

Eco Safari

ENERGY

Fossil fuels, what are they?

Very slowly, sometimes over millions of years, organic materials have been accumulating and transforming... into fossil fuels.

Gas, oil, and coal are fossil hydrocarbons (comprised mostly of carbon and hydrogen). Easy to transport and store, these hydrocarbons have established themselves as a source of energy. They are rich in chemical energy that is easily recovered by simple combustion. They are then transformed into CO₂ and water by releasing heat, the form under which energy is exploited.

Unfortunately, CO₂ contributes to climate change by accumulating in the atmosphere. In addition, the stocks of fossil fuels are decreasing. Tomorrow, we will have to learn to do without oil and turn to other forms of energy. The depletion of stocks is leading us to look for other types of hydrocarbon deposits such as shale oil, shale gas or methane hydrates, the exploitation of which poses environmental problems.

Renewable energies

Who has never dreamed of an inexhaustible resource? We have one, the sun!

With a few exceptions such as geothermal or tidal energy, the sun is the source of all renewable energy. By heating the air or the sea unevenly, the sun creates movements: the winds and sea currents.

The sun also causes water to evaporate, which, by condensing into rain, feeds rivers. Thanks to its light, it allows the growth of biomass.

To heat domestic water, thermal solar panels are used: the water circulates in pipes on the roof where it receives heat from the sun. Power stations harness this heat to produce steam. By driving a turbine, it will provide electricity.

Solar radiation can also be converted directly into electricity by photovoltaic panels that capture light. Today, objects that use such panels have become more and more popular (lamps, chargers, etc) even if the efficiency is still low.

Photovoltaic panels are classically made of silicon. A new generation based on organic components promises to be less polluting, cheaper and more flexible in use.



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These energies are said to be renewable because their regeneration speed is higher than their consumption speed.

We should not confuse renewable and clean. A clean energy is an energy that produces none or little pollution. The manufacture of solar panels or the installation of wind turbines (which capture the energy of the wind) have an impact on the environment.

In France, 15% of the electricity produced in 2009 was of renewable origin, mainly hydroelectric.

The objective is to increase this percentage to at least 23% by 2020.

Energy is also political!

With the depletion of Fossil fuels and global warming, the current situation is unsustainable. Tomorrow's energy will have to be clean and renewable: producing little CO₂, less waste, drawn from inexhaustible sources such as the wind or the sun; these are the specifications of sustainable energy.

The increase in energy consumption is in the process of being brought under control through better insulation of housing, improved industrial processes and more efficient transportation practices. In western countries we are becoming more conscious of wasteful uses of resources.

What can be done to reduce energy consumption? Some world organizations are proposing quotas that would give citizens a certain amount of energy to spend.

The world demand for primary energy, taken directly from nature, is expected to double by 2030 according to the International Energy Agency.

How can we limit climate change and avoid wars over resources?

Few concrete results have been achieved. However, the Kyoto Protocol was an important step forward: it entered into force in 2005 and commits the signatory countries to saving CO₂ emissions. A global agreement on limiting energy consumption is still a long way off: it would require harmonisation of the views of developed countries and those aspiring to the same standard of living.

The Kyoto Protocol has given rise to much discussion. It was signed in 1997 but has only gradually been ratified by the different countries. Some have even already withdrawn from the agreement.

Source : <http://www.cvc.universite-paris-saclay.fr>



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WATER AND PLASTICS

Resistant, versatile, durable, light... plastics play a very important role in our societies. They have replaced wood, metal and glass in many objects and are used in all fields.

The increase in the consumption of plastics is accompanied by an increase in the plastic waste. This raises environmental issues, as used plastics have several destinies: abandoned in nature, landfills, incineration, and at best, recycled.

Plastics in nature, in landfills or incinerated

The advantages of plastics (unbreakable, rotproof, not afraid of freezing or drying out, difficult to decompose by micro-organisms, etc) quickly become problems when plastics are thrown away: they persist for a long time in nature, and, moreover, the pesticides, dyes, heavy metal and other toxic substances in their composition are released during the degradation process over time. In just a few decades, the accumulation of plastic waste in nature and in landfills has become a global problem, especially packaging and bags.

Derived from fossil fuels (oil, natural gas or coal), used plastics have long been used as a fuel. Energy recovery is still predominant in the world (more than 60% of plastic packaging waste is incinerated for energy, and barely a quarter of it is recycled) but it generates atmospheric pollutants (dioxins, hydrochloric acid, etc.). Currently, most plastics are still buried or incinerated.

Certain plastics are biodegradable, i.e. they degrade in a shorter time than usual plastics.

Recycled plastics

Unlike other packaging, glass, steel, etc., which is mostly recycled, plastic recycling channels are recent, but environmental concerns are encouraging their development. To treat plastic waste, several approaches have been developed depending on the country:

- production of composite materials (building blocks...) allowing to mix used plastics of different nature.
- production of recycled materials of equivalent quality to the original plastics. (selective sorting of the different plastics then specific recycling for each type of plastic).



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WATER AND PLASTICS

In France, plastic waste is mainly produced by industries (often production leftovers) but also from private individuals: plastic packaging occupies a significant place in our waste bins.

In practice, private individuals are encouraged to sort plastic waste in the selective collection bins, which allows the "life cycle" of plastic to continue.

However, not all the plastics collected are recycled (various factors come into play: cost of sorting, processing, non-recyclable plastics, etc.). The main recyclable plastics are distinguished by a code (a number placed in the centre of a triangle made up of three arrows) on the plastic, and can be transformed into new products.

Dispersed plastics

Apart from individual negligence, it is above all economic activity (industries, urban and port activities, fishing areas, open dumps, tourism...) that remains the main vector for the dispersion of plastics in nature, leading to large-scale pollution. Currently, hundreds of thousands of tons of plastic packaging waste escape recovery every year: neither biodegradable, nor incinerated, nor collected nor recycled, they end up going down the path of sewers, rivers, pushed by rain, currents, winds, they make their way to the oceans of the planet and form large accumulation areas: "the 7th continents".

Recyclable, renewable, reusable, biodegradable, compostable, the future of plastics?

In the long term, the collection and treatment of plastic waste allows savings (in materials and energy) and contributes to reducing pollution. Several countries have limited or even stopped the use of certain problematic plastic products (disposable plastic bags, expanded polystyrene (PS) containers, etc).

The development of bioplastics potentially allows to reduce the impact on the ecosystems compared to synthetic plastics, provided that they are integrated into the recovery and sorting channels. By limiting the varieties of biosourced plastics marketed to privilege biodegradable plastics we avoid the use of toxic additives. But one can also direct the future towards a reduction in the use of plastics, by simply modifying certain consumption habits.



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BIODIVERSITY

Biodiversity is all around us, but we don't always have the eyes to see it, the ears to listen to it, the nose to smell it. When we use excessively, when we degrade, when we ignore this biodiversity, we are harming ourselves.

Biodiversity is the living fabric of our planet. It covers all natural environments and forms of life (plants, animals, fungi, bacteria, etc.) as well as all the relationships and interactions (cooperation, predation, symbiosis, etc.) that exist, between living organisms themselves, between these organisms and their living environments. We humans belong to a species - Homo sapiens - which constitutes one of the threads of this fabric.

The use of the word biodiversity is relatively recent, but biodiversity is very old: today's biological diversity is the product of the long and slow evolution of the living world on the whole planet, with the first known living organisms dating back nearly 3.5 billion years.

Three interdependent levels

The very notion of biodiversity comprises of three interdependent levels:

The diversity of living environments at all scales (ecosystems): from oceans, meadows, forests, etc. to the content of cells (think of the parasites that can live there), from the pond at the bottom of a garden to the green spaces in the city.

The diversity of species living in these environments, which are in relation with each other (predation, cooperation, etc.) and with their living environments.

The diversity of individuals within each species: in other words, we are all different! Scientists speak of genetic diversity for this third level.

A worrying observation

Approximately 1.8 million different species have been described on our planet, 280,000 of which are found in the seas and oceans. Specialists estimate that 5 to 100 million species inhabit our planet, while they describe about 15,000 new species every year. The census work is therefore far from over.

At the same time, experts indicate that the current rate of their extinction is 100 to 1000 times higher than the natural rate of extinction. Some scientists even speak of an ongoing process towards a sixth mass extinction of species, the latest being that of the dinosaurs 65 million years ago. But the current crisis is much more rapid and is almost exclusively linked to human activities.

The International Union for Conservation of Nature (IUCN) offers a global inventory of the conservation status of species known as The World Red List of Threatened Species. In 2018, 28% of the 96,951 species studied are threatened, including 40% of amphibians, 33% of reef-forming corals, 25% of mammals, 14% of birds, 31% of sharks and rays, 34% of conifers.

Natural environments have also been weakened or destroyed by human activities. For instance, more than 35% of coastal and continental wetlands have disappeared since 1970, worldwide. Another illustration: at the current rate of deforestation, tropical forests could disappear within 50 to 70 years.



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The main causes of biodiversity loss

There are natural causes that can explain the disappearance of species or natural environments, but the current rate of erosion is largely attributable to human activities. Five major causes of biodiversity loss have been identified:

The destruction and fragmentation of natural environments, particularly as a result of urbanization and the development of transportation infrastructures.

Overexploitation of wild species: overfishing, deforestation, poaching, etc.

Water, soil and air pollution.

The introduction of invasive exotic species, such as the Asian Hornet, ragweed, bull frog...

Climate change, which can add to and aggravate other causes, contributes to modifying the living conditions of species, forcing them to migrate or adapt their way of life, which not all are capable of doing.

The causes frequently combine. For example, coral reefs have declined sharply in some areas due to intensive fishing, marine pollution and climate change.

What is the use of biodiversity?

We often hear about it, but we don't always know for what it can be used!

Live

Do you breathe? Do you eat? Do you drink? Do you dress? Do you take medicines? In short, you live. Well, without knowing it, you breathe biodiversity, you eat biodiversity, you dress with biodiversity and you heal thanks to biodiversity!

And yes, if we have oxygen, food, raw materials and medicines to live on, it is thanks to biodiversity.

Wonder

The first daisies you picked as a child, the hedgehog that runs through your garden, the weeping willow that sheltered your first kiss and the lake in which you bathe every summer, all these elements of biodiversity have contributed and contribute every day to make you aware of its protection. Protecting biodiversity means wanting to live with nature, and being grateful for what it offers us to see, hear and feel.

Innovating

Every day, biodiversity brings us new and wonderful stories. It inspires us, challenges us, allows us to move forward. Innovation would certainly not be much without the inspiration and resources that nature offers us. You just need to know where to look...

