



Science Rocks
Career Expo 2020
ONLINE
STUDY GUIDE



biology /neuroethology
astrophysics
ocean engineering
renewable energy

Great Southern Science Council Pro Files series – connecting science professionals and our community

Dr Wiebke Ebeling

job title Centre Manager

organisation The University of Western Australia – Wave Energy Research Centre (focus on renewable energy from ocean waves)
<https://marineresearch-gs.com/wave-energy-research-centre/>

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Pro File video interview Watch the Pro File video

Wiebke Ebeling - Ocean renewable energy research includes many sciences

to learn more about this STEM professional, why they chose to work in this field and their pathway to it, their typical work day, favourite part of the job, common myths about their field, and more.



“Who needs a career plan as long as furry Australian marsupials are involved?”

Wiebke’s PhD at The Australian National University in Canberra.



“Astronomy is physics on steroids,” says Dr Ebeling,

“People of all ages love learning about the stars and galaxies.” Wearing her science communications hat, Wiebke loved producing a children’s comic book that encourages curiosity and courage.



Wiebke now works closely with engineers, ocean researchers, innovators and State Government representatives to understand ocean waves and wave energy device technology towards harvesting renewable energy from the oceans.

EXTENSION MATERIAL – science professionals answered these questions to extend your interest and study in their topic area

FREQUENTLY ASKED QUESTIONS in this topic/job	FAQ 1 [from Wiebke’s PhD on marsupial vision] <i>I thought animals are colour blind?</i>	<i>Quite the contrary! A lot of animals have colour vision that is superior to humans, e.g. fish and insects. And while most mammals are “colour deficient” (similar to a fraction of people), they see colour – just a bit different.</i>
	FAQ 2 [from Wiebke’s work in science communication about astrophysics] <i>Astrophysics is too hard and too technical for girls.</i>	<i>Clearly rubbish, hence a long human history of men trying to steal women astronomers’ thunder (Vera Rubin, Jocelyn Bell Burnett etc.). Yes, astrophysics uses maths – to explain concepts in the physical world within the largest-ever lab, the universe! If the science is fascinating, it’s just all about accepting the tools (maths, coding) – similarly, a tradie might be inspired by a particular building concept but needs to get the consistency of the cement right to get it done.</i>
	FAQ 3 [from Wiebke’s current work in ocean engineering and renewable energy] <i>Why would we try to make ocean energy work if we have solar panels and wind turbines?</i>	<i>Because humanity has never accepted the status quo but driven technology forwards, why should we stop? Challenges result in innovation. Ocean energy is more consistent and more condensed than any other type of renewable energy. While figuring out how to best harness it and how to maximise technology survivability, we will inevitably invent other important things.</i>
YOUR TURN	What question could you ask this person?	
LEARN MORE	Wiebke recommends this <i>The Conversation</i> article about ocean renewable energy:	https://theconversation.com/catching-the-waves-its-time-for-australia-to-embrace-ocean-renewable-energy-66048
	Wiebke says these websites have excellent resources about this topic:	https://marineresearch-gs.com/ https://www.csiro.au/en/Research/OandA/Areas/Marine-technologies/Ocean-energy/Wave-energy https://oceanenergygroup.org.au/
DO MORE	A citizen science or interactive project that community can be involved in to learn more about this topic	[from yet another previous job] https://portal.aodn.org.au/ (publicly available marine data sets – to avoid duplication and increase collaboration across sectors) Astronomy: https://radio.galaxyzoo.org/ https://www.zooniverse.org/projects/zooniverse/snapshot-supernova/ https://astroquest.net.au/science/galaxy-explorer-report/

<p>INNOVATE One, Two, Three... solved!</p>	<p>One Big Problem we are trying to understand in this topic area Two Innovative ways we are already trying to solve the problem THREE Ideas for the problem solving wishlist that anyone could help develop</p>	<p>1 <i>Cost-effective ocean renewable energy technology.</i> 2 <i>Research into step-changing ways to support the industry: wave buoy instrumentation to optimise placement of wave energy converters; wave prediction to optimise performance and survivability of wave energy converters; foundation / anchor sharing for wave energy farms to reduce cost.</i> 3 <i>Support for collaborative ocean energy test sites to pool and share resources and accelerate technology developments.</i></p>
<p>YOUR TURN</p>	<p>Using your new insights for this topic and its issues, please add another idea for the Problem Solving Wishlist. Then think of a research question to test possible solutions. <i>e.g. Idea: have a blue-sky “maker space” session to dream up 10 wave energy converter models for the Southern Ocean near Sandpatch, Albany Wind Farm.</i></p>	
<p>YOUR TURN... AGAIN</p>	<p>How does innovation happen? Research and list three examples of “blue-sky research” that resulted in step-changing ways how people have done things?</p>	<p>1 2 3</p>
<p># CURRICULUM LINKS.1 #</p>	<p># Science is a human endeavour # Write some dot points about what this means to you, then write answer the questions that follow.</p> <p>1 How could an understanding of the scientific method can be part of your career path, without becoming an expert in a particular STEM discipline?</p> <p>2 Does all scientific research have to lead to tangible applications in our everyday life? Can you give three examples of research projects that “only” improve our knowledge of the natural world?</p>	

<p># CURRICULUM LINKS.2 #</p>	<p># Year 9: Science as a Human Endeavour - using knowledge of science to test claims made in advertising or expressed in the media #</p> <p>Wiebke works in renewable energy, and there are contradictory claims in the media about renewable energy. Read to compare this article https://www.theguardian.com/australia-news/2020/may/29/rapid-shift-to-renewable-energy-could-lead-australia-to-cheap-power-and-100000-jobs with this article https://www.theaustralian.com.au/commentary/the-coal-hard-fact-is-we-must-put-jobs-first-in-this-economic-climate/news-story/de84f2b7a8cfb74559afbc00c2308f02</p> <p>Are there statements in the two articles that contradict each other? If so, how would you decide which one is correct?</p>
<p>FAMOUS PEOPLE IN RENEWABLE ENERGY</p>	<p>Elon Musk is, arguably, one of the most well-known people in the field of renewable energy. Do some research to discover three facts about Elon Musk. Do these facts relate to renewable energy? Discuss whether Musk's media personality is of benefit, or not, to the use of renewable energy.</p>
<p>KNOWLEDGE + IMAGINATION What was it like?</p>	<p>Renewable energy sources were the only energy sources before we started to use fossil fuels. For example, water wheels have been used for over 2,000 years http://www.waterhistory.org/histories/waterwheels/ What natural features are needed for effective production of energy from waterwheels? Can you think of anywhere in your area where a waterwheel could be used to produce energy?</p>
<p>OUR PATCH RENEWABLE ENERGY FOR ALBANY, WESTERN AUSTRALIA</p>	<p>In 2018, the Mayor of Albany, Western Australia stated that he wanted the city to be powered entirely using renewables by 2028. https://www.albanyadvertiser.com.au/news/albany-advertiser/self-powered-city-a-realistic-goal-mayor-ng-b88763640z Do you think that this goal is reasonable? Give your reasons for your answer. What can you do to help your town to use a greater proportion of renewable energy?</p>