| **SCIENCE EDUCATION PLANNER: HARNESSING THE SUN** | | | | | | | |
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| **SCIENCE STRANDS:**  Living World  Material World | | | Physical World  Plant Earth and Beyond | | **MAIN IDEA:** Understand why solar energy is of interest to scientists and how solar energy can be used and demonstrate an aspect of this by making and using a solar oven. | | **LEVEL:** 1 2 3 4  **YEAR:** 5 & 6  **TEACHER:** B Ryan |
| Nature of Science – understanding, investigating, communicating, participating and contributing. | | | | |
| **STRANDS/AOs:** | * Identify and describe everyday examples of sources of energy, forms of energy and energy transformations. | | | | | | |
| **KEY COMPETENCIES:**   * Thinking – considering Earth’s energy needs, current energy sources (for example, fossil fuels) and alternative sources; the transformation of the Sun’s energy into electricity and the implications of this; using the Sun for heat and what is needed to produce a solar oven. * Relating to others – discussions about Earth’s energy issues and how solar energy could be useful, negotiating with others and sharing ideas for a project. * Using language, symbols and texts – using scientific language related to solar energy thinking and activities. * Managing self – in group discussions, making plans, managing a project. * Participating and contributing – within the group to accomplish the task. | | | | | | | |
| **INTENDED LEARNING OUTCOMES:** The students will: | | | | | | | |
| **Conceptual LOs** | | **Procedural LOs** | | **Nature of science** | | **Technical LOs** | |
| Students will understand that:   * without energy from the Sun, there would be no life * solar energy in the form of light and heat is transmitted through space to Earth and can be transformed into different forms of energy * solar energy is dependent on time, weather and distance from the equator * solar energy can be reflected or absorbed * technology and science can be used to harness solar energy. | | Students will be able to:   * research solar energy using books and resources from the Science Learning Hub and the internet * use and explore technology using solar power * explore the effects various colours have with heat and use that knowledge to heat water * use knowledge to construct a solar oven to cook ‘pizza’ (spaghetti and cheese on toast). | | Students will understand and appreciate that scientists:   * are working together to ‘harness the Sun’ and use solar energy as an alternative to other energy sources * change their ideas over time as they find out about and make sense of solar energy * have special scientific language associated with solar energy they use in discussions – solar, energy, heat, light, photovoltaic, radiation, atmosphere, nuclear fusion * explore issues of the world’s energy resources and make decisions about possible actions for the future. | | Students will be able to:   * use solar powered devices * complete an experiment, observing results and making explanations * follow instructions to construct a solar oven from a pizza box, using skills such as measuring, cutting and taping. | |
| **RESOURCES:**   * [Harnessing the Sun – introduction](https://www.sciencelearn.org.nz/resources/1757-harnessing-the-sun-introduction) * Copies of the Māori legend *Māui and the Sun* – there are numerous versions around, for example, <http://crash.ihug.co.nz/~rickja/page5.htm>. * Books and images about the Sun and nuclear fusion. * Educational solar energy kit, solar energy toys. * ‘Make way for the Solar Kiwi – an interview with David Somerset’ (*School Journal* Part 4, Number 3, 1994) * Equipment and materials for investigating using heat energy. * Equipment and materials for the solar oven. * *Building Science Concepts* – Solar Energy (29) and Insulation (47). | | | | | | | |
| **ASSESSMENT ACTIVITY EXAMPLES:**   * Students will show an understanding of how solar energy can be transformed into energy to meet our needs by designing and drawing a solar powered/heated device of their choice (which could be a new invention), labelling the device and writing an explanation about how it uses the Sun to work. | | | | | | | |

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| **SCIENCE: PLANNING FOR TEACHING AND LEARNING: HARNESSING THE SUN** |
| **MAIN IDEA:** Understand what solar energy is and how it can be used and to demonstrate an aspect of this by making and using a solar oven. |

| **Micro task** | **Resources** | **Planned**  **interactions** | **Intended learning**  **outcomes** | **Reflections** |
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| **MESO TASK:** Students will understand what solar energy is. | | | | |
| Understand the importance of the Sun and the need to ‘harness’ it, using the Māori legend *Māui and the Sun*.  Explore nuclear fusion and the release of energy from the Sun.  Explore the electromagnetic spectrum to find out about energy waves radiated from the Sun to the Earth. | * Activity: [Māui and the Sun](https://www.sciencelearn.org.nz/resources/1752-maui-and-the-sun). * Copy of the Māori legend *Māui and the Sun*. * Books/images about the Sun and nuclear fusion. * Media: [The electromagnetic spectrum](https://www.sciencelearn.org.nz/image_maps/63-the-electromagnetic-spectrum).   **Teacher reference:**   * Article: [Solar energy](https://www.sciencelearn.org.nz/resources/1746-solar-energy). * Article: [Using solar energy](https://www.sciencelearn.org.nz/resources/1747-using-solar-energy). | * Follow instructions in the activity [Māui and the Sun](https://www.sciencelearn.org.nz/resources/1752-maui-and-the-sun). | Students will understand:   * the Sun is important for all life – without the Sun, we would die * we get light and heat energy from the Sun * energy is formed through nuclear fusion and then radiated (as rays) to us through space. |  |
| **MESO TASK:** Students will understand how solar energy can be used for electricity. | | | | |
| Investigate devices that are solar powered.  Explore the idea that light can be transformed into electricity through photovoltaic panels (solar panels). | * Activity: [Exploring solar power](https://www.sciencelearn.org.nz/resources/1753-exploring-solar-power). * Solar energy kits, solar energy cars, frogs etc. * ‘Make way for the Solar Kiwi – an interview with David Somerset’ (*School Journal* Part 4, Number 3, 1994). * Article: [Photovoltaic roofs](https://www.sciencelearn.org.nz/resources/1745-photovoltaic-roofs).   **Teacher reference:**   * Article: [Photovoltaics](https://www.sciencelearn.org.nz/resources/1748-photovoltaics). | * Follow instructions in the activity [Exploring solar power](https://www.sciencelearn.org.nz/resources/1753-exploring-solar-power). | Students will understand:   * light can be converted into electricity * a photovoltaic panel is the same as a solar panel and they transform sunlight into electricity * solar energy is not new, but scientists are exploring new ways through technology to harness the Sun’s energy to transform it into electricity to power cars and for household needs * scientists work to overcome problems with current solar technology. |  |
| **MESO TASK:** Students will understand how solar energy can be used for heating. | | | | |
| Investigate how colour affects heat:   * using coloured paper and chocolate biscuits * by taking the temperature of coloured boards in the Sun * using black piping and water.   Make or examine a water heater. | * Activity: [Using heat energy](https://www.sciencelearn.org.nz/resources/1751-using-heat-energy). * Equipment and materials for investigations.   **Teacher reference:**   * Article: [Using solar energy](https://www.sciencelearn.org.nz/resources/1747-using-solar-energy). | * Follow instructions in the activity [Using heat energy](https://www.sciencelearn.org.nz/resources/1751-using-heat-energy). | Students will understand:   * dark colours absorb heat * light colours reflect it, particularly white, and aluminium foil and shiny items will reflect light * black is particularly good at absorbing heat and is often used to heat water * thermometers are used to measure heat * solar collectors are designed to absorb and collect heat, and they can be used to heat water. |  |
| **MESO TASK:** Students will make a solar oven and cook in it. | | | | |
| Make a solar oven.  Cook in the solar oven. | * Activity: [Making a solar oven](https://www.sciencelearn.org.nz/resources/1754-making-a-solar-oven). * Equipment and materials for the solar oven. | * Follow instructions in the activity [Making a solar oven](https://www.sciencelearn.org.nz/resources/1754-making-a-solar-oven). | Students will understand:   * the principles of solar cooking (dark colours to absorb heat, clear covering to create a greenhouse effect, shiny surface to reflect heat into the oven, insulation to slow heat energy transfer) and be able to construct a solar oven * thermometers are used to measure heat * solar collectors are designed to absorb and collect heat and can be used to heat water. |  |