

Name: \_\_\_\_\_

## Investigating Energy Resources for the Isle of Navitas Investigation Sheet

You are the chief energy officer (CEO) of one of three provinces on the Isle of Navitas, an island about the size of Pennsylvania. It has a population of about 7,000,000 people. Your task is to explore the energy resources for your province using GIS to recommend an efficient combination of energy sources that will minimize the impact on the environment. You will

1. Explore energy resources for the Isle of Navitas.
2. Analyze the benefits and costs of each energy source.
3. Analyze the environmental impacts of each energy source.
4. Recommend an efficient combination of energy sources for your province.

### Information about the Isle of Navitas Provinces

Province	Urban Population	Rural Population	Total Population	Households	Some Interesting Facts
Cambria	543,485	190,219	733,704	244,568	30 years ago, the nuclear power plant on the Molopo River had a core melt down. All power had to be turned off and the population within a 30-mile radius around the plant had to be evacuated.
Gaul	1,521,556	380,389	1,901,945	633,982	In 1938, an underground coal fire occurred underneath the coal mining town of Coalburb. The town had to be evacuated and even today the coal fire still burns underground underneath the town.
Iberia	3,137,165	1,254,866	4,392,031	1,464,010	Iberia is home of the annual Francesco Tidal Bore surfing competition.

Read **all** instructions on your handout and answer **each** question.

1. Complete the tables on the following pages to find out what energy resources your province has.

**Energy Resources for \_\_\_\_\_ Province**

<b>Hydroelectric Power</b>	
<p>The factors needed to determine the ideal location of a hydroelectric dam include the topography, a canyon that can be dammed, and an area to make a reservoir upstream of the dam. Zoom in to where the streams start in the mountainous areas (light green or white). Hydroelectric power requires a power plant at the dam site and access to the grid for power distribution.</p>	
Describe the most suitable location in your province to build a hydroelectric power plant. (Note criteria listed above)	
Does the electrical grid exist near your proposed plant location?	
What is required to develop hydroelectric energy? (For example, building facilities).	
What are the benefits of using hydroelectric energy?	
What are the environmental impacts of using hydroelectric energy?	

<b>Tidal Energy</b>	
<p>The factors needed to determine the ideal shore location of a tidal power plant include a large tidal range and a funnel shaped shoreline pointing inland. Tidal power requires a power plant at the coast and access to the grid for power distribution.</p>	
Describe the most suitable location in your province to build a tidal power plant. (Note criteria listed above)	
Does the electrical grid exist near your proposed plant location?	
What is required to develop tidal energy? (For example, building facilities).	
What are the benefits of using tidal energy?	
What are the environmental impacts of using tidal energy?	

### Biofuels/Biomass

The factors needed to determine the ideal location for biomass production include lots of level farm land (may need to fertilize and water) and transportation infrastructure to get the fuel to a processing plant. Biofuels/Biomass production requires a biofuel processing plant. Although biofuels are most commonly used for transportation, they can be used to create electricity. To do this, an energy generating plant with access to the grid is also needed for power distribution.

Describe the most suitable location in your province for biofuels/biomass production. (Note criteria listed above)	
Does the highway exist near your proposed biofuels/biomass production location?	
Does the electrical grid exist near your proposed biofuels/biomass production location?	
What is required to produce biofuels/biomass? (For example, building facilities).	
What are the benefits of using biofuels/biomass?	
What are the environmental impacts of using biofuels/biomass?	

### Solar Energy

The factors needed to determine the ideal location of a solar power plant include lots of open flat areas, lots of sunshine, and no shadowing trees or buildings. Solar energy requires infrastructure to make power and distribute electricity to the grid.

Describe the most suitable location in your province to build a solar power plant. (Note criteria listed above)	
Does the electrical grid exist near your proposed plant location?	
What is required to develop solar energy? (For example, building facilities).	
What are the benefits of using solar energy?	
What are the environmental impacts of using solar energy?	

<b>Wind Energy</b>	
The factors needed to determine the ideal location of a wind farm include enough sustained winds and grid access for power distribution.	
Describe the most suitable location in your province to build a wind farm. (Note criteria listed above)	
Does the electrical grid exist near your proposed farm location?	
What is required to develop wind energy? (For example, building facilities).	
What are the benefits of using wind energy?	
What are the environmental impacts of using wind energy?	

<b>Coal</b>	
The factors needed to determine the ideal location of a coal-fired power plant include transportation infrastructure for fuel delivery, water for the electrical generation plant, storage of solid waste produced by the plant, and access to the grid for power distribution.	
Describe the most suitable location in your province to build a coal-fired power plant. (Note criteria listed above)	
Does the railroad track or highway exist near your proposed plant location?	
Does the electrical grid exist near your proposed plant location?	
What is required to develop a coal-fired power plant? (For example, building facilities).	
What are the benefits of using coal?	
What are the environmental impacts of using coal?	

<b>Natural Gas</b>	
The factors needed to determine the ideal location of a natural gas power plant include pipelines for fuel delivery, water for the electrical generation plant, and access to the grid for power distribution.	
Describe the most suitable location in your province to build a natural gas power plant. (Note criteria listed above)	
Does the pipeline exist near your proposed plant location?	
Does the electrical grid exist near your proposed plant location?	
What is required to develop energy from natural gas? (For example, building facilities).	
What are the benefits of using natural gas?	
What are the environmental impacts of using natural gas?	

<b>Petroleum (crude oil)</b>	
The factors needed to determine the ideal location of a petroleum (crude oil) power plant include a refinery to process the crude oil into fuel, a plant for electrical generation, water for the electrical generation plant, and access to the grid for power distribution.	
Describe the most suitable location in your province to build a petroleum (crude oil) power plant. (Note criteria listed above)	
Does the highway exist near your proposed power plant?	
Does the electrical grid exist near your proposed power plant?	
What is required to develop energy from petroleum (crude oil)? (For example, building facilities).	
What are the benefits of using petroleum (crude oil)?	
What are the environmental impacts of using petroleum (crude oil)?	

<b>Geothermal Energy</b>	
The factors needed to determine the ideal location of a geothermal power plant include a hot Earth location and access to the grid to distribute electricity.	
Describe the most suitable location in your province to build a geothermal power plant. (Note criteria listed above)	
Does the electrical grid exist near your proposed plant location?	
What is required to develop geothermal energy? (For example, building facilities).	
What are the benefits of using geothermal energy?	
What are the environmental impacts of using geothermal energy?	

<b>Nuclear Energy</b>	
The factors needed to determine the ideal location of a nuclear power plant include uranium mines, a plant to process the ore into fuel rods, an electrical generation plant, cooling water for power plant, grid to distribute electricity, and a place to store radioactive waste.	
Describe the most suitable location in your province to build a nuclear power plant. (Note criteria listed above)	
Does the electrical grid exist near your proposed plant location?	
What is required to develop nuclear energy? (For example, building facilities).	
What are the benefits of using nuclear energy?	
What are the environmental impacts of using nuclear energy?	

Energy Resource	Rating	Justify your Rating
Hydroelectric		
Tidal		
Biofuels/Biomass		
Solar		
Wind		
Coal		
Natural Gas		
Petroleum (crude oil)		
Geothermal		
Nuclear		

2. What is the most efficient combination of energy sources for your province? Remember, you can select as many energy sources as you wish that will have the least impact on the environment.
  
3. Which energy sources did you not select to use for your province?
  
4. Why did you not include these energy resources in your recommended energy source combination?
  
5. What are the main infrastructure requirements of your recommended energy sources? List 4 infrastructure requirements.
  
6. What are the main benefits of your recommended energy sources? List 4 benefits.
  
7. What are the main environmental impacts of your recommended energy sources? List 4 environmental impacts.