

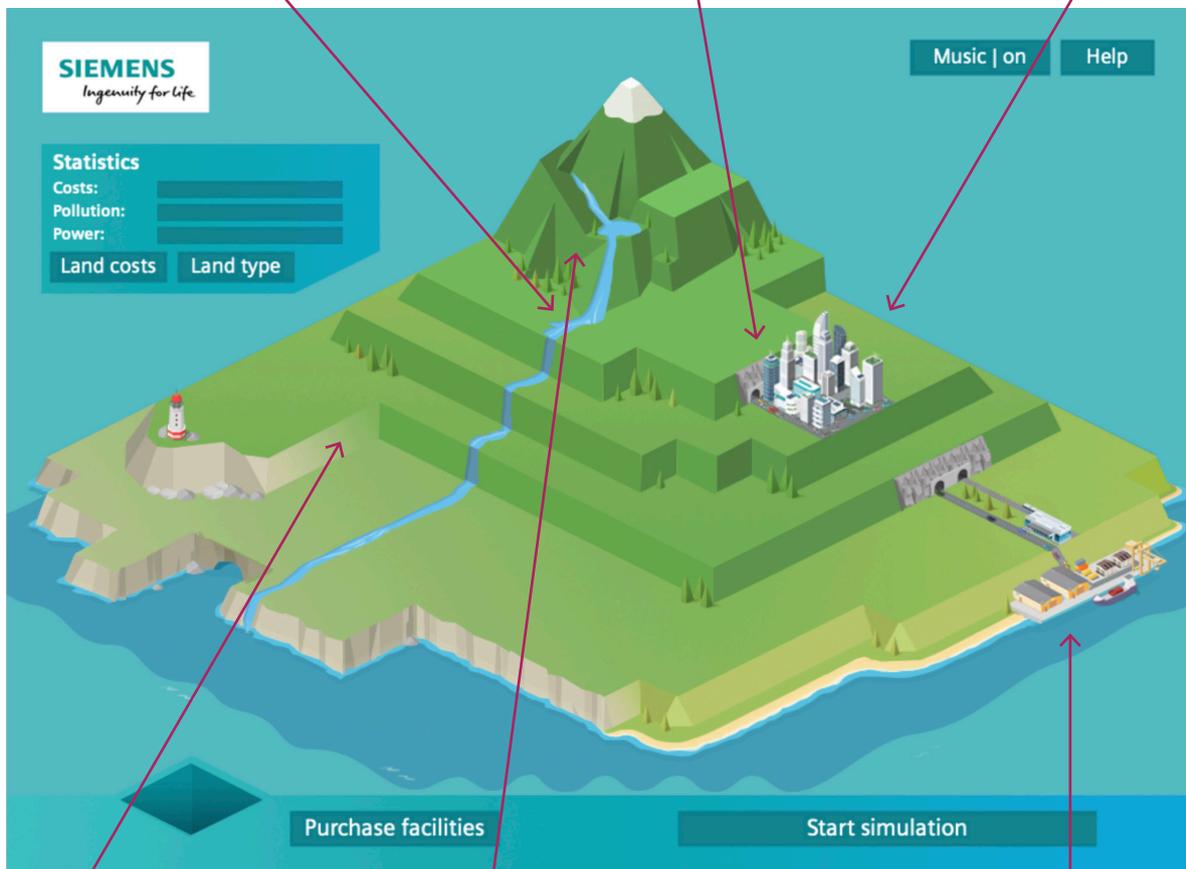
## Resource sheet - Energy island

Weigh up the factors below and decide on the best way to provide energy for the island.

Lake with river  
draining to sea

City with industrial and  
commercial facilities

Open hillsides



Farmland and  
grazing

Rocky windswept area

Coastal area with  
fishing villages and  
tourist facilities

You are responsible for providing energy to the 5,000 inhabitants of Siemens Island. You have to supply enough electricity to power all the services over a 24 hour period and to do so economically and without damage to the environment.

## Energy supply systems

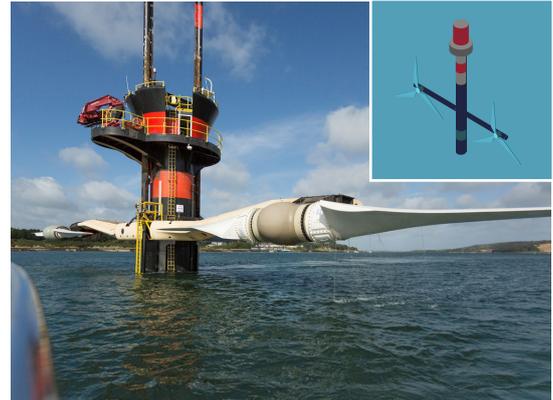
### Tidal turbines

**Summary:** Tidal turbines are mounted on the sea bed in tidal areas. As the water flows into or out of the area it turns the turbine blades which drive a generator. They need to be placed in areas with strong water currents to be effective.

**Advantages:** No solid waste, carbon emissions or greenhouse gasses are released.

They have little visual impact on the landscape.

**Disdvantages:** The amount of electricity produced depends upon the strength and time of the tides. Maintenance and connections are more expensive.



### Solar cells

**Summary:** Photovoltaics, or solar cells, convert sunlight directly into electricity. They need to be placed in areas which catch a lot of sunlight to be truly effective.

**Advantages:** No solid waster, carbon emissions or greenhouse gasses are released. Quick to start up and bring on-line.

**Disdvantages:** A large area of land needs to be covered with cells to produce a significant amount of energy. The amount of electricity produced depends wholly on the amount of sunlight available.



### Wind power

**Summary:** Wind blowing across the blades turns a turbine which drives a generator. The blades are turned to face the wind. They can be placed on top of hills or off-shore to harness the strongest winds available.

**Advantages:** No solid waste, carbon emissions or greenhouse gasses are released. Quick to start up and bring on-line.

**Disdvantages:** The amount of electricity produced depends upon the wind speed. They have a visual impact on the landscape.



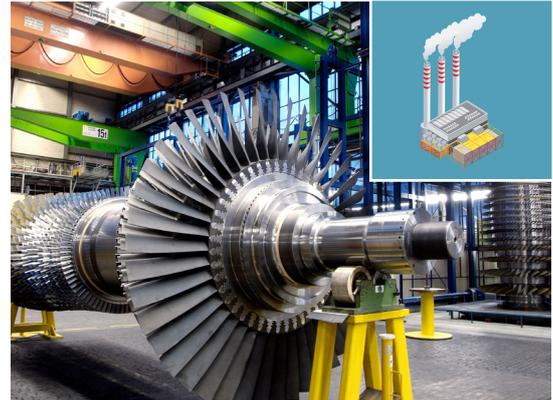
## Energy supply systems cont'd

### Gas turbine

**Summary:** A gas turbine power station burns gas to produce electricity. The gas is mixed with air and ignited and the hot exhaust rushes through the blades of a turbine, which powers a generator.

**Advantages:** Can be started and closed down relatively quickly to respond to sudden changes in demand. More efficient than other fossil fuels power stations, such as those burning coal.

**Disadvantages:** Uses (non-renewable) fossil fuels. Releases carbon dioxide and nitrous oxides.



### Hydroelectric power

**Summary:** Hydroelectric power comes from building a dam across a valley and then letting the water held back run through turbines, which power generators. They need to be sited across a river to be effective.

**Advantages:** No solid waste, carbon emissions or greenhouse gasses are released. Quick to start up and bring on-line.

**Disadvantages:** Construction floods large areas of land which is often agricultural. Construction depends upon the availability of a suitable valley.



### Biomass

**Summary:** Biomass is plant material which can be burned, the heat turning water into steam to drive turbines and power generators. The plant material can either be waste, such as tree stumps or dead branches, or plant grown specially, such as bamboo.

**Advantages:** Produces very little carbon or sulphur dioxide compared with fossil fuels. Plant waste would otherwise rot anyway releasing carbon dioxide and more methane than if used as a fuel.

**Disadvantages:** Releases some carbon and sulphur dioxide. If plants are grown specially for fuel it cannot then be used to grow crops.

