**Joule Island**

**Background Information**

Joule Island is a remote island, in the Pacific Ocean.

You are in a team of 30 scientists who will be staying on the island for 3 years to study the local habitat.

Your task is to provide all the energy that the team will need.

**Island Information**

There are no fossil fuels on the island, and its 500km to the mainland.

The island has sunny days but cold nights. The wind blows most days, but not in the summer. The hot springs are at a temperature of 80°C.

**Task 1: Success Criteria**

Before you start planning how you will provide the energy the team needs, write down at least 5 success criteria you think are important.

*Justify* and *explain* your success criteria.

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**Task 2: Location of Power Plants**

1. On the map provided, write where you would put each of the following power plants. *Think carefully!!!*
   - Nuclear Power plant
   - Solar Power plant
   - Wind power plant
   - Tidal power
   - Geothermal power plant
   - Biomass power plant
   - Hydroelectric power plant
   - Coal power plant
   - Gas power plant

2. Compare your answers with the person next to you. Complete handout 1 as a pair.

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**Task 3: Meeting their demands**

- Choose three of the most likely power plants that could easily meet the demands of the team from task 2...
- For each one write how it works and the advantages / disadvantages.

**Task 4: Map & Conclusion on Energy needs**

You now need to decide which energy source you will use on the island to provide the team with enough energy. You only have enough equipment to build one power station (i.e. only 1 type).

You asked other scientists for their opinions on the energy choices, these can be seen on the back of this sheet.

Write a detailed conclusion using the scientists opinions and your own extensive knowledge to decide which energy source is best suited for the team. *(justify your decisions).*

Use the level ladder (on the back) to help you write your conclusion. How high can you reach?

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**Task 5: Review Success & Link Learning**

*Review Success Criteria:* Now that you have concluded on your energy choice, reflect on your success criteria.

*Use the level ladder (on the back) to help you reflect on your success criteria. How high can you reach?*
### Joule Island

Are any of these statements: biased, based on opinion or facts?

<table>
<thead>
<tr>
<th>Type of energy production</th>
<th>Environmental Scientist</th>
<th>Geologist</th>
<th>Physicist</th>
<th>Biologist</th>
<th>Oceanographer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>No polluting gases produced</td>
<td>Not a reliable source of energy</td>
<td>Energy supply limited on cloudy days</td>
<td>Expensive to setup...Breaks easily..</td>
<td>Does not make energy at night.</td>
</tr>
<tr>
<td>Tidal</td>
<td>Expensive to set up.</td>
<td>Ugly tidal barriers will be needed</td>
<td>Could effect plant and animal life</td>
<td>May be dangerous to shipping</td>
<td>Large amount of tidal energy available..</td>
</tr>
<tr>
<td>Hydroelectric</td>
<td>Does not produce carbon dioxide</td>
<td>You need a lot of concrete when making a dam.</td>
<td>Cant set it up everywhere</td>
<td>Could effect fish and their habitats</td>
<td>Only a limited amount of sites and it can be affected from a lack of rainfall.</td>
</tr>
<tr>
<td>Geothermal</td>
<td>Takes a while to set up. Not many example across the world.</td>
<td>Energy supply lasts a very long time...</td>
<td>Greenhouse gases could be released</td>
<td>Hot springs are sites of biology interest.</td>
<td>Water needs to be hot enough to turn into steam.</td>
</tr>
<tr>
<td>Wind</td>
<td>Can effect bird behaviour if too close to a bird colonies.</td>
<td>Can't put turbines everywhere</td>
<td>No greenhouse gases produced</td>
<td>Can look ugly.</td>
<td>No power when there is no wind.</td>
</tr>
<tr>
<td>Biomass</td>
<td>Have to use part of the island as a landfill site</td>
<td>Will take a while to produce enough biomass to start making energy.</td>
<td>Unreliable and smells.</td>
<td>Reusable energy source and reduces waste problem</td>
<td>Limited amount of energy supply</td>
</tr>
<tr>
<td>Nuclear Power</td>
<td>Produces radioactive waste.</td>
<td>Power plant only lasts about 30 years.</td>
<td>Easily and cheaply produce the electricity we need. Limitless supply of energy.</td>
<td>Radiation danger.</td>
<td>Large amounts of water is needed and is normally taken from the sea—possible contamination.</td>
</tr>
</tbody>
</table>

### Extension
1. What would the advantages / disadvantages of setting up a power station which used coal / oil? 
2. What renewable energy resources are there on the island? 
3. Which natural resource on the island should be carefully conserved? 
4. When summer comes, you find that the fresh-water sources tend to dry up. Design a way to get over this? 
5. For some experiments in the island you need some gas. Describe 2 ways you to provide this? 
6. The team is going to construct buildings to live in. 
7. Name 2 ways in which the huts could be heated? 
8. Design a way of supplying hot water for washing 
9. Design a way of supplying energy for cooking. 
10. The team has a refrigerator for medicines which have to be kept cool at all times, day and night. 
11. Design a way of supplying electricity continuously for the refrigerator.