

Student Folio: Energy generation challenge

Name: _____ Date: _____

Use the student folio to understand the energy challenge you need to undertake, record your research and note advantages and disadvantages.

What is the energy challenge?

Cleangreenton, an imaginary city in Tasmania, needs a sustainable renewable energy generation plan. You will be challenged to create this plan.

You must determine which combination of renewable resources from wind, hydropower, solar, and even a possible future wave energy, will be best suited to your area. Examine the topography, wind and weather patterns, and any environmental factors provided.

Tools to help you include an Excel spreadsheet designed to calculate the cost and area required for each source of energy generation. You will also have maps showing environmental factors to consider in the area. Try different combinations of resources to maximize energy production while minimizing financial and environmental costs.

Finally, you will present your findings, justify your choices, and discuss differences between you and your classmates' solutions.

Part 1

Make notes in the space below on the renewable energy source you are researching for your group. Find out as much information as you can about how it works and the advantages and disadvantages of using your source for energy.

Advantages and disadvantages

As the class discusses the various benefits and issues with each energy source, complete the chart below.

Energy Source	Advantages	Disadvantages
Hydropower		
Solar		
Wind		
Wave		

Part 2

1. Fast facts - Cleangreenton

- **Population:** 1,500,000 people
- **Geography:** Situated on an ocean harbour alongside a river. Gentle hills surround, with one small mountain.
- **Weather and climate:** Warm, dry and sunny summers and cool, sunny and windy winters.
- **Economy:** Mostly agricultural, where plenty of fruits and vegetables grow and sheep farms are common.
- **Energy needs:** 3, 950, 150 MWh per year of energy (total) for residents, agriculture and other community facilities.
- **Budget for energy expenditures:** \$45,000,000 per year
- **Biodiversity:** Coastal waters are home to many plants and animals, several of which are endangered. Part of the shoreline has been designated as protected habitat for the threatened hooded plovers and pied and sooty oystercatchers. Galaxiids are a native threatened fish species that spawn on the shores of lakes in Tasmania and can be affected by fluctuating lake levels.

2. Instructions for your renewable energy challenge

- Using the Excel spreadsheet calculator, decide what combination of renewable energy technologies can provide a constant and reliable 3,950,150 MWh/year (megawatt hours per year) of electricity per year for all of the residents and businesses of Cleangreenton without going over budget, or area requirements.
- Don't forget to use the information found on all maps to help you determine what solutions are possible for the area.

- c. Draw (to scale) the locations of where you will build your renewable energy technologies on the Cleangreenton student plan. The Excel spreadsheet will help you calculate how much land/ocean space you will need for each. Use a ruler and the scale bar on your map to carefully choose your locations. Be ready to justify why you built things where you did!

3. **Variability of renewable energy**

Remember that some renewable energy sources like the wind and sun are intermittent (not available all the time)! You might not want to rely solely on those resources.