

## Other Energy consumptions

A lot of energy is necessary to allow us to live our current lifestyles. As we all know, our current lifestyle is largely defined by the goods that we consume, such as food we eat, books we read, shows we watch, cars we drive, computers we possess and so on. All these things cost energy to produce and be transported to us. Generally, the life cycle of a good can be divided into four phase:

- 1<sup>st</sup> phase: digging up the raw materials needed to produce the goods. This includes digging up minerals, melting them, purifying them etc. Also included is the production of the metals, plastic, ceramics, rubber etc. Do produce all these materials, the raw materials undergo several processes and are transported from one location to the other.
- 2<sup>nd</sup> phase: Actual building of the good. Usually done in a factory (cars, computer ships, etc.). This step requires a lot of heat and electricity for the people and machines to put the different components together to one good. Also included here are packaging and transport.
- 3<sup>rd</sup> phase: Actual use of the goods by the consumer.
- 4<sup>th</sup> phase: Disposal of the broken/unwanted goods. When goods are recycled, some of their energy is recovered.

Usually the first two phases cost by far the most energy. Below are some examples of energy cost for producing and packaging of selected examples (from SEWTHA):

- one aluminum drink-can: 0.6 kWh
- 500 ml water bottle made of PET: 0.7 kWh
- typical embodied energy in packaging: 10 kWh/kg
- personal computer: 1800 kWh
- rechargeable nickel-cadmium AA battery: 0.001 kWh
- newspapers and magazines → embodied energy in paper is 10 kWh/kg
- shell of a three-bedroom-house: 42000 kWh
- car: 76000 kWh
- building and maintenance of roads: 35000 kWh/m over a duration of 40 years

Even though transportation is included in phase 2, the above examples exclude transportation energy. To calculate and estimate the energy usage for Luxembourg, we would need the corresponding data. Since we are missing them, we will only deal with the British ones as estimated by SEWTHA:

- road transport: 1 kWh per t-km
  - 2006: 156e9 t-km. Shared between 60e6 → 7 t-km per day per person
- freight transport by container ship: 0.015 kWh per t-km
  - 560e6 tons → Tyndall Centre calculations: 4 kWh/d/p
- rail : 0.1 kWh per t-km
- plane : 1.6 kWh per t-km

From these values, we can see that freight transport over water is the most energy-saving one. However, we transport a huge amount of goods over water such that, overall, the energy consumption is not so significantly different compared to road freight. Rail freight is very cheap in energy and air freight is the most expensive one.

Other notable examples:

- sewage: 0.4 kWh/d/p
- supermarkets (heating, cooling, lighting): 0.5 kWh/d

Looking at the above values, there are some very straightforward and “easy” things we can do to reduce our energy footprint for “stuff”. These things include:

- Buy stuff locally as much as possible. This includes mostly food. You do not need to buy Kiwis from New Zealand to feel happy in life. Also, in central Europe you can plant and buy local apples all year round. No need to import them from Chile. Pay attention at the supermarket where your food comes from.
- Avoid packaging. Most supermarkets also offer reusable bags that you can use to transport fruits and vegetables. There are supermarkets (OUNI) that do not use any packaging at all, you have to bring your own containers. Packaging costs roughly 4 kWh/d/p (assuming a use of 400g of packaging per day – which is a realistic value)
- Do not drink sodas (they are awful for your health) from aluminum cans and do not buy plastic bottles. If you drink two soda cans and one plastic water bottle per day, you consume 1.9 kWh/d/p. If you want an awesome drink, just fill your reusable bottle with tap water.
- If you buy a new computer every two years, you will have an energy consumption of 2.5 kWh/d/p. This is quite extreme for something as “little” as a computer. If you keep your computer for four-five years (which is realistic even if you are a gamer and need high-end CPU and GPU parts), you can reduce this amount of energy down to 1 kWh/d/p.
- Cars are very energy-expensive. Even if you replace your car 15 years (something that nobody in Luxembourg does), you consume on average 14 kWh/d. Now, if you change your car every 5 years (probably more realistic for Luxembourg), then you consume on average a whopping 42 kWh/d. This latter value really is huge. This is only the energy that you pay for the possession of a car, even if you do not drive! So, how to counter this:
  - If you are a family of 4, and everybody uses the car, the energy consumption goes down by a factor of 4. So, one solution would be to only have a single car per household.
  - Another obvious solution is to not replace your car by a new one after a duration less than 15 years.
  - Better: if you buy a new car, buy a used one.
  - Best: do not possess a car at all.
- You cannot do much about the building and maintenance of roads. However, where the amount of cars and trucks and so on is limited, then no roads would not be built. Furthermore, if the amount of electric and heavy vehicles is reduced significantly, the road maintenance would also be significantly reduced (nobody needs to repair a concrete road that only has bikes driving on it)