Technical English
Unit 10
professional english
Measurable parameters

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Spring 2016

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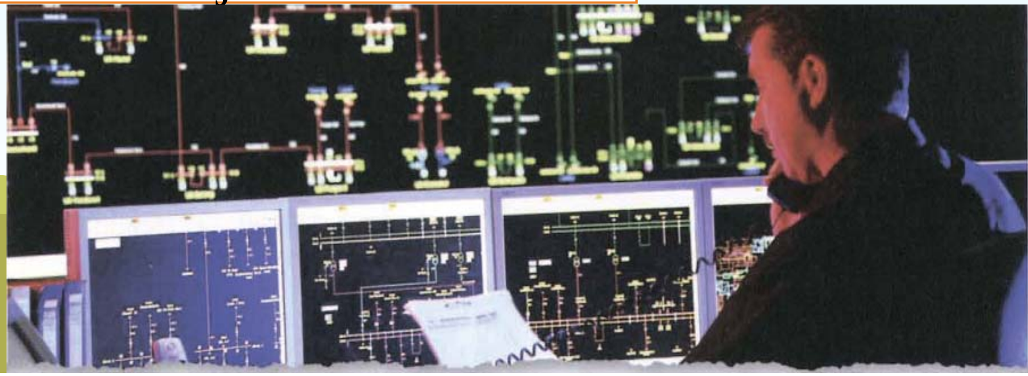
Supply, demand and capacity

The article below is from the technology section of a business magazine.

Calculating the **capacity** of an electricity grid -the amount of energy it needs to **supply** to users might seem simple. Just add up the power supplied over a given **period** of time to give the total amount **consumed** by users. Then, divide the **cumulative** amount of power used during the whole period by the number of hours in the period. The result is an **average** level of **consumption** per hour.

But there's one problem with this method -and it's a major one.



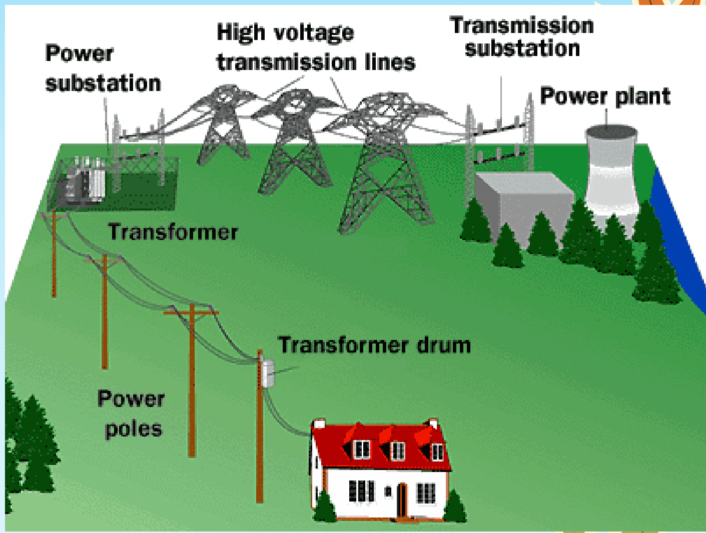
The **rate** of power consumption -the amount that's being consumed at a particular moment- is not **constant.** In other words, consumption does not stay at the same level all the time. So electricity **supply** requirements cannot simply be **averaged out** over time. People use more power at certain times of day, and less at other times, which means that **demand** for power **fluctuates** significantly. Generally, it rises to a maximum in the evening **(peak** demand is at evening mealtimes), and falls to its lowest levels during the night. These **fluctuations** are so big that at **peak times** consumption can be twice as high as it is during **off-peak times.** Clearly, the grid needs to have sufficient capacity to **meet demand** when consumption **peaks.** But since each peak is brief, the grid will only **run to capacity -** at or close to its maximum capability- for a few moments each day. This means, most of the time, it has significant **spare capacity.**

Input, output and efficiency

Power lines and transformers are relatively **inefficient,** wasting energy - mainly by giving off heat. As a result, there is a difference between **input** - the amount of energy put into the grid by power stations, and **output** - the amount used by consumers. On a typical grid, the difference between input and output is about 7%- there is a 7% energy **loss.** But if electricity is generated at the place where it's consumed, and not transmitted through long-distance power lines, this loss can be avoided. Consequently, locally produced electricity is more **efficient** than grid-supplied power, as there is a **gain in efficiency** of around 7%.

Photovoltaic solar panels

One way to produce power locally is with photovoltaic (PVs) - often called solar panels. However, many PV installations are still connected to the electricity grid. This means that when there is **surplus** power – when electricity is being produced by the solar panels faster than it is needed in the home - it is fed into the grid. If consumption **exceeds** production - if electricity is being used in the home faster than the solar panels can produce it - then power is taken from the grid. Homes with low consumption may therefore become **net** producers of power, producing more electricity than they consume.



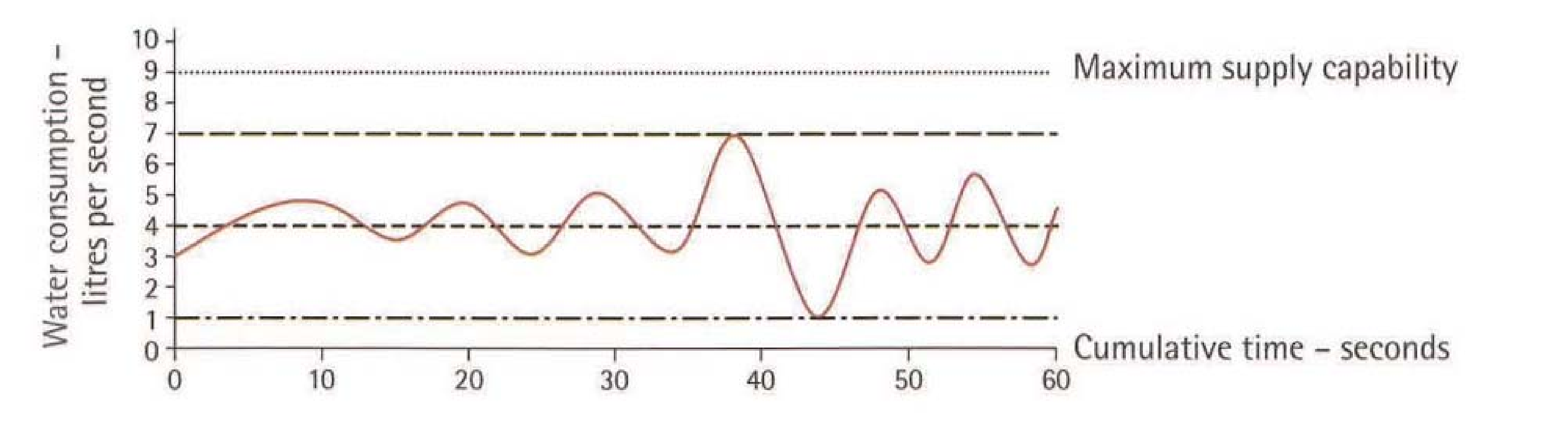
10.1 An engineer is talking to a colleague about the design of a fuel tank for a water pump. Complete the explanation using the words in the box. Look at A opposite to help you.

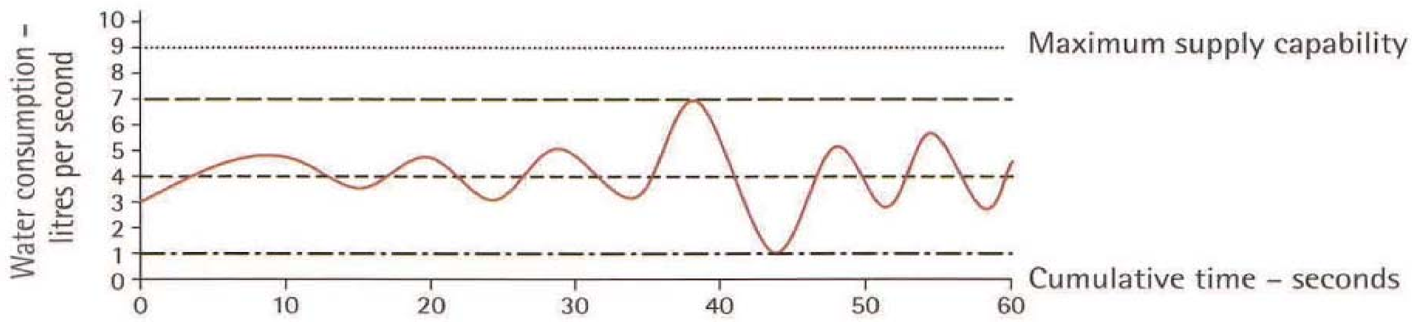
average capacity constant consume consumption cumulative duration rate

Fuel (1) .... for this engine is about 1.5 litres per hour. Of course, sometimes it'll (2) .... a bit more, sometimes a bit less, depending on the workload. But 1.5 is an (3) .... figure. And let's say the (4) .... of a work shift is 8 hours. The pump will have to be stopped occasionally, to clean the intake filter, so it won't be 8 hours of (5) .... running. But we'll say 8 hours, to be on the safe side. So 8 hours of running at a (6) .... of 1.5 litres per hour gives 12 litres of (7) .... consumption over a shift. So if we want the pump to have sufficient fuel autonomy for an 8-hour shift, the (8) .... of the fuel tank needs to be 12 litres, minimum.

10.1
1 consumption
2 consume
3 average
4 duration
5 constant
6 rate
7 cumulative
8 capacity

10.2 The graph below shows water consumption in a washing process at a manufacturing plant. Write figures to complete the comments. Look at A opposite to help you.





1. Water consumption fluctuated between and litres

10.2 1 1, 7 2 4 3 7 4 9 5 2

2. Averaged out over the period shown, consumption was roughly .. .. litres per second.

3. Consumption peaked at a rate of .. . . litres per second.

4. If the process ran to capacity, it could use water at a rate of . ... litres per second.

5. When consumption peaked, the process had spare capacity of .... litres per second.

10.3 Choose the correct words from the brackets to complete the explanations from a guided tour of a manufacturing plant. Look at A and B opposite to help you.

1. A lot of heat is generated in this part of the process. And all of that (input / output) is recycled- it provides a (demand / supply) of heat for the next stage of the process. So it's quite an (efficient / inefficient) system.

2. Sometimes, there's (insufficient / surplus) heat, and it can't all be recycled. At other times there isn't quite enough recycled heat to keep up with (peak / off-peak) demand for heat energy further along the process.

3. Some material is lost in the washing process, but the mass of water absorbed is greater than the mass of material lost. So there's a net (loss / gain) in total mass.

10.3 1 output, supply, efficient 2 surplus, peak 3 gain