

Address

by **Eduard R. von Geldern, Director-General
for Industry and Economics at the European
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**INDUSTRIAL DEVELOPMENTS IN THE
EUROPEAN ATOMIC ENERGY COMMUNITY**

I. INTRODUCTION

It was in 1960 that I last had the privilege of addressing your Forum here. That was over three years ago. Compared with a whole lifetime, a period of three years is not long. However, during the time that the youth is passing through puberty on the road to manhood and maturity, every year is of double or triple importance.

This is also true of the development of a young modern science such as nuclear energy. What changes there have been since 1960, both in America and in Europe, in our view of atomic energy; its scientific and industrial aspects, its role in the overall pattern of world energy supply, its acceptance by governments and by the general public.

It is for these reasons that I am extremely grateful to the Atomic Industrial Forum for its invitation today to sketch out for you a brief outline of the most recent industrial developments in the six member-states of Euratom: Germany, France, Holland, Belgium, Luxemburg and Italy - and of the part played by the Euratom Commission in the overall complex of these industrial developments.

I propose first of all to devote some attention to the energy requirements of the European Community during the next 10 to 20 years, and then to consider the question of what types of energy will have to meet this demand. The part played by nuclear energy in the overall energy pattern will then clearly emerge.

After that, I should like to mention briefly the main nuclear power plants in existence, under construction, or planned, and to explain in broad outline some of the problems that industries and public utilities are facing today and the way in which our Commission tried to help them to overcome their difficulties. At the end I hope to say a few words on future relations between the United States and European industry.

II. ENERGY REQUIREMENTS AND PRODUCTION

a. Total Energy Requirements

In 1960, the total energy consumption in the Euratom countries was 460 million tons of coal equivalent. Since that year, it has risen at an annual rate of about 6%, with the result that for 1962 it amounted to approximately 500 million tons of coal equivalent and, if this rate of growth is maintained, which is more

than likely, will be of the order of 700 million TCE in 1970. As regards the period after 1970, my Common Market colleagues anticipate an energy growth factor of 4%, which means that by 1975, consumption will have reached a level of 850 million TCE and could be over 1,500 million TCE by 1980.

To meet the consumption of 460 million TCE in 1960, 125 million tons, i.e. 27%, were imported, mostly in the form of crude oil. We reckon that our demand will rise faster than our domestic output, consequently our imports will account for an ever-increasing proportion of our consumption. Because of this, the European energy problem is not only of a purely economic character, but has political aspects which are every bit as important. The fact that, in such a vital economic sector of activity, dependence on non-Community countries is becoming more and more accentuated will undoubtedly have a bearing on decisions to be taken in the future.

b. Electricity Demand

As in every other part of the world today, the electricity demand in the Community is following a far more pronounced upward trend than the power demand in general. Whereas the latter is rising by 6%, later 4% annually, the growth factor for electricity requirements is about 7%. In 1960, electrical energy consumption in the Euratom countries totalled 270,000 million kWh. Assuming an annual growth rate of 7% - and in fact, the growth rate for 1961 and 1962 was 7% - the demand would be doubled by 1970, tripled by 1975 and quadrupled by 1980, equivalent to a consumption of 1,000 to 1,100 million kWh.

c. Nuclear energy requirements

The next question concerns the part to be played by atomic energy in meeting future energy needs. Up to 1960, we can draw a clear picture of the trend which will be followed:

- in 1962 the Community's nuclear energy output totalled 500 million kWh;
- by 1968 about 2,700 MWe will be installed, yielding a total nuclear energy output of about 15,000 million kWh.

Therefore, the European Community will be extremely active in nuclear development over the period 1962-1968. The picture of the period after 1968 is still far from clear. A better overall view will not be obtained until the national research centres and the Euratom centres have more thoroughly canvassed the future prospects opened up by the breeder reactor and any other advanced-type reactors.

This state of affairs has, however, not prevented us from drawing up a reasonable estimate for the development of nuclear energy after 1968. The following total production requirements were arrived at:

- 1970	: 20	- 25,000	million kWh
- 1975	: 60	- 100,000	million kWh
- 1980	: 180	- 240,000	million kWh

This requirement for 1980 corresponds to a total installed capability of 40,000 MWe.

It should also be pointed out that 50% of the total electricity output at the moment is provided by coal, oil and natural gas, the other 50% being covered from "privileged sources" such as water-power, blast furnace gas, lignite, etc. Assuming that the estimates given above for 1980 turn out to be correct, 50% of the energy required then will be generated from coal, oil and natural gas, 25% from privileged sources and a maximum of 25% from nuclear energy.

We arrived at these figures on the basis of careful and cautious estimates of the cost pattern followed by both nuclear and conventional primary energy. Without entering into all the details now of the hypotheses adopted for this calculation, I shall merely point out that, in our opinion, by about 1970 the cost price per nuclear kWh will have fallen to 5 - 7 mills in the larger plants, a price which will be competitive with modern conventional plants, assuming, for the latter, a coal price of ten to twelve dollars per ton of coal equivalent.

The picture which I have given you of the way in which the energy supply situation will develop - a picture which, incidentally, will have to be revised and touched up from time to time - will have made it clear to you that nuclear energy will in Europe in no way drive coal off the market. On the contrary, the production or import of coal, oil and natural gas will still have to be stepped up considerably if energy requirements are to be met. Nuclear power will provide a very welcome and very necessary addition to the more traditional sources of energy.

III. THE NUCLEAR INDUSTRY

Assuming that our estimates for the future are vindicated by events, the stepping-up of an installed nuclear power plant potential from 2,700 MWe in 1968 to 40,000 MWe in 1980 will call for a mighty industrial effort.

How are the utilities on the one hand and the engineering industries on the other facing this situation?

From an organizational standpoint, the electricity companies differ practically from country to country. In France they have been nationalized for some time, while in Italy this step was taken a short while ago. In Germany and Belgium private companies predominate; in Holland the provincial authorities are foremost. Fortunately this situation has not proved a stumbling block to close cooperation at European level. In fact, there are now five fully integrated national high-voltage grids in the Community, all hooked up with each other as well as with the Swiss and Austrian systems to form what is known as the European integrated network. And in the nuclear field, this cooperation has led, for instance, to the decision of French and Belgian utilities to build a 266 MWe reactor on the Franco-Belgian border, the construction of which - to Westinghouse design - has already made considerable progress.

As there is a French delegate on the speakers' list for this afternoon, I shall confine myself to stating that the French programme up to 1968 provides for the construction of four large gas-graphite reactors. The aim which is being deliberately pursued is to make a number of technical improvements in each successive reactor. Furthermore, the French Atomic Energy Commission has since several years displayed interest in a heavy-water-moderated reactor project which is now under construction and is now engaged in discussions with German industry on the subject.

The active efforts of the Italian companies have so far resulted in the construction of three reactors totalling about 530 MWe. As to Italy's future construction programme, uncertainty will continue to prevail until the nationalization process has been completed and the Government has announced its decision as to the future course of events.

In Germany there is a growing interest in the construction of power reactors. Work was recently started in Southern Germany on a 237 MWe boiling-water reactor designed by General Electric, and serious consideration is being given to the building of several other power plants. In general, it may be said that the private utilities are not opposed to nuclear investments, provided that special nuclear risks and a share in the financing are borne by the public authorities.

Finally, in the Netherlands, where recent discoveries of natural gas in large quantities have removed any anxiety concerning energy supplies in the immediate future, the electricity undertakings have nonetheless decided to proceed with the construction on their own account of a 50 MWe boiling-water reactor based on a design to be drawn up in collaboration with General Electric.

On many sides a tricky problem now arises: whether to carry on with the construction of the present proven-type reactors or to slow down the construction rate until the laboratories have provided a firmer basis for the building of the previously described advanced reactor types on an industrial scale.

This problem was the focus of interest at a meeting of the top management of the major European construction enterprises which was arranged by the Euratom Commission at the end of September 1963. The meeting concluded with justifiable satisfaction that European industry had succeeded without any great difficulty in solving the problems that confronted it in connection with the power plants under construction or already commissioned. European industry can now be considered capable of supplying virtually all nuclear power-plant equipment at competitive prices. In all probability, therefore, it will in the near future also manage to solve those problems which still constitute bottlenecks, such as the construction of the reactor core, the fabrication of fuel elements and the reprocessing of irradiated fuels - problems which are already being overcome in Britain and France.

The final decision now rests with the utilities. On the one hand their apprehension that they would be compelled to operate unduly expensive power plants if more of the present types were built is understandable. On the other hand the utilities are well aware that large-scale power plants, used to produce base-load electricity and designed and built on the basis of actual know-how and technology, would be competitive with conventional power plants once they started KW. The opinion was also voiced that the construction of a further, limited, number of larger proven-type plants is necessary both in order to keep pace with technical progress and to consolidate and extend industrial know-how. It was also said that any protracted period of inactivity in reactor construction would discourage skilled labour from entering into or staying in the nuclear field and would raise major difficulties with regard to achieving the capacity of 40,000 MWe in the Community, envisaged in 1980.

No wonder the utilities turn to their national governments and to Euratom for assistance with a nuclear power plant construction programme.

This brings me to the role of the Euratom Commission.

IV. THE PART PLAYED BY EURATOM IN THE CONSTRUCTION OF LARGE-SCALE NUCLEAR POWER PLANTS

In the first (1958-1962) and second (1963-1967) five-year plans, drawn up by the Euratom Commission and approved by the European Council of Ministers, the Commission's major activities in this field have been carried out under 1) the US/Euratom Joint Reactor Programme and 2) the Euratom Programme of Participation, both of which have acted as a considerable stimulus in inducing the electricity companies to tackle the construction of power plants.

Three plants are now under construction under the US/Euratom agreement - the Senn plant in Italy, the KRB plant in Germany and the SENA plant on the Franco-Belgian border. Each of these plants enjoys the facilities provided under the US/Euratom agreement concerning the lease of fissile material, plutonium buy-back, reprocessing of fuel elements and AEC burn-up guarantee, while the last two plants have also been granted a loan under the line of credit opened by the Eximbank.

The three power plants mentioned are also included in the Euratom programme of participation, which covers five plants in all, the two others being the SIMEA gas-graphite plant in Italy and the SEP boiling-water plant in the Netherlands. Under this programme, the Euratom Commission agrees to bear part of the start-up losses, while it likewise refunds a proportion of the cost of reactor components and fuel elements, insofar as they are manufactured by firms within the Community.

In return for its financial support the Commission requires that the reactor operator accept two conditions, namely:

1. The Commission shall have the right to send to the site its own experts, or experts from nuclear industries in the Community, to work on the design, construction and operation of the reactor;
2. The Commission shall have the right to distribute throughout the Community the information and experience gained in the design, construction and operation.

In this way, the entire nuclear industry can benefit from the know-how gained by the first reactor constructors, and at the same time a core of young trained nuclear experts is created.

This programme for participation, for which the Commission has earmarked 32 million dollars, is now progressing to the satisfaction of all parties concerned. Both its aims - the dissemination of knowledge which without the Commission's participation would have been restricted to a small circle, and the promotion of industrial activity within the European Community - seem to have been achieved.

The opportunities afforded by the Euratom/US Joint Reactor Programme and the Euratom programme of participation have effectively contributed to the further development of nuclear industry in Europe as well as in the U.S. The Commission's present budget provides only limited possibilities for the granting of further assistance to any would-be builders of nuclear power plants. As soon as serious plans for the construction of new power plants are submitted to the Commission, each individual case will be considered on its merits as to whether assistance can be granted and, if so, in what form and to what extent. Substantial assistance would require the express approval of the European Council of Ministers or would have to be incorporated in the third five-year programme (1968/73).

V. RELATIONS WITH U.S. INDUSTRY

Finally, I should like to examine a question which will certainly be of interest to a great number of you.

If Europe, and in particular the European Community, carries out such an extensive development of nuclear energy as one may expect, what then will be the relation with U.S. industry?

At a recent symposium held at the beginning of this month, initiated by the Euratom Commission, on the proven-type reactors, Governments, construction firms and utilities discussed the economics of proven-type reactors. It has been said that the relation between U.S. and European industry, until now based on a supplier to customer relation, does in fact no longer answer to the actual facts, these facts being that the industries in Europe are growing steadily to a more integrated and more independent status.

Now that the period of vacuum in Europe is coming to its end, it seems appropriate to ask oneself whether new ways for cooperation between U.S. industries and European industries can be found which respond in a more effective way to the industrial pattern in Europe as it stands today.

In evaluating this problem, it seems appropriate to take into consideration two major objectives of the European Community. These objectives are determined by the need to achieve a dual purpose - in the first place the need to build up the Community's own potential, based on its own research, development work and industrial experience. Those Community countries which have exerted the greatest effort in this area will arrive at this stage first, while the others will have to rely on outside help for a little longer and will make the grade later. The trend toward mastery of the entire field of nuclear technology, however, is unmistakably manifest everywhere.

On the other hand, we are faced with the need to provide the consumer with the electricity so necessary for the further industrialization of Europe, and at the lowest possible price. This trend calls for an open energy market where free competition between industries in and outside the Community is allowed full rein.

It is not possible to predict when, to what extent and for how long the one tendency will predominate over the other. In the same way as a pendulum on a clock, it will probably swing both ways. From the long-term point of view, however, as in any open market, the winner will be he who can supply the best product at the lowest price. And this applies just as much to American products on the European market as to European products on the American market.

Once we have arrived at the synthesis of both trends - an integrated industry and lower cost power - it is clear that we will have made a step of major importance towards a stronger and more united Europe.

Of course the growing maturity of European industry will constitute an increasing challenge to industries outside Europe, including those of the United States, but indeed leaders of American industry and of American government

realise this. Only recently, your Vice President Lyndon Johnson, speaking in Amsterdam, declared (and I quote):

"We in the United States are challenged -- and know we are challenged -- by the progress of European unification. But we welcome this kind of challenge. We welcome it because a unifying Europe presents us with a greater hope of achieving the partnership we seek across the Atlantic."

I believe, Mr. Chairman, ladies and gentlemen, that in the field of nuclear energy, this partnership is already a reality. It remains for us all to develop this partnership along pragmatic lines that offer the partners the greatest mutual benefits.