STEM Community Partnerships Program

Fairfield local scenario

Energy

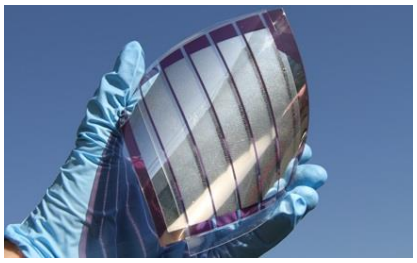
Energy powers our daily lives and global demand for energy is forecast to grow at a rapid rate. It is suggested that the world's appetite for this valuable resource could lift by more than 70 per cent by the year 2040. The single largest energy source, coal, is nearing its end, thus a secure and affordable electricity supply is crucial for Australia to maintain a strong economy and preserve our quality of life.

Although we are certain that our energy needs will grow, we are still uncertain about what sources we will use to generate it or how to store it more efficiently. Harnessing renewable energy to reduce Australia's dependence on fossil fuels is one of our biggest challenges. Additionally, as lowering emissions becomes more important for industry and homeowners, we need new ways of generating energy and storing it. As the demand and use of renewable energy technologies in both commercial and residential environments increase, it is critical to understand how electricity generated by these sources can be integrated into future grid designs.

Research is being undertaken into a wide variety of alternative energy sources, from solar and wind, through to harnessing the energy of ocean waves. CSIRO is developing new materials to produce thin, flexible and semi-transparent solar cells, based on printable inks. Fairfield City Council has installed solar photovoltaic cells on local buildings, replaced facility lights with energy efficient light bulbs and LED technology. This means that these facilities have reduced running costs and make a significant contribution to reducing CO_2 emissions.

Census data shows that other Council areas around Fairfield have a 2 –4 % higher uptake of solar panels. When compared to other parts of Sydney, the difference can be as high as 12%. There are a range of reasons as to why the uptake in Fairfield family dwellings and businesses of alternative energies supplies does not seem to reflect that of the wider Sydney population.

How your Council tackles the complexity of this issue impacts you and your community, now and in the future.



CSIRO Renewables and energy - CSIRO

Your task

Your task is to use the information above, and resources provided below as a start to identify a local problem and design a STEM-focussed solution.

(Question, Design, Explore, Communicate)

Resources

CSIRO research

- CSIRO's Virtual Power Station links dispersed renewable energy generators – like rooftop solar PV panels – with energy storage and load control systems in a web-based network, to create a single reliable energy supply, much like a power station: Virtual Power Station - CSIRO
- CSIRO's Energy research: http://www.csiro.au/en/Research/EF
- CSIRO research on Renewables and Energy: http://www.csiro.au/en/Research/Energy
- Renewable Energy Integration Facility: Renewable Energy Integration Facility (REIF) - CSIRO
- Intelligent Systems: Intelligent systems - CSIRO
- Economic Modelling: Economic modelling - CSIRO
- Supercritical Steam: Supercritical steam - CSIRO
- Photovoltaics: Photovoltaics - CSIRO

Reports

- Fairfield City Council article, 'Council saves the environment and money', 20 March 2019 https://www.fairfieldcity.nsw.gov.au/News/Council-saves-the-environment-and-money
- Fairfield City 2040 A Land Use Vision, Shaping a Diverse City, 30 March 2020 https://www.fairfieldcity.nsw.gov.au/files/assets/public/documents/plan_build/14___pp_appendix_b_fairfield_lsps_2040.pdf
- Australian Bureau of Statistics Fairfield : Region Data Summary (abs.gov.au)
- World Energy Needs and Nuclear Power: http://www.world-nuclear.org/information-library/current-and-future-generation/world-energy-needs-and-nuclear-power.aspx
- World Energy Outlook 2020: https://www.iea.org/reports/world-energy-outlook-2020
- CSIRO Global Megatrends Report Overview, 2012: https://publications.csiro.au/rpr/download?pid=csiro:EP126135&dsid=DS2
- Hajkowicz, Stefan 2015, *Global megatrends: seven patterns of change shaping our future*, CSIRO Publishing, Victoria, Australia

Articles and other resources

- A Salty Solution to Solar after Dark, CSIRO News Blog: https://blog.csiro.au/salty-solution-solar-dark/
- Australian Government Productivity Commission On Ageing Australia: Preparing for the Future: https://www.pc.gov.au/research/completed/ageing-australia

Generation STEM is managed by CSIRO and made possible by an endowment from the NSW Government to the Science and Industry Endowment Fund (SIEF).