used to help power space shuttles exploring our galaxy.

Day-to-day, Le spends much of his time in the lab conducting experiments on his materials to test their efficiency and stability. It's complex work requiring lots of collaboration, but Le thrives on the challenge. "Clean energy research requires you to find different, creative ways to solve problems every day. Sometimes the results are surprising, but that just makes it all the more interesting!" he says. – *Amelia Caddy*

CLEAN ENERGY RESEARCH REQUIRES YOU TO FIND DIFFERENT, CREATIVE WAYS TO SOLVE PROBLEMS EVERY DAY"



Le talked us through what a day in his job might look like:

8.30am

Doing a PhD, your days are very flexible. I prefer to get all my reading and writing done in the morning while my brain is fresh. Before I get started though, I like to go through my emails and make a plan for the day.

9am

At the moment, I'm working on what will be my first published research paper, which has been accepted with minor revisions to the journal *Energy Materials*.

11.30am

Morning tea time. QUT puts on morning and afternoon tea for us almost every day. It's a great chance to connect with other researchers and learn about their work.

12pm

It's important that I stay up-to-date on the latest research, so I'm always reading journal articles. These papers inform how I conduct my lab work – I can conduct my research more effectively if I build on what others have already learnt.

1pm

Afternoons are usually spent in the lab, doing experiments to understand the different properties of the materials I'm working with.

6pm

My brain needs a break! After work, I head to the gym to help me relax and unwind.



PHD CANDIDATE, QUT



MASTERS OF PROFESSIONAL ENGINEERING (MECHANICAL), QUT



BACHELOR OF SCIENCE (CHEMISTRY), QUT

Get the job!

Keen to power up your career in clean energy science? Start with these simple steps...

Choose this career if you...

- ✓ Love coming up with creative solutions to complex challenges
- ✓ Are looking for a rewarding and impactful career
- ✓ Enjoy working as part of a team

FEEL-GOOD FILMS

There's no denying we've landed ourselves in a hot mess, but if climate news is starting to get you down, these documentaries are here to remind you there are people out there (like your future self) working to turn things around.

2040 (YouTube) – Operating off the premise that we already have the tools and knowledge we need to solve the climate crisis, 2040 delivers a vision of a future in which those solutions have been implemented at a large scale.

Fight for Planet A: Our Climate Challenge (ABC iView) – Don't have time for a full-length documentary? Let this three-part docuseries break climate action down into more manageable chunks for you.

Tomorrow (Amazon Prime, Apple TV, Google Play, YouTube) – This hopeful documentary travels all over the world, showcasing people and communities who've found creative solutions for a more sustainable world.

CODE YOUR CAREER

If engineering is your jam, then programming is a must, and there are plenty of free, online resources to get you started.

FreeCodeCamp.org

Feeling intimidated and not sure where to start? This registered charity offers over 9000 free tutorials organised into a set curriculum so all you have to do is sit down and start learning. Please and thank you!

Code Academy

Described as like 'learning to code with training wheels', Code Academy's free courses take less than 11 hours each, and cover 12 programming languages.

Google's Python Class

Who better to teach you code than the tech giant itself? Of the many programming languages out there, Python is one of the most popular and the most useful. While this free course assumes a little prior knowledge, it's well worth bookmarking for when you're ready.

2040

Electives checklist

Choose these subjects in years 11 and 12 to get a head start on your studies:

- ✓ Mathematics
- ✓ Chemistry ✓ Physics
- ✓ Computer studies