EURATOM

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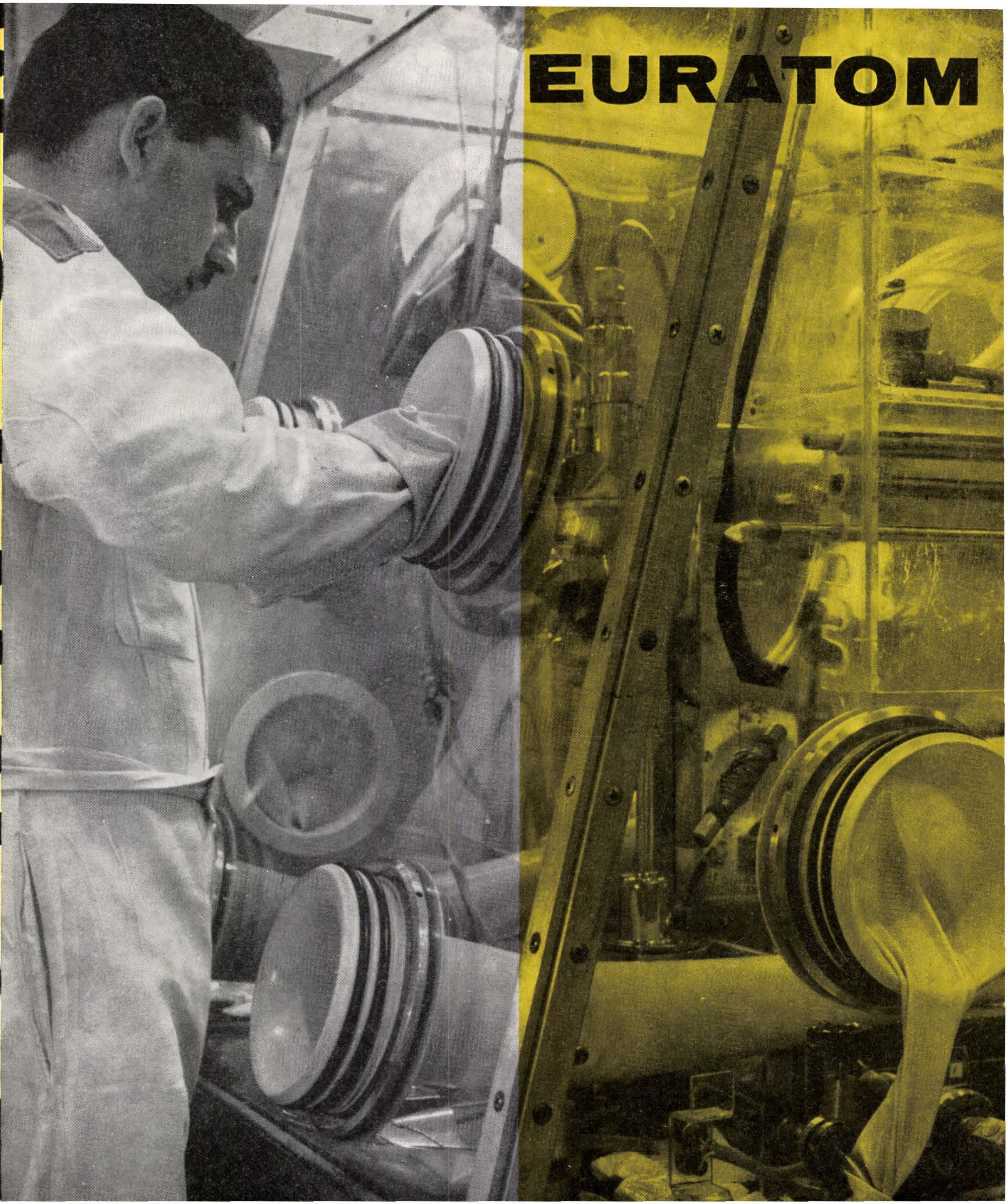


ATOMS FOR PEACE FOR 170 MILLION EUROPEANS

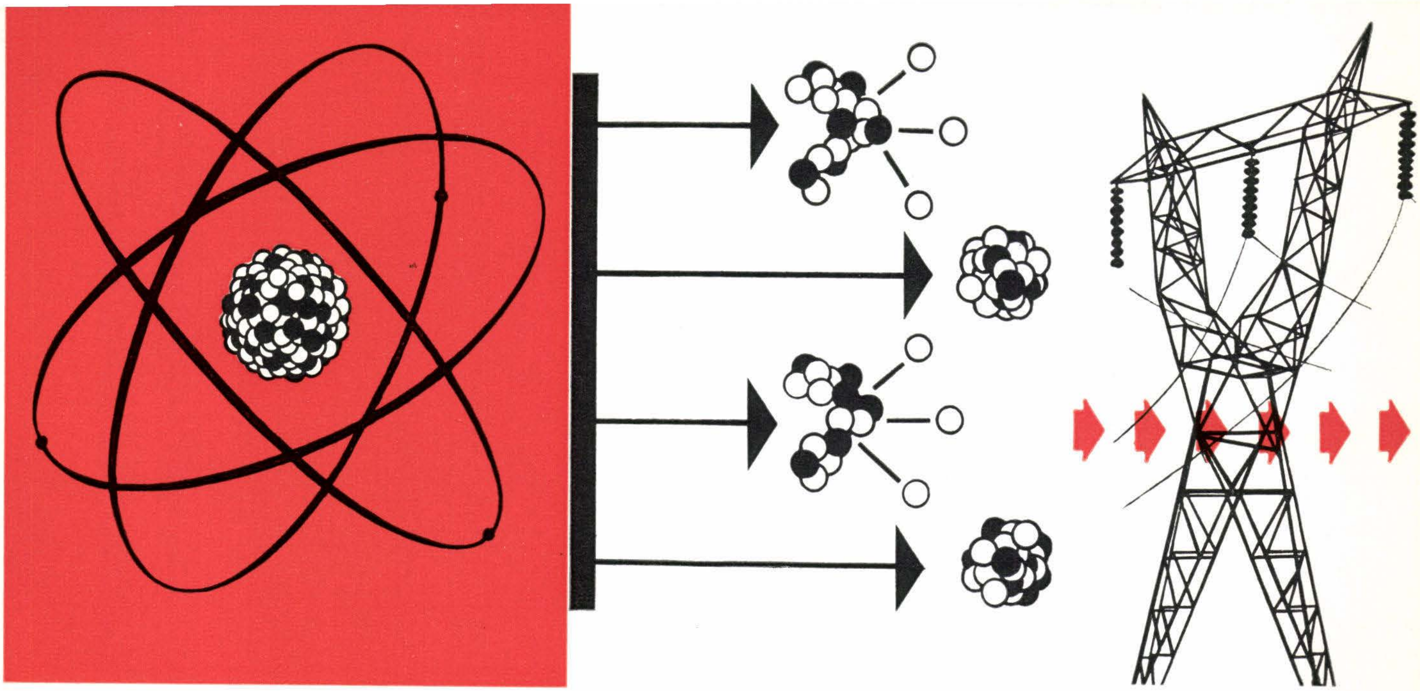
EURATOM, the European Atomic Energy Community, was set up by the Treaty of Rome signed on 25 March, 1957. Six countries are members: Belgium, Federal Germany, France, Italy, Luxembourg and the Netherlands.

A five-member Commission, appointed by the member governments, is responsible for executing the Euratom Treaty, which came into force on 1 January, 1958.

EURATOM's task is to promote the exploitation of nuclear power for peaceful purposes for the benefit of the member countries. To achieve these aims, the Community has its own financial resources and far reaching powers.

Euratom was set up for political reasons. The decision to create an organisation responsible for the co-ordination and furtherance of nuclear research and development in Western Europe was taken at the same time — following the Messina Conference of June, 1955 — as that for the establishment of the European Economic Community (the Common Market).

With the European Coal and Steel Community — the "pilot" Community set up in 1952 — Euratom and the Common Market represent the three roads along which an economic and political unity is being brought into being in an area with a population of 170 millions. The Community is no exclusive grouping of states for it is open to other European countries to join or become associated with it; moreover, the Community is contributing to the fight against ignorance, hunger and other evils of underdevelopment outside as well as within Europe.

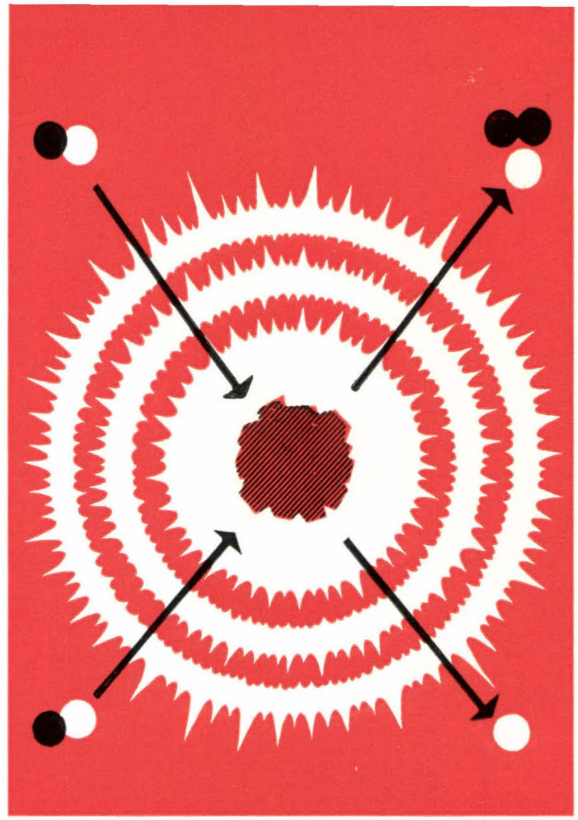


How nuclear energy is harnessed

By harnessing the power of the atom for peaceful purposes, man has entered a new world of scientific possibilities. There are two ways of releasing the tremendous energy contained in matter — fission and fusion.

Fission. — This involves the exploding of the nuclei of such heavy atoms as uranium 235 which is contained in natural uranium in the proportion of 0.73 %. At the present stage of technical development the fission of the U235 atoms contained in one kilogram of natural uranium produces as much energy as 10 tons of coal, but it is hoped to improve on this by developing reactors producing more nuclear fuel than they consume, at the same time liberating enormous quantities of energy, i.e. fast reactors.

The peaceful applications of controlled uranium fission include the generation of electric power, marine propulsion, district heating and the manufacture of radioelements, invaluable to medicine, agriculture and industry.



Fusion. — Here the nuclei of such light atoms as deuterium (existing in its natural state in water) are fused together. The fusion of a kilogram of deuterium produces as much energy as 2,800 tons of coal. Unfortunately, the reaction is still too violent to be tamed for peaceful purposes, but the researchers hope to discover adequate techniques in the not-so-distant future.

EURATOM RESEARCH IN THE FIELD OF POWER REACTORS AND FUSION EMBRACES A WIDE RANGE OF ACTIVITIES BOTH IN THE SEARCH FOR CHEAP POWER AND IN THE MANY OTHER APPLICATIONS OF NUCLEAR ENERGY.

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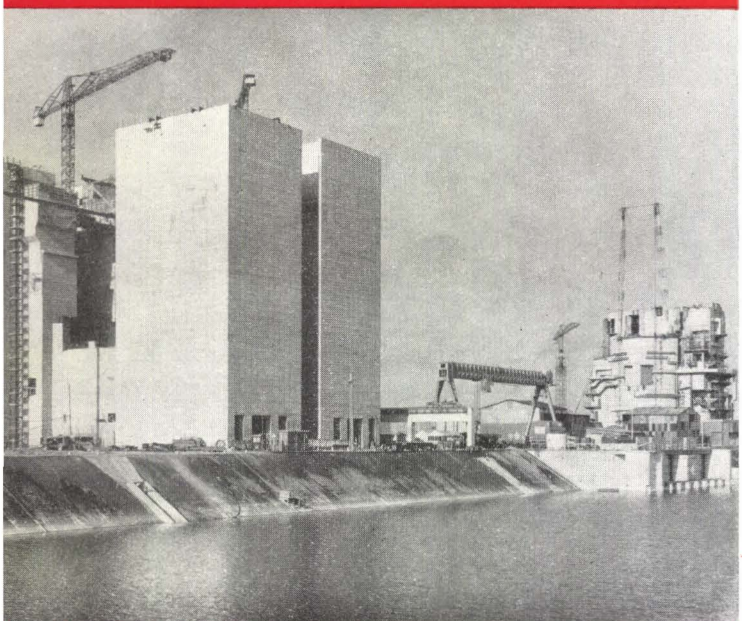
European countries unite to prepare for



The reactor building of E.D.F. 2 near Chinon (France)

Economic integration is intended to help Europe to achieve a rate of expansion which will give its population a standard of living comparable to those of the two great Eastern and Western blocs twenty years hence. A refusal to integrate would be tantamount to allowing Europe to fall more and more behind the two economic giants, ultimately finding itself in a state of relative underdevelopment. For industrial production in the Soviet Union is increasing at a rate of nearly 10 % a year compared with 5 ½ % in the Community. The Common Market has therefore been formed to ensure that the best use is made of economic resources and to provide the best conditions for economic expansion.

The key problem of economic expansion: Power supplies.

An adequate and assured supply of energy is essential for this expansion but over the long-term it is far from certain that Europe's conventional power supplies will be adequate. Indeed, in order to maintain the present rate of industrial growth during the next twenty years, Europe will need much more energy than can be obtained from her own resources. If, on the other hand, resort were made to coal or oil imports to makoog ed the shortage, the reliance on foreign supplies would eventually reach a dangerous level. For while the Community now imports 27 % of its energy requirements, this proportion would rise to 50 % by 1980 if a new source of energy, atomic power, is not developed in Europe. Clearly such a situation involves certain

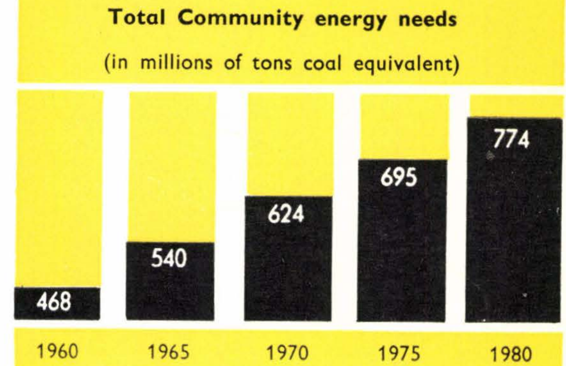
the atomic civilisation

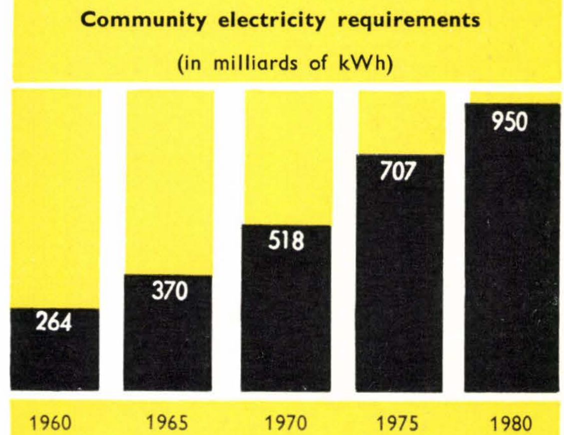
risks. On the one hand, it could be dangerous to place too great a reliance for power on the oil-producing countries of the Middle East and North Africa, with which Europe's relations are uncertain. On the other hand, massive imports could lead to severe foreign payments' difficulties.

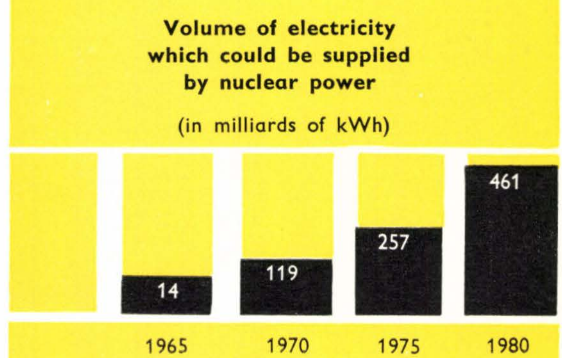
The outlook, serious enough as regards power in general, is much greater in regard to electricity. Community electricity requirements are doubling every 10 years. Thus, by 1980, the Common Market must aim at an electricty output of around 950 thousand million kWh, i.e., nearly four times present production. This figure represents about 5,000 kWh per capita, or roughly the present per capita consumption of the United States, while it is far behind the Soviet goal for 1980 of 8,500 kWh.

It is primarily in the production of electricity that atomic power will play a major rôle. It is predicted that by 1980 around 250-300 thousand million kWh annually would be required from nuclear power in Europe; that is, as much as the Community's total present output. This would mean the construction of about 40,000 MW of nuclear capacity — 200 medium-size or 100 large-size power stations.

Atomic power on a large scale will underpin Europe's economic expansion, the implications of which are not only to be seen in terms of rising living standards. For a high rate of expansion is also required if Europe is to meet its responsibilities in tackling what is perhaps the greatest current problem — that of conquering poverty in the under-developed parts of the world.



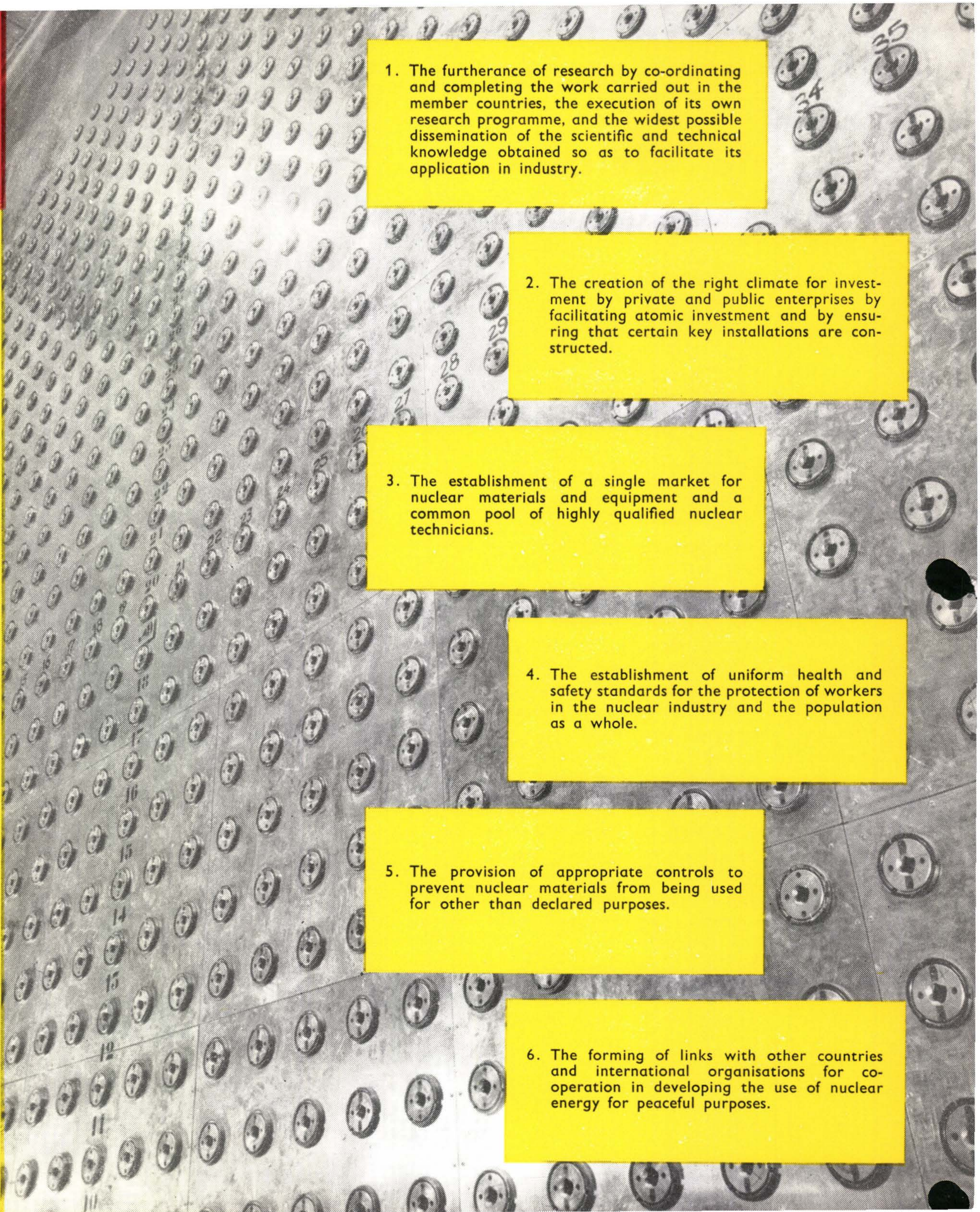




EURATOM

Towards a European nuclear industry

To build a European nuclear industry, Euratom must carry out the following tasks:



1. The furtherance of research by co-ordinating and completing the work carried out in the member countries, the execution of its own research programme, and the widest possible dissemination of the scientific and technical knowledge obtained so as to facilitate its application in industry.

2. The creation of the right climate for investment by private and public enterprises by facilitating atomic investment and by ensuring that certain key installations are constructed.

3. The establishment of a single market for nuclear materials and equipment and a common pool of highly qualified nuclear technicians.

4. The establishment of uniform health and safety standards for the protection of workers in the nuclear industry and the population as a whole.

5. The provision of appropriate controls to prevent nuclear materials from being used for other than declared purposes.

6. The forming of links with other countries and international organisations for co-operation in developing the use of nuclear energy for peaceful purposes.

Euratom encourages European nuclear research

Euratom's task is to **co-ordinate, encourage** and **supplement** European atomic research and to **pool scientific information.**

Co-ordination is not intended to give Euratom a monopoly over atomic research in Europe. Instead, the aim is to avoid wastage. To bring about this co-ordination, Euratom requires the member countries to inform the Commission of their research programmes so that a general assessment of the scope of Community research can be made.

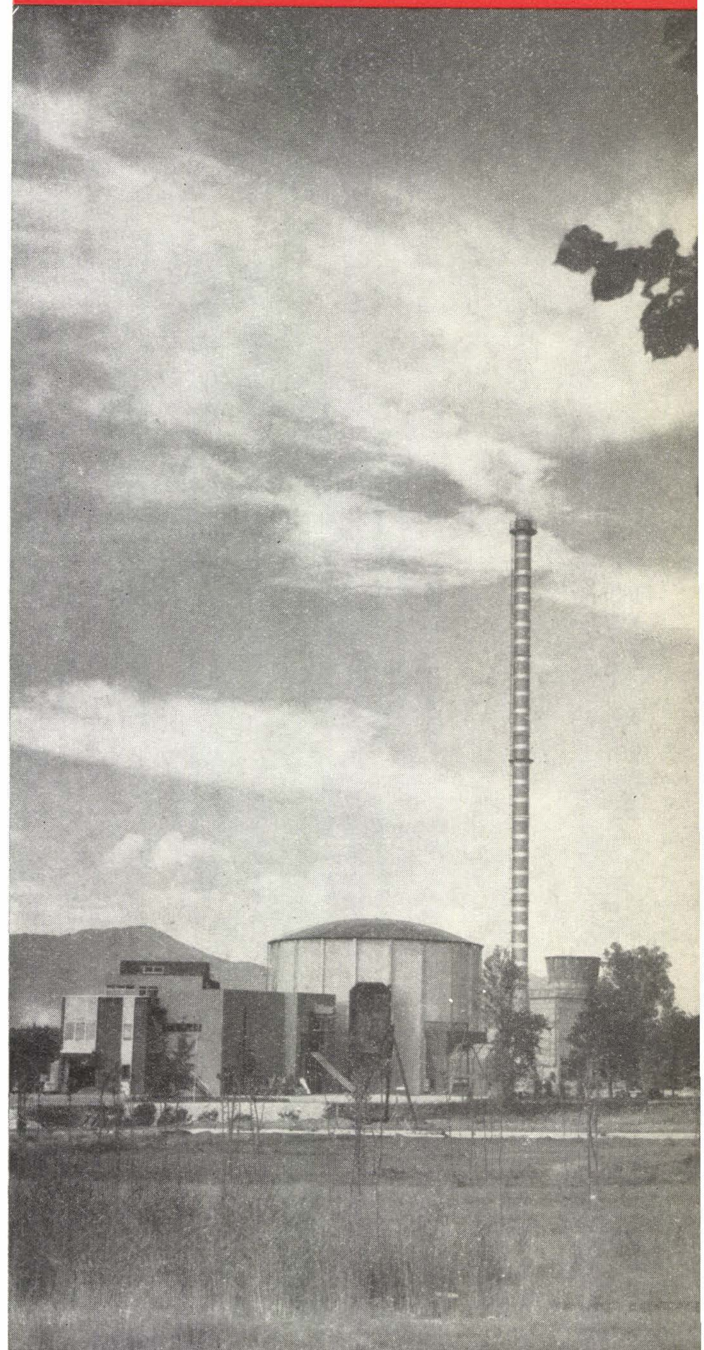
In order to **encourage** research, Euratom is concluding research contracts with research centres or industrial undertakings. The contracts stipulate mutual rights and obligations such as the communication of the results to the Commission or the participation of Community staff in the work.

So far Euratom has signed more than 240 contracts involving an outlay of over $ 140 million with official bodies, universities, institutes and industrial firms and concerns.

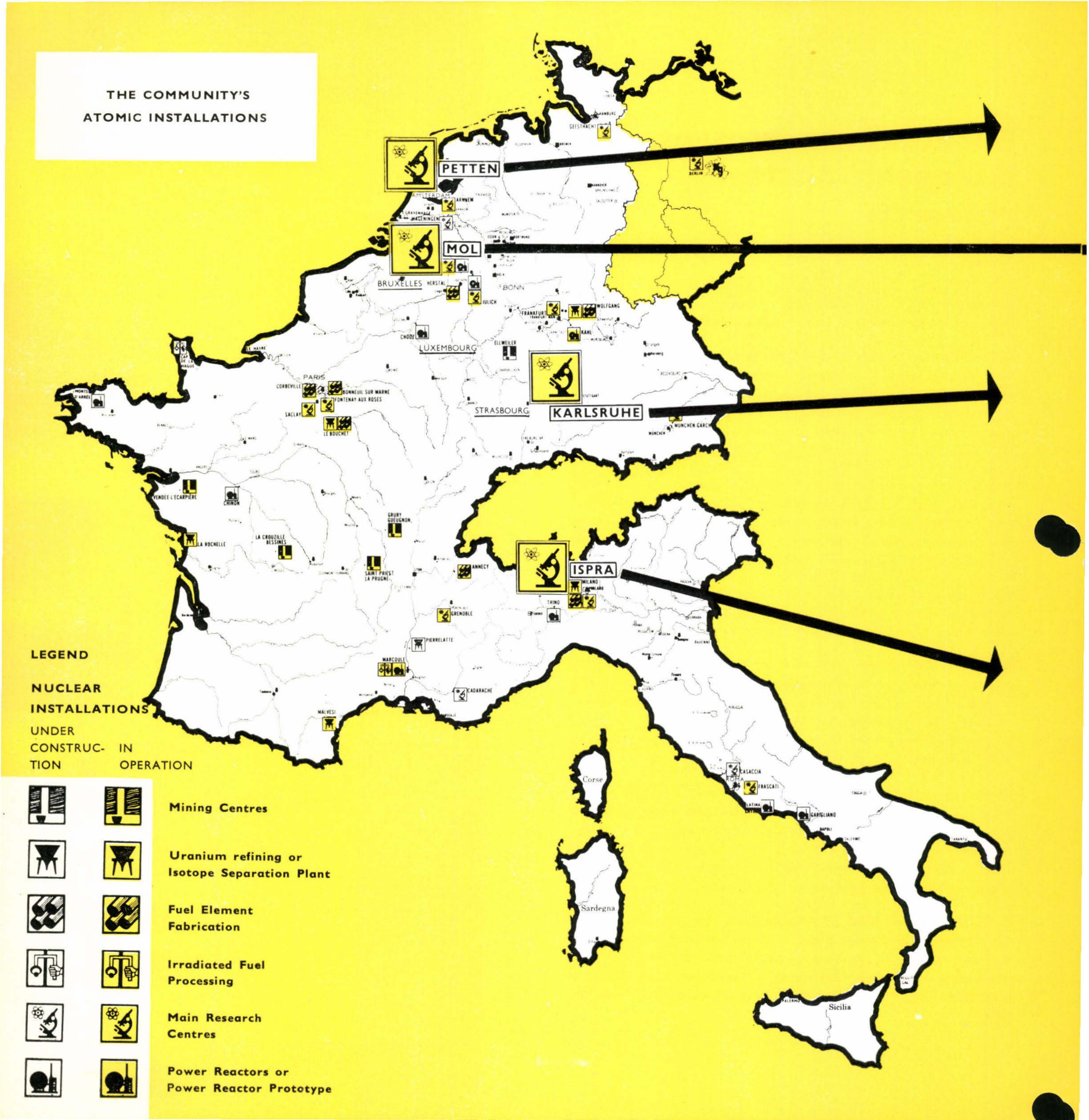
So as to **supplement** the research carried out in member countries, Euratom has surveyed both the achievements and plans of each member country and launched a joint research programme in which the Community's intellectual and financial resources are being concentrated on certain fields which have hitherto been neglected.

There are three types of research under way: the use of the atom for **power, the uses for radiation and radioisotopes,** and the study of **controlled thermonuclear reactions (fusion).** Euratom has a budget of $ 215 mn for the five-year period 1958-1962 to carry out this joint research. A second five-year programme (1963-67) is now under preparation.

To further the **pooling of information,** Euratom has formed an information and documentation center responible for distributing the results of its research programme and for providing information on nuclear techniques. Euratom has also formed a specialised research group for its study of automatic data-processing.



Ispra I reactor


THE COMMUNITY'S ATOMIC INSTALLATIONS
PETTEN
MOL
KARLSRUHE
ISPRA
AMSTERDAM
ARNHEM
'S GRAVENHAGE
WAGENINGEN
BRUXELLES
HERSTAL
BONN
JULICH
FRANKFURT
WOLFGANG
KAHL
GEESTHACHT
BERLIN
CHOOZ
LUXEMBOURG
ELLWEILER
STRASBOURG
MÜNCHEN-GARCHING
PARIS
CORBEVILLE
BONNEUIL SUR MARNE
FONTENAY AUX ROSES
SACLAY
LE BOUCHET
CAP DE LA HAGUE
MONTS D'ARRÉE
VENDÉE L'ECARPIÈRE
CHINON
LA ROCHELLE
LA CROUZILLE BESSINES
GRURY GUEUGNON
SAINT PRIEST LA PRUGNE
ANNECY
GRENOBLE
PIERRELATTE
MARCOULE
CADARACHE
MALVESI
MILANO
TRINO
CASACCIA
ROMA
FRASCATI
LATINA
GARIGLIANO
Corse
Sardegna
Sicilia
LEGEND
NUCLEAR INSTALLATIONS
UNDER CONSTRUCTION
IN OPERATION
Mining Centres
Uranium refining or Isotope Separation Plant
Fuel Element Fabrication
Irradiated Fuel Processing
Main Research Centres
Power Reactors or Power Reactor Prototype

The Petten Establishment (Holland)

Following an agreement between Euratom and the Dutch government a general purpose research establishment is to be installed at the Petten Centre, At first research at Petten will be devoted to experiments with a high neutron flux reactor, now being completed. Euratom intends to allocate $ 10 million to the Petten centre, which, in three or four years' time will employ 600 people. 400 of whom will be Euratom staff. The Petten centre is situated near the sea about 40 miles north of Amsterdam.

European Transuranium Institute, Karlsruhe (Germany)

Euratom has concluded an agreement with the German Federal Republic on the construction of a Transuranium Institute at the Karlsruhe Nuclear Research Centre. Completion is expected in about two years and the cost is put at $ 12 million, of which $ 4.8 million will be provided by Euratom. Initially, the Institute will have a staff of 250 who will be occupied with the study of elements which are higher than uranium in the periodic table, such as plutonium, but which are used solely for peaceful purposes.

Plutonium is a by-product in natural uranium reactors and possesses the important property of being fissile, i.e., it can be disintegrated and so provide energy. Plutonium is therefore as much a nuclear fuel as uranium 235, both being contained in natural uranium. But there are special problems regarding its use in power reactors.

The Ispra Establishment (Italy)

An agreement signed between Euratom and the Italian government, and ratified by the Italian Parliament in July 1960, transferred the Italian Centre at Ispra to Euratom. Under this agreement, Euratom is to allocate $ 40 million to Ispra by the end of 1962, while the Italian government's contribution for the same period will be about $ 10 million. This total of $ 50 million will cover the cost of contructing, equipping and operating about forty laboratories. The present activities of the general purpose establishment at Ispra are centred on the following three fields

1) the operation of the Ispra research reactor, at present operated by the Italians ;

2) the Orgel project, devoted to the study of a new species of reactor in which natural uranium is used as the nuclear fuel, heavy water as moderator and an organic liquid as coolant;

3) the setting up of a European Scientific Data Processing Centre.

By the end of 1961 the Ispra plant had a staff of 1000, which will be increased to 1,200 by 1962, more than three-quarters of whom being research workers, engineers and technicians. Ispra is situated about 1 mile from Lake Maggiore and about 45 miles from Milan.

Central Nuclear Measurements Bureau, Mol (Belgium)

At Geel, near Mol, about 45 miles north-east of Brussels, Euratom has set up the Central Nuclear Measurements Bureau, employing about 60 people, around 40 of whom are engineers or technicians. By 1963 there will be a staff of 170. The primary aim of the CNMB is to further the science of physical measurements, which involves certain detailed studies for the improvement, preservation and distribution of primary standards and the development of the appropriate instruments and measuring devices.

In short, the Central Nuclear Measurements Bureau is to become a metrological centre capable of carrying out all essential measurements at least as well as the best specialised American laboratories. Euratom has also decided to furnish a large quantity of scientific equipment and has ordered a 3 million electron-volt positive ion Van de Graaf generator, with a special millisecond pulsation device and a high-power linear accelerator.

The CNMB represents Euratom and the member countries on the European-American Nuclear Data Committee. This Committee, set up by Euratom and the OECD, is a notable example of collaboration unifying the resources of the Western world in a limited but essential sphere.

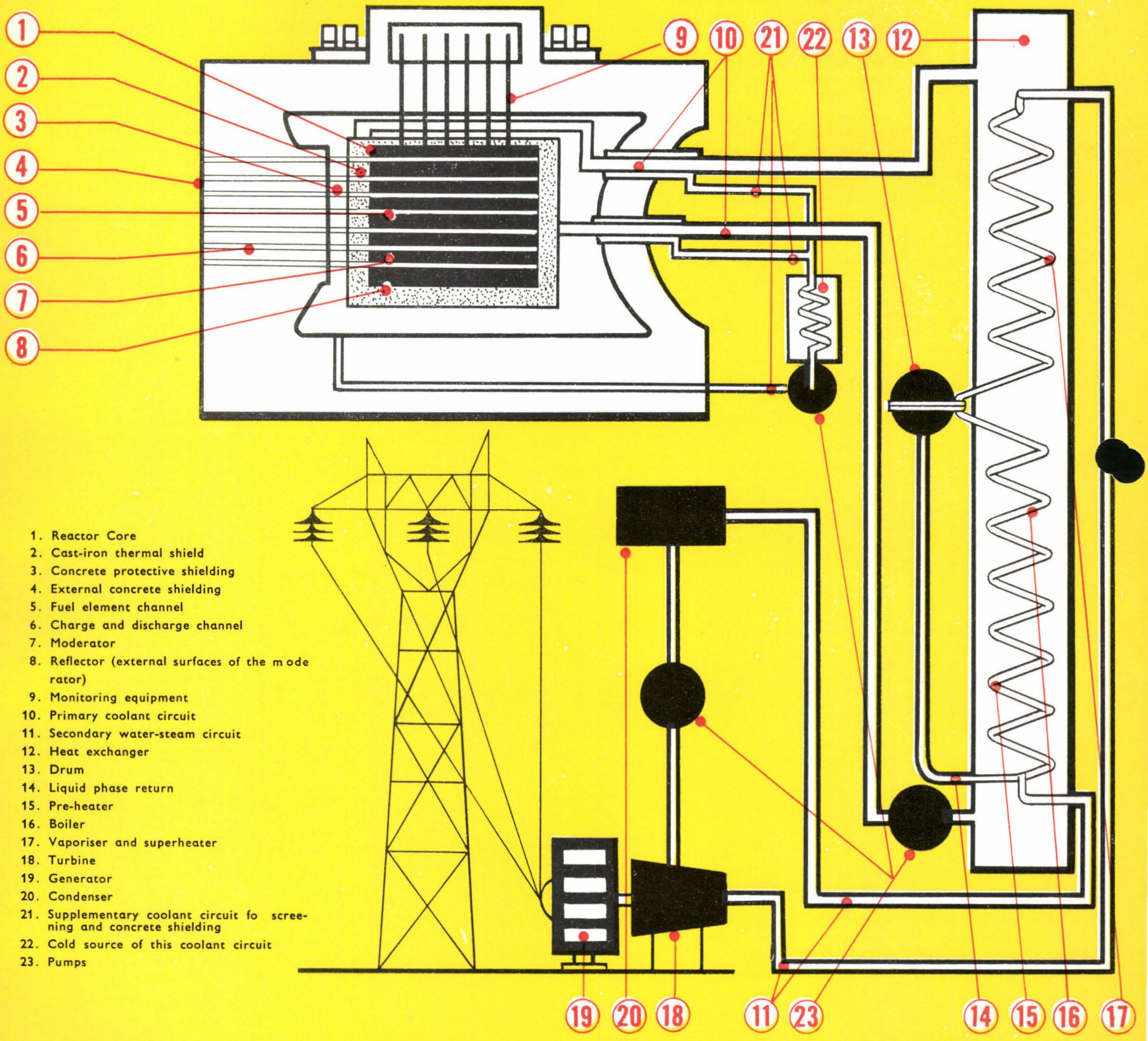
From the North Sea to Lake Maggiore

EURATOM'S N° I ASSET : the Joint Research Centre

The Joint Research Centre was been set up to combine the technical and financial resources of the Community to supplement in a number of essential fields the work being undertaken in member countries.

The Centre is split up into four establishments, each situated in a different Community country.

HOW TO PRODUCE NUCLEAR ELECTRICITY



1. Reactor Core
2. Cast-iron thermal shield
3. Concrete protective shielding
4. External concrete shielding
5. Fuel element channel
6. Charge and discharge channel
7. Moderator
8. Reflector (external surfaces of the m ode rator)
9. Monitoring equipment
10. Primary coolant circuit
11. Secondary water-steam circuit
12. Heat exchanger
13. Drum
14. Liquid phase return
15. Pre-heater
16. Boiler
17. Vaporiser and superheater
18. Turbine
19. Generator
20. Condenser
21. Supplementary coolant circuit fo screening and concrete shielding
22. Cold source of this coolant circuit
23. Pumps

The basic principle involved in producing nuclear electricity is a simple one. An atomic reactor produces heat through the controlled disintegration of its fuel (uranium) and thus plays the classical rôle of a furnace, the coal or gas being replaced by uranium. The heat thus produced merely has to be collected in order to feed a turbine linked to a generator, which supplies electricity (or turns the screw of a ship).

However, difficulties arise once the practical application of these principles starts, especially in view of the fact that the electricity produced by power reactors will, for several years to come, still be more costly than that obtained by conventional methods.

All the leading countries of the world are pursuing the same aim in their reactors research, namely that of improving the efficiency of reactors and of determining the type best suited for a particular function. The results thus obtained are, of course, dependent on the scope of the research programme. In Europe research has been centred on only a limited number of power reactor types, the scope of the research being too narrow for the probable needs of the future.

It is Euratom's rôle to increase the number of types of reactors known in Europe and to embark on detailed studies of everything concerning atomic power reactors (the extraction and processing of raw materials, the physics of nuclear energy, the physico-chemistry of reactors, the economics of power production, etc.), the primary aim of these studies, research projects and installations being to render the production of electricity from nuclear energy as economic as possible.

Euratom is participating in the construction of two reactors outside the Community (Halden and "Dragon") and one reactor in a member country (the "Suspop" reactor) and is investigating a new reactor string (the "Orgel" project) as part of its own programme.

The Orgel Project.

Euratom is using its own resources to study a reactor string, about which little is known in Europe, which employs natural uranium as nuclear fuel, heavy water as moderator and an organic liquid as coolant. This project, which has aroused considerable interest in scientific circles, has already resulted in the signing of several contracts with Belgium, Federal Germany, France, Italy and the Netherlands. Two important features of this project are the construction of a special testing reactor, abbreviated as ESSOR, and, at Ispra, a critical assembly, ECO.

The Suspop Reactor.

A 3-year contract of association is in operation between Euratom and the NV Tot Keuring van Electronische Materialen (KEMA), in the Netherlands, which provides for the construction of a homogeneous suspension reactor. This original design is one presenting several problems, both in the sphere of basic research (methods of preparing suspensions of uranium oxyde and thorium) and in that of applied research (erosion phenomena to which the reactor components are subject).

The Halden Project.

Euratom represents the six countries of the European Community in the Halden project, launched by the Norwegen Atomic Energy Authority and taken over by the European Nuclear Energy Agency for the construction and operation of a boiling heavy water reactor. This reactor went into operation on June 29, 1959.

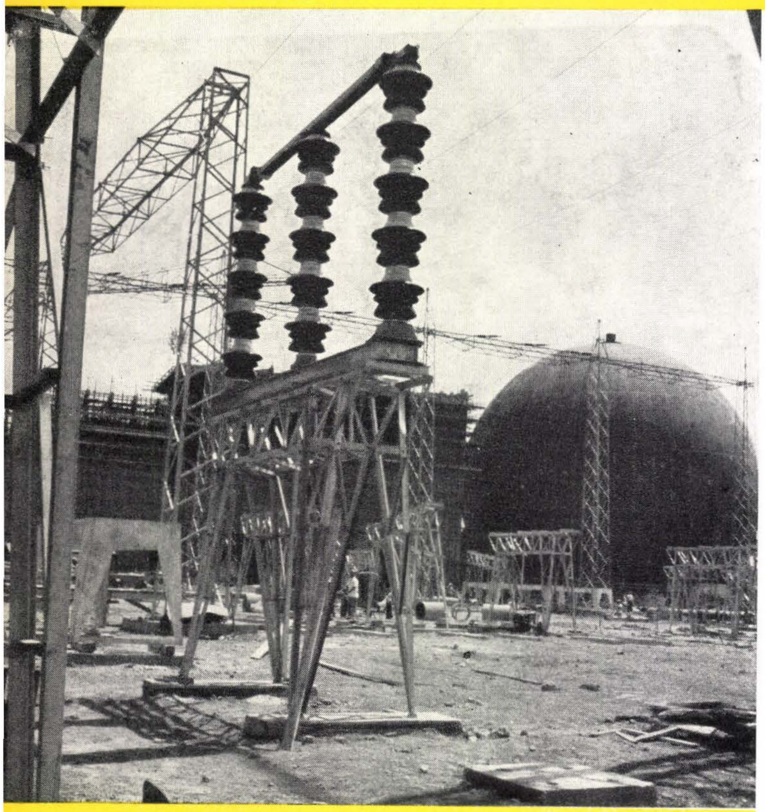
The "Dragon" Project.

Euratom also represents the six countries of the European Community in the European Atomic Energy Agency's Dragon project for the design and construction of a high temperature reactor — the coolant, pressurised helium, having a minimum outlet temperature of 750°C. This represents a considerable advantage in that it could appreciably improve reactor efficiency. This high-temperature reactor is under construction at the UK Atomic Energy Authority's Winfrith Heath centre in Dorset (Southern England). Euratom is playing a major part in the project and is contributing 43.4 % of the total cost as well as around 40 research workers, some of whom hold key positions.

Fast Reactors.

All reactors at present in existence or under construction in Europe are those in which the neutrons are slowed by moderator down to so-called "thermal" velocities. The only exceptions are the Dounreay reactor in the UK and the Rapsodie reactor under construction at Cadarache in France, in which the neutrons are not slowed down by moderators. This type of reactor, which presents exceptionally formidable technological problems, is likely to prove an important step forward in that the uranium isotope 238 easily collects the fast neutrons and a large amount of plutonium 239 is formed. As plutonium is also fissile, it can either re-feed the reactor or be recovered for use as fuel in another core. This means that the consumption of uranium 235 will be greatly reduced, thus reducing the cost of the power produced. Euratom is at present drafting a research programme on fast reactors and has concluded an initial contract with a Belgian firm on the study of fast-neutron critical assemblies. Far-reaching contracts of association are envisaged in this field with concerns in Federal Germany and France ("Rapsodie" project).

Euratom is participating in the construction and operation of Europe's first large nuclear power stations



The Italian Garigliano plant under construction (July 1961)

Euratom is to participate in the construction and operation of certain atomic power plants. While nuclear energy will be required to make good the energy shortage which will undoubtedly arise, it is not expected to become competitive with conventional sources of power until around 1970 — assuming that research and development goes ahead on the scale expected.

Once, however, that it has become an economic proposition, the ability of atomic electricity to make a major contribution to Europe's power supply will depend on whether the industrial resources and the experience of the electricity producers are adequate for the construction of nuclear power plants. Euratom's aim therefore is to spur the development of nuclear industry to ensure that the Community gains all the necessary experience and to make nuclear energy competitive at the earliest possible date. Clearly, it is impossible to carry out this three-fold aim without the construction of "full scale" (i.e. industrial scale) plants thus entailing the development of a reactor construction industry, the training of qualified staff and the study of technological problems in their true perspective.

A minimum of four or five years is required to design and build a reactor, and the shortest period of operation to enable useful experience to be derived from the plant itself is three to four years. Euratom has therefore allocated $ 32 million out of its five-year budget of $ 215 million for immediate participation in the construction and operation of atomic plants in the Community. This participation is of a varied nature, and, depending on the individual case, covers such costs as the manufacture of fuel elements and certain reactor components or the additional expense involved in starting up a nuclear power plant, as opposed to conventional power stations.

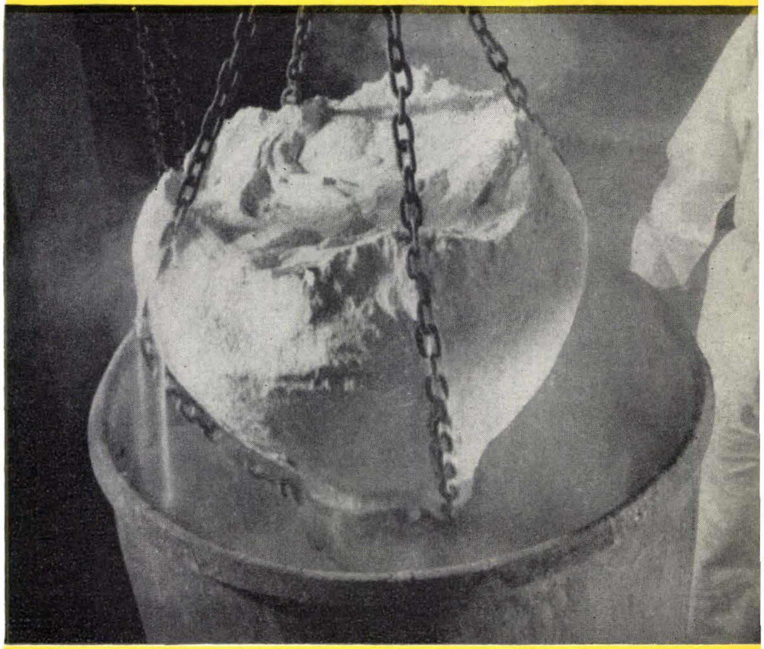
Conversely, the knowledge thus acquired in designing and running nuclear plants will be transmitted to Euratom, and hence to the whole European industrial network, in the form of detailed technical reports by the engineers and through the presence at the site of the technicians and trainees seconded by the Community. So far, three firms have requested Euratom's participation: the Società Elettronucleare Nazionale (SENN), which is building an atomic power plant north of Naples, the Società Italiana Meridionale dell'Energia Atomica (SIMEA), which is constructiong one at Latina, and the Société d'Energie Franco-Belge des Ardennes (SENA), which is about to start work on a plant at Chooz in the French Ardennes.

In addition, under the agreement between Euratom and the United States signed on 8 November, 1958, European industrialists can now obtain experience of American techniques, obtain financial loans at a favourable rate of interest and obtain supplies of nuclear fuels on favourable terms.

The Italian Atomic Power Plant on the Garigliano.

The Euratom-US Agreement provides for the construction of atomic power plants and the execution of a joint research and development programme. On 13 April, 1959, Euratom invited electricity suppliers to submit their projects for nuclear power plants to be constructed by 1963.

Five firms replied, the Italian SENN firm (already mentioned), the German "Arbeitsgemeinschaft Baden-Württemberg zum Studium der Errichtung eines Kernkraftwerkes" (AKS), the SENA grouping of the "Electricité de France" and the Belgian "Centre et Sud", the German "Berliner Kraft- und Licht AG (BEWAG)", and the Dutch "Samenwerkende Electriciteitsproductiebedrijven (SEP)".



Ingot of uranium metal with calcium gang after calcium heat treatment (Usine du Bouchet, France)

Uranium ore

Two large power stations under construction.

So far, the Italian SENN firm has presented a project within the time limit and the Franco-Belgian SENA has confirmed its intention of constructing an atomic power station to come into action by 1965.

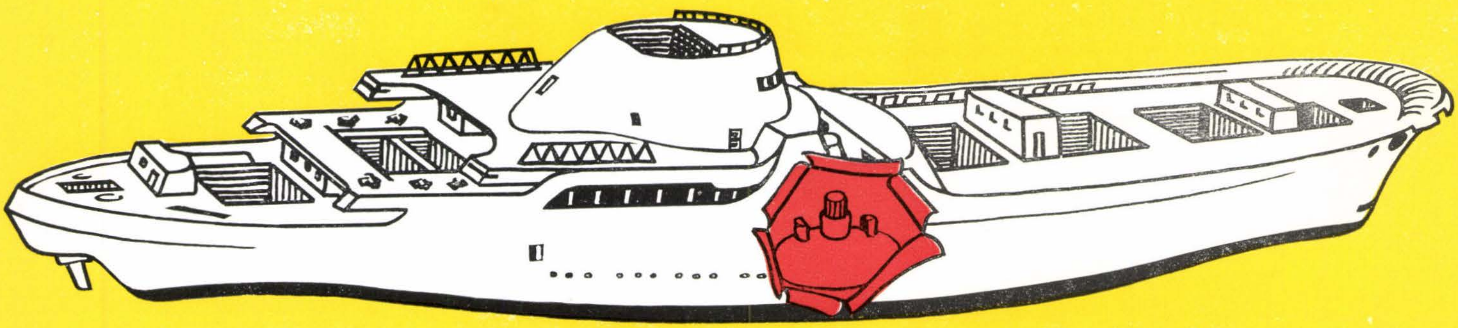
The Italian centre is being built 40 miles to the north of Naples, a few miles from the mouth of the Garigliano river. It will be of 150 MWe capacity and will supply the Italian electricity network in 1963.

The second power station under construction under the terms of the US-Euratom agreement is the SENA project. On 19. July 1960, the Council of Ministers awarded the project the status of Joint Enterprise, which will enable it to benefit from certain important fiscal and customs privileges. On 26 July, 1960 the SENA company informed Euratom that the tenders of the ACEC-Framatome-Westinghouse groupings would be retained for its power project. This plant, which will be built in France a few miles from the Belgian frontier on the river Meuse, will be equipped with a 242 MWe pressurised water reactor.

The testing of reactor constructional materials.

In order to select from the many potentially suitable materials most suited for use in reactor construction, the nuclear industry must have at its disposal an efficient means of testing them. Under an agreement between Euratom and the Belgian government, the Community has access to a remarkable item of equipment, the BR2 test reactor. The Community is participating in the operation of this reactor, whose neutron flux is the fastest in Europe thus enabling it to irradiate extremely rapidly the various materials to be studied.

NUCLEAR SHIP PROPULSION PROJECTS



Another use for nuclear power is the propulsion of ships. For Euratom nuclear ship propulsion has the double attraction of posing interesting nuclear and technical problems and of being of interest to the shipbuilders who represent a major section of private industry in Europe.

Euratom's rôle here is that of a co-ordinating body and a source of financial, technical and material aid. For a start, the Commission has decided to participate in four research and development projects in Federal Germany (two), Italy and the Netherlands respectively.

The Federal German projects.

In January, 1961 Euratom signed a contract with the Gesellschaft für Kernenergieverwertung in Schiffbau und Schiffahrt (GKSS), Hamburg, and the Interatom Company for the development of an OMR marine reactor (cooled and moderated with an organic liquid).

Since then the Commission has decided to join in a general research programme proposed by the GKSS. This programme, to which Euratom will contribute \$ 1.8 million, involves a series of original experiments on ship propulsion reactors (e.g. shielding and stability tests) to be carried out over a five-year period. This research programme is likely to be followed by the design of a ship propulsion reactor.

The Italian project.

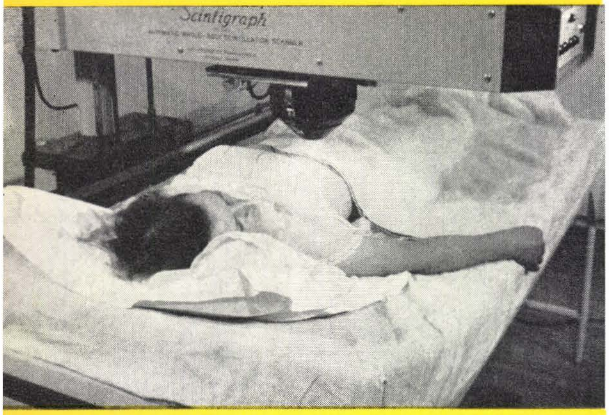
Euratom will contribute about \$ 1.2 million to the two-year research programme of the Italian Atomic Energy Commission (CNEN), the Fiat company of Turin and the Ansaldo ship-building company of Genoa to undertake research on a 50,000 ton nuclear-powered oil tanker.

The Dutch project.

The Dutch programme is in the hands of the Reactor Centrum Nederland (RCN) in collaboration with several Dutch firms. Research will be carried out on the adaptation of pressurized water reactors to the requirements of marine propulsion, and a complete plan for such a reactor is to be prepared. Euratom is to contribute about \$ 1.9 million, the contract being for three years.

Parallel to this technical research, certain specialists in marine and shipbuilding affairs, under the aegis of Euratom, are to carry out technical and economic studies on questions concerning-tonnage, type of freightage, length and other matters relevant to the operation of nuclear-powered merchant ships.

Radiation and radioisotopes for use in biology, medicine,



Detection of liver tumours
at the Joliot Hospital, Orsay, France.

Radiation is the term given to the various types of rays (alpha, beta, gamma) emitted by certain instruments and all natural and artifical radioactive substances.

While its resistance to the action of other physical agents is relatively good, living matter — and especially man — is exceptionally sensitive to the effects of radiation, for life is a delicate balance of phenomena the correct functioning which of is dependent on the harmonious operation of an extremely complex machinery. Quite slight changes in certain critical aspects of this mechanism can thus cause functional disorders, and while the action of radiation itself is almost instantaneous, it make take days, months or even years before these disorders become apparent. It can, for instance, result in a lethal attack of radiation sickness, the growth of cancer tumours, a reduction in life expectancy, sterility or malformations in the offspring.

The possible, but at the same time avoidable, consequences of irradiation and the part played by nuclear energy in the modern world present an important and pressing problem.

An essential aspect of a nuclear industry: the development of radiobiology.

Ignorance of the mechanics of the action of radiation on living beings is primarily due to insufficient knowledge of the mechanics of biology in general. It is therefore essential that research into basic biology be conducted parallel to research into radiobiology proper. One of the critical points of living matter, for example, which reacts to radiation, is deoxyribonucleic acid, the main constituent of the chromosomes (the material vehicle of heredity). In order to understand the effects of radiation in this field and, even more fundamentally, to learn more about the physico-chemistry and biology of this strange molecule, Euratom has already concluded a research contract on the interaction of these rays and the deoxyribonucleic acids with the Laboratoire Pasteur de l'Institut du Radium, Paris. Others are being prepared on basic biology with various institutes in the Community countries.

As well as research on the effects of radiation on living matter, however, attention should be given to research aimed at improving the empirical means of treating its harmful effects (e.g., grafting of bone marrow). Euratom has therefore signed an association contract with the Dutch Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijke Onderzoek (TNO).

agriculture and industry

Radioisotopes.

Together with protection against the harmful effects of radiation, there are a multitude of others which can be used to improve man's welfare and health, particularly in the form of radioisotopes. These radioisotopes, otherwise known as radioelements, are elements (gold, cobalt, phosphorus, iodine etc.) which have been rendered radioactive by being placed in an atomic reactor.

1. With the aid of radioisotopes a great number of basic problems of animal and plant **physiology** can be studied and solved.

2. In the field of **medicine,** radioisotopes and radiation pave the way for:

— more precise and earlier diagnoses;
— more selective treatment (especially for cancer).

3. In their application to **agriculture,** radioisotopes offer an insight into the behaviour of the various elements in the soil and plants, enable food products to be preserved through irradiation and, through the mutations caused, a higher quality of vegetable products and improved strains of animals may be brought about. A large-scale 20-year association contract between Euratom and the Dutch ITAL institute is dealing with this type of research.

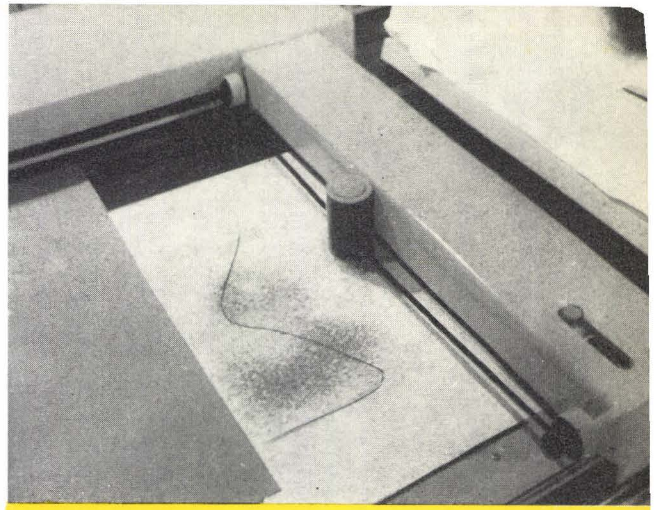
The Industrial Application of Radioelements.

There are many possible uses to which radioisotopes can be put so as to bring about important economies or increases in efficiency. Euratom intends to:

1. **Rationalise production** by co-ordinating the work of the various producers of radioisotopes, special aid being given on their use in certain fields.

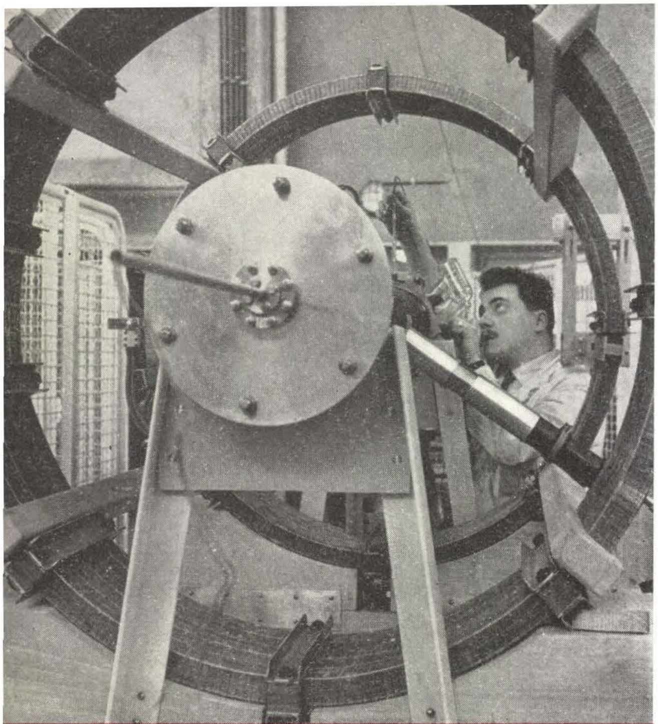
2. **Develop the industrial uses of radioisotopes.** Radioisotopes are much less employed in European industry than in the U.S.A. and the U.K. This is due less to the difficulty of obtaining them (France, Belgium and the Netherlands are producers) than to insufficient knowledge, in particular on the part of small and medium-sized firms, of their innumerable uses.

Euratom has therefore set up a Radioisotope Information Bureau which issues brochures and films and, in collaboration with the specialised national bodies, advises interested parties concerning their particular problems.

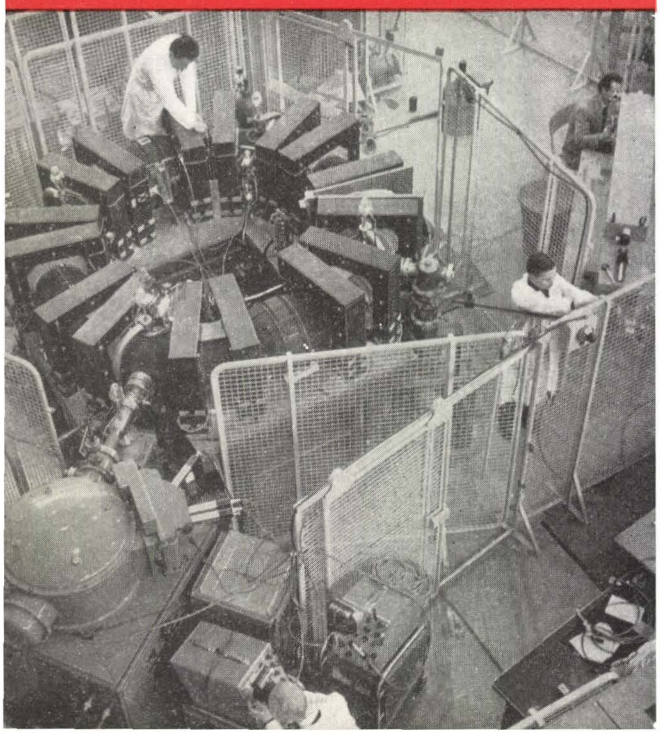


Localisation of liver tumours
at the Joliot Hospital, Orsay, France
The photograph shows that the isotopes
absorbed accumulate in the affected area

Monitoring rainwater radioactivity



Experimental equipment for fusion studies



Fontenay-aux-Roses, Frascati and Munich, Europe's Centres for the study of thermonuclear fusion

Controlled thermonuclear power (or fusion) offers limitless possibilities for the future — if only it can be put to industrial use. With it, electricity could be produced at a negligible cost and on a vast scale.

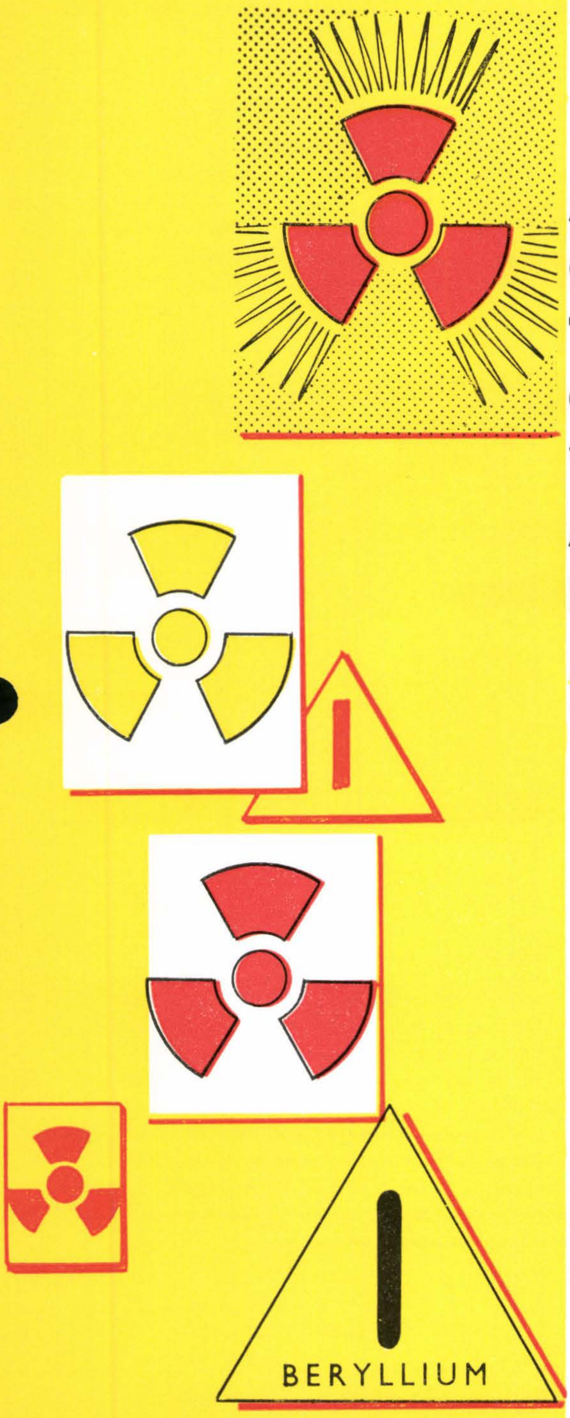
Present uses of fusion are unfortunately limited to the brutal, destructive force of thermonuclear energy in the shape of the H-bomb. Attempts are being made to tame H-power for the good of mankind, but the difficulties hitherto encountered have been so great that it will not be available for industry in the near future.

Euratom is interested in the numerous problems posed by controlled thermonuclear fusion and has signed a contract of association, renewable after three years, with the French CEA (Commissariat à l'Energie Atomique). According to this contract, Euratom is contributing $ 6 million out of a total budget of $ 9 million and (at present 40) research workers drawn from various laboratories of the European Community. The CEA, for its part, is placing its laboratories and staff at Euratom's disposal. This project is under the direction of a joint management committee.

The research at Fontenay-aux-Roses is being carried out in new premises specially built for this type of work.

The Euratom-CEA joint management committee has also signed a subcontract with the Comitato Nazionale per l'Energia Nucleare for fusion work at its Frascati laboratories, while a three years' contract of association has been signed between Euratom and the Institut für Plasmaphysik G.m.b.H., at Garching, near Munich. About 80 physicists, engineers and technicians will form the staff at Garching, where the laboratories are now nearing completion.

It is still far too early to speculate about the outcome of these fusion studies, above all about the date at which a prototype thermonuclear plant is likely to go into service. But one thing is certain: that this sort of research is so expensive and offers so many different fields for exploration that it must be undertaken on a Community scale.

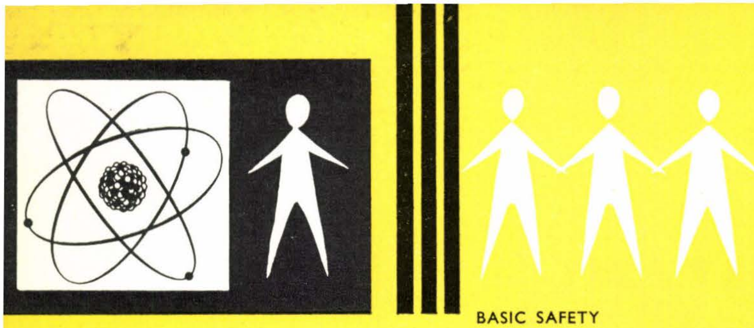


A CONSTANT CONCERN : THE PROTECTION OF WORKERS AND POPULATION

Atomic energy has been placed at a disadvantage in the eyes of the world by first manifesting itself in the form of the holocaust, with which, even today, it is readily associated. This fear might well result in a certain prejudice against the use of nuclear energy for industrial power, owing to the known dangers of radiation. However, in practice, wherever atomic energy is being put to peaceful uses, from large generators to industrial and medical equipment, hygiene and safety precautions are so rigorous that workers are not subjected to any greater risks than those in other industries.

As regards the protection of the population at large, a close-knit network of monitoring and sampling stations keeps a constant check on the state of the air, water and soil as well as the food chain.

Euratom's responsibilities regarding health protection are principally the establishment of basic standards, keeping a watch on radioactivity levels and ensuring adequate security measures in installations.

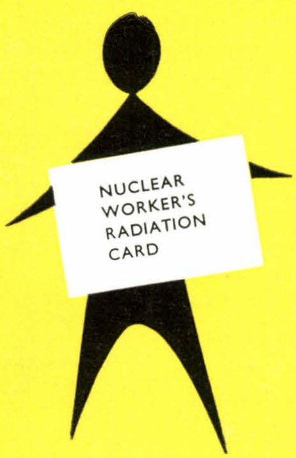


a) **Establishment of Basic Health Standards.**

In January, 1959, Basic Health Standards drawn up by the Commission were adopted by the Council of Ministers and are being adopted as the basis of health legislation in the member countries. Once they have been brought into force as law, Euratom will have established a standard Community system for basic health legislation in the nuclear field.

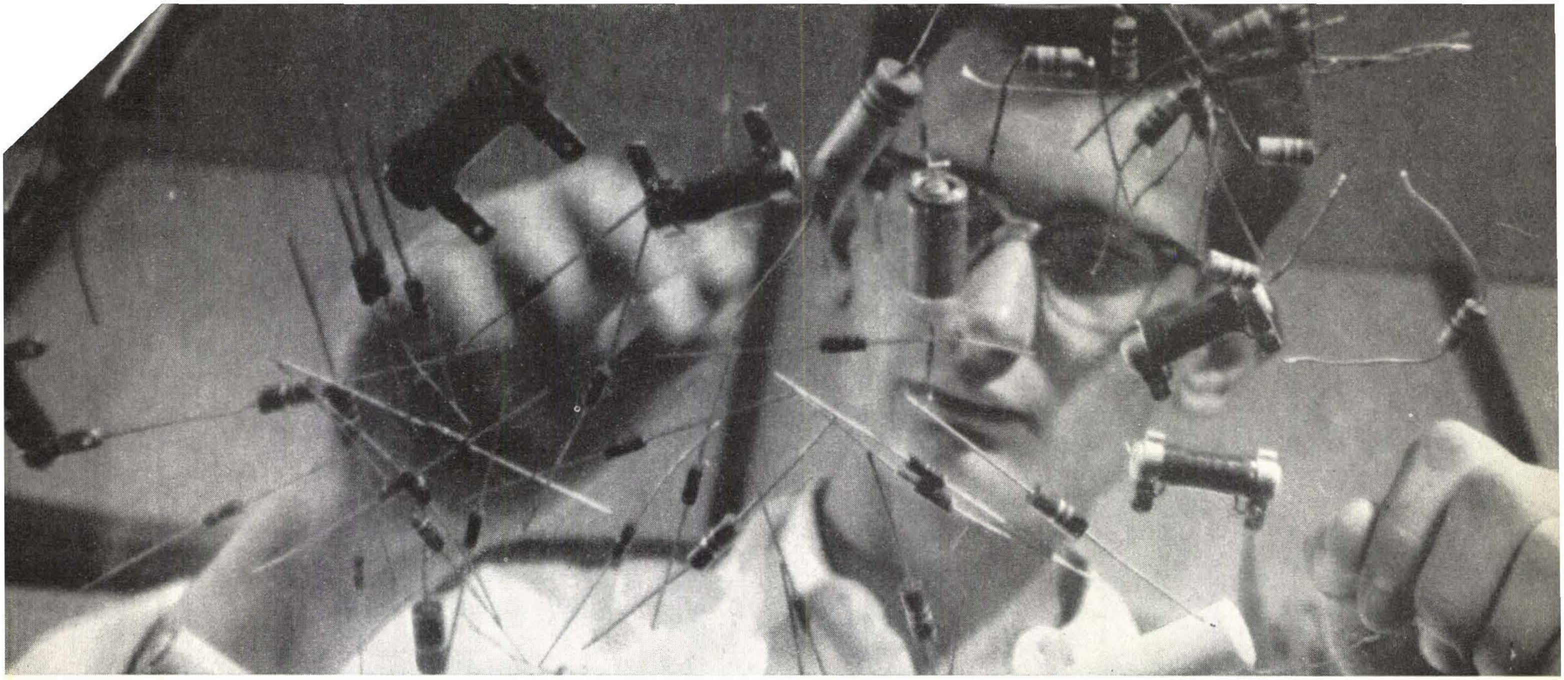
b) **Safety in nuclear plant.**

This is one of Euratom's leading problems: the development of a nuclear industry can only go ahead if adequate safety precautions can be guaranteed. During 1961 several projects for nuclear power plants have been examined from the health and safety angle by the Commission. Euratom has drafted a model irradiation card for nuclear workers which has been accepted by the member states and is already in use in major nuclear power plants. Finally, in accordance with the Euratom Treaty, the member countries submit to Euratom all new projects for the disposal of radioactive waste.



c) **Monitoring Background Radioactivity.**

Euratom has compiled a list of the monitoring stations used in the European Community to monitor radiation levels in the air, surface, drinking and sea water, the soil and the food chain and the Commission is periodically informed of their findings. In addition, technical studies carried out jointly with the member states are aimed at standardising the control methods used throughout the Community. The background radioactivity of the major river basins, for example, is to be a subject of their joint study. Identical studies on the monitoring of the food chain are to be carried out in the six member countries.



Electronically compiled documentation

The development of a Community-scale atomic industry demands the widest possible availability of information. Euratom has an important part to play here including the creation of a documentation centre consisting of a technical and scientific library accessible to all research workers (both from the Community and outside countries). A documentation pool, "Transatom" deals with translations of technical documents from Slav or Oriental into Western languages; working in direct collaboration with their opposite numbers in the United States and in Great Britain, this pool provides a central filing system of all information relevant to the translations and publishesa monthly periodical, "Transatom Bulletin", containing news of existing and forthcoming translations.

Machines for translating scientific papers.

At Ispra Euratom has set up a scientific data processing centre (CETIS) to undertake complex calculations, to classify all types of data and to prepare scientific languages, all of which is performed by an electronic brain which analyses, selects and supplies the results or information required.

The Centre is carrying out studies on the automatic translation of the principal languages and is developing an artificial language for use in an automatic filing system. The work is being conducted with the aid of powerful computers.

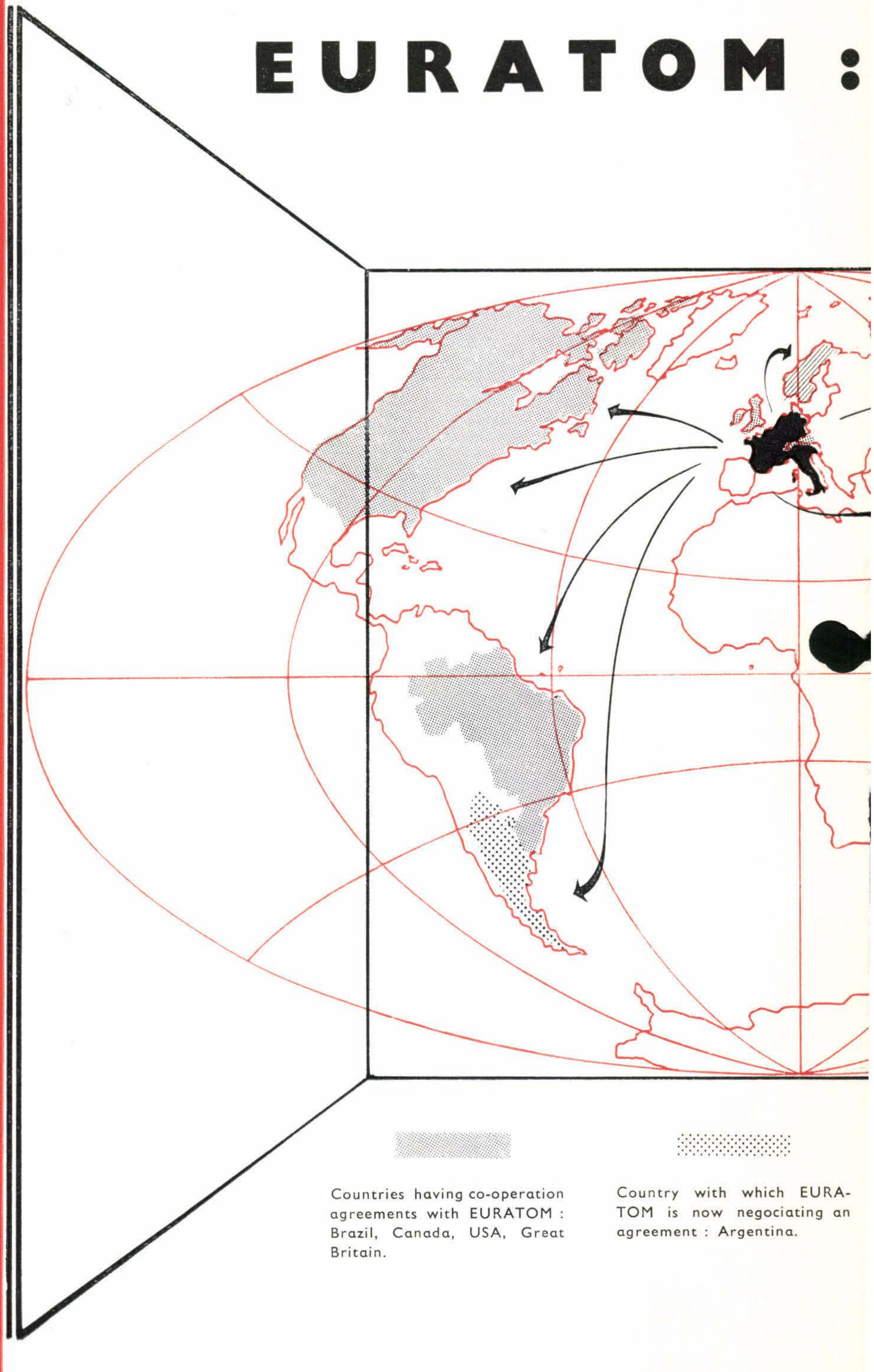
The European Atomic Energy Community maintains close contact with the rest of the world. Agreements for co-operation put Euratom's research programme on a far broader basis by enabling it to participate in the development of a wide range of reactor types, each of which might prove to be the key to really cheap nuclear energy.

The US-Euratom Agreement for Co-operation: signed on 8 November, 1958. M. Etienne Hirsch, the former President of the Euratom Commission, has defined the object of this agreement as follows: "the first aim was a political one . . . to strengthen, by a combined effort, the unity of Europe and the ties between this new European Community and the US. The second aim was an economic one; it was to add to the reactor experience already gained in the United States the experience of full-scale construction in Europe, where the cost of conventional fuel is higher. This effort was to be accompanied by a major research and development programme".

The UK-Euratom Agreement for Co-operation: signed on 4 February, 1959, for an initial period of 10 years. Its aim is "co-operation in the peaceful use of nuclear energy" between both public and private institutions and establishments in the United Kingdom and the Community. The main clauses provide for the exchange of information and training facilities, the supply of nuclear fuel and reactors by the United Kingdom, and the creation of two committees each composed of representatives of the two sides.

The Commission and the UKAEA undertake to exchange unclassified information concerning the peaceful use of atomic energy and to help persons and firms to supply each other with information, within the limits imposed by the requirements of patent regulations. They likewise agree to exchange technical advisers and to receive in each other's schools and training centres the students and technicians of the other party.

EURATOM :



Countries having co-operation agreements with EURATOM : Brazil, Canada, USA, Great Britain.

Country with which EURATOM is now negociating an agreement : Argentina.

a window on the world

Countries with missions accredited to EURATOM : Austria, Conada, Denmark, Great Britain, Japan, Israel, Norway, Sweden, Switzerland, the Republic of South-Africa and the USA.

There has already been an exchange of knowledge and personnel and the Continuing Committee and Working Group meet at regular intervals.

The Euratom-Canada Agreements: signed on October 6, 1959, one with the Canadian Government and the other, of a technical nature, with Atomic Energy of Canada, Ltd.

The first agreement provides for the exchange of information, nuclear materials, reactors and equipment, the use of patentable information, and the use by each contracting party of the other's material and training facilities. In particular, it provides for a joint research programme on heavy water-moderated natural uranium reactors.

The contract with Atomic Energy of Canada, Ltd. concerns research and development work on heavy water-moderated natural uranium reactors. Canada has placed all its emphasis on the development of this type of reactor, one of which, now under construction, will be used for power production.

The Euratom-Brazil Agreement for Co-operation: signed on 9 June, 1961, the main purpose is to aid Brazil in the development of its nuclear industry, especially in the training of technicians and ore-prospecting.

RELATIONS WITH INTERNATIONAL ORGANISATIONS

On the Community's behalf the Euratom Commission has ties with such United Nations' bodies as the World Health Organisation, the International Labour Organisation (with which the Commission has an agreement on health and safety), the Food and Agriculture Organisation and the GATT Secretariat. In Europe the Community is closely linked with the European Nuclear Energy Agency set up by the OEEC, through representing the Community in the "Dragon" and Halden projects.

Finally, eleven countries have missions accredited to Euratom: Austria, Canada, Denmark, Great Britain, Japan, Israel, Norway, Republic of South-Africa, Sweden, Switzerland and the United States.

New problems of education

The development of a European scale nuclear industry and European integration generally poses new problems not only for scientists, but also administrators and technicians. It was for this reason that the Euratom Treaty provides for "an institution at university level". On the basis of this provision the Commission has already laid the foundations for a European University. It is also organising training courses in the atomic field and it is planned to award "Euratom diplomas".

The European University

The declaration of cultural co-operation drafted following the conference of Heads of States and Governments held at Bonn on July 19, 1961, refers to "Italian responsibility for the establishment of a European University at Florence, to the intellectual life and financing of which all the six governments will contribute". As a result of this conference, the Italian government has been given the task of setting up the University, but representatives of the European Community will be associated with the various aspects of the preparatory work. It will be located near Florence.

The University will be given an international charter which will stipulate the scope of the courses, the terms governing the recruitement of teaching staff and students and the award of a European doctorate. A group of educational experts from the six countries has been entrusted with this work.

Euratom Training Courses

Euratom has organised two to twelve month training courses for students in nuclear centres in the member countries and, since 1961, at the Ispra and Geel establishment of the Joint Research Centre.

The institutions of Euratom

Euratom has four institutions, each with certain powers. These are :

1. **The COUNCIL OF MINISTERS** of the six Community countries which has final powers of decision and takes all measures to co-ordinate the policies of the member states. Each Government delegates one of its Ministers to the Council, which takes ananimous decisions in **certain** cases (e.g. the preparation of the research and training programmes, amendments to proposals from the Commission, applications for membership of or association with the Community from third countries). Other decisions are taken by a so-called "qualified" majority which takes account of the differences in size of member-countries, or by simple majority.

2. **The COMMISSION,** which acts as a body and consists of five members independent of but appointed by the governments of the member states. It is responsible for ensuring the application of the Treaty, and has powers of decision in certain clearly-defined sectors. It has close links with the Executives of the other two Communities and co-operates closely with them in much of its day-to-day work.

The present membership of the Euratom Commission is :

MM. Pierre CHATENET, President (French)
Enrico MEDI, Vice-President (Italian)
Paul DE GROOTE, Member (Belgian)
Heinz L. KREKELER, Member (German)
Emmanuel M.J.A. SASSEN, Member (Dutch)

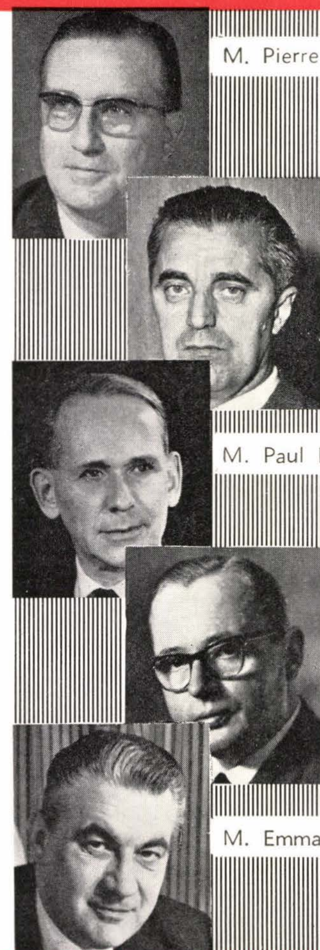
3. **The ASSEMBLY,** common to the three Communities, exercises deliberative and supervisory powers. It consists of 142 representatives from the member states, delegated from their national Parliaments. It discusses the annual report which must be submitted to it by the Commission, which it may dismiss from office by a two-third majority vote; it must also be consulted before certain decisions are taken and has the right to scrutinize Euratom's budget.

4. **The COURT OF JUSTICE,** composed of seven judges, which ensures observance of law and justice in the interpretation and application of the Treaty. It has sole power to uphold or annul decisions of the Executives. Its judgments are binding on all parties concerned in the application of the Euratom Treaty.

For all additional information, apply to the European Communities **Information Offices,** namely :

BONN, Zitelmanstrasse, 11, Tel. 26.041
THE HAGUE, Mauritskade, 39, Tel. 18.48.15
LONDON, S.W.1, 23, Chesham Street, Tel. BEL 49 04
PARIS 16e, 61, rue des Belles-Feuilles, Tel. KLEber 53-26
ROME, Via Poli, 29, Tel. 68.81.82-68.13.48-67.06.96
WASHINGTON 5 DC., Southern Building 236, Tel. National 8.7067

Euratom Commission, 51-53, rue Belliard, BRUXELLES, Tel. 13.40.90.



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