Unit 5 Electrical grids

Task 1
Complete the texts with the words below.

generating plants, transformers, consumers, transmission lines, suppliers

An electrical grid is an interconnected network for delivering electricity from a) ……. to b)……..... It consists of three main components: 1) c) ……. that produce electricity from combustible fuels (coal, natural gas, biomass) or non-combustible fuels (wind, solar, nuclear, hydro power); 2) d) ……. that carry electricity from power plants to demand centers; and 3) e) ……. that reduce voltage so distribution lines carry power for final delivery.

wholesale, economies of scale, stepped up, across, stepped down,

In the power industry, *electrical grid* is a term used for an electricity network which includes the following three distinct operations:

1. Electricity generation - Generating plants are usually located near a source of water, and away from heavily populated areas. They are usually quite large in order to take advantage of the a) ……. . The electric power which is generated is b) ……... to a higher voltage-at which it connects to the transmission network.
2. Electric power transmission - The transmission network will move the power long distances-often across state lines, and sometimes c) ……... international boundaries until it reaches its d) ……. customer (usually the company that owns the local distribution network).
3. Electricity distribution - Upon arrival at the substation, the power will be e) ……. ……. in voltage—from a transmission level voltage to a distribution level voltage. As it exits the substation, it enters the distribution wiring. Finally, upon arrival at the service location, the power is stepped down again from the distribution voltage to the required service voltage(s).

Adapted from http://en.wikipedia.org/wiki/Electrical_grid

Task 2
Before you read the text, answer the questions.

1. What is a *blackout*?
2. Have you ever had any problems caused by a blackout?

The biggest blackout in North America

The Northeast blackout of 2003 was a widespread power outage that occurred throughout parts of the Northeastern and Midwestern United States and Ontario, Canada on Thursday, August 14, 2003.

While energy experts differed on the precise cause of the power blackout, they were in agreement that the extensive failure betrayed the age of the region's transmission system and its struggles to keep up with demand. The USA is a major superpower with a third-world electrical grid. Its grid is antiquated and it needs serious modernization.

The power system in the Northeast has long been plagued by inadequate transmission capacity and bottlenecks nationwide, especially in the New York metropolitan area. Most of New York City's and Long Island's power at peak times must be generated in the city and on the Island, because it is physically impossible to transmit that much power into the area along the existing lines.
Bottlenecks limit how much power can be shipped. It's very difficult to get financing for a major transmission line. With only a limited number of high-voltage lines, a power failure can spread more quickly when generators try to send their power to areas that need it, overloading the lines that remain. Generators are designed to switch off if their power cannot be transmitted, which is apparently what happened to dozens of turbines and nuclear plants around the northeast and upper Midwest that day.
If there had been more lines available at the time this event occurred, it's possible they could have absorbed the load and kept the failure from spreading.
The restoration process was not an easy one. Plants shut down, or go on standby, more or less automatically in a situation like this, to avoid pumping excess power into the grid that has nowhere to go. Then, when they come back on line, it isn't just a matter of flipping a switch. It can take hours to make sure equipment is O.K.

Adapted from http://www.nytimes.com

Task 3
Match the definitions with the words from the text.

1. to send or pass something from one person, place or thing to another
2. an engine or motor in which the pressure of a liquid or gas moves a special wheel around
3. a period of time when there is no electricity supply
4. to send something, usually a large object or a large quantity of objects or people, to a place far away
5. a thermal power station in which the heat source is one or more nuclear reactors
6. a delay in one stage of a process that makes the whole process take longer
7. a series of actions that help something return to its earlier good condition
8. a large wire carrying large amounts of electricity above or under the ground
9. an occasion when something stops working properly
10. to put too much electricity through an electrical system or piece of equipment
11. the amount of something such as electricity that can be sent from one place to another

Task 4
Watch the video about Siemens Subsea Power Grid and answer the questions.

1. What is the purpose of subsea power grids?

   …….

2. What are the elements of the grid?

   …….

3. What other unusual usages of power grids can you think of?

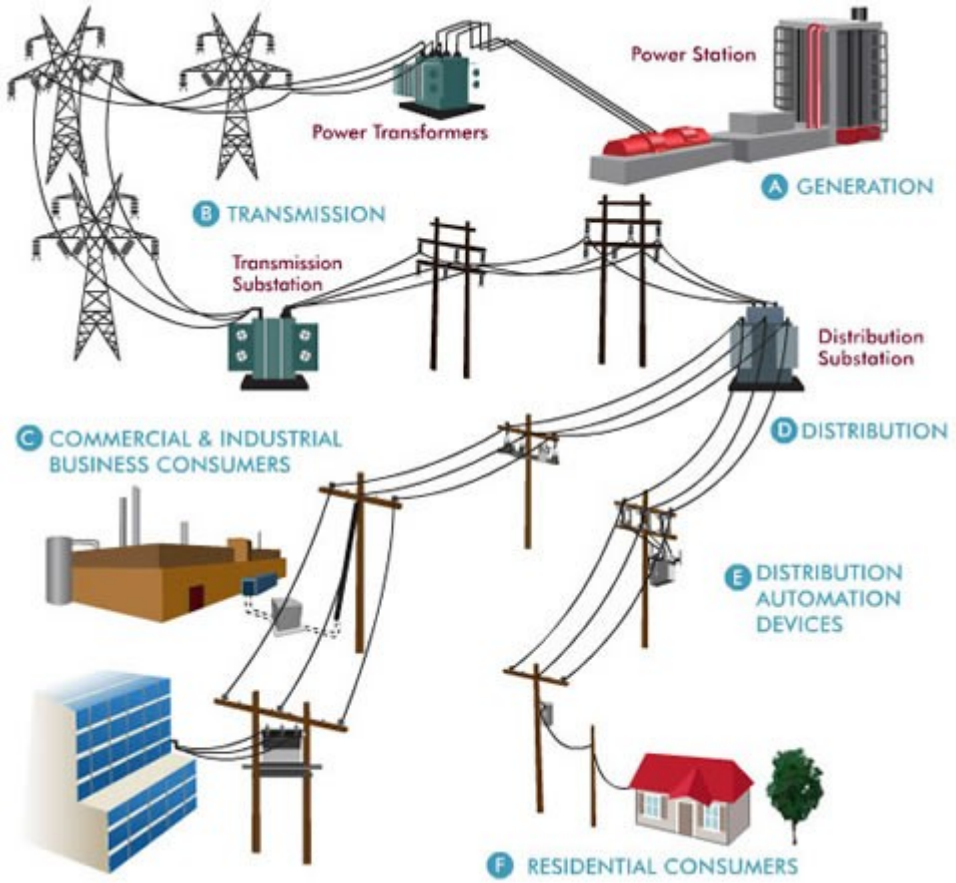
   ……..

Recording from http://www.youtube.com/

Task 5

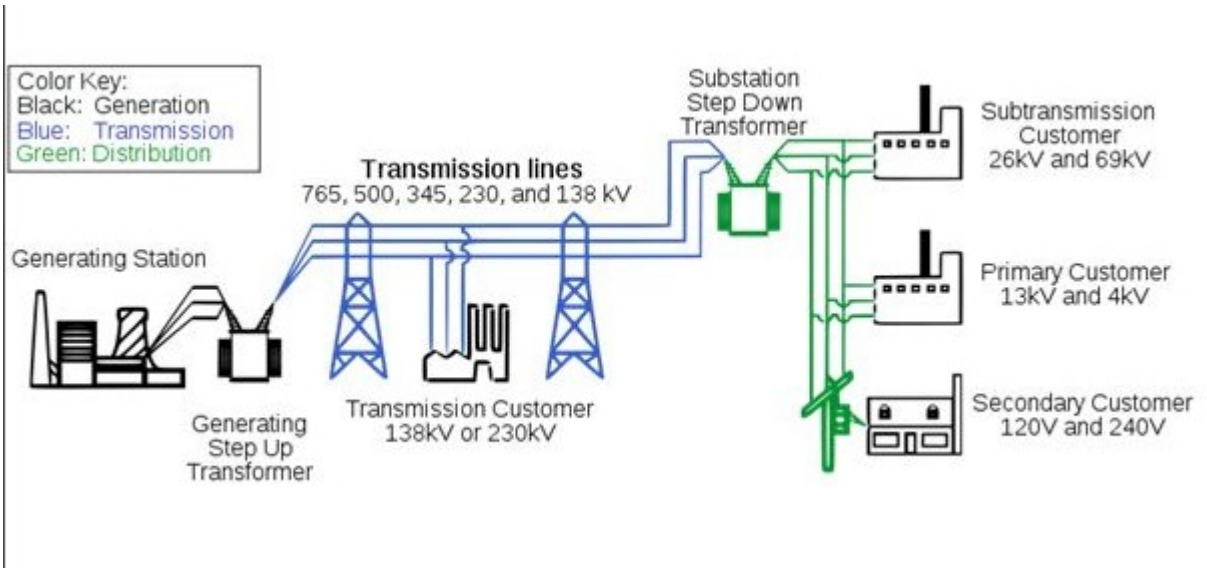
Study the diagrams and describe the process to your partner.

a)



Adapted from http://www.altenergymag.com/

b)



Adapted from http://antares.org/blog/understanding-your-utility-bills-industrialcommercial-edition/