

## The secondary sector

### Mining

Mining was carried out in ancient times. However, it has developed greatly since the Industrial Revolution began in the late 18<sup>th</sup> century.

Today, countries need very large quantities of raw materials and energy to maintain their manufacturing industries. Investment in mineral resources has stayed high despite the world economic crisis which started in 2007.

Mining may cause serious problems:

- It has a strong environmental impact. It destroys the landscape and pollutes water and soil.
- Excessive mining. It exhausts deposits.
- Conflict. In less developed countries, mining can lead to combats to control the deposits, and expulsion of the population from mining areas.

### Energy sources

Energy sources are the resources that provide the force required for the transformation of raw materials into processed products.

Classification of energy sources:

- **Non-renewable or conventional energies** are those which exist in limited amounts and can't easily be replaced.
  - ✓ Advantages:
  - ✓ Drawbacks: environmental pollution and dependence on the energy-producing countries that makes the industrial countries vulnerable to sudden price increases.
- **Oil and natural gas:** they are formed by the decomposition of living organisms at the bottom of the ocean over millions of years. This process has not stopped, but it is extremely slow and we are using these resources up very quickly.

The biggest oil reserves are in the Persian Gulf, Venezuela and Canada. Gas reserves are more diversified, but there are important reserves in the Middle East and the Russian Federation.
- **Coal:** it is formed by the decomposition of remains from vegetation in shallow water. Coal is found all over the world. The main deposits are in China, the Russian Federation and North America.
- **Uranium:** it is a chemical element that generates energy from a fission process. The main producers are developed countries such as the United States, France and Japan, which have been joined by China and India.

The use of nuclear energy has caused protest movements which denounce the problem of storing radioactive waste and the danger of a nuclear accident. Advocates of nuclear power argue that it is a clean energy source, which does not release harmful gases into the atmosphere.

Evolution of the production and consumption of non-renewable energy sources:

**Coal** was the most used source until 1950 and since then it went into decline due to the depletion of the best deposits, the expensive exploitation, the decrease in demand and its negative environmental impact.

**Oil** began to grow in 1950, coinciding with the decline of coal, and due to its lower cost and its higher calorific value.

**Natural gas** began to grow after 1970, coinciding with the oil crisis, and an increase in its consumption is expected.

The problems of exhaustion, pollution and external dependence caused by non-renewable sources of energy have led to the development of techniques that make it possible to obtain energy from inexhaustible sources that are more respectful of the environment.

- **Renewable or alternatives energies** are those which replenish themselves and can be used again and again.
  - ✓ Advantages: these energies are available everywhere and they have little impact on the environment.
  - ✓ Drawbacks: they require a large investment, supply is irregular and the energy produced is difficult to store.

Main renewable energy sources:

- **Solar energy:** sunlight is captured in solar panels. Germany, Italy and Spain are the countries which produce the biggest quantity of electricity from solar energy.
- **Wind energy:** wind spins wind turbines or windmills. China, the USA, Germany and Spain are the largest producers of electricity through wind.
- **Hydroelectric energy:** the force of falling water moves generators. China, Brazil and Canada are the main producers. The largest dam in the world is the Three Gorges Dam on the Yangtze river in China.
- **Geothermal energy:** the heat under the earth can be used for heating and hot water in homes or for creating electricity. This is especially possible in volcanic regions.
- **Biomass energy:** organic materials such as forestry, agricultural and urban waste are burnt to provide energy. France is the largest consumer of biomass in the European Union.

- **Tidal energy:** the rise and fall of the tides, which are caused by the gravity of the Moon pulling the oceans towards it, spin turbines. The largest tidal power station in the world is Sihwa Lake in South Korea.

Evolution of production and consumption of renewable energies:

In the 1970s, these energy sources were considered to be alternatives to conventional energies.

Today, the use of renewable energy sources is growing quickly thanks to lower technological costs, more expensive fossil fuels, the payment of a tax for CO<sub>2</sub> emissions and the subsidies that governments provide.

By 2035, one third of energy is expected to come from renewable sources.

### What is industry?

Industry is concerned with the transformation of raw materials into manufactured goods. It is the most important economic activity of the secondary sector.

Humans have made tools since Prehistory, but modern industry requires: machines, energy, factories and large quantities of goods.

Industry is linked to development, and industrialisation promotes economic growth. The richest and most developed countries have a well-established industrial network.

### Origins of industry:

For many centuries, people lived in rural areas and worked the land. Families made the objects they needed at home or had them made in workshops, where a single worker made the whole product.

Industrial production began in England in the late 18<sup>th</sup> century. It was based on:

- **Technical innovation:** the machines carried out part of the manufacturing process which until then had been done manually.
- **Division of labour:** production was divided into multiple tasks carried out by workers who were responsible for a particular phase of the process. This saved time and increased productivity.
- **Large-scale production:** the manufacture of many products pushed selling prices down and promoted international trade.

Industrialisation changed society and economy. Large numbers of people moved from rural areas to work in factories, cities grew quickly. The changes were so great that they became known as the Industrial Revolution.

In this first phase, industrialisation spread from England to a few other European countries, like France, Germany and Belgium.

### The second stage of industrialisation:

Mass production emerged in the USA at the end of the 19<sup>th</sup> century. It became known as the Fordist model because it was developed on the moving assembly lines of the Ford automobile factory.

Under this new efficient system, productivity increased enormously. Production costs were reduced, and products were made available to many more people. This was the beginning of an era of mass consumption.

The USA, Western Europe and Japan led this new revolution. A huge economic gap developed between industrialised countries and other parts of the world.

### The modern industry

Since the 1970s oil crisis, a new model of industrial production, known as the post-Fordist model, has emerged. It is based on:

- **Automation:** this means that machines and robots carry out mechanical tasks which used to be performed manually in the past. Productivity increases and production costs fall. However employment diminishes.
- **Decentralisation of production:** it consists of locating the different phases of industrial production in different territories or subcontracting other specialized companies in a specific activity.
- **Offshoring:** it is the relocation of some company business activities in a different country. Thanks to improved information technology and communications this became widespread in the 1990s. At first, companies in developed countries relocated in emerging countries like China and India. But today these emerging countries are now relocating some of their production in new emerging countries like Indonesia.

### The industrial powers

- China, the world's leading industrial power: its growth has been based on its abundant natural resources and abundant source of cheap labour.

- The traditional industrial powers: the USA, Japan, Germany, United Kingdom, France and Italy are included here.

- Other powers: India, Brazil, South Africa and Asian Dragons are included here.

### Mining, energy and industry in Spain

Spain was a power in mineral raw materials, but with the end of the Second World War the mining activity decreased due to the exhaustion of many deposits or its lack of

profitability due to the high extraction costs or the strong competition from other countries. Currently the mining sector is heavily influenced by the mining policy of the European Union, which has promoted the closure of many deposits, either due to its lack of profitability or because of the environmental problems that they generate. However, mining has a secondary role in the economy of our country, although the extraction of industrial rocks during the construction boom somewhat improved the situation.

#### Non-renewable energies in Spain:

Oil production in Spain is very unimportant, since it only represents 0.5% of total consumption. The only active deposits are located off the coast of Tarragona and Ayoluengo (Burgos).

The production of natural gas in Spain is scarce. The only deposits are located off the coast of Vizcaya and Huelva.

In Spain it began to be implemented around 1965 to balance the energy deficit. Currently, six nuclear power plants are in operation: Vandellós, Ascó, Cofrentes, Trillo, Almaraz and Tobalina. But it has a strong social rejection by the dangers and the production of highly contaminating and very long-lasting radioactive waste (possible nuclear cemetery in Villar de Cañas, Cuenca).

#### Renewable energies in Spain:

Solar energy is produced mainly in Andalusia, the Balearic Islands and the Canary Islands. Its production is increasing, but still not taking advantage of the great possibilities of this type of energy in Spain, one of the countries with most hours of sunshine per year, because the technology is not highly developed and because of the need to import it.

#### Industry in Spain:

Industrialisation in Spain began in the mid-19<sup>th</sup> century, later than in other European countries. The earliest industries were textiles in Catalonia and coal and iron mining in the Basque Country and Asturias.

In the early 20<sup>th</sup> century, industry grew thanks to the capital brought back from Cuba and the Philippines after their Independence, Spanish neutrality in the First World War, and the building of new infrastructures. Protectionist politics favoured the consumption of national products.

This growth was interrupted by the Civil War, but the Spanish economy expanded strongly between 1959 and 1975. Existing industrial areas were joined by the coastal areas of Levant, Cantabria, Galicia and western Andalusia as well as inland areas like Madrid, Zaragoza and Valladolid.

After 1975, many traditional Spanish industries became uncompetitive. In the 1980s, there was some restructuring when many companies in traditional industries like iron were closed down.

The world economic crisis, beginning in 2007, had serious effects throughout the world. For years, a large part of secondary sector production was connected to the boom in building construction. When this slowed down, many other activities were also affected. Employment fell, and salaries and consumer buying went down. This was the cause of a fall in production and employment in industry.