**E5 More energy flows through a community than is captured in living mass**

E5.1 Illustrate how some of the energy entering the community is captured as chemical bonds and most is lost as heat.

Text p198-200 (refer to diagram on p199)

* Energy is vital for organisms (reproduction, movement, cellular processes, etc)
* Energy is made available through respiration reactions.
* The sun is the starting point for the production of energy, then the producers use light to produce energy in *photosynthesis*.
* **Energy is not *created* nor *destroyed* it can be converted from one form to another.** Eg. Light energy 🡪 chemical energy
* It is estimated that producers trap around 1% of the energy produced by the sun. The other 99% is absorbed or reflected by the Earth’s surface.
* The rate of conversion of *light energy* to *chemical energy* is termed the **primary productivity of the ecosystem.**
* Approximately *10% of energy* will be converted to the next trophic level.
* The rest (90%) is either used by the organism for ***cellular processes*** OR lost to the atmosphere as ***heat energy.***
* Energy is also lost as organisms do not absorb all of the food material they eat (eg cellulose)
* In summary, as energy flows through the community some energy is used by organisms, some is lost as heat and some is converted into biomass.

1. Explain why only a small percentage of the energy hitting the Earth’s surface is trapped by producers.
2. Describe reasons why only about 10% of the energy trapped by a trophic level is available for the next trophic level.
3. State the form that energy is stored in the biomass of a community and give examples to illustrate your answer.
4. Explain why most food chains are limited to around 3-4 trophic levels.
5. In terms of energy flow in an ecosystem explain why there are so few wedge tailed eagles in Australia.

E5.2 Know that the level of the energy available may limit the productivity of a community

The number of organisms and structure of a community will depend on the amount of energy available to the community.

Factors that affect the amount of energy include:

* Light intensity / amount of light available
* Resources available to the community (nitrogen, carbon, etc)
* The number of decomposers

A productive community (with greater biomass) usually will have a greater amount of energy available. Energy is required to make organic molecules and to store matter.

1. Explain how light penetration in the ocean limits the productivity of an ocean ecosystem.
2. Cave communities containing bats, crickets, beetles, spiders, and a variety of other insects and arthopods have been well documented.
3. Suggest a likely energy source for a cave community.
4. Explain why the productivity of such a community is quite low.
5. Explain why a desert community, with ample light, still has low productivity.

E5.3 Know that the input and the output of energy on the Earth are almost equal

* The sun provides energy to the Earth in the form of heat. It does this through a series of fusion reactions. This is the **input** of energy.
* 99% of the energy is then reflected back into the atmosphere. This is the **output**. This is why it’s said that the input and output of energy are almost equal. This creates a stable environment for Earth and its ecosystems.
* What would happen if they were not equal? Many human processes have added to the concentration of Carbon Dioxide in the Earth’s atmosphere. CO2 traps heat radiated from the Earth’s surface and the energy is unable to move through the atmosphere. This is known as **the greenhouse effect.**
* Scientists expect that sea levels may rise, the ocean may evaporate, rainfall will vary, and ice caps may melt.
* “Human processes” include; burning fossil fuels, deforestation, industrialisation, etc.

1 a.) Describe some likely consequences for communities on Earth if the energy input and energy output from our atmosphere do not balance each other.

b.) What are thought to be the key contributors to Global Warming?