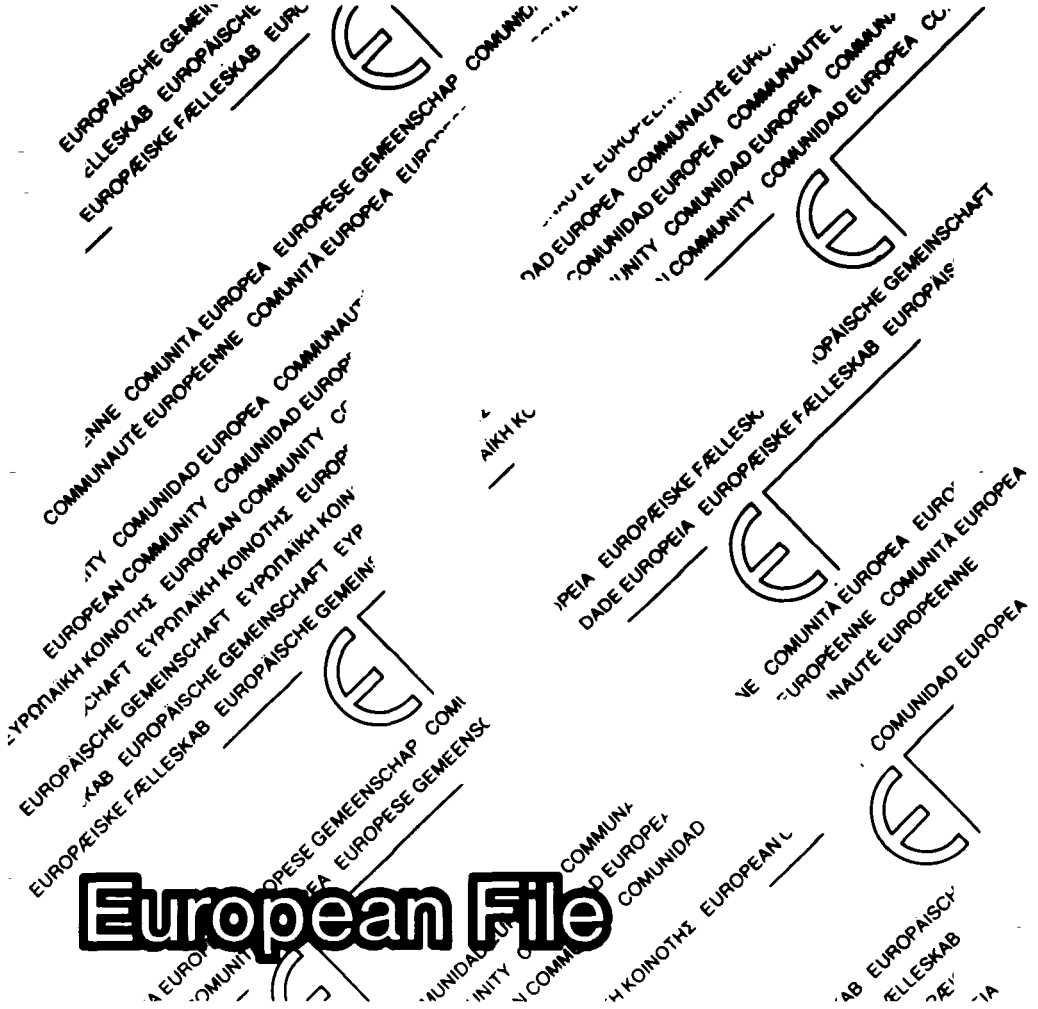
Nuclear energy in the European Community



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CHERNOBYL: the very serious nuclear accident that occurred in the Ukraine on 26 April 1986 raised the problem of the security of nuclear installations in the most concrete fashion. Even though the Soviet reactor was of a design with no equivalent outside the USSR, it was natural for public opinion to react as intensely as it did, particularly in Europe.[1]

Confronted with this accident, the European Commission considered it necessary to adopt a responsible position and avoid two extreme reactions: neither condemning nuclear energy outright nor minimizing the gravity of what had happened at Chernobyl. It was more appropriate to draw all the lessons from the incident. In order to do so, the Commission:

- Analysed the origins and causes of the accident.
- Clarified existing responsibilities in the nuclear sphere at national level, at Community level (Euratom, the European Atomic Energy Community), and at the international level (IAEA, the International Atomic Energy Agency).
- Exercised the powers which the Treaties, and particularly the Euratom Treaty, confer on the Community including the power to undertake new initiatives.

Briefly, the Commission holds the opinion that nuclear power can continue to play an important role in Europe only if people are convinced that their safety and health are assured. This is also the opinion of the European Parliament and of the Community's Council of Ministers. A year and a half after the accident, events have proved that this balanced attitude is the best one to adopt.

This *European file* on nuclear energy seeks to answer four questions:

- What is the contribution of nuclear power to covering European energy needs?
- Who is responsible for guarding against the risks?
- Could the Community do without nuclear energy?
- Is there an alternative to nuclear energy?

1. What is the contribution of nuclear power to meeting Europe's energy requirements?

In 1986, the 12 Member States of the Community consumed a little more than 1 000 million toe (tonnes oil equivalent). Of this amount, 44% was accounted for by oil, 22% by coal, 19% by gas, 13% by nuclear energy and 2% by hydroelectricity.

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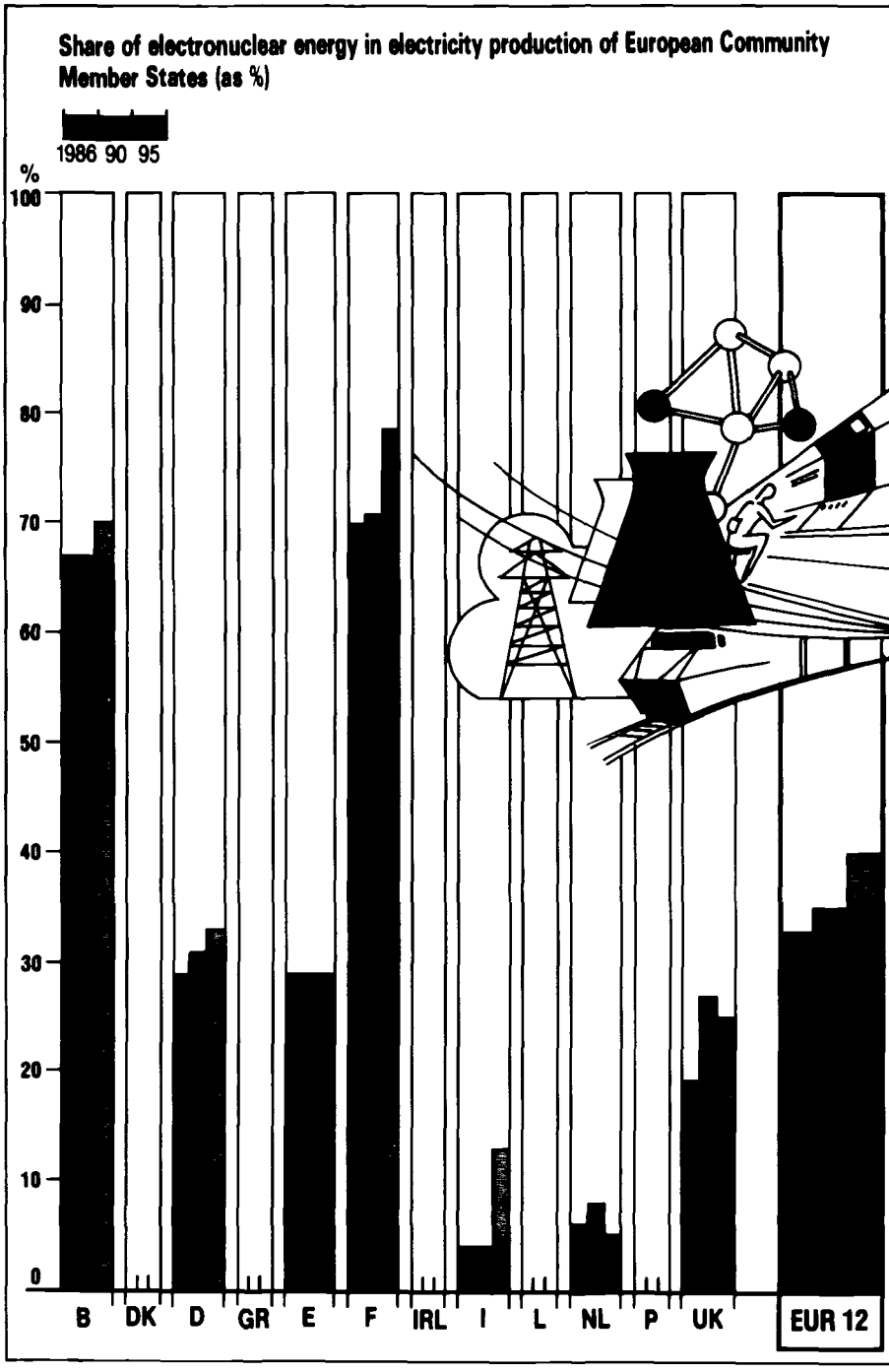
[1] This file replaces our No 15/79.


Share of electronuclear energy in electricity production of European Community Member States (as %)
1986 90 95
%
100
90
80
70
60
50
40
30
20
10
0
B
DK
D
GR
E
F
IRL
I
L
NL
P
UK
EUR 12

Today in the Community, nuclear power represents 13% of total energy production (it was 2% in 1970) and 33% of electricity production. These are averages (see table); in France and Belgium, nearly 70% of the electricity produced is of nuclear origin, while Denmark, Greece, Ireland, Luxembourg and Portugal have no nuclear power stations. This does not stop some of these countries from purchasing electricity of nuclear origin from their neighbours.

The use of nuclear energy is economically advantageous for four reasons:

- The uranium involved represents 10% of the total cost of the electricity produced. The proportion is more than 30% in the case of coal and up to 70% with oil and gas, depending on the country and the price of these materials. The purchase of uranium from third countries therefore has less effect on the external trade balance of Member States than would the purchase of other fuels from third countries.

- World production of nuclear power enables the consumption of other fuels, including oil, to be reduced by some 400 million toe per year. Such an economy in the use of oil, gas and coal helps to restrict price rises for these materials. This factor benefits the economies of all energy-importing countries, whether or not they themselves produce nuclear energy.

- The price of nuclear energy depends very little on fluctuations in the world market for energy materials. Besides, it is still very competitive in Europe, compared to the cost per kilowatt-hour for oil or coal. The relatively low level of this price helps boost the competitiveness of industries which use electricity and thus helps to create employment.

- Nuclear energy has also a qualitative impact, of a technical and scientific nature, because the technology used in all the stages of nuclear activity has consequent effects for other industrial sectors.

From an environmental point of view, the production of electricity by nuclear power stations causes no pollution, apart from the release of water vapour. The use of electricity does not pollute either. Nuclear power therefore has the merit of ensuring not only greater security of energy supply, but also a reasonable diversification of the ecological risks arising from energy production, in regard to atmospheric pollution, for example.

Despite this, the growth prospects of European electronuclear programmes have been gradually reduced since the middle of the 1970s:

- The oil crisis of the 1970s slowed down economic activity, causing energy demand forecasts to be lowered.

- The use of energy was rationalized; electricity consumption increased less than expected.

- The activities of ecological movements opposed to nuclear energy, as well as the positions adopted by certain political parties, was not without influence on decisions made in some Member States about the development of nuclear programmes.

2. Guarding against the risks: who does what?

The use of nuclear energy is dependent on national political decisions made by public authorities, public opinion being taken into account according to national procedures. On the other hand, regulations concerning the various aspects of nuclear safety are a matter not only for national authorities; they equally involve European bodies (Euratom), and even world bodies (the IAEA).

Like all human activities, the use of nuclear energy entails certain risks. Everything must be done to reduce to a minimum the risks from the production of electricity from nuclear energy. This must be carried out at all levels: in the design and construction of power stations, in their maintenance and exploitation, in their active and passive supervision. One must also be ready to guard against every possible accident and to minimize the consequences.

- *Protection against the effects of radioactivity.* There are several sources of ionizing radiation: natural radioactivity from the ground and from medical, military and energy activities, etc. Since 1928 – even before nuclear energy began to be exploited – radiological protection has been guided by the recommendations of the International Commission on Radiological Protection (ICRP). There are also other international bodies, particularly the World Health Organization (WHO), which study the effects and analyse the epidemiological consequences of artificial radiation.

  In the Community, basic standards for radiological protection are determined by the Council of Ministers acting on a proposal from the European Commission, which consults with qualified experts. Member States are required to apply these standards. The basic standards were determined by the Council of Ministers in 1959 and have been revised and amended – most recently in 1984 – to take account of improved scientific knowledge.

  The Euratom Treaty gives the European Commission not only the power to propose standards and to verify their application in Member States, but also precise duties in the field of health protection. Thus the Commission supervises the effectiveness of the Member States' monitoring of radioactivity levels in the atmosphere, water, earth and food chain. In addition, Member States are required to provide the Commission with general data concerning each project for disposing of radioactive waste, so that the Commission may make recommendations if necessary.

  Following the Chernobyl accident, the Commission took initiatives regarding:

  - The determination of tolerance limits for radioactivity in agricultural products and drinking water.

- The organization of rapid exchanges of information in the event of danger from radiation.

- Mutual assistance in the event of a nuclear accident.

☐ *Technological security.* Within the Community, the technological security of nuclear installations is the responsibility of Member States. It is asssured by technical planning that provides for successive levels of defence against the occurrence and development of accidental situations.

- The design of electronuclear power stations must be based, firstly, on tested technologies and their use must be subject to rigorous rules.

- At the second level, the possibility of a system failure and of human error is taken into account. This dictates means of detection and correction to prevent minor accidents from escalating.

- The third level allows for the possibility of a failure in the normal corrective process. Safety systems must be such as to ensure in all circumstances the continuity of essential safety services, for example, the control of radioactivity, the voiding of residual power and the confinement of radioactive materials.

- The fourth level provides for emergency plans and intervention measures in the event, despite all the foregoing measures, of a nuclear accident with the uncontrolled release of radioactive substances.

The Community pursues vigorously the joint examination of aspects of technological safety and the harmonization of safety criteria. This is done through the work of experts who represent the national authorities, the electricity producers, the builders of nuclear power stations and the research centres. These experts hold frequent meetings. After the Chernobyl accident, the European Commission took an initiative in this area, in addition to the steps mentioned above under the heading 'Protection against the effects of radioactivity'. This initiative was intended to perfect the harmonization process, so as to continue to ensure a high level of nuclear safety.

While it may be true that rules on technological safety have not been set at international level, indicative standards (nuclear safety standards) have been formulated within the scope of the IAEA. In addition, a team of world specialists which includes European experts (Operational Safety Analysis Review Team) analyses the operation of nuclear power stations from a safety point of view.

☐ *Radioactive waste.* The intensity, character and duration of its radioactivity are very varied. All the Member States produce radioactive waste as a result of medical applications, non-nuclear industry and research. In addition, countries with nuclear installations produce waste from the plants themselves: it is this waste which poses a particular problem.

By classifying waste according to its characteristics, it is possible to forecast the scale of growth of its production from now to the year 2000 with the following results:

- A million cubic metres of low- and medium-activity waste, such as the clothes of workers exposed to radioactivity.
- Some tens of thousands of cubic metres of waste contaminated by alpha emitters: waste containing traces of plutonium, for example.
- Several thousand cubic metres of high-activity waste. This refers essentially to residues from reprocessing plants for irradiated fuel elements.

Low-activity and medium-activity waste is disposed of in facilities prepared not far underground. Waste contaminated by alpha transmitters is stored in appropriate geological structures: salt domes, clay and granite layers. The same type of treatment is envisaged for high-activity waste: it is first vitrified, encased and packaged in containers with multiple barriers before disposal deep underground.

Community Member States with electronuclear programmes manage their radioactive waste through national agencies. The Community participates in the development of definitive disposal procedures for radioactive waste, through its research and development programme. It also helps with the financing and coordination of national programmes and with information exchange.

☐ *Physical protection.* During the stocking, use and transportation of nuclear materials, they are protected against misappropriation and sabotage by the Member States, which alone have the means at their disposal – police forces in particular. Nevertheless, the IAEA, the International Atomic Energy Agency, has drawn up a series of recommendations on the subject and Member States have signed a convention which requires them to apply physical protection measures at least as strict as the recommendations to nuclear materials being tansported between countries.

☐ *Safety control.* Certain materials used or produced by the nuclear energy industry could – under certain conditions – be used illegally and even for the manufacture of explosives. The Community, with the aid of its own body of inspectors from Euratom Safety Control, guarantees that the use of civil nuclear materials in Member States conforms to that declared by the holders of these materials. The inspection, based on a system of surveillance, declarations and on-the-spot checks, is coordinated with the IAEA whose own control system is specifically aimed at detecting possible misappropriation of materials for non-peaceful use.

3. Could the Community do without nuclear energy?

In statements to the European Parliament, the Commission has said that any examination of this question must be undertaken in a fully objective way. All of the

costs involved in a withdrawal from nuclear energy would have to be taken into account: the cost on the environmental level, the cost as regards security of supply, the direct financial cost and indirect costs, particularly for developing countries.

To clarify the debate, certain statistics must be recalled. In 1986, nuclear energy – which provided 13% of the energy and 33% of the electricity produced in the Community – enabled the Community to economize the equivalent of more than 130 million tonnes of oil, which amounts to almost the Community's present overall production. Such a comparison shows the degree to which nuclear energy helps in maintaining oil prices at a stable and relatively low level.

- If all the Community's Member States were to renounce nuclear energy, they would once again be confronted with a significant growth in demand for oil and a subsequent rise in prices. Such a rise would weigh heavily on European economic growth, as happened during the 1970s.

- In addition, heavy use of other energy sources, such as coal and oil, runs the risk of detrimental consequences for the environment (acid rain, etc).

- The sources of energy which would be substituted for nuclear energy are essentially those imported from third countries outside of Western Europe. This poses risks as regards security of supply.

A word here about *developing countries*. The renunciation of nuclear energy is put forward by some Europeans as a moral question. Another moral question to be asked is whether the Community, by giving up the use of nuclear energy, would not inevitably draw more on fossil resources, to the detriment of the world's most disadvantaged countries.

We cannot forget that the population of this planet has quadrupled during this century and that the world's population is increasing by more than 130 million each year. These billions of men and women consume energy. Such astronomical figures run the risk of becoming apocalyptic by the beginning of the next century – particularly for us Europeans who are consuming more and more energy – *in so far as world sources of fossil energy will be exhausted during the next century.*

Faced with the risk of such a situation and taking account of the fact that the interest of the Community citizen must be the primary consideration, the European Commission considers that it is desirable at the present time not to renounce nuclear energy, but rather to pay even greater attention to a high level of safety in nuclear installations.

The significance of the resolutions adopted by the European Parliament must be underlined here. They confirm the position of the Commission, both as regards long-term energy objectives and the consequences of the Chernobyl nuclear accident.

At the end of 1987, the Commission will take stock of the implementation of Community energy objectives for 1995. It will continue to press the Council of Ministers for a strengthened application of the powers conferred on the Community by the Euratom Treaty in the area of nuclear safety.

4. Is there an alternative to nuclear energy?

What about a return to the use of oil? Ten years ago, oil represented more than two thirds of the energy consumed in Europe. Today it accounts for approximately 45% and between now and 1995/2000 it should stabilize at around 40%. The Community considers that Europeans must pursue their strategy of reducing their dependence by diminishing their consumption of oil and diversifying their sources of supply, particularly as more than 50% of reserves are located in the Middle-East.

Five other possibilities remain which must be considered:

- Firstly, *solid fuels* (coal, lignite, etc.). For the past 10 years they have represented nearly 25% of the Community's supplies. The Commission wants an increase in coal consumption, under conditions that are acceptable for the environment.

- *Natural gas.* Between 1973 and 1985, its share of Community energy consumption increased by half, from 12% to more than 17%. The Community's energy objectives for the period to 1995 provide for this share being maintained. The agreement concluded with Norway for the exploitation of the enormous Troll fields is a positive step in this direction. The Community also has large quantities of gas available to it up to the year 2000 and beyond, although an increasing share of this gas will come from countries outside the Community, such as Norway, the USSR and Algeria.

- *New and renewable energy sources.* In accordance with Community energy policy, the contribution to be made by new and renewable energy sources, such as wind and solar energy, water power and biomass, should be increased as far as possible. None the less, given the actual level of energy prices, the breakthrough to the industrial stage will probably not happen in this century. The Commission certainly anticipates that the actual production level, which approaches 15 million tonnes oil equivalent, will more than triple, but even that will scarcely cover 5% or 6% of the energy consumption in the year 2000. Despite this realistic estimate – which is somewhat contrary to the expectations of public opinion – the Commission and the Council wish to pursue all the current research, development and demonstration efforts, so as not to deprive the Community of the long-term option represented by alternative energy sources.

- *Thermonuclear fusion.* This is at the stage where fission was before 1945, the stage of major experiments. Along with other countries, the Community has decided to take on this great technological challenge: if successful, it could prove to be a significant and practically inexhaustible source of energy. However, great scientific and financial efforts are still required, to exploit the potential of thermonuclear fusion.

- *Sensible use of energy.* One thing is certain: Europeans have to use energy better. In 12 years, they have learned how to produce as much while using at least 25% less energy. A similar level of progress is still possible provided that a definite policy is followed and, in particular, that realistic prices are applied at the level of the consumer.

The effectiveness of the energy policy of the Community and its Member States, based on a harmonious combination of market forces which include minimal price control, the development of indigenous resources and appropriate consideration of environmental problems, should be strengthened by the achievement between now and 1992 of the *large European internal market.*

In this context, greater flexibility and better interconnection of gas and electricity networks are certainly desirable. A genuine internal market will ensure greater security of supply, reduction of costs and strengthened competitiveness. At the same time, research and development in the energy field should be encouraged, particularly as regards new and renewable energy sources.

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The Chernobyl accident has been a significant challenge for the Community. In so far as its competence allows, the Community accepts this challenge. While it may be too early to sketch out the evolution of nuclear energy in Europe over the next 20 to 30 years, certain reference points with regard to 1995 can be noted:

- On 15 September 1986, the Council of Energy Ministers adopted European energy objectives for 1995. They do not set a specific target for nuclear energy, but they imply the continuation of nuclear programmes. Today, it is anticipated that the proportion of electricity generated by nuclear energy will grow from 35% to 40% between 1990 and 1995.

- On 26 September 1986, the General Assembly of the IAEA, during a special session devoted to the Chernobyl accident, adopted – by unanimous vote of the 94 countries present – a resolution affirming that nuclear energy will continue to be an important energy source for economic and social development. Only a minority of IAEA countries are aware of the significant inconveniences which the abandonment of this form of energy would present at a global level.

To renounce nuclear energy would be tantamount to creating a large increase in demand for fossil fuels, particularly for oil. The inevitable increase in prices would certainly have very negative consequences for the economy. In addition, it should be increasingly recognized that nuclear energy, correctly managed, has only minor effects on the environment. The current role of nuclear energy implies that it will continue to be one of the pillars of the European Community's energy strategy during the coming years ■

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