# Science and technology

## The energy dilemma

The world is **in need of** more energy than ever before. Ideally, energy should be clean, **sustainable** and cheap. However, our current dependence on **fossil fuels** and nuclear power **causes** serious problems. The nuclear catastrophes of Chernobyl and Fukushima have reminded us of the **vulnerability** of this technology and its **toxic waste**. Another concept that divides experts is the so-called **peak oil** theory, which talks about the end of the oil age. In addition, the burning of fossil fuels results in **CO2 emissions**, which are **harmful** to the environment. Finally, every person who uses a **petrol engine** or heats his house with **domestic fuel oil** depends heavily on the price of oil. Hence, lots of governments are trying to turn to alternative energies to gradually replace the old nuclear reactors or become less dependent on oil.

## Renewable energies

The advantage of **renewable energies** is the fact that the energy is **generated** through the **exploitation** of natural energy resources that cannot be **exhausted**. According to some experts, this green energy is truly sustainable and has far less impact on the environment than the current generation from fossil fuels or **nuclear fission**.

# *Keywords*

| | |
|---|---|
| **dilemma** | *- Zwickmühle* |
| **in need of** | *- etwas brauchen* |
| **sustainable** | *- nachhaltig* |
| **fossil fuels** | *- fossile Brennstoffe* |
| **to cause** | *- etwas verursachen* |
| **vulnerability** | *- Verwundbarkeit* |
| **toxic waste** | *- Giftmüll* |
| **peak oil** | *- Ölfördermaximum* |
| **CO2 emissions** | *- CO2 Abgase* |
| **harmful** | *- schädlich* |
| **petrol engine** | *- Benzinmotor* |
| **domestic fuel oil** | *- Heizöl* |
| **renewable energies** | *- erneuerbare Energien* |
| **to generate** | *- erzeugen* |
| **exploitation** | *- here: Förderung* |
| **exhausted** | *- here: aufgebraucht* |
| **nuclear fission** | *- Kernspaltung* |

## Solar power

With the improvement of the **photovoltaic cell** technology, **solar power** has become the ultimate **clean energy source**. The solar cells in the solar panels **convert** light directly into electricity. Negative aspects might be the **efficiency** of this technology, which heavily relies on constant sunlight and the recycling of solar panels.

## Wind farms

Wind farms promise **pollution-free** electricity without the **waste-disposal** problems of other technologies. The wind turns the **blades** of the turbine and the latter turns a generator, which produces electricity. The weather conditions are crucial for this type of energy. When there is no wind, the turbines do not produce electricity and too much wind may result in a shutdown of the turbines to prevent damage. Another disadvantage is that it would need a lot of wind farms to produce the amount of energy that a nuclear power plant can generate. Moreover, in **densely populated** areas there might not be enough space for wind farms. Locating them **offshore** might solve this problem. People often oppose wind farms in their local communities on the grounds of **noise pollution** and **visual intrusion**. Environmentalists have also proved that wind farms **pose a threat** to birds and kill thousands of them every year.

## Hydroelectric power

Hydroelectric power is already **supplying** more than 20% of the world's electricity. Water flows through a turbine and produces cheap energy. However, the building of dams and the **interference** with the natural flow of streams and rivers poses environmental problems.

# *Keywords*

| | |
|---|---|
| **photovoltaic cell** | *- fotoelektrische Zelle* |
| **solar power** | *- Solarenergie* |
| **clean energy source** | *- saubere Energiequelle* |
| **to convert** | *- umwandeln* |
| **wind farm** | *- Windpark* |
| **pollution-free** | *- schmutzfrei* |
| **waste-disposal** | *- Abfallentsorgung* |
| **blades** | *- here: Turbinenschaufel* |
| **densely populated** | *- dicht bevölkert* |
| **offshore** | *- offene See* |
| **noise pollution** | *- Lärmbelästigung* |
| **visual intrusion** | *- das Landschaftsbild stören* |
| **to pose a threat** | *- eine Gefahr darstellen* |
| **to supply** | *- here: liefern* |
| **interference** | *- Eingriff* |

## Fracking

Hydraulic fracturing is the process of drilling and injecting fluid into the ground at high pressure in order **to fracture shale rocks** so that the latter release the natural gas inside. In last decade, the USA has witnessed a real fracking boom. However, lots of **hazards** are involved in this process. The fluid that is injected into the ground contains lots of poisonous chemicals that end up **contaminating** the ground water. Many chemicals out of the 600 used in fracking fluid are **carcinogenic**. Communities close to a fracking site often alarm the authorities about the **intoxication** of their **ground water**. Some citizens were even able to light their **tap water** on fire. Other critics claim that with the process of fracking wastes more energy than it generates. In Europe we are currently debating whether fracking should be allowed or not.

## Alternatives to the petrol engine

The biofuel revolution ended in a fiasco. People in third world countries had to starve so that the rich could drive. The high demand for energy crops increased food prices in the poorest countries and caused **starvation** among the population.

The latest **salvation** seems to be the electric car. Electric cars or hybrid cars use a battery that runs an electric motor. These vehicles certainly solve the **underlying** problem of CO2 emissions. Nonetheless, it remains to be seen if this **eco-friendly** way of driving is **picked up on** by the consumer. Critics argue that the lithium-ion batteries that are used in these cars will create a lot of **hazardous high-tech trash** in the future. Furthermore, the electricity currently used to drive is not necessarily generated from clean energy.

# *Keywords*

| | |
|---|---|
| **fracking** | *- das Fracking* |
| **to fracture** | *- zerbrechen* |
| **shale rocks** | *- Schieferstein* |
| **hazards** | *- Gefahren, Risiken* |
| **to contaminate** | *- verunreinigen* |
| **carcinogenic** | *- krebserregend* |
| **intoxication** | *- Vergiftung* |
| **ground water** | *- Grundwasser* |
| **tap water** | *- Leitungswasser* |
| **petrol engine** | *- Benzinmotor* |
| **starvation** | *- das Verhungern* |
| **salvation** | *- Rettung* |
| **underlying** | *- grundlegend* |
| **eco-friendly** | *- umweltfreundlich* |
| **to pick up on** | *- etwas aufgreifen* |
| **hazardous** | *- gefährlich* |
| **high-tech trash** | *- Hightech Müll* |

## The morality of science and technology

**Scientific development** and **technological advance** are the **pillars** of human **progress**. Nevertheless, relevant questions in this domain remain hot topics of discussion. Should there be limits and **constraints** regarding scientific experiments? What are the **implications** of technological breakthroughs on society? What are the **moral obligations** of the players involved? If an idea is possible, does that automatically mean that it should be realised? History teaches us that science and technology can be misused to serve **malicious ends**. This **begs the question** if progress is **innately** positive? And what if, like Frankenstein's monster, the creation **overpowers** its creator?

## GM technology

Genetic modification (**GM**) is the name given to techniques used to change the genetic composition of living organisms. Basically, you isolate a gene in one organism, extract it and insert it into another organism. This procedure of playing God still divides experts and scientists worldwide.

## GM medicine

GM can be used to produce larger quantities of a medicine than could be produced from natural sources (for example: very rare plants). As a consequence, more people can be **treated** at less cost. Human cloning also gives doctors the possibility to grow GM organs. As a result more organs would be available and this would save the lives of many people who are currently on waiting lists.

# *Keywords*

| | |
|---|---|
| **scientific development** | *- wissenschaftl. Entwicklung* |
| **technological advance** | *- technologischer Fortschritt* |
| **pillar** | *- Säule, Stütze* |
| **constraint** | *- Einschränkung* |
| **implication** | *- Auswirkung, Folge* |
| **moral obligation** | *- moralische Pflicht* |
| **malicious** | *- bösartig* |
| **ends** | *- Ziele, Zwecke* |
| **to beg the question** | *- eine Frage aufwerfen* |
| **innately** | *- per se, von Haus aus* |
| **to overpower** | *- überwältigen* |
| **GM** | *- genetically modified* |
| **to treat** | *- behandeln* |

## GM agriculture

In agriculture, the benefits of genetically modified organisms (GMOs) seem endless. Farmers can buy **crops** with a higher resistance to **pests** and an advanced tolerance to extreme weather conditions. Consequently, they might not have to spray their fields with chemicals as often as in the past. This is good news for the environment. Moreover, due to these characteristics, GM crops produce greater **yields** and therewith increase the farmer's productivity. In addition, the FDA supports the theory of substantial equivalence, which basically proclaims that GM crops are similar to regular crops and not in any way harmful for the **consumers**. Finally, some corporations have announced that their GM crops **herald** the end of world hunger. In theory this sounds like **a** win-win situation.

On the other hand, many critics have argued that GMOs cannot be considered as **equivalent** to normal crops and they have accused the FDA of being **in the pocket of** big corporations. Experts claim that due to the pressure of big companies, the food market has been flooded with GMOs without the necessary safety and health **precautions**. According to them, no one can yet **foresee** the potential **repercussions** for consumers.

What is more, companies like Monsanto, which sell the apparently harmless GMOs, have been caught lying about the negative implications of their products in the past. Moreover, they are heavily criticised for their business strategy. Farmers who use their products have to sign a contract which forces them to only buy Monsanto products. Moreover, Monsanto's GMOs contain **a suicide gene** so

# *Keywords*

| | |
|---|---|
| **crop** | *- Ernte* |
| **pest** | *- Pflanzenschädling* |
| **yield** | *- here: Ergiebigkeit* |
| **substantial equivalence** | *- check internet* |
| **to herald** | *- einläuten, ankündigen* |
| **consumer** | *- Konsument* |
| **equivalent** | *- gleichwertig* |
| **in the pocket of** | *- unter dem Einfluss von* |
| **precaution** | *- Vorsichtsmaßnahme* |
| **to foresee** | *- voraussehen, vorhersehen* |
| **repercussion** | *- Auswirkung* |
| **suicide gene** | *- Suizid Gen* |

that the crop only grows for one season. Since farmers have agreed the terms of Monsanto's contract, they are not allowed to use other **seeds** or keep seeds from previous **harvests**. So they have to buy new seeds every year. This pushes poor farmers in developing countries to their financial limits. Some experts claim that Monsanto is responsible for the fact that the **suicide rate** of Indian farmers who cannot earn enough to feed their families has **skyrocketed**. This **casts serious doubts on** the GMO's **noble quest** to end world hunger.

# *Keywords*

| | |
|---|---|
| **seed** | *- Samen, Saat* |
| **harvest** | *- Ernte* |
| **suicide rate** | *- Selbstmordrate* |
| **to skyrocket** | *- hochschnellen* |
| **to cast doubts on** | *- etwas in Zweifel ziehen* |
| **noble quest** | *- edle Mission* |

# *CHECKPOINT*

**Can you answer these questions with adequate vocabulary?**

1. Explain the energy dilemma we find ourselves in.
2. What are the disadvantages of our current energy policy?
3. What are the alternatives to our current energy policy?
4. Why do we not simply switch to alternative energies?
5. What is the problem with fracking?
6. Why is biofuel not a long-term solution?
7. Are electric cars long-term solutions? Why? Why not?
8. Give examples which show that science or/and technology have failed us.
9. Is science and technology living up to its moral responsibility? Why? Why not?
10. What are the advantages and disadvantages of GM technology?