第15回原産年次大会 英語論文

1982年3月

社団法人 日本原子力産業会議

セッション 1、 ブリックス IAEA事務総長

発表は 3月 8日 午前/午後 時 以降に願います。

ADDRESS

BY

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DIRECTOR GENERAL OF THE INTERNATIONAL ATOMIC ENERGY AGENCY

AT THE

JAPAN ATOMIC INDUSTRIAL FORUM CONFERENCE

8 March 1982

Introduction - Japan's Interest in Nuclear Energy

1. I am very grateful for the opportunity you have given me to make one of my first public statements as Director General of the IAEA in Japan. Japan plays a very important role in the IAEA and holds this year for the third time the Chairmanship for the Board of Governors. For several reasons Japan is also a particularly appropriate place to discuss the role of nuclear energy in the world and the mission of the IAEA.

First, Japan provides an example of a society that is rapidly achieving a very high standard of living for its citizens. Despite an impressive conservation record, Japan will need increasing sources of energy especially for electricity production. Nuclear energy is amongst the few viable solutions.

Second, Japan has reached a level of extreme sophistication in mastering complicated and advanced scientific techniques. Thus Japan's cadres of man power and its infrastructure, administrative as well as technical, offer a reassuring basis for the long step into the nuclear future.

Third, the density of population of these islands is such that no one is tempted to take lightly the questions of safe running of nuclear plant and safe disposal of nuclear wastes.

Fourth, and last, this country, alone in the world, has experienced the horrors of the military use of nuclear power and shares the ardent wish of millions so to order the peaceful uses of nuclear power that the proliferation of nuclear weapons is avoided and so to act that nuclear disarmament becomes a reality.

The General Energy Question

2. Let me first address the question of nuclear power development in the world, which is linked to the general question of energy development.

Of the general energy question it may be said that hardly any single other issue is of equal importance to world peace and to the progress of the developing countries. Until recently it was the practice of the industrialized world to satisfy most of its vastly increased energy needs by consuming more oil. This has contributed to making the Middle East potentially the most explosive region of the world, has precipitated the oil price rises which the industrial countries have still not been able fully to assimilate and which have led to catastrophic economic disruption in many developing countries.

A lessening of the world's thirst for the finite reserves of oil and a more equitable distribution of oil itself is attainable only if other sources of energy are exploited. While research should be and is being intensified into many alternative sources, only coal, nuclear and hydro power offer significant alternatives at the present time. They should all be used.

The Nuclear Option

3. There are those who are convinced that nuclear energy is merely a passing phase in world energy production. I think, however, that one should guard against drawing rash and final conclusions from those, hope-

fully temporary, factors which have combined to make the nuclear option less attractive in several countries today. The three main factors are:

a) The international recession, which has generally dampened the demand for energy. While there are sharply different views on the wisdom of current economic policies of various governments, it is reasonable to expect that the world economy will in time recover; that unemployment will be brought down; that the development process will regain momentum and that the many social needs that still exist in the industrialized societies will be met by increased production. All this requires more energy.

b) Compared to energy produced by coal and oil nuclear power has high capital and low fuel costs. Abnormally high rates of interest thus penalize nuclear power. No one believes that the present high rates can last indefinitely.

c) The nuclear industry is rather young. When the civil aviation industry was of comparable age I think many people would have had reservations about flying; in fact they preferred to go by train or ship. The regulation of civil aviation and sophistication in handling its safety problems were also at a stage of continuous development, not dissimilar from nuclear power regulations and safety today. Regulation and safety are promotional.

Thus the public reservations about nuclear power and the long lead-times for building plants that we see today in several countries may be a consequence of the relatively short experience we have had with nuclear energy. Youth, it is said, is curable over time. The nuclear industry, too, is coming of age.

Variations Between National Nuclear Programmes

4. These, however, are no arguments for complacency, nor for an assumption that the attractiveness of the nuclear option will automatically increase. Dedicated efforts will be needed to restore nuclear energy's role. Let us look briefly at the situation in various countries; it is by no means homogenous.

   a) Perhaps the most depressed situation at the moment is in the country that pioneered nuclear power, the United States. In 1981 alone eight further orders for plant were cancelled. The long lead-times show no signs yet of decreasing. Interest rates are on the rise again. The utilities face formidable problems in raising needed capital. No new orders seem to be in prospect for several years.

   b) Almost the opposite is true of France where there is a continuing commitment to nuclear energy after a change in government and a parliamentary debate of the issues. There have been minor reductions in the 1982 and 1983 programmes, chiefly reflecting lower demand projections. By 1990 56 rather than 59 nuclear power plants will be in operation.

   c) In the rest of Western Europe the picture is more mixed. The debate on the role of nuclear energy continues. Local opposition frequently frustrates the generally positive policies of central governments in, for instance, the Federal Republic of Germany, Spain and Switzerland and even the UK. The prospects are modest growth, weakest in Switzerland, strongest in Spain.

   d) The Soviet Union and Eastern European countries remain committed to the rapid expansion of nuclear power, which seems to be limited only by constraints on manufacturing capacity.

e) I hardly need recount the Japanese situation. Dependence on imports has made the development of nuclear power and diversification of the energy base a high priority for many years. The only visible prospect of some degree of energy independence is the fast breeder reactor fuelled largely by home-bred plutonium. For these and other reasons you must derive satisfaction from the progress being made towards commercial reprocessing and towards gas centrifuge enrichment.

f) The developing countries present an equally mixed picture. Balance of payment problems appear to have slowed down somewhat the Argentinian and Brazilian programmes but the prospects of a large programme have opened in Mexico. The first Yugoslav power plant has just come on line and tenders may soon be called for a second. Egypt has announced an eight reactor programme of which the first two appear to be on the point of commitment. There is talk of introducing nuclear power in Algeria, Libya, some Gulf states and Indonesia but no concrete plans have emerged. The Indian programme moves ahead somewhat slowly. Perhaps the most consistently growing developing country programmes are in the Republic of Korea and in Taiwan.

Future Prospects for Nuclear Power

5. Despite the ups and downs that nuclear power has experienced, this audience is convinced, as I am, that the nuclear option remains an important one. The share of electricity produced by nuclear power worldwide had already reached 8 % in 1980, will rise to 17 % in 1985

and probably to 18 % in 1990. There are wide variations from country to country. The 1985 figure for Japan is 15 %, for the Federal Republic of Germany 20 %, for the United States 17 %, for Belgium and Sweden 50 % or over and for France 60 %. In fact already to-day there are periods when more than half of France's electric power is coming from nuclear reactors.

Looking to the future, France and the USSR are the world leaders in the development of the fast breeder. France's first commercial plant SUPER-PHENIX due in operation next year. The UK breeder programme has achieved good results but commercialisation is not in sight. There have been serious problems in meeting the rapidly increasing cost of the German-Dutch-Belgian plant at Kalkar. I understand that the (Japanese) JOYO reactor is being converted into a materials testing irradiation reactor and that good progress is being made with the plans for the pilot fast breeder MONJU; valuable experience is being gained by the operation of the Heavy Water Reactor FUGEN - named respectively after the Boddhisatvas of Wisdom and Compassion and symbolizing their control of the powerful nuclear forces within the reactors.

All in all it seems reasonable to assume that the fast breeder reactor may begin to play a significant commercial role in a few industrial countries by the turn of the century and possibly earlier in France.

A more distant but increasingly fascinating prospect is thermonuclear fusion and we appreciate the support Japan has given to the INTOR Fusion Project. International cooperation in major joint undertakings of this kind can give obvious benefits in mobilizing large investments, in avoiding wasteful duplication of essentially similar projects and in promoting the intellectual exchange which is the driving force in all branches of science and technology.

In a shorter perspective a growing number of nuclear power plant manufacturers are showing interest in designing and marketing smaller thermal reactors - in the 200-400 MWE range - that might now be economically competitive with fossil fuel plants as well as being more appropriate to the needs of several developing countries whose grids are still too small to accommodate today's standard sizes. We should not, however, underrate the problems attending the decision-making process, the commitment in resources and the time it might take to translate such projects into operating plants. Nor the manpower and infrastructure problems in the developing countries.

A related development in my own country has been the design of a relatively small thermal reactor (200 MWth) solely for the purpose of providing heat for district heating. The project which goes by the name of SECURE (Safe Environmentally Clean Urban Reactor) is reported to be inherently extremely safe because of the relatively low temperature and low pressure at which the reactor would operate, thus eliminating the possibility of an accident involving significant loss of coolant. The Soviet Union is pressing ahead with similar but larger reactors for the same purpose.

Reversing the Decline

6. These long term perspectives are exciting but if the

industry is to remain healthy or even to survive in certain countries the present trends in reactor orders must be reversed. What can be done and what is the IAEA's mission?

On a personal note let me say that while I am aware that temporary perception often moves the public and determines policy, I am not in favour of using propaganda to manipulate perceptions. The spirit of a disinterested civil service and its dedication to a detached objectivity will, I think, not only be more respectable but also one that a public, tired of being manipulated, will want us to demonstrate. Moreover, I believe that in the long run the facts about the nuclear industry and its record - which is very good - will shape both popular and political perceptions of it. What we can do - the IAEA, governments and the nuclear industry - is to help maintain that record in such a way that the doubts that have existed and still exist in some sections of the public, are allayed. These doubts arise chiefly on three counts:

- operational safety,
- environmentally safe disposal of nuclear waste,
- avoiding proliferation of nuclear weapons and the capacity to make them.

Safe Operation

7. I hardly need remind an audience in Japan why the man in the street is sensitive to any risk of uncontrolled radiation. Despite the remarkably good safety record of nuclear power itself, the general public in many countries is not yet at ease with it.

The Three-Mile-Island accident, the incident at Tsuruga last year and the recent mishap at GINNA remind us that there is room for improvement - although in the GINNA case both operators and safety devices functioned as they should in contrast to Three-Mile-Island.

One pre-requisite for better safety is a freer exchange of safety-related information. As the Managing Director of your Forum recently pointed out, there is a risk that "the most important data on safety will be classified as corporate secrets and therefore ... hardly made available". Such restrictionism would be very shortsighted. On the contrary it is very much in the interest of utilities and industry to cooperate fully with the IAEA in its undertaking, launched last November, to serve as a focal point for the world-wide collection, analysis and dissemination of information concerning significant abnormal operating experiences.

Internationally agreed safety standards are also a major element in gaining public acceptance as well as in helping countries that are introducing nuclear power. Most of you will be familiar with the IAEA's work in this field through its Nuclear Safety Standards Programme, which is now entering its ninth year and which is covering every aspect of nuclear power plant regulations, siting, construction, safe operation and quality assurance.

The Three-Mile Island accident and the Tsuruga incident although very different in scope and consequences, both underlined the importance of operator training. The IAEA is developing guidelines for raising the level of and standardizing the requirements for plant operator qualifications and for ensuring that these are always maintained at the requisite high level.

As your Forum has also pointed out, we need an internationally agreed and clear-cut safety goal based on a reasonable application of the cost-benefit principle. The safety standards set for nuclear plants are higher than those of other industrial plants that deal with other dangerous materials but safety added must not be marginal in relation to the cost involved.

Finally, the IAEA is helping Member States to deal with nuclear emergencies by assisting them to improve preparedness at the site and in its environment, by setting up international arrangements to fly in safety experts at short notice, by preparatory work for international agreements for mutual assistance and by up-grading the IAEA's effectiveness in serving as a focal point for arranging emergency help.

Waste Disposal

8. Our second objective must be to show that we have mastered the problems of disposing safely of nuclear wastes. Concern about the environmental effects of every industrial activity is very strong today and rightly so. We live in the midst of our industrial refuse and pump it steadily into the atmosphere.

Paradoxically we have failed to get across to the public the fact that nuclear power is environmentally less damaging than other available sources of energy. Technically there may be advantages in keeping nuclear wastes on the surface for some decades, while its activity falls by several orders of magnitude. But if we are to gain the public's confidence, we must demonstrate now our ability to handle nuclear waste and show how it will be done in practice. Moreover, we must not leave the bill to the next generation - waste disposal and decommissioning costs must be included in the current price of electricity.

At present responsibility for waste management rests solely with national governments. This is understandable because the best way to handle the matter depends very much on local circumstances, both physical and social. We must, however, in my view, continue to work towards regional and international solutions which offer the possibility of limiting the total number of sites and choosing the most favourable.

Japan has special problems because of its population density, its dependence on the ocean as a source of food and widespread public concern. Although several governments see no alternative to ocean dumping of low level wastes, we must also face the fact that public opinion is still sceptical. It would therefore be prudent to press ahead vigorously with R and D on other methods of waste disposal and on long term spent fuel storage.

Most of the IAEA's work is to promote a full international exchange of information on research and operating experience in handling waste, on the economics of alternative methods, and on different regulatory approaches to the problem. These and other matters will be discussed at the IAEA's Conference on Radioactive Waste Management in the USA in May next year. The IAEA has also been a forum for reaching international agreement on guidelines to cover various aspects of waste management ranging from the establishment of underground repositories to the decontamination of nuclear power plants.

The Non-Proliferation Regime

9. I now come to the third question - nuclear proliferation.

Preventing the further spread of nuclear weapons is vital if we are to avoid increasing international tension and the risks involved in having more fingers on more nuclear triggers. In many countries it is also vital for public acceptance of nuclear energy programmes and of international trade in nuclear materials. The public is well aware of the enormous destructive power of relatively small quantities of enriched uranium and plutonium. It wants to be assured that peaceful nuclear energy programmes will not open the path to production of atomic bombs. How can we give this assurance?

It should be recognized from the outset that the scientific knowledge and the technical know-how needed to make nuclear weapons exist in many more states than those that already have such weapons and that the number of states that possess such technical capability will grow continuously. In ten or twenty years time this number is likely to be very large.

Important conlcusions emerge from this premise. The first is that non-proliferation must be secured primarily through the conviction of governments that it is in their own best interest not to acquire nuclear-weapons capacity. The vast majority of the world's governments have reached precisely that conclusion. It is also most significant and gratifying that large industrial powers like Japan, the Federal Republic of Germany and Italy have done so and have adhered to the non-proliferation treaty. While their adherences and the safeguards accompanying them are today taken for granted, I think one should not forget how very significantly they have contributed and are contributing to limiting international tension.

IAEA Safeguards

10. Before I turn to the problems arising from the fact that several states have not yet adhered to the NPT, I should like to elaborate somewhat on the function of IAEA safeguards. The more so since they have been the object of some sharp criticism lately.

I said a little while ago that the public wants to be assured that civil nuclear programmes are not opening the door to nuclear weapons. The international community, too, wants to have this assurance. This is precisely the function of the verification programmes of the IAEA. They constitute a remarkable innovation in international cooperation. While as citizens we are accustomed to be scrutinized by governments from our cradle to our death bed, we are not accustomed as sovereign states to be scrutinized by international organizations, least of all through inspections on our own soil. This new system also raises some hope that the problem of verifying disarmament, which has been discussed without result for two decades, is not, in principle, intractable. Having struck this optimistic note, however, I hasten to make a number of qualifications and precisions.

First the IAEA is an organization through which governments interact. Through it they collectively arrange for verification of their civilian nuclear programmes so as to demonstrate to the whole world that they are not using these programmes to produce nuclear explosives. Safeguards thus serve the individual interests of the governments concerned and perform a service for them. The IAEA must make its verification fully credible; otherwise it has no purpose. Credible verification inspires confidence, helps avoid international tensions and promotes easy trade relations in the nuclear field and other desirable results.

Secondly, and this follows from what I have already said, the IAEA has no police power and is not a supranational body but rather an organization that performs its safeguarding function at the request of the governments concerned. It can apply no sanctions, it cannot physically prevent a government from diverting nuclear material. It can only report honestly its conclusion that the state concerned has complied with its non-proliferation obligations or that the IAEA is not able to verify compliance, or in the extreme case, that there has been non-compliance.

Thirdly, while the IAEA can never give any assurance about the future actions of governments that have invited it to apply safeguards, any interruption of safeguards on any grounds would serve as an alarm and enable other governments to exercise whatever powers of dissuasion they might have to prevent proliferation.

Fourthly, the IAEA safeguards should of course operate at maximum efficiency in order to give maximum credibility. They can do with some improvement. Because of the growth of the nuclear industry and in the number of safeguards agreements the system has grown very fast and there have been growing pains. With some more manpower, better use of it, more and better equipment and cooperation by the governments that request safeguards, it should be possible to remedy the shortcomings.

I have tried to explain what the international safeguards system can do. I should like to add that this is precisely what it is doing in the case of Japan. The assurance sought from the system, in my opinion, is achieved by the Government of Japan with which the IAEA has excellent cooperation.

Unfinished Business

11. I have indicated that the IAEA is not asked to apply full-scope safeguards in all non-nuclear-weapon-states. Some installations in Israel, India, Pakistan and South Africa remain unsafeguarded. The IAEA cannot, of course, say anything about these installations. In some other states,* the IAEA is applying safeguards at all existing plants of which it is aware, but the governments concerned have made no commitment about all future installations.

* Argentina, Brazil, Chile, Cuba, People's Democratic Republic of Korea, Spain

There is little the IAEA itself can do about this matter. The universal acceptance of the NPT and its safeguards can result only from the conclusion by the governments concerned that their best interests lie in this direction

I should like to use this opportunity to express the hope that these matters are examined by governments with the utmost seriousness. The IAEA stands ready to perform any service that may be asked of it. It seems to me that we may be in a fairly crucial period in this respect. On the one hand there might be possibilities of a dynamic swing towards non-proliferation. Egypt's accession to the NPT was a great encouragement but further steps would obviously be needed. The non-proliferation issue should not be overlooked in current negotiations involving several countries most closely concerned. Conversely, if present opportunities are missed or, even worse, if there are any further so-called peaceful nuclear explosions, a negative evolution could be triggered.

Vertical Proliferation

12. I should like to add two further points. The first relates to so-called vertical proliferation. In Article VI of the Non-Proliferation Treaty the nuclear-weapon-states undertook to make progress on nuclear disarmament. They have evidently not been very successful. When the NPT was concluded they were estimated to have between them 5800 nuclear warheads. The 1981 figure has risen to about 16.000 nuclear warheads. Even more disturbing is the constant evolution of new types of nuclear weapons and their deployment, including those of small calibre. These discouraging developments in vertical proliferation do not make it any less vital to avoid the horizontal spread of nuclear weapons to additional countries but they do present new risks to the security of all states and could place further strains upon the NPT.

Supply Assurances

13. So, too, could the restraints placed in recent years on the transfer of peaceful nuclear plant and technology - to which the fullest possible access was promised in Article IV of the NPT. The IAEA's Committee on Supply Assurances which is now considering the principles which should govern such access therefore has an important role in relation both to safeguards and to a more stable international regime for nuclear trade.

Nuclear Science Techniques in the Third World

14. A description of the IAEA's present role would not be complete without a reference to its work in promoting nuclear science and techniques in the developing countries. The IAEA's most important promotional work is to coordinate international efforts to promote the safe use of nuclear power and the safe disposal of nuclear wastes. However, for most of our developing member states the chief benefits of nuclear techniques for many years to come will be in the use of isotopes and radiation in food and agriculture, medicine, industry and hydrology. The RCA project in which Japan is now fully participating is a good example of how these techniques can be promoted by a regional agreement for cooperation between developing states with the active partnership of advanced states in the region. We are trying to promote the evolution of a similar project in Latin America.

Concluding Remarks

15. I have mentioned some of the challenges and opportunities which seem to me, at the beginning of my term of office, to lie ahead for the IAEA and for nuclear energy world-wide. In each of the main areas Japan has played and will continue to play a crucial and sometimes a pioneering role. Because of its energy resource base Japan has a unique interest in nuclear power but it has also special safety and waste disposal problems. Japan was the first country in the world to accept IAEA

safeguards, accounts for about 30% of the facilities now under international safeguards and is providing a testing ground for some of the latest safeguards techniques. Japan is also the first industrial country to play a significant role in a regional agreement to promote nuclear techniques in the developing countries. Japan has a concern, second to none, in ensuring that nuclear energy is never again used for man's destruction. The IAEA thus has a profound interest in the future of all aspects of nuclear energy in Japan and Japan has a special stake in the success of the work of the IAEA.

ルベ大臣論文

発表は3/8午前以降
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Mr. Chairman, Ladies and Gentlemen

I am deeply conscious of the honor that you do me by inviting me as an official guest to this Annual Meeting of the Japan Atomic Industrial Forum (JAIF).

It is an honor for two reasons :
First, because of the outstanding quality of this event and of its participants who represent the spearhead of the driving forces of a powerful industry, and in overall terms of a country whose economic dynamism is so often singled out as an example for the western end of our Eurasian continent.

Secondly, because I am well aware that through me you have invited the representative of a government and of a country which, in the field of energy, has decided to apply for a policy of energy redeployment, distinguished in particular by reliance on nuclear power, in short, a policy determined to meet the challenge of the increasing scarcity of natural resources, and the desire to shoulder unflinchingly its responsibilities towards developing countries.

For a French energy executive, Tokyo is the place of the summit meeting of June 1979, especially important for us because it was here, that for the first time, the Heads of State and Government of the leading industrialized countries decided to set up energy objectives, a step destined for a great future.

Thus, for us, Tokyo symbolizes the first tentative to stop the waste of the planet's oil resources, through greater control of consumption and through the development of replacement energies.

In the vanguard of this endeavor, Japan and France find themselves in closely similar situations : very limited national energy production, traditionally consisting of coal and hydroelectric power, and large oil and gas imports. In the area of nuclear power, on the other hand, the achievements of our two countries are going ahead, but at somewhat different rates.

Hence facing an audience as distinguished as yourselves in these areas, I think it is justified to raise questions concerning this difference. Undoubtedly, here more than elsewhere, this is a specific problem, which derives from an unfavorable psychological context, but that we must overcome if we wish to preserve the long-term energy equilibrium of the planet.

Following a major political change on 10 May last year, we in France have just initiated a vast collective discussion on these topics. At a time when Japan itself is reconsidering the orientation to be assigned to its own nuclear policy, it may be worthwhile for me to discuss our experience in this field.

If the "French experience" of recent months is of some significance to other countries, I would assert that its secret resides in the quest for democracy : this is the source and the objectives of our energy program.

Democracy above all : the actual starting point of our national energy discussion was the electoral campaign of Spring 1981.

Since these campaign, this topic, and especially considerations of the position of nuclear power in the French energy balance and in broader terms within French society, has been projected into the limelight of the political debate. The decisions taken in the previous period have created a climate of anxiety and misunderstanding in public opinion, that had to be dissipated. Hence from the very outset, the candidate François Mitterrand decided to organize a vast democratic debate on this specific subject immediately after his election. This is why one of the first decisions of the new President of the Republic was to ask the Government to prepare a plan of energy independance and to submit it to Parliament for ratification. Simultaneously, to avoid influencing the results of the debate, it was decided to suspend temporarly the construction of some power plants, and to tie the future of these units to the conclusions of the debate itself.

Democracy also marked the preparation of this debate throughout last summer. Following a broad consultation with Union representatives, professional organizations, ecological associations and energy-producing and consuming entities, reports of experts were prepared by the administrative departments under my authority. On this occasion experts' files were made available to the representatives of the public.

Simultaneously, the French legislative assemblies also proceeded to discuss the matter. The Economic and Social Council, whose members are the representatives of French economic life, devoted many of its meetings to the topic of energy. And furthermore, the National Assembly set up an *ad hoc* committee of six Members of Parliament belonging to different political parties. This committee went on with hearings and thus prepared the information for the Parliament. I reported personally to the Economic and Social Council and the competent Committee of the National Assembly.

Democracy again : It is only after the proceedings of all these hearings we complete and published, that the Government submitted an energy plan to the vote of Parliament, primarily aimed at making energy one of the driving forces of our independence, our growth and our development.

This plan was adopted by Parliament last October. Allow me to briefly explain its main guidelines.

* * * * *

They can be described as follows :

The main goal is to reduce the share of imported energy as significantly as possible in comparison with total energy consumption. This independence goal is expressed as a percentage : 25 % in 1973, 35 % today, and it should be raised to around 50 % in 1990.

Obviously this trend requires a major redeployment effort.

One way to achieve this result obviously is to increase the efficiency in using energy in the economic growth pattern that we adopt. We therefore decided to launch willfull and rigorous energy conservation policy.

Assuming an annual growth rate of 5 %, energy consumption in 1990 will amount to 232 Mtoe, corresponding to an increase of slightly more than 20 % over present consumption (189 Mtoe).

To achieve this, France will have to make an energy conservation effort aimed at some 100 million toe. Thus we intend to invest 40 billion francs per year over the entire period.

This effort brings along a second benefit: these investments will result in creating 230,000 to 330.000 jobs by the end of the present decade. To carry out this plan we have decided to create a major decentralized national public service called the "National Agency for Efficient Management of Energy". This Agency combines the existing entities (Agency for Energy Conservation, Solar Energy Commission, Heat Committee and Geothermal Energy Committee) and coordinates all aspects of research, development, and applications.

Reducing our energy dependency also means substituting <u>alternative energies</u> to excessively massive use of oil. The share of oil is supposed to fall from 48.5 % to around 32 % in 1990, well below the 40 % objective set in Venice.

This means massive development of all other possible sources of primary energy.

For gas - a resource more evenly spread out than oil, our objective is to raise its share from 13.2 % to a range of 13.5 to 17 % in 1990.

As for new and renewable sources of energy, we intend to expand significantly the use of biomass, and solar and geothermal energies. Whereas our hydroelectric potential is more or less fully equipped . The share of renewables in our overall energy balance will rise to 7 % in 1990. Since the development of new and renewable energies closely depends on research, we have decided to triple research expenditures over the 1981/1985 period.

As for coal, the current situation in France is very similar to that of Japan. Like yourselves, we produced some 60 million tons in 1960, like yourselves, we are producing some 20 million tons today, with substantially equivalent numbers of miners (60.000) and aid programs.

In the future coal must continue to play an important role in our energy balance since, by the year 2000, it will constitute one of the major sources of energy. Hence not to adopt a voluntarist policy for the use of coal would be a strategic error.

It is with this in mind that we have set ourselves a consumption target in 1990 between 53 and 60 million tons per year, with the intent of raising our internal production to meet 50 % of our consumption. This last goal will be difficult to reach. But we are already taking the first steps to reach this goal by launching an increased prospection effort. Moreover modern technologies in the use of coal, especially coal gasification, will be developed. In this field we know that your country has already made exemplary efforts which shows us the way.

In other words, we feel that coal is certainly an energy of the future.

The specific object of your forum allows me now to put some emphasis on nuclear energy.

This is a form of energy that is relatively independent of the raw material (uranium), of which France moreover has significant reserves. Moreover France has gained a good mastery in all aspects of the nuclear technology. Thus it represents a particularly important element of our energy independance plan. How much nuclear energy should we use ? This was a much discussed issue in the general public and also within the majority elected last spring.

Two specific problems were thoroughly debated: How many nuclear units should be launched in 1982 and 1983, and should spent fuel be reprocessed.

On the first point, the previous Government had planned the construction of nine units.

Some socialist representatives wanted to reduce this program to four units. The Government and Parliament finally decided on six units.

As for reprocessing, close examination led to the decision of going on.

This calls for some comments. On one hand, the program adopted is smaller than the previous one : six units instead of nine. But it is important to note that this decrease results from the drop in the forecasts of electric power demand due to a slow down of economic growth in the past two years, and second to the energy conservation program we decided.

Hence the reduction of the French nuclear program does not correspond to a reflex of mistrust, but simply to the general trend in favor of greater control of consumption.

Even thus, the French nuclear program remains very large. If I compare the share of this energy in the overall balance by 1990 for the seven leading industrialized countries it will be the highest in France : 26 to 28 % or the equivalent of more than 60 million tons of oil.

It goes without saying that the nuclear program decided by the government is intended to cover the whole nuclear system so that we have also decided to resume our reprocessing activities in full.

We have estimated that nuclear power offers two essential qualities :

. today it allows the production of electricity at a cost half as much as coal and one-third that of oil,

. among the major energy sources existing throughout the world, it is by far the safest form of energy.

In this respect, we have paid the closest consideration to the fact that specific nuclear risks are half as great as those incurred by coal with respect to accidental risks for workers, and about ten times less concerning occupational diseases of workers in the fuel cycle. In all countries, we cannot forget the dramas resulting from colliery accidents. We should also remember the other victims of coal : 700 unspoken annual victims of silicosis just for France.

Nuclear power is also safer for the environment. As an elected representative of Brittany, a coastal region lying alongside one of the most densely traveled oil routes of the world, and hence a region that has been the victim of many accidental oil spills of several hundred thousand tons in the past decade, I am in a good position to know about the damages to the natural environment.

In dealing with reprocessing, and I believe that this point should interest you, we payed a special attention to the fulfillment of our international commitments and we decided to honor them complitely.

Thus after the moratorium which - as it is natural and fair - accompanied the vast national discussion of the French energy and nuclear program, once the guidelines were set after the Parliamentary vote, it again became possible - and this is also perfectly natural - to resume the activities that had been temporarily stopped. You probably know that the French Government showed the same determination in this phase as in the previous one : It tooks all the measures necessary for the unloading of japanese fuels at La Hague last Autumn.

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It is perfectly legitimate to take this type of decision once the democratic debate has pointed the way.

It is legitimate yet difficult. This shows how much has to be done to achieve the broadest possible consensus on the energy problem and the use of nuclear energy in particular.

This consensus implies a permanent democratic spirit.

To transform this objective into facts we decided a series of measures in order to improve the public information and to mobilize its confidence and responsibility.

The issues at stake are information, decentralization, consultation and control.

INFORMATION

We think that confidence and responsibility imply mutual information which is neither the monopoly of a center nor of an institution.

This information must be spread throughout our institutional system.

We therefore decided the following :

. the creation of an energy observation center under the Ministry of Industry, to act as a large data bank,

. the creation of Regional Energy Agencies,

. the creation on each energy site of local information committees : the objective of these committees is to establish the possibility, at a local level, of consultation and exchange of information ; set up in the initial phase of each project, they must operate in a pluralist, contradictory, independent and continuous way.

Meeting the Chairmen of the local information committees at a national conference should provide an opportunity to discuss mutual experiences, to identify obstacles, and hence to improve their action.

DECENTRALIZATION

In a country like France, marked by a strong centralizing tradition, energy provides an opportuniy for decentralization.

Decentralization implies a new distribution of competences, new procedures and new structures.

As part of the new distribution of competences, we felt that the share of new and renewable energies in the national energy balance could grow only if the decentralized authorities were mobilized in this field. To apply our policy of the rational use, conservation and replacement of energy require from the authorities, determination, powers and means. We shall try to supply them what they need.

As part of the new procedures, it was decided that each region would set up an energy plan taking account of regional demographic and economic forecasts, including physical energy conservation and new energy objectives. These plans must include an information, research and development, and incentive policy.

If the region remains an area that facilitates decentralized programming, however, the overall expression of regional needs, the urban unit and the municipality will continue to be the true practical and concrete centers of the development of all these activities.

It is at these levels that certain aspects of energy consumption can be better brought under control through urbanization, public transportation, traffic control, networks management plans etc.

With respect to new structures, it was decided to create a Regional Energy Agency reporting to each regional assembly.

As a policy instrument associated with the regional assembly, this consultative entity will perform advisory and technical assistance functions to the regional assembly and local municipalities, covering training, information and animation.

It will be a true permanent "energy" committee working for the regional councils, its composition will be governed by the twofold requirement of representativity and competence. It must include a majority of elected representatives, representatives of Union organizations, chambers of commerce, environmental associations, universities and administrations and private organizations concerned with energy.

CONSULTATION

For the successful implementation of the energy programs and the corresponding decisions, it is important for the local populations and municipalities to be closely associated and fully informed.

The support of the population is a basic condition for efficiency : a local information committee and Regional Energy Agencies are bodies that are to be consulted in the same way as municipal, general and regional councils.

But we felt that substantial progress would be made by reorganizing certain procedures such as public inquiries related to the construction of major energy facilities.

The question here is to improve the information provided and to guarantee a fair debate.

CONTROL

It is not sufficient for the decision to be democratically made : its implementation must be closely supervised.

We therefore decided to make specific improvements to Parliamentary and administrative controls.

For better Parliamentary control, we decided to create a Bureau for Technology Assessment and a Permanent Parliamentary Delegation for Energy.

To guarantee better safety control :

. the role of the Commissioner for Atomic Energy has been reinforced and the independence of the Institute for Nuclear Protection and Safety has been guaranteed,

. a top executive has been appointed to the Director General of the EDF national utility to guarantee full consideration of safety aspects in all facilities,

. we have created a special high-level scientific commission responsible to look after operation of the La Hague facility, its expansion, and, in general, reprocessing technology.

Thus the energy policy will go hand in had with the national will.

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Mr. Chairman, Ladies and Gentlemen, until recently, a real divorce existed in France between the nation's energy policy and public opinion, which was systematically left in ignorance of the justifications for the decisions taken.

It is clear that this divorce was especially pronounced in the specific area of nuclear energy, and for very natural reasons : this is the energy that give rise to the most complex production cycle, it is in this area that the tendency for centralization is the strongest, and it is therefore understandable that the overall decision-making process culminating in the production of nuclear power was viewed negatively by the public. We felt that we could not let go on this situation, because the broadest possible consensus is a condition for smooth utilization of this precious potential. This potential is particularly precious for us. From the standpoint of Frenchmen and nationals of countries so advanced in development and industrialization, to continue our efforts related to nuclear energy allows us to make good use of a particularly important scientific, technical and economic potential on an exceptional scale.

It is also precious from the stand point of the energy equilibrium of the planet. I shall go on repeating that for countries like ours, it is not possible to favor the progress of the developing countries and to oppose the use of nuclear energy.

You know as well as I do that the developing countries consume less than 20 % of the energy available in the world, while our developed countries consume more than 80 %. This pattern cannot last : the gradual progress of the developing countries will unfailingly induce the considerable growth of its energy needs, including its oil requirements.

In fact, oil offers many advantages for developing countries ; it is easy to use, cheaply transported and transformed. Added to this is the fact that the efforts that we make for the conversion and development of alternative energies represent a cost beyond the scope of the financing capacities of the developing countries.

This means that the growth in the oil consumption of the developing countries inevitably implies the decline of our own consumption. In
In the present state of the possibilities of the different replacement energies, we cannot agree to give up nuclear energy.
Hence in order to promote a new and more equitable world energy distribution that we feel necessary to increase our energy independence and hence to make greater use of nuclear energy.

J.A.I.F. - TOKYO, March 8th 1982

NUCLEAR ENERGY : one of the ways to diversify energy supplies

by M. PECQUEUR - Administrateur Général du Commissariat à l'Energie Atomique (FRANCE)

I - INTRODUCTION

In 1981, nuclear power plants worldwide generated 185 Mtoe equivalent, i.e. more than half the japanese total annual consumption of primary energy. This corresponds to a 16 % increase compared to the previous year. Japan and France together accounted for approximatively one quarter of that generation. The 280 plants in operation, corresponding to a rough installed capacity of 168 GWe, generated last year 10 % of the world electricity production. The nuclear cumulated production worldwide, since the beginning up to the end of 1981, i.e. 1150 Mtoe is equivalent to the whole OPEP production in 1981.

These rather encouraging basic statements demonstrate that the worldwide development of nuclear energy can be, and must be, one of the components of a diversified policy of energy supplies. The experience gained shows that nuclear energy is one of the primary energy sources, immediately available and economically competitive, able to reduce the dependence upon hydrocarbons.

Compared to the generalized slowing-down, at world level, of the implementation rate of new nuclear plants, in recent years, the amplitude and the growth of the French nuclear programme might give the picture of a strong polarization of the domestic energy supply on that energy source. Nothing of the kind ! The Minister of Energy has just told you the guiding lines of the French energy policy. The plan of energy independence passed by the Parliament rests on the mastery of energy consumption and on the diversification of primary energy sources from oil. Nuclear energy is one of the components of that diversification, and, in that framework, is progressing in a balanced way among the other energy sources : in 1981, it contributed for 11,8 % to our global primary energy consumption (Fig.1). That share

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must reach 26 to 28 % in 1990, by the objectives of the energy plan, already outlined by the Minister of Energy.

II - THE FRENCH NUCLEAR PROGRAMME

In 1981, for the first time ever, French nuclear power plants generated more electricity "in toto" than either fossil-fuelled or hydro installations. The 100 billions nuclear kWh generated represent 37,7 % of the total French electricity and 22 Mtoe equivalent, i.e. a production 70 % higher than last year (Fig. 2). Such a large growth is first due to the steady development of the programme in progress : in 1981, 8 new plants of the PWR 900 MWe standardized type, spread amongst 5 sites, have been connected to the grid ; 7 plants were connected in 1980. The 30 plants installed up to January 1st 1982 correspond to a 22 GWe capacity, the 21 PWR 900 MWe plants only accounting for 19 GWe.

Such a significant increase of the nuclear output in 1981 comes also from the remarkable operation of the PWR 900 plants on line : their availibity factor now reach 70 %. The geographical distribution of the sites, more often planned for the implementation of 4 plants, aims at the optimal sharing of the electronuclear production all around the country, a larger part being momentarily generated in the south-east (Fig. 3).

This year 1982 will see a significant slowing-down of this growing rate : only 4 plants are planned to be installed. Nevertheless, with the 25 plants presently in construction, 12 PWR 900 MWe units and 13 PWR 1 300 MWe units, i.e. a 27 GWe capacity, the French nuclear capacity will have doubled between now and 1986.

One of the major factors of the success of the French programme rests on the policy of plant standardization : only two plants sizes are ordered, 900 MWe and 1 300 MWe ; the first 1 300 MWe plant, PALUEL, will be in operation in 1983 (Fig. 4). Such a standardization policy, followed by EdF, has many advantages :

- at the R & D and design levels, it allows to concentrate R & D programmes, test programmes, and engineering teams ;

- at the fabrication level, the order to industry of significant series promotes the implementation of adapted manufacturing capacities and simplifies the QA problems ;

- the progressive growth of directly re-usable experience appears to be extremely profitable in the fields of design, construction, operation, maintenance and especially safety ;

- finally, training of operation and maintenance teams is made much easier.

These advantages have brought significant improvements in reliability, construction times and economics. Thus, a significant gain has been obtained in construction time. Between the beginning of construction and industrial operation, time has decreased from 85 months, on the average, for the first plants down to 67 months in 1981 and moves progressively to 5 years. In the same way, nuclear energy shows a significant economic advantage, in the French conditions, compared to the other electricity generation sources. The kWh production costs, as recorded in France in 1981, give a ratio of 1,6 for coal over nuclear and a ratio of 2,5 for oil over nuclear. Already, in the French situation, the sole cost of the primary fuel, for the coal kWh, is practically of the same order of magnitude as that of the global cost of the nuclear kWh, including the full investment and operating costs of the whole nuclear energy chain. For industries large electricity users, the economic advantage provided by nuclear energy naturally represents a significant asset.

The experience thus gained at the level of design, construction, operation and safety demonstrates the complete mastery of the French industry and of the operating utility Electricite de France (EdF) in the technology of pressurized light water nuclear plants. For the number of plants in operation or in construction, Framatome today has the second position worldwide, with about 60 GWe. Since March 1981, thanks to the R & D programmes carried out by industry, EdF and CEA and thanks to the experience gained from the operation of French plants, Framatome has terminated its initial licensing agreement with Westinghouse and now controls a purely domestic technology, available for export. These attaintments allow to renew technical cooperation agreements between American and French industries on an equal partnership basis.

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The comprehensive R & D programme presently carried out in France to improve the performances of the French PWR plants concerns mainly the decrease of the irradiation doses received by operation and maintenance teams, the lessening of the generating costs, the improvement of reliability and of operating flexibility. The new advanced PWR plant presently developped by Framatome, integrates the results of that R & D programme : its performances appear to be specially attractive.

The new nuclear plants orders decided by the Government and the Parliament for 1982 and 1983 concern 7,3 GWe, namely 5 1300MWePWR and one 900MWePWR. That decision guarantees the continuity of the programme for the coming years. It should lead, at the end of 1990, to a French installed nuclear capacity of about 56 GWe, taking only into account the orders presently decided. At the end of the eighties, nuclear energy in France should then be able to produce annually about 60 Mtoe equivalent (Fig 5).

III - THE GLOBAL ENERGY CHAIN

Nuclear energy led to the awareness that any energy system has inevitably to be dealt with globally. Indeed, the plant is only one of the components of the whole chain. The fuel cycle steps upstream and downstream from the plant, the plant itself, the impact of the whole energy system on the human and natural environment, the global economic aspects make a complete and undissociable chain. If, from the beginning, nuclear energy tackled the question on that basis, it is only recently that the approach to the other energy systems, oil, gas, coal, renewable energies, is carried out globally, from primary materials up to wastes and effluents.

France has built a comprehensive nuclear fuel cycle industry, coherent with her installed nuclear plant capacity : this industry covers comprehensively all the links of the nuclear energy chain : natural uranium, enrichment, fuel fabrication, reprocessing, nuclear wastes management.

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In a better situation for natural uranium than for hydrocarbons, our country has within its boundaries, about 2 % of the reasonnably assured and estimated additional world resources, at a production cost lower than 130 $/kg, i.e: about 120 000 tonnes. On the other hand, thanks to participations held by French societies in various foreign uranium ventures, in some cases in connection with Japanese companies, our country has access to resources of the same order of magnitude as that of the domestic resources. French uranium procurement in 1981 was about 40 % from domestic production. Thus , uranium supply for the french nuclear programme is obtained in conditions satisfactory for both national independence and guaranty of supply.

Furthermore, France has on her own territory, a uranium stockpile that gives her a 5 years global autonomy in case of total rupture of her foreign supplies : to-day, it covers only three months of consumption for oil. The easy storage of uranium and the low share of uranium in the nuclear kwh cost, about 10 to 15 %, allow to keep the stock at this level without unduly financial constraints whatever the development of the nuclear programme.

However, the present depression of the uranium prices on the world market, coming from the slowing-down of the nuclear programmes, is particularly worrying for the mid-term supply. Despite present difficulties, exploration for uranium must continue to satisfy the needs of nuclear programmes which shall necessarily start up again in the next decade.

As for enrichment services, the multinational EURODIF gaseous diffusion plant at TRICASTIN has reached its nominal capacity of 10.8 millions separative work units (ten thousand eight hundred tonnes swus) within the forecasted time and budget (Fig 6). The French share of this 25 % of world enrichment capacity will meet the needs of the French nuclear programme for the next ten years. Operation of the Eurodif plant is most satisfactory as the electric utilities of Japan, customers of Eurodif since 1980, have found out for themselves. For the future, in addition to the gazeous diffusion process, still valuable for large facilities, CHEMEX, the French development chemical process shows particular promise.

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Recent increase of process performances shows that even for mid-size enrichment facilities, for example one thousand tonnes separative work units per year (one million SWUS), the CHEMEX SWU cost compares favourably with the cost of SWUS for large sijed facilities based on the gaseous diffusion and ultracentrifuge processes. Since CHEMEX can be built up by modules, installed capacity can readily fit demand.

Fuel fabrication for pressurised water reactors (PWR) takes place in the plants of Société Franco-Belge de fabrication de combustible (FBFC) at DESSEL in Belgium and Romans in France. Joint production capacity from these two plants will be increased this year to 1000 tonnes per year. COGEMA and FRAMATOME have also started construction of a new plant with and additional capacity of 200 tonnes per year, to be in operation by 1984. Capacity of this plant will be raised to 500 tonnes per year by 1986. At the same time, a significant research and development programme is underway to improved the performance of French designed PWR fuels. This advanced fuel will bring significant improvements in both specific burn-up and reliability, leading to conservation of energy raw materials.

Closing the nuclear fuel cycle downstream from the reactors is one of the assets of the French nuclear industry. In France, reprocessing of spent fuel is a significant and indispendable step of the fuel cycle. Sorting out nuclear waste according to its characteristics through reprocessing also allows optimal conditionning of waste, a major safety asset. Reprocessing also allows recovery of the valuable energy materials contained in so-called spent fuels, namely reusable enriched uranium and plutonium.

More than 400 tonnes of spent light water reactor fuel have already been reprocessed at the La Hague facility. Despite a few minor incidents during operations over the last few years, operational mastery of the industrial process in now well proven. During the national debate in energy last automn (1981), the French Government and Parliament have authorized the increase of capacity of the La Hague facility to 1600 tonnes per year.

IV - CONCLUSION

For countries that are huge energy consumers and have no hydrocarbons resources, like Japan and France, a comprehensive development of a significant nuclear programme is a must. In both our countries, nuclear energy was implemented in a relatively parallel way, although a larger growth of the installed capacity took place in France in recent years (Fig. 10).

The similarity of the French and Japanese energy situations and the parallel development of our nuclear programmes naturally led both our countries to enter into a large bilateral nuclear cooperation in the scientific and industrial fields. Planned growth for both the Japanese and French nuclear programmes and the experience accumulated by each party can only lead both our countries to look for a further increase of this cooperation and its extension to new areas.

More widely, the experience already gained in industrial countries where significant nuclear programmes are now being implemented must be used to offer to other nations which so desire the possibility to commit themselves to nuclear energy.

A larger share for nuclear nuclear energy in the world energy balance can contribute to the continuous reduction of constraints on the demand for hydrocarbons ; this will relieve the economy of the developping countries that still rely mainly on imported oil and gas for their energy supplies.

Several recent indications show that an upward movement of the nuclear programmes development in various countries might take place shortly. I express the wish that these hopes take form rapidely. The example of the nuclear energy development in France and in Japan demonstrates that nuclear energy has a fundamental role to play in a balanced policy of diversification of energy supply.

LIST OF FIGURES

FIGURE 1

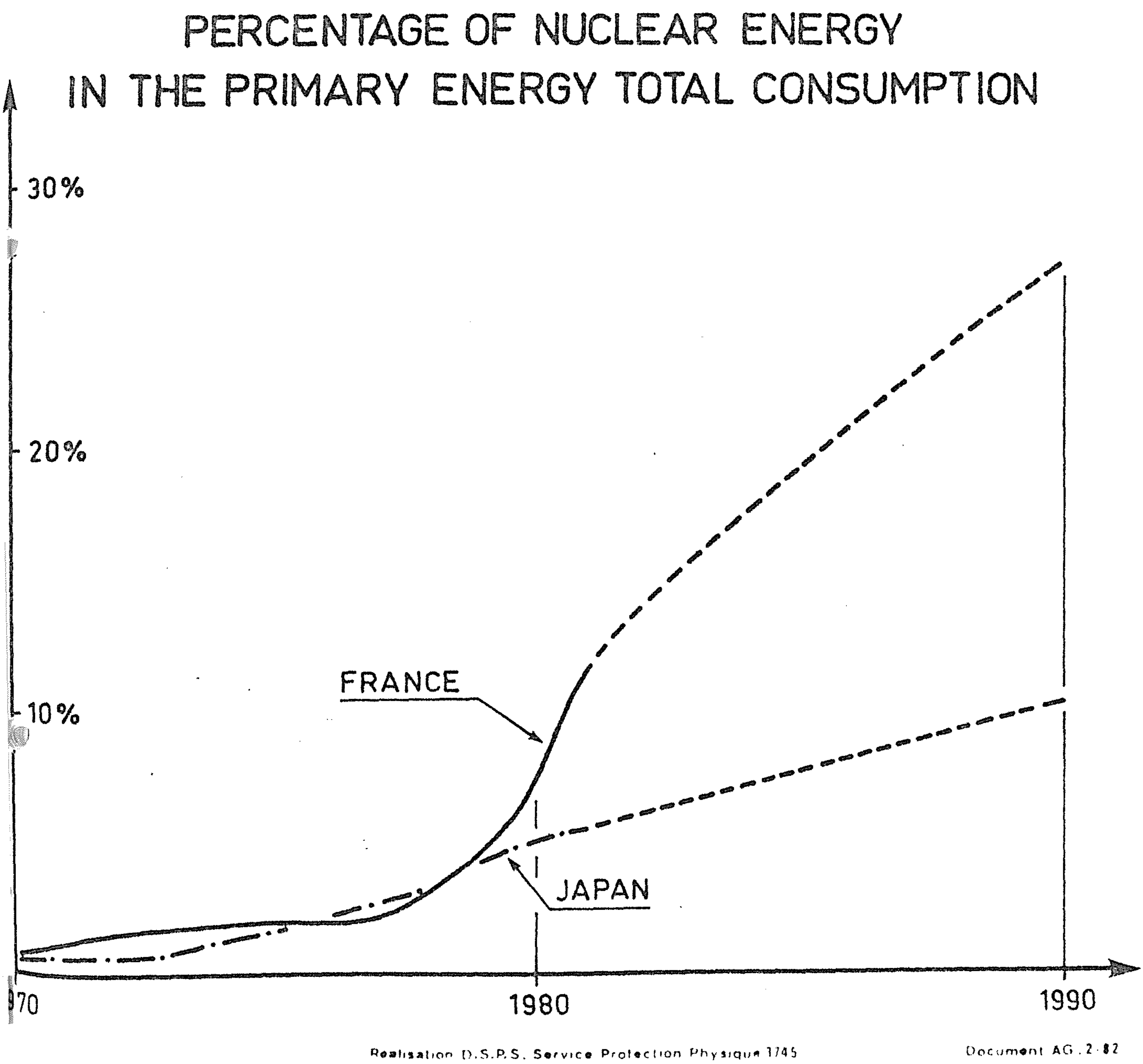
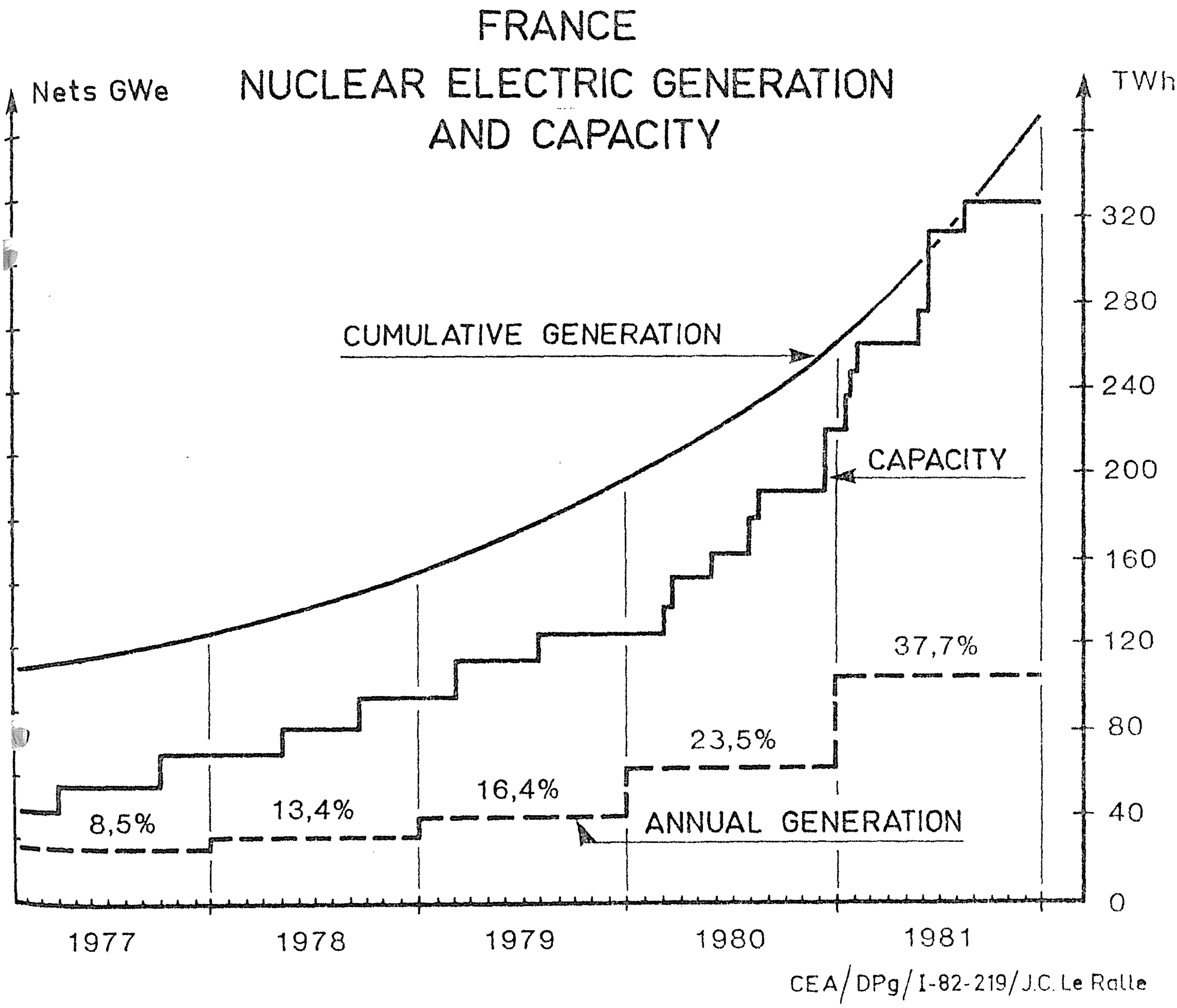

PERCENTAGE OF NUCLEAR ENERGY
IN THE PRIMARY ENERGY TOTAL CONSUMPTION
30%
20%
10%
FRANCE
JAPAN
1980
1990
Realisation D.S.P.S. Service Protection Physique 1745
Document AG.2-82

FIGURE 2

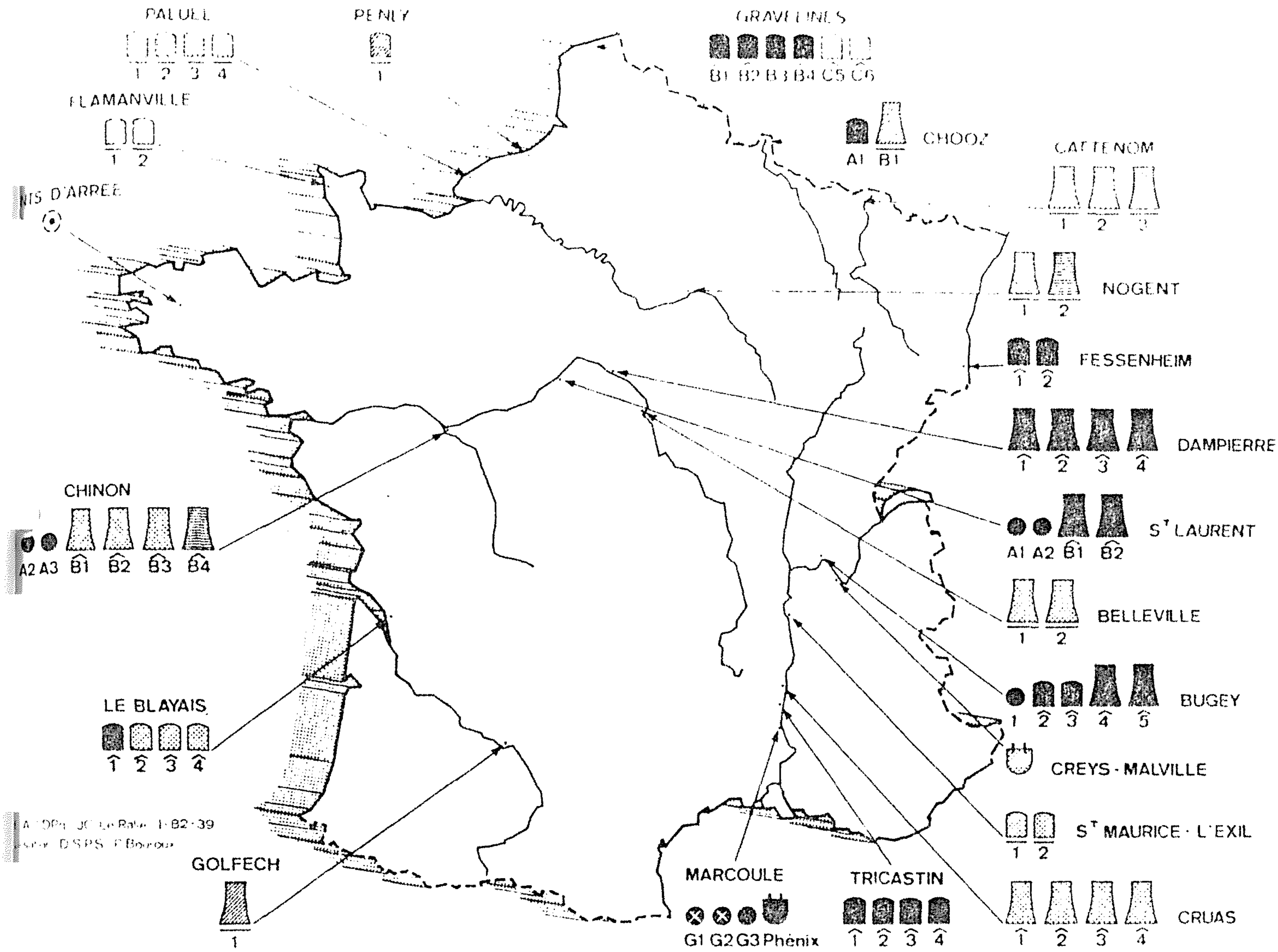


FRANCE
NUCLEAR ELECTRIC GENERATION
AND CAPACITY
Nets GWe
TWh
CUMULATIVE GENERATION
CAPACITY
ANNUAL GENERATION
8,5%
13,4%
16,4%
23,5%
37,7%
320
280
240
200
160
120
80
40
0
1977
1978
1979
1980
1981
CEA/DPg/I-82-219/J.C. Le Ralle

FIGURE 3

/ / 1 *DPq*

FRENCH NUCLEAR POWER PLANTS



ON 1982-01-01

REACTOR TYPE

- GRAPHITE-GAS REACTOR
- HEAVY WATER-GAS REACTOR
- FAST BREEDER REACTOR
- PWR, ONCE THROUGH COOLING SYSTEM
- PWR, CLOSED COOLING SYSTEM, TOWERS

STANDARDIZED SIZE

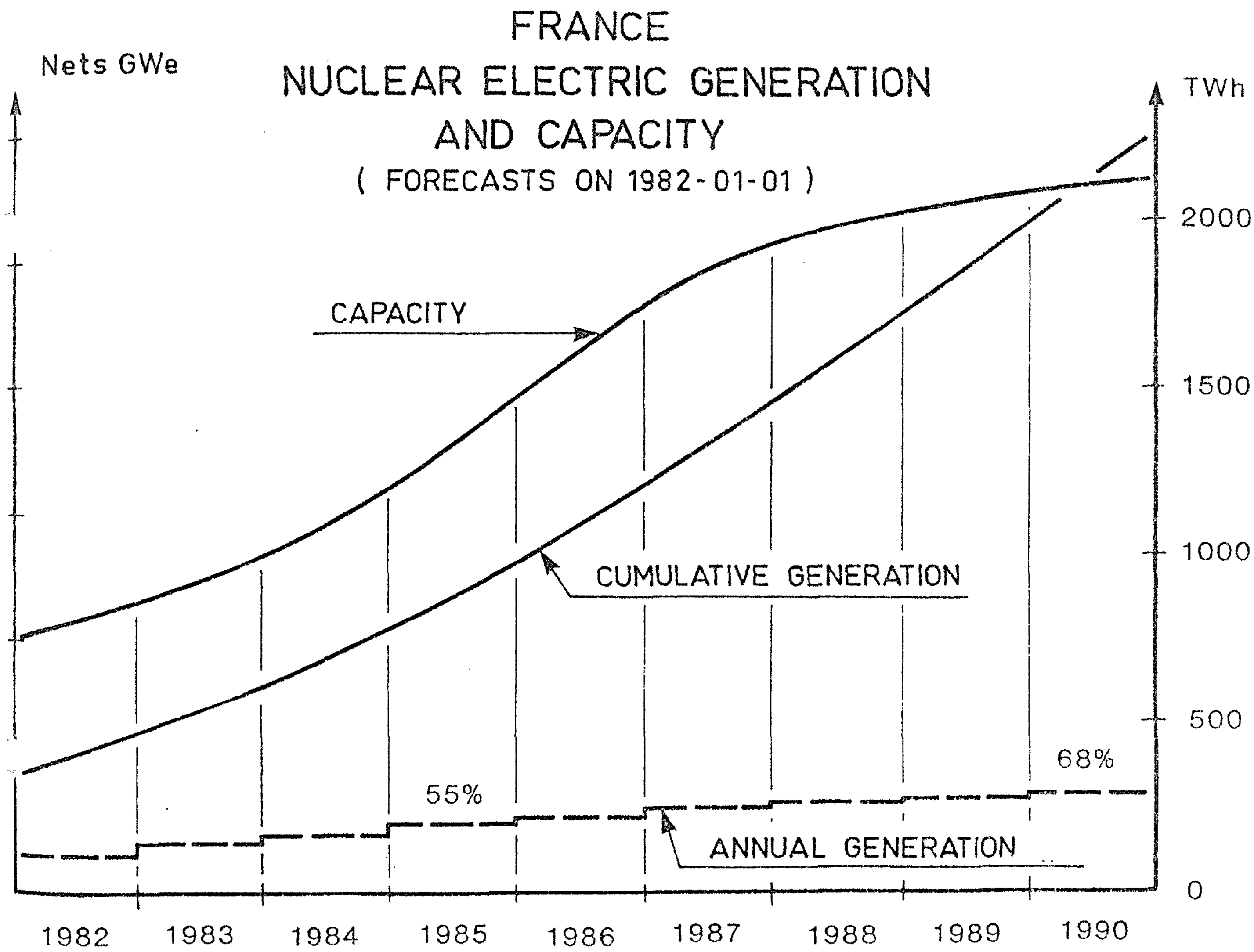
- 900 MWe CLASS UNITS
- 1300 MWe CLASS UNITS

STATUS

- IN OPERATION (FIRST CRITICALITY ACHIEVED)
- UNDER CONSTRUTION (AUTHORIZATION TO PROCEED GIVEN)
- COMMITMENTS EXPECTED IN 1982
- COMMITMENTS EXPECTED IN 1983
- CLOSEDOWN UNITS

IN OPERATION: 30 UNITS	UNDER CONSTRUCTION: 26 UNITS	COMMITMENTS EXPECTED IN 1982 AND 1983
21 PWR-900, 1 PWR-300, 1 BREEDER, 6 GAS-GRAPHITE, 1 HEAVY-WATER	12 PWR-900, 13 PWR-1300, 1 BREEDER	1 PWR-900, 5 PWR-1300
21800 MWe NET	28600 MWe NET	7300 MWe NET

FIGURE 5



CEA/DPg/I-82-219/J.C. Le Rolle

Fig. 6

EURODIF enrichment plant

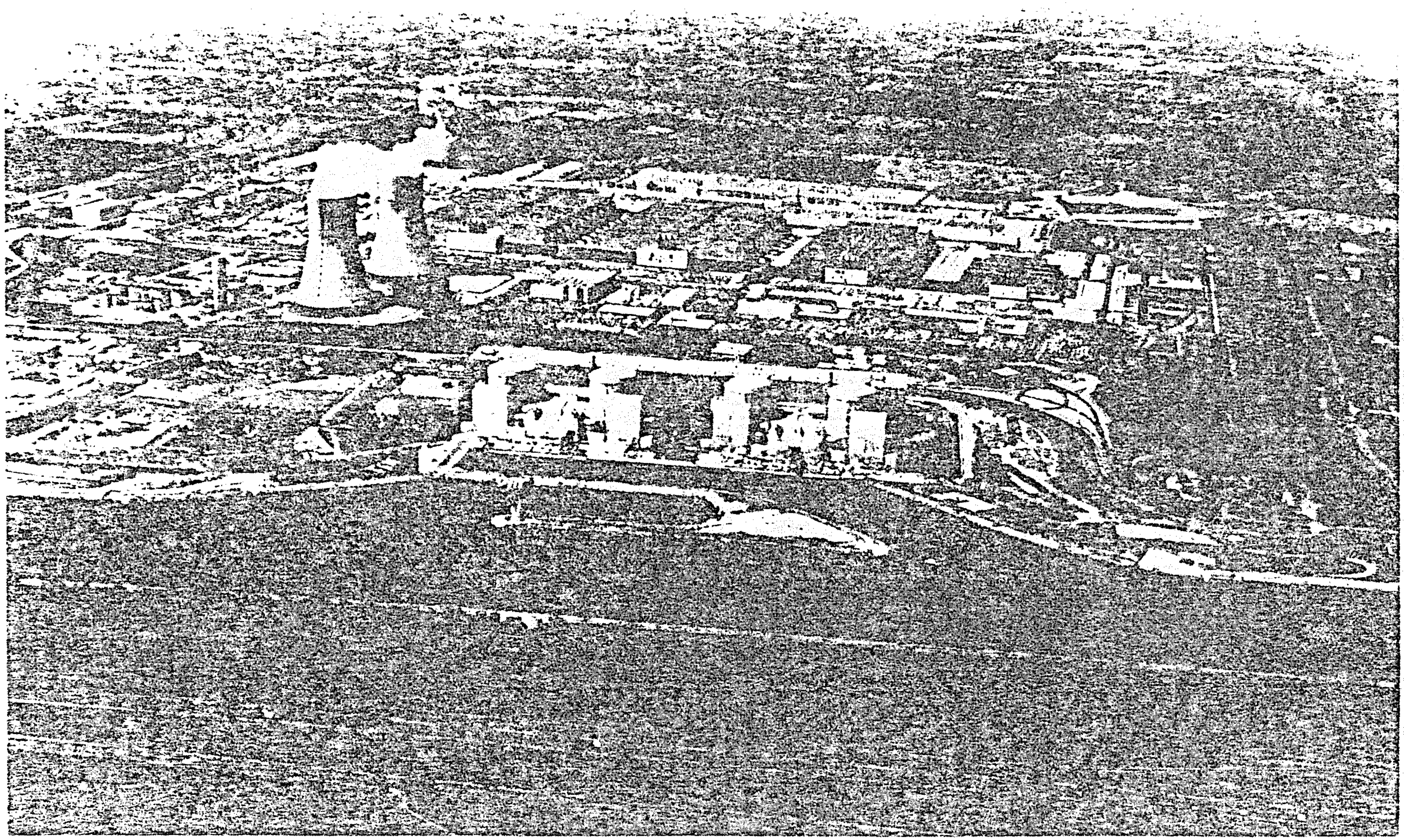


FIG. 7

LA HAGUE reprocessing plant

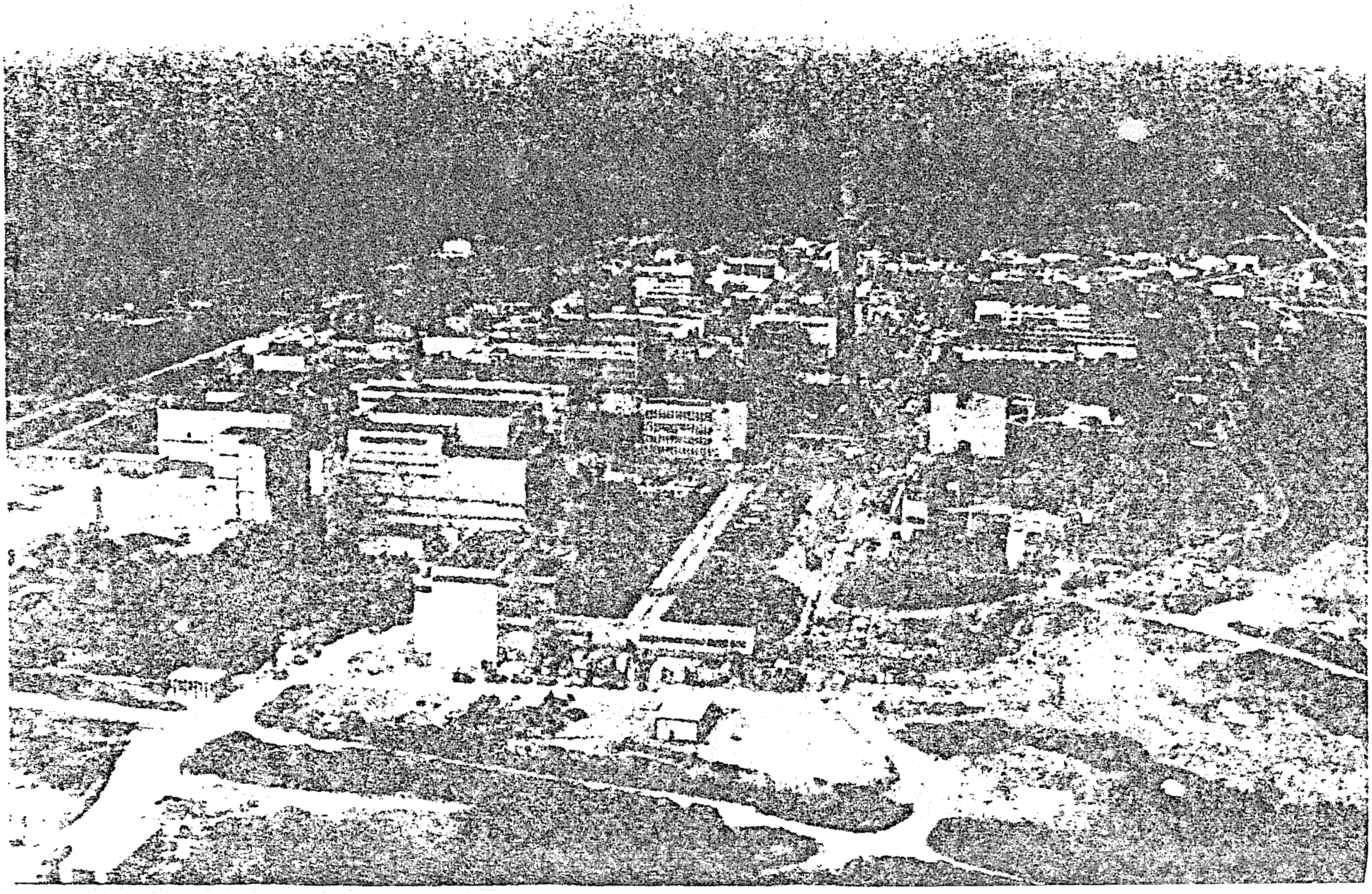


FIG. 8
MARCOULE waste vitrification plant (AVM)

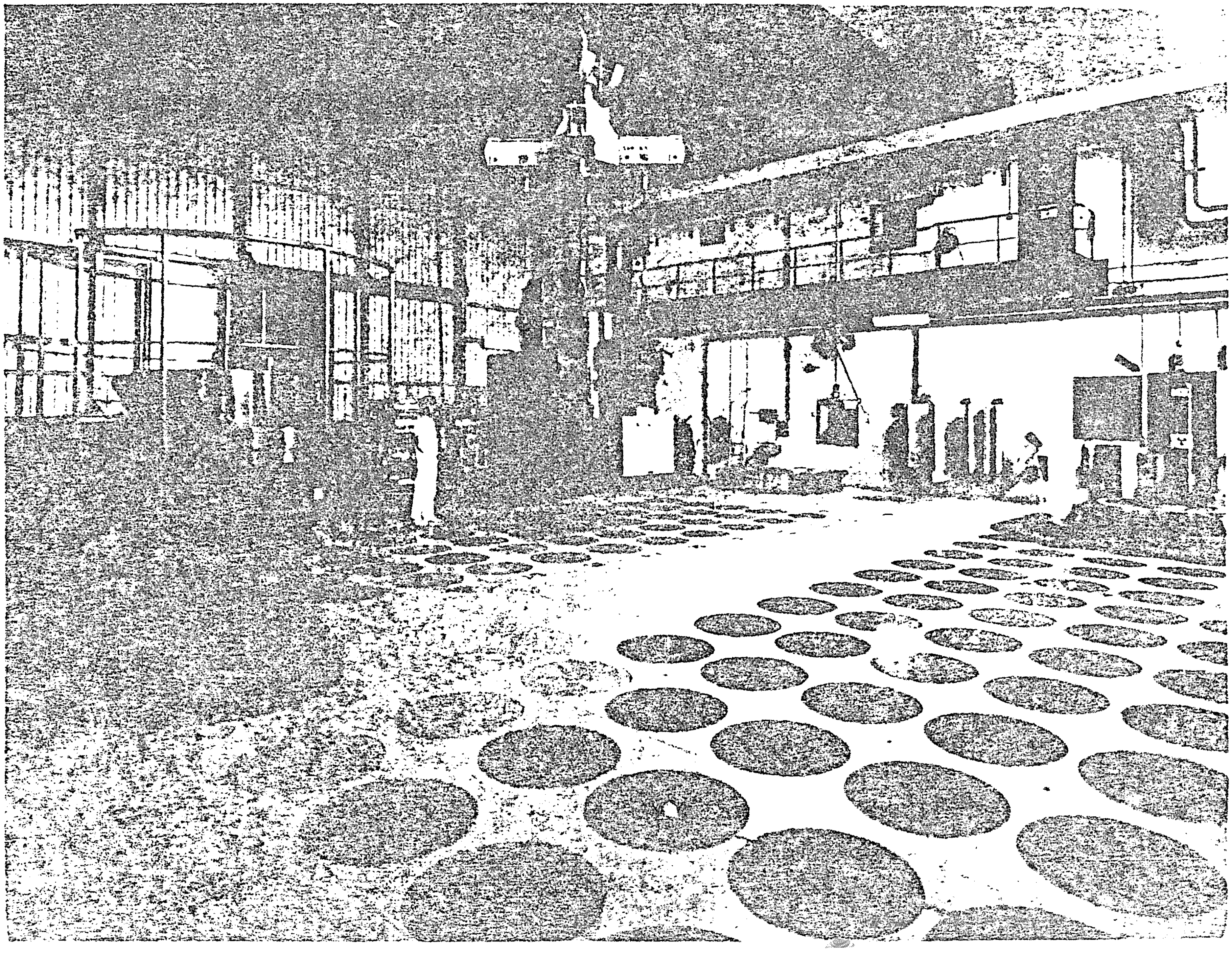


FIG. 5

SUPER-PHENIX breeder plant (1 200 MWe)

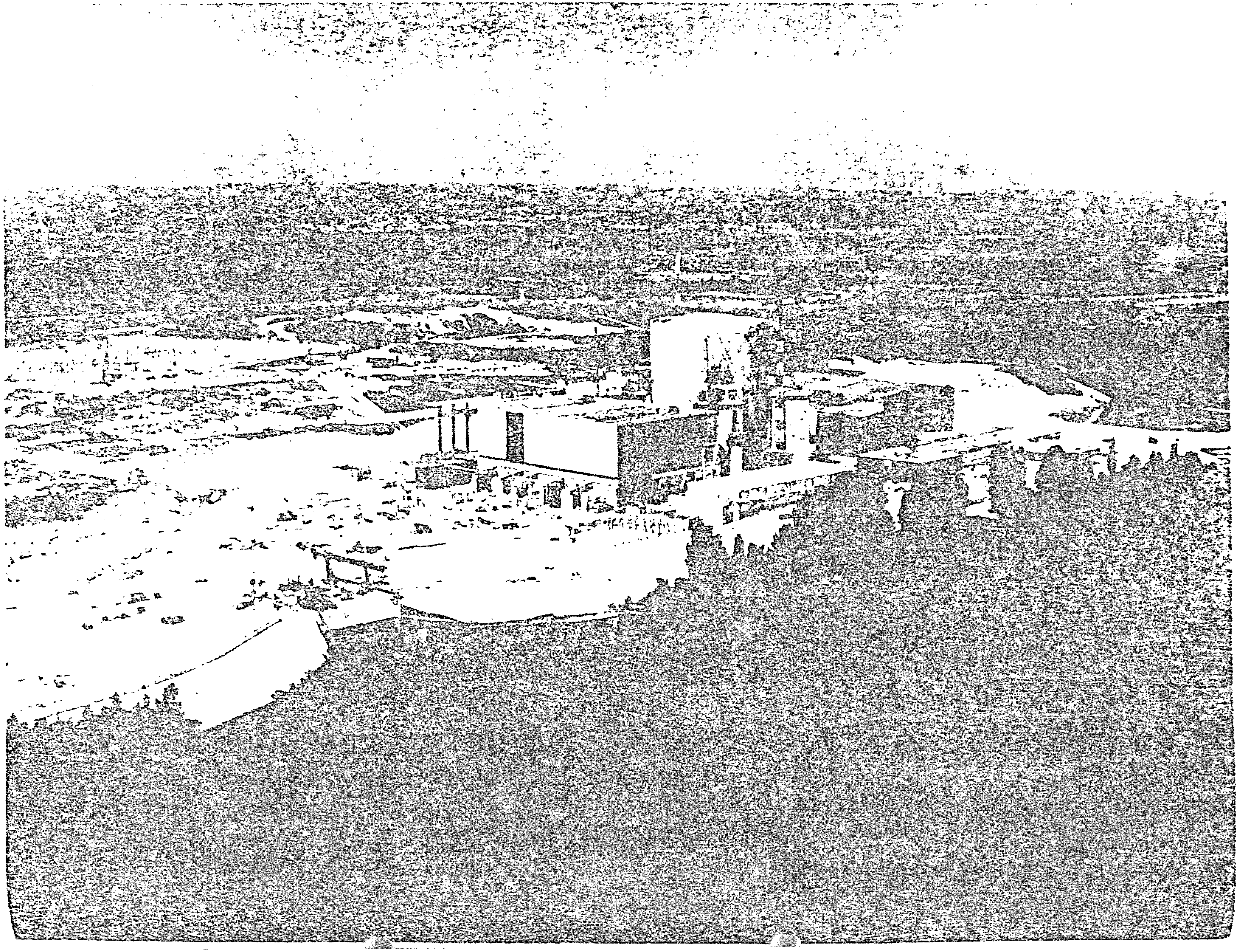
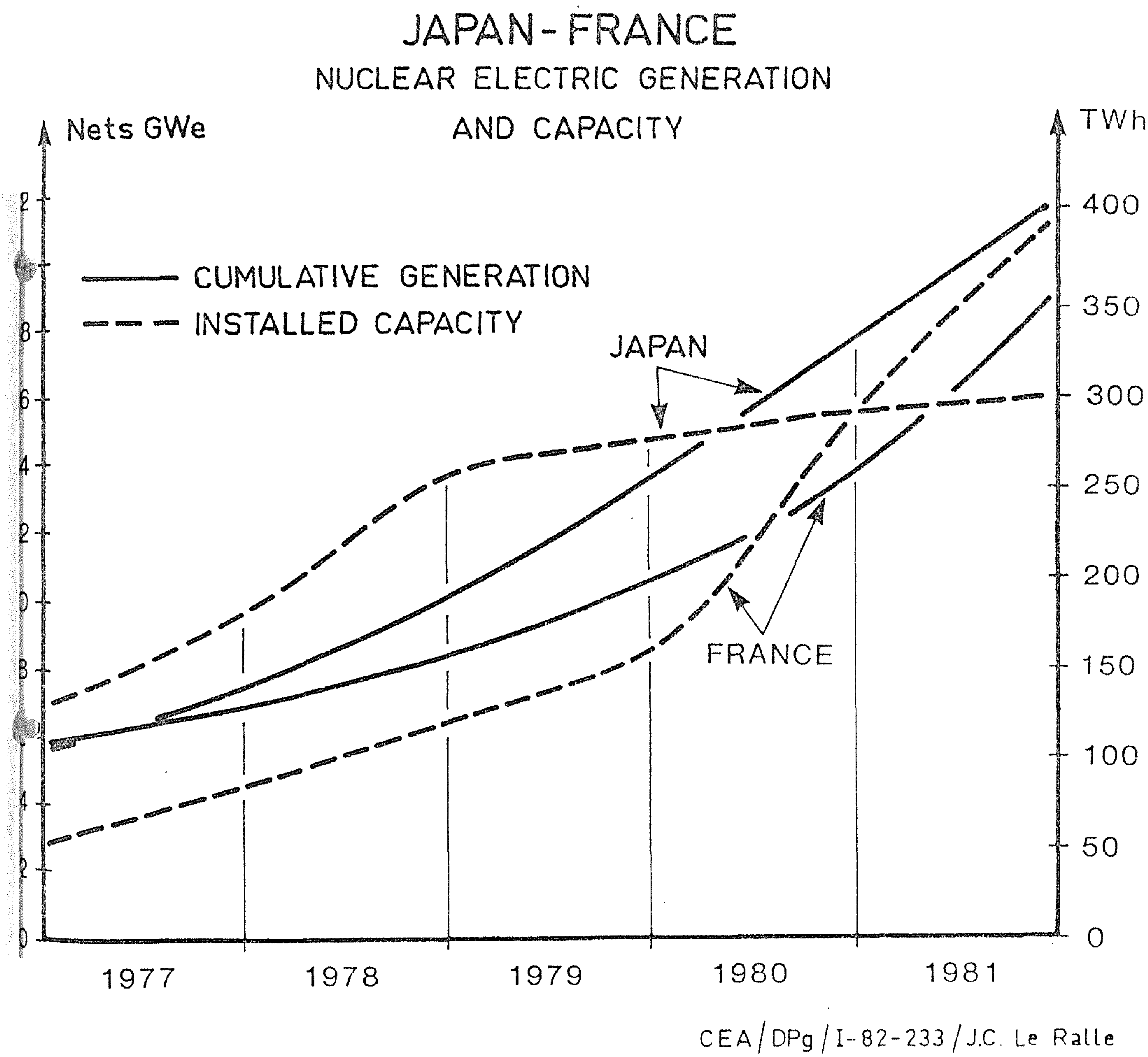


FIGURE 10



JAPAN - FRANCE
NUCLEAR ELECTRIC GENERATION
AND CAPACITY
Nets GWe
TWh
CUMULATIVE GENERATION
INSTALLED CAPACITY
JAPAN
FRANCE
400
350
300
250
200
150
100
50
0
1977
1978
1979
1980
1981
CEA / DPg / I-82-233 / J.C. Le Ralle

(4)

セッション 1　　C. カストロマデロ
アルゼンチン原子力委員会
委員長

発表は 3 月 8 日 午前 午後 時
以降に願います。

THE NUCLEAR POWER DEVELOPMENT STRATEGY IN ARGENTINA

Carlos Castro Madero, Chairman
National Atomic Energy Commission, Argentina

1- The development of nuclear energy in Argentina
starts a few years after it had irrupted in the world scene
with the explosions in Hiroshima and Nagasaki in 1945.

2- The history of this development can be subdivided
into four periods. During the first period, extending from
1950 to 1958, decisions are taken leading to the establish-
3- ment of what is at present the Comisión Nacional de Energía
Atómica, the institution in charge of conducting all nuclear
activities in the country. The first research and develop-
4- ment groups are organized, personnel is trained mainly in
the most advanced centers abroad, the regular training of
physicists is started through the establishment of the Ins-
5- titute of Physics "Balseiro", prospection for uranium re-
sources gets started, and the first experimental reactor, a
6- 100 kW (th) Argonant, is built in the country as well as its
fuel elements.

7- During the second period, from 1958 to 1967, a 5 MW
(th) irradiation and research reactor is designed and cons-
tructed in the country; metallurgy research and the develop-
ment and manufacturing of the fuel elements for this reactor
are carried out; the first conventional uranium mill is ins-
8- talled at Marlargüe, province of Mendoza, and a heap-leach-
9- ing plant for uranium ore is installed in Don Otto, province
of Salta; production of radioisotopes and techniques for

10-

their applications in medicine, biology, industry and agriculture are developed, and, using local expertise only, CNEA performs the feasibility study for the installation of the first nuclear power plant.

During the third period, extending from 1967 to 1976, Argentina begins its activities in the nucleoelectric field. As a result of the above mentioned feasibility study a call for bids is issued, ultimately leading to a turnkey contract with Siemens A.G. for a natural uranium-heavy water nuclear power plant of the pressure vessel type of 330 MW net power installed at Atucha, which starts commercial operation in June, 1974. Two years earlier a new call for bids is issued for a second nuclear power plant of 600 MWe -also using natural uranium and heavy water, but of the pressure tube type, sited at Embalse, province of Cordoba. The contract is awarded in 1973 to the Canadian-Italian Consortium AECL - IT, who starts construction of the plant in 1974.

During the same period uranium exploration activities are expanded, increasing uranium reserves to 25,000 tons of U_3O_8 in the category of reasonably assured resources the Malargüe uranium mill capacity is tripled, another heap-leaching plant is built in Los Adobes, province of Chubut, and a purification plant for uranium concentrates is installed in the province of Cordoba.

During the fourth period, starting in 1977, the knowledge and experience gained by the country in the nucleoelectric field is consolidated. All nuclear activities are intensified and expanded with the purpose of closing the fuel cycle and obtaining the domestic capability to design and construct nuclear power plants. With this aim, CNEA's budget, as well as the number of qualified personnel in all areas of nuclear interest, are significantly increased since that year.

20- Decree 3183/77 defines the national objectives and
policies in the nuclear field, with the aim of achieving
21- self-sufficiency for developing an independent nuclear
program at the service of the national objectives. These
include, on the one hand, satisfying the future demand of
electric power, which grows at an estimated rate of 8 to 9%
per year, by means of the combined utilization of hydroelec-
tric and nuclear resources, and, on the other hand, to
achieve the maximum autonomy in the utilization of nuclear
energy.

22- To materialize these objectives, the Government, by Decree 302/79, approves the Nuclear Program consisting in installing four additional nuclear power plants scheduled to start commercial operation in 1987, 1991, 1994/5 and 1997 respectively, and also an industrial plant for the production of heavy water and the necessary installations to close the whole nuclear fuel cycle.

The structure of this Nuclear Program responds to the need of promoting the active participation of Argentine engineering and industry by means of assured long-term perspectives and continuity of action, both indispensable requisites for stimulating private enterprises to engage in these activities and to make the necessary investments.

The aim is to generate the required national capabilities for the desing and installation of nuclear power plants as well as for the fabrication of their components and supplies, on account of the fact that, towards the end of this century, the main hydroelectric resources will be fully committed, and the subsequent growth in generating capacity will then depend on the installation of nuclear power plants at a rate of 600 MWe per year. It is also expected that implementation of the Nuclear Program will minimize dependence from external suppliers, situation which will be liable to be utilized for imposing political conditions and for maintaining hegemony, as it was particularly exemplified by the recent past.

Following these objectives, and as one of the initial steps of the Nuclear Program, on March 14, 1980 CNEA signed with Sulzer Brothers a turnkey contract for the construction of an industrial heavy water production plant that should start opertion in 1984 with a guaranteed output of 250 tonnes per year. In may 1980 CNEA and KWU signed the contracts for the imported supplies and services for a natural uranium-heavy water nuclear power plant of the pressure-vessel type, of an approximate 700 MWe capacity, which is scheduled to start commercial operation in 1987. The domestic supplies and services for this plant remain under CNEA's responsibility, and Atucha II is thus the first nuclear power project to be constructed on a non-turnkey basis in Argentina.

The decision to achieve nuclear self-sufficiency led to the adoption of the natural uranium-heavy water reactor line, which offers the following advantages for Argentina:

1. Compared with the enriched uranium line, it permits to achieve full domestic control of the fuel cycle on the basis of the country's scientific, technical and industrial capabilities.

2. Being its uranium consumption per KWh generated lower than that of the enriched uranium line, it permits a

more rational utilization of the country's substantial uranium resources.

3. It offers greater possibilities for national industry participation, the fabrication of its different components being more feasible for the country's capabilities, particularly in the case of the pressure tube reactor design.

An evaluation of the national uranium resources in the light of the projected future demand shows that, in spite of using natural uranium-heavy water reactors, the reserves will be sufficient only until the first decades of tne next century. This indicates the need for the future increase of the energy value of these reserves by using the plutonium generated in the spent fuel elements, either by:

a) its recycling, which in the case of natural uranium reactors means to duplicate the reserves, or

b) its future use in breeder reactors.

For these reasons, CNEA has now under advanced construction a pilot-scale reprocessing plant that will permit to expand the efforts already started to secure the technology and know-how for the fabrication of mixed-oxide fuel. Our country has been subject to strong external pressures to abandon all efforts to proceed with this line of work, which was labled as proliferating. Argentina's response has been that, in view of the severe restriction to nuclear technology transfers, particularly in sensitive areas, and coherent with its policy of self-sufficiency, the country cannot leave it to the good will of the more advanced countries the opportunity to obtain its own plutonium and to use it at the time and in the amounts it may deem convenient for solely peaceful applications.

On the other hand, Argentina aspires to become an exporter of nuclear technology and does not wish to enter an increasingly competitive market deprived from a very important stage of the fuel cycle.

Taking all these facts into account, and keeping with the established policies, the following decisions have been taken:

1. To adopt the natural uranium-heavy water line for the nuclear power plants.

2. To prospect, to mine and to produce uranium concentrate in the amounts needed to feed the nuclear power program. At present, reserves of 30,000 tonnes of U_3O_8 have been established in the category of reasonably assured resources, and concentrates are being produced at a rate of 180 - 220 tonnes of U_3O_8 per year.

3. To install plants for uranium concentrate purification and for UO_2 production. For these installations, CNEA will use two UO_2 production lines, each with a capacity of 150 tonnes per year, one purchased to the Federal Republic of Germany, that will start operation by the middle of this year, and the second based on domestic technology, which is also expected to be completed in 1982.

4. To develop the technology of fuel element fabrication, including the zircaloy fuel cladding and other zircaloy structures, first through the operation of pilot plants, and then on an industrial scale in the amounts required to supply the nuclear power plants.

The industrial fuel fabrication plant will start operation in March of this year, using the know-how gained after completing the manufacture in a pilot installation of 240 fuel elements presently used in the Atucha Nuclear Power Plant with absolutely normal results.

30- Regarding the zircaloy cladding and other structures, zircaloy ingots have been produced and development of the process of manufacturing zircaloy tubing for cladding was completed. It is expected to commission an industrial plant, the construction of which is already finished, in 1983.

31- 5. To establish the necessary support infrastructure needed for the fabrication of fuel elements, such as high and low-pressure test loops and hot cells for the analysis
32- and inspection of irradiated fuel elements. The installation of the loops has been completed and a preliminary design was prepared for the construction of the cells.

33- 6. To develop the technology for zirconimum sponge production. A pilot plant of 1 tonne per year capacity, to develop the capability for production at an industrial scale, has been operating since 1978 at the Bariloche Atomic Center.

34- 7. To develop heavy water production technology through the design, construction and operation of a pilot plant to positively assure the capability for production of heavy water in the country and to serve as a basis for the construction of the future plants that will complement
35- the industrial plant now being built in the province of Neuquen. This pilot plant, heavily instrumented for measurements, is in an advanced stage of construction and is expected to start operation in 1983 with a production capacity of 2 tonnes per year.

8. To develop reprocessing technology and technology for the production of mixed-oxide fuel elements. The corresponding plant is in an advanced stage of construction, its cold commissioning being scheduled for early 1983, while hot operation should start by mid-1984.

9. To develop the capability for the design, project management, engineering, procurement, construction, supervision, erection and commissioning of nuclear power plants, through the establishment of an engineering company to have the role of main contractor both for design and as an architect engineer for the future nuclear power plants. That company was established in Buenos Aires on October 2, 1980 and is presently in charge of the construction of Atucha II.

10. To promote the development of the capability of private industry to manufacture the heavy components of power reactors. An Argentine private firm, assisted by an adequate regime of promotion of nuclear industry, is manufacturing the two steam generators, three moderator coolers and the pressurizer for Atucha II.

11. To establish a formal academic curriculum of nuclear engineering at the Institute of Physics "Dr. José Balseiro", providing all the necessary infrastructure, an example of which being a 500 KW (th) research and teaching reactor that we expect to inaugurate in August, 1982. The career was started in 1978 and its first promotion has graduated in 1981.

12. To carry out the necessary studies to determine the approppriate site and the design basis for a repository for the disposal of high level radioactive waste resulting from fuel reprocessing. After a survey of

areas exhibiting the required geological conditions, one site among 200 favorable locations was chosen in the province of Chubut, where further studies have been started in order to confirm its suitability for installing a repository for disposal of the wastes of the nuclear fuel cycle.

41- 13. To intensify research and development activities in support of the Nuclear program, among which it is worth mentioning the construction of a 20 MeV heavy ion accelerator that should start operating by the middle of this year.

42- Some further comments should be made regarding point 9 of the above listing. Taking advantage of the construction of the Embalse Nuclear Power Plant, in 1977 CNEA took the responsibility for the erection of the critical nuclear components and systems, such as the calandria,
43- the fuel channels, the reactivity mechanisms and the fuel transfer system. CNEA also granted an extension of the take-over date to allow domestic engineering firms to take the responsibility for the remaining erection tasks, both in the nuclear as well as in the conventional sector. With the same
44- purpose, and also because of the necessity to accelerate the construction, CNEA took the role of AECL's main subcontractor for the erection of the nuclear sector. This fact has provided the country with a very important know-how applicable to the Nuclear Program, which was not previously available.

45- As suppliers of natural uranium reactors are very few and taking account of Atucha I outstanding operating experience, CNEA had promoted the continuity of KWU's presence in this market by jointly carrying out a feasibility study for a plant of the pressure-vessel type, with a capacity of not less than 600 MWe. The positive results of that study permitted a subsequent commercial competition with other suppliers, and this offered the possibility of choice for Atucha II under more competitive conditions.

CNEA is presently planning to carry out a feasibility study of a pressure-tube reactor that would permit the use in its design of the experience so far gained by Argentina and would also be feasible to construct with maximum domestic participation.

Closely matching these developments, CNEA, who also performs the regulatory funcions on all nuclear activities in Argentina, has continued to develop experience on radiological protection and nuclear safety, both in the operational as well as regulatory aspects. CNEA has established the corresponding national safety criteria, and has an active participation in different international bodies that produce basic recommendations or nuclear safety standards, codes and guides, such as the ICRP and the IAEA (mainly the NUSS program).

Our international nuclear policy deserves a special paragraph.

Argentina does not recognize any privilege to any country, and specially not on the basis of having manufactured a nuclear explosive before a given date.

For this reason Argentina refused to sign the Non-Proliferation Treaty, known as NPT, which pretends to maintain such privileges in perpetuity, thus affecting the principle of legal equality of all States. Argentina considers the NPT as discriminatory, both in its origin as well as in its application.

Argentina adheres indeed to the world efforts towards achieving total nuclear disarmament and to avoid nuclear proliferation, both horizontal and vertical, but without renoucing the right of having the possibility of developing nuclear explosives with all guaranties as to their use for peaceful purposes only, if that may contribute to the development of the country.

Argentina advocates that the best way to prevent nuclear proliferation is the expansion of international cooperation through the transfer of technology for the peaceful uses of atomic energy, linked to the application of the IAEA safeguards system, on what is been transferred, and without discriminatory restrictions.

We are persuaded that the IAEA safeguards system is the adequate way to assure non-proliferation. The technology and equipment transfered under safeguards generate a network of safeguard controls involving increasingly all the nuclear facilities of a country in a natural way and without originating frictions.

Any additional requirements, such as restrictions to the transfer of technology in certain fields, or conditions such as the so called the previous consent, specially when they are adopted unilaterally, do introduce an element of arbitrariness and discrimination.

It is not possible to discriminate and to expect that the victim will accept this situation without making an effort to free itself from such discrimination; such supposedly antiproliferating measures have thus the opposite effect of what is being intended.

We maintain that non-proliferation assurances and the assurance of supplies are interconnected.

It is wholly unrealistic that developing countries having important nuclear programs would extend a blank check regarding safeguards, such as the NPT or "full scope safeguards", without the corresponding assurance of the transfer of all technology, equipment and services by the supplying countries.

Discriminatory anti-proliferating measures have paralyzed international trade, while the best method of avoiding proliferation is, as already mentioned, precisely to promote international exchange linked to IAEA safeguards.

The nuclear development of developing countries must be promoted by means of effective measures of assistance, without hegemonic or supremacy connotations, and without really trying to discourage important phases of such development. This attitude will contribute to improve the standard of living of these countries and also to preserve the harmonious relationship of those facing, to some degree, a serious energy crisis.

This philosophy is not merely declamatory: within its possibilities, Argentina has put it into practice by giving support to all Latin American countries who have requested it, through fellowships, experts or scientific visits and by financing some of the assistance projects submitted by these countries to the IAEA and which were not financed by the Agency.

A relevant example of this large cooperation is the construction, jointly with the Peruvian Nuclear Energy Institute, of an Atomic Research Center 30 km. from Lima. This Center consists of a 10 MW (th) research and irradiation reactor with a radioisotopes production plant, laboratories of physics, chemistry and biology research, and a national center of radiological protection and nuclear safety. The experience of this joint project has opened the way for similar contracts with other countries.

47- Argentina has developed nuclear energy for peaceful uses only. This has been always its purpose, as it has been proven by its actions. It has based its future development on the generation of nucleoelectric power and it aspires to maintain its independence and its freedom of decision.

Aware of these purposes, the people of Argentina supports warmly the Nuclear Program and is proud of the institution -CNEA- that conducts all the nuclear activities

48- of the country.

NUCLEAR ENERGY POLICY IN THE UNITED KINGDOM

INTRODUCTION

1. Nuclear power forms an integral part of the UK's broadly based energy strategy. The major objective of the UK Government's energy strategy is to ensure the availability of adequate supplies of energy, at the lowest practicable cost to the nation. To achieve this objective we aim to make the best possible use of our oil and gas reserves; valuable as these are they are, like fossil fuels elsewhere, finite resources. We must, therefore, develop the other sources of energy necessary to meet our longer term requirements. We are exploring new sources of energy such as wave power, wind power and solar energy and are strongly encouraging energy conservation but it is evident that a crucial element in our future energy mix must be nuclear power. Nuclear power not only reduces our dependence on fossil fuels; it also offers the prospect of cheaper electricity supplies. Today I intend to survey briefly the UK's experience of nuclear power and indicate our approach to its future development.

2. We in the UK were among the first to recognise the benefits that civil nuclear power could offer.

3. In 1956 the first nuclear power station in the world started operating at Calder Hall and it is still operating today. We have thus had over a quarter of a century of experience of using nuclear power for civil purposes. Up to now, the Electricity Generating Boards have installed 6600 MW of nuclear capacity, so that some 12% of our electricity is now being generated by nuclear power.

4. From the original 200 MW Calder Hall station we developed the 250-300 MW Magnox stations of which 9 were built for the Electricity

Boards in the UK. I was pleased to hear on an earlier visit to Japan that a Magnox reactor built at Tokai Mura was giving sterling service. These have proved reliable workhorses and the backbone of our nuclear capacity. The Electricity Generating Boards intend to keep them in service for as long as it is technically and economically feasible to do so, if possible beyond their designed life of 25 years.

5. These Magnox stations were followed by the 1300 MW Advanced Gas Cooled Reactors (AGRs). During the 1970's, there was some loss of momentum in developing nuclear generating capacity. Many factors contributed to this - among them the difficulties over the construction of the first generation of AGRs and the consequent escalation of costs. But today the UK has accumulated over 300 reactor years of experience in operating commercial nuclear stations and some 475 billion kilowatt hours of electricity have been generated.

6. Furthermore, our nuclear generating capacity continues to provide a reliable base load of electricity, more cheaply than any other source of electricity apart from hydro-electric power. The CEGB estimate that their nuclear stations last year produced electricity at 1.45p to 1.65p per kilowatt hour. This compares with the average cost of producing electricity from modern coal stations last year of 1.85p per kilowatt hour, and 2.62p from oil. These comparisons are based on the historic cost of generation, including capital, operating and interest charges; complete fuel cycle costs including waste conditioning; annual sums estimated to be required to cover the net costs of decommissioning; and an allocation for research and training. These figures do not provide a basis for making decisions on new investments, but the CEGB's appraisals also lead them to see nuclear as the economic choice for the future: there seems little doubt that nuclear is the economically attractive means of generation provided stations are built to their expected time and cost.

7. The five AGRs currently under construction will make a further contribution to reducing operating costs. This year will see a further three come on stream for the first time. When all five are in operation they will add a further 6400 megawatts of new nuclear capacity to the generating system. When fully operational each of them is expected to save some £100m a year compared with the cost of coal-fired power generation.

THE PRESENT

8. The current world recession has reduced the demand for electricity in the UK, as elsewhere. This has slowed the impetus for nuclear growth. Nevertheless, the operators in the UK are convinced that nuclear power will play an increasingly important and necessary role in future. For example, in 1977 CEGB prepared their "thermal reactor strategy". The basic elements of this strategy were:

(i) completion as rapidly as possible of the AGRs at present at an advanced stage of construction;

(ii) the ordering of two further AGR stations (one of which would be for the South of Scotland Electricity Board);

(iii) the production of a satisfactory PWR design and the ordering of such a station subject to safety clearance and planning consent.

The Government of the day endorsed this strategy and the present Government has reaffirmed it.

9. The development of the PWR as a safe and economic alternative to the AGR is an important element of this strategy. The British nuclear

industry has therefore been concentrating its efforts on developing the design of a PWR nuclear power station (based on the Westinghouse Nuclear Steam Supply System) suitable for UK conditions and requirements. In July last year a Task Force was established under the Chairmanship of Dr Walter Marshall to ensure that firm design proposals for the first PWR station - which the CEGB wish to build at Sizewell in Suffolk - were developed as quickly as possible. This combined the resources of the National Nuclear Corporation, the Central Electricity Generating Board and the UK Atomic Energy Authority. Excellent progress has been made. The Task Force, in consultation with Westinghouse and Bechtel, has now produced a Reference Design which the CEGB, as client, has endorsed. This design is based as closely as possible on the Westinghouse SNUPPS design but includes such changes as are judged to be required to meet the UK's present safety standards. The first major hurdle has therefore been successfully overcome. Work on the next stage, namely preparation of a full detailed design, is now well under way.

10. The next major hurdle which the project faces is the Public Inquiry which is to be held into the CEGB proposal to build the Sizewell station. The Government has announced that this will commence in January 1983, to allow members of the Public adequate time to study the extensive safety documentation which the industry will be making available later this year. The outcome of this inquiry, and the decision whether or not to build the Sizewell station, will be of great significance to the future development of Britain's thermal reactor programme. I shall explain later the details of this inquiry.

11. As to the size of this programme, when the present Government announced, in 1979, its support for the industry's strategy it was envisaged that 15 GW of new nuclear capacity might be required by the

year 2000. Allowing for retirements of the earlier nuclear stations, this "planning" figure implied a nuclear capacity of about 22 GW by the turn of the century. But it was always foreseen that each new order would need to be considered on its merits and that such a programme will need to be justified by economic growth. The Department of Energy is currently revising its energy projections and it is too soon for me to indicate what the outcome will be and whether these projections will justify a programme of that order, or something higher or lower.

THE FUEL CYCLE

12. In its development of nuclear power for civil purposes, the UK has taken its view that there were good technical and economic reasons for developing the full fuel cycle. Thus an important feature of the nuclear industry in the UK is British Nuclear Fuels Limited. BNFL provides enrichment, fuel fabrication and reprocessing services for present and future markets at home and abroad.

13. BNFL is currently engaged in a programme of expansion - a programme fully supported by the Government. This programme is designed to meet a growing market, but it does not significantly depend upon the future expansion of nuclear power; it is largely to meet the fuel cycle needs of reactors already in operation or under construction.

14. The next ten years will see the expansion of BNFL's facilities in all sectors of the fuel cycle. The largest single investment will be in reprocessing facilities. In current money values over £600 m is to be spent in the next ten years on refurbishment of the existing Magnox reprocessing facilities. About £900 m will be spent on the new Thermal Oxide Reprocessing Plant to reprocess irradiated fuel from the UK's AGR's and from light water reactors abroad. About £200 m will be spent on a plant for the vitrification of highly active waste. (This plant will make use of the French AVM vitrification process, and should be operational by mid 1980's). Improvements in fuel fabrication facilities will require about £230 m. BNFL hope in due course to supply fuel for any UK PWR's that are built, depending on the outcome of the Sizewell Inquiry. They also plan to enter more fully the export market for this type of fuel. Finally, the enrichment division will invest over £400 m in the successful centrifuge project. Of the total investment programme of about £3 billion in current values, about £900 m will be spent on waste management programmes.

15. Much of this investment will in fact by for BNFL's overseas customers, especially in reprocessing. BNFL's main overseas customers for reprocessing are of course Japanese utilities who have taken up capacity in the proposed Thermal Oxide Reprocessing Plant at Windscale. These contrasts represent an important area of joint activity between the nuclear industries of Japan and the UK. They have brought other benefits as well, for example in the successful joint venture between BNFL and Japanese companies in the shipping of irradiated fuel to the UK, and the manufacture of fuel flasks for this activity by Japanese companies. BNFL also provide fuel fabrication and reprocessing facilities for Japan's Magnox reactor at Tokai Mura. I believe a new

reprocessing contract for this has just been successfully negotiated.

16. BNFL's participation in the Centrifuge process of uranium enrichment is through a multi-national venture; the Netherlands and FRG are the UK's partners. URENCO has pioneered the centrifuge enrichment process. It has the only operating commercial plants in the world and is an established and successful company, helping to create a diversified supply of enrichment services to the nuclear industry worldwide. The expansion of Urenco's capacity has inevitably been constrained by the slack international market for enrichment services. Nonetheless, total capacity at the two operating plants at Almelo and Capenhurst will shortly reach 1000 tonnes SW pa and further expansions are planned. In addition Urenco (Deutschland) has recently received permission to construct tho third Urenco plant at Gronau in the FRG. This will have an initial capacity of 400 tonnes SW pa and should be commissioned in 1986.

WASTE MANAGEMENT AND DISPOSAL

17. Management and disposal of nuclear wastes is, rightly, one of the issues that figures in the nuclear debate. But the argument that the industry has no answers to the problems must be strongly resisted.

18. Safe management techniques exist for the control and containment of all categories of radioactive waste in the UK. Some small amounts of low-level radioacitvity are released to the environment. Other low level waste is buried in special trenches at authorised sites, some is incinerated and some is packaged and disposed of in the deep sea. All these practices are suject to statutory authorisation and careful inspection and in the case of deep sea disposal, international controls and surveillance.

19. Intermediate and high-level wastes are at present stored at nuclear sites for the time being. A major programme of research is in progress, currently valued at about £9 m pa, to develop disposal routes for those non-heat-generating wastes, where there is no technical advantage in further storage. The safety record for stored wastes in the UK has for over a quarter of a century been extremely good and although some leaks of radioactivity have occurred, these have not given rise to any significant radiation exposure of the public. The effectiveness of storage techniques is constantly monitored through the Nuclear Installations Inspectorate and the Radiochemical Inspectorate.

20. In the case of high-level heat-generating waste, storage is provided in stainless steel tanks at Sellafield. This waste which is in liquid form, consists mainly of fission products left after the reprocessing of spent nuclear fuel. Fission products amount to only 2% of the total fuel but they account for 99% of all the radioactivity in highly active waste. British Nuclear Fuels Ltd have announced plans to construct a plant, to be completed in the late 1980s, for converting this waste into solid glass blocks, using the AVM process pioneered by their French colleagues. Solidification will facilitate the supervision, storage and, if desired, the transport of the waste, although here again there are stringent international standards which have to be met. Present plans are to store solidified waste blocks at Sellafield.

21. The Government recently reviewed the research in progress on the final disposal of high-level waste, and an announcement was made in December 1981. This review highlighted the fact that, the longer such waste is stored, the more safely it could be eventually buried, because there would then be less heat to dissipate. For this reason,

our Radioactive Waste Management Advisory Committee has also recommended that serious consideration should be given to the desirability of storing high-level waste at the surface in solid form for a period of 50 years and possibly much longer. At the end of that period a decision would be needed whether to continue to store it or to dispose of it by one of the three methods currently under study. These are emplacement on or under the ocean bed or deep burial underground.

22. With respect to the underground option, the Government has also been reviewing the progress of research in other countries. It believes the feasibility of geological disposal has now been established in principle and nothing has emerged to indicate that it would be unacceptable. The UK research programme is now being reorientated to confirm the applicability to the UK of the findings from this research in other countries. For the time being this will be done by means of desk studies, laboratory work, and the use of data already available. Exploratory drilling will not be needed for this purpose, and it is not now intended to construct a demonstration facility for underground disposal in the UK. Instead the UK will follow closely studies involving underground facilities in Sweden, Canada and the USA for granite, in Belgium for clay, and in the USA and Germany for salt.

PROLIFERATION ISSUES

23. The UK Government is firmly committed to the NPT and is a strong supporter of international Safeguards measures. We recognise the need for developing a climate of international confidence during a period of expansion in nuclear trade - an expansion that can take place without threat to security and peace. As I said in speaking to the IAEA General Conference last year the UK Government welcomes

the progress made in the Committee on Assurances of Supply, and also the US declaration of its policy to restore the US as a reliable supplier and predictable partner for peaceful nuclear co-operation under effective safeguards.

24. For nuclear energy to play its full part in meeting world energy needs arrangements for international nuclear trade must be secure, transparent and predictable. This should allow civil nuclear developments not to be constrained by delay or discontinuity of supplies.

25. Equally, suppliers and the international community must be adequately reassured that freer international trade will not increase the danger of nuclear weapons proliferation. We therefore welcome and have supported the Vienna Agency's programme to improve safeguard systems. May I also take this opportunity of paying tribute to Japan's steadfast recognition of the vital importance of safeguards and her support in improving their effectiveness.

THE LONGER TERM

26. The UK Government recognises that in the longer term, the fast reactor will have an important role to play in electrical power generation. Timing is uncertain; as we see it, there is less urgency than hitherto thought. However, the UK has undertaken a substantial research and development effort in this field over recent years and the Prototype Fast Reactor at Dounreay has given us valuable experience and much confidence about the concept. The Dounreay plant for reprocessing fuel from the prototype fast reactor reprocessed over a ton of uranium and plutonium fuel - about

a quarter of full core loading - during its first campaign which was completed in 6 weeks. The extracted plutonium is now being refabricated into fresh fuel for recycling in the PFR.

27. So the question is, how best to build on that experience so as to be ready when the fast reactor is needed. The UK Government is now reviewing how its fast reactor programme should develop and, in particular, the prospects for international collaboration in proceeding to a demonstration phase.

28. In the much longer term there is the possibility of developing a commercial fusion reactor. Here too the UK is closely involved in research which, if successful, will benefit the international community. Construction of the Joint Euorpean Torus - JET, the large experimental fusion device being built by European partners at Culham Laboratory - is proceeding well. The laboratory and administrative buildings which the UK Atomic Energy Authority undertook to provide for JET's use were handed over on schedule and several of the other buildings which the Project is itself providing are now complete and in use. JET is a good example of international Collaboration. In a few years time wider International co-operation than the European JET Project through INTOR may be possible, although no major decisions have yet been taken.

SAFETY AND LICENSING

29. All this has been achieved with a safety record of which those concerned are justly proud. During 25 years of commerical operation of nculear power stations in the UK, no accidents have occurred that have given rise to significant public hazard.

30. From the beginning, UK Governments and the nuclear industry have recognised the importance of safety. There is , of course, no such thing in engineering as absolute reliability, but the nuclear industry in the UK, as elsewhere, has got as near as possible to complete safety. This has been achieved through very high standards of design, based on 'fail safe' principles. Duplication of key plant items, good quality control during component manufacture and assembly, through life inspection and testing of vital components, and well-trained operators working to well-defined operating procedures have all reduced the risk of a serious accident to a negligible level.

31. Under the 1965 Nuclear Installations Act no commercial nuclear installation may be designed or constructed without a nuclear site licence granted by the Health and Safety Executive's Nuclear Installations Inspectorate. This process begins with the NII carrying out safety assessments at the design stage, and then continues through construction, commissioning and operation of the plant, only ending when ultimately, at some stage after decommissioning, there is no longer considdred to be a radiation hazard. The NII would never allow a nuclear installation to operate unless they were fully satisfied as to its safety.

32. But under our approach the responsibilities of this regulatory body do not in any way lessen the operators responsibilities. The relevant legislation makes it clear that it is the licensee's responsibility, from conception, through operation to decommissioning, to achieve and demonstrate an adequate standard of safety for his plant. There is also a duty on the licensee to reduce hazards so far as reasonably practicable, and, not merely to meet standards or criteria but to do better if he reasonably can.

33. It is the NII's responsibility to assure itself on the soundness of the licensee's safety case and the suitability of the proposed installation for licensing and eventual operation. The NII obtains its assurance by a combination of monitoring the licensee's design procedures and construction of the plant. It also checks on the licensee's safety case against established safety criteria and standards which are themselves continuously developing.

34. The safety question has been of paramount importance from the beginning. Our main safety objective has been and is to reduce the risk of serious accident to negligible level. Today, as elsewhere, I think it can be claimed that no industry has to face more demanding and exacting safety standards than the nuclear industry. Indeed, there is some risk that a legitimate public concern for safety in this field could lead to unreasonably high, and even indefensible, standards being imposed which could erode the economic benefits to be gained from nuclear power.

THE NUCLEAR DEBATE

35. As elsewhere, there is a vigorous debate about nuclear power in the UK. Some people are fearful of a complex technology they do

not fully understand. This anxiety leads some, a minority I believe, to commit themselves firmly against the nuclear option. The selection of sites for nuclear installations is often opposed by local residents (although there would be similar opposition to almost any industrial activity, one suspects). But up to now, at any rate, anti-nuclear opinion in the UK has not been a severe constraint.

36. But the task of the nuclear industry, and, in appropriate areas, the Government, is to demonstrate that there are reasonable answers to reasonable fears. The UK's approach to the nuclear debate has been to make available the fullest possible information about nuclear operations and activities. The nuclear industry publishes a great deal of information and encourages its staff to give talks on nuclear power to various social groups.

37. We are also fortunate in the UK in having a legislative framework which provides for all new major industrial activities to be the subject of planning approval. This procedure means that potentially controversial projects can be subjected to public enquiries so that all the arguments, for and against the project, can be examined in public by experienced Inspectors. The Thermal Oxide Reprocessing Plant at Windscale was subject to just such a public enquiry.

38. As I mentioned earlier the proposed order for a PWR at Sizewell is also to be examined at a Public Inquiry, due to commence next January. This provides a good example of the way our planning system works. The Inspector will commence preliminary meetings shortly to consider such matters as the scope of evidence to be taken and the timetable for the main Inquiry. However, it will certainly be wide-ranging and is likely to consider the safety features relevant to the design, construction and operation of the

station; proposed waste management arrangements; the implications of the proposed development for local amenities and interests; for agriculture and fisheries, coast protection, local employment, transport requirements and other relevant issues. The preliminary meetings and the main Inquiry will be open to anybody who wishes to attend.

39. The Central Electricity Generating Board plan to publish, in April, their Pre-Construction Safety Report. This will be followed in the summer by publication of a report by the Nuclear Installations Inspectorate of safety issues. Interested parties will thus have ample time to study these key documents before the Inquiry itself gets under way and prepare any written submissions they, in turn, may wish to make.

40. Only after the Inspector has assessed all the evidence and has submitted his report will the Government decide in the light of all the evidence whether or not to approve the Central Electricity Generating Board's proposal. A decision will not therefore be taken for some time, but when it is it will be based on a very thorough and open investigation of all the relevant facts. We believe this is essential in a democratic society and the only way in which progress can be made.

CONCLUSION

41. I have today sought to explain the UK's experience and expectations in the development of nuclear power for civil purposes. There are, inevitably, uncertainties.

42. Firstly there are questions about the rate of economic growth, in the UK and in the world more generally. It is our intention that new

nuclear stations will be ordered only when they can be justified economically.

43. A key factor here will be continued confidence that nuclear power can produce cheaper electricity than other forms of generation. This in turn depends upon the nuclear industry being able to construct power stations without costly delays. One of our objectives, therefore, is to continue to strengthen the capabilities of the industry to this end.

44. Finally, there is the question of public confidence which has to be secured if nuclear power is to make the contribution we believe it should. Fortunate as we in the UK have been in this regard, in this age we can in no way isolate ourselves from the rest of the world. Opposition to nuclear power is an international phenomenon. To varying degrees, all developed countries share that problem and this is a field in which shared experience through the international organisations and at Conferences like this can make an important contribution. A failure in one country has a very real impact on others. That is why many of us have strongly welcomed the commitment of the present US administration to nuclear power; if the US, with the obvious strengths of its nuclear industry, cannot make progress, this is bound to have much wider effects.

45. I believe that progress will be possible, that public opinion can be reassured, but only by resolute action by industries and strong leadership by those Governments who believe that the nuclear option meets their national interest.

発表は 3 月 8 日 午前 午後 時 EMBARGO UNTIL トリペールヒース (1)

23:00 ワシントン [04]

以降に願います。 8 march a.m. p.m.

住電第1809号別FAX信

WS2435-2

NUCLEAR POLICY AND DEVELOPMENT STRATEGY IN THE U.S.

IT IS A PLEASURE TO BE HERE WITH YOU THIS AFTERNOON. ENERGY SECRETARY EDWARDS HAD HOPED TO BE HERE HIMSELF BUT, UNFORTUNATELY, HIS SCHEDULE DOES NOT ALLOW HIM TO BE AWAY FROM WASHINGTON JUST NOW. HE EXTENDS HIS GREETINGS TO YOU.

I WANT TO TALK TO YOU ABOUT OUR ADMINISTRATION'S OVERALL ENERGY POLICY FRAMEWORK AND ABOUT OUR EFFORTS TO STRENGTHEN NUCLEAR POWER. WE BELIEVE FISSION AND FUSION POWER HAVE A BRIGHT FUTURE.

TODAY, NUCLEAR ENERGY IS PROVIDING APPROXIMATELY 12 PERCENT OF OUR TOTAL ELECTRICAL SUPPLY IN THE U.S. IT IS PROJECTED TO BECOME IN 1980 THE SECOND LARGEST GENERATOR OF ELECTRICITY IN THE U.S., SURPASSED ONLY BY COAL. SEVENTY-SIX NUCLEAR POWER PLANTS ARE NOW IN OPERATION. SIXTY-EIGHT ARE SCHEDULED TO COME INTO OPERATION BY 1990, AT WHICH TIME NUCLEAR ENERGY'S CONTRIBUTION WILL INCREASE TO BETWEEN 22 AND 25 PERCENT. THIS IS IMPRESSIVE PERFORMANCE.

WE ARE CONVINCED THAT NUCLEAR POWER CAN AND SHOULD DO FAR MORE TO MEET OUR FUTURE ENERGY SECURITY NEEDS. THE NUCLEAR OPTION IS CAPABLE OF PROVIDING HUNDREDS OF YEARS OF ECONOMIC ELECTRICAL POWER, INDEPENDENT OF FOREIGN ENERGY SOURCES, WHILE ALLOWING FOSSIL FUELS TO BE CONSERVED FOR OTHER APPLICATIONS.

WE ARE NOW TAKING THE STEPS NEEDED FOR NUCLEAR POWER TO BEGIN TO MEET ITS FULL POTENTIAL AND PROMISE. WE ARE WORKING WITH CONGRESS TO ESTABLISH A COMPREHENSIVE WASTE MANAGEMENT PROGRAM; FOR THE

SECRETARY, ONE OF THE HIGHEST SHORT-TERM PRIORITIES IS TO SECURE PASSAGE OF HIGH-LEVEL WASTE LEGISLATION AND TO BEGIN CONSTRUCTION OF OUR FIRST CIVILIAN PILOT GEOLOGICAL RESPOSITORIES. WE HAVE LIFTED THE BAN ON COMMERCIAL REPROCESSING. WE ARE WORKING TO RESOLVE REGULATORY AND LICENSING CONCERNS AND TO IMPROVE THE CLIMATE FOR NUCLEAR POWER. WE ARE MOVING FORWARD WITH BREEDER DEVELOPMENT, INCLUDING COMPLETION OF THE CLINCH RIVER BREEDER REACTOR. WE ARE CONTINUING TO FUND LARGE, ADVANCED RESEARCH PROGRAMS IN THE NUCLEAR AREA. WE ARE DOING OUR UTMOST TO RESTORE PUBLIC CONFIDENCE IN NUCLEAR POWER.

I WANT YOU TO KNOW THAT THIS ADMINISTRATION IS CONFIDENT ABOUT THE FUTURE OF NUCLEAR POWER, THAT WE REALIZE THAT FOR COUNTRIES LIKE JAPAN NUCLEAR POWER IS ABSOLUTELY ESSENTIAL, AND THAT WE INTEND TO BE A RELIABLE, PREDICTABLE PARTNER.

WE BELIEVE THAT OUR TWO COUNTRIES ARE GOOD WORKING PARTNERS. WE HAVE HAD SOME DIFFERENCES, BUT ALSO A NUMBER OF SUCCESSFUL JOINT RESEARCH PROGRAMS, PARTICULARLY IN THE AREA OF FISSION AND FUSION RESEARCH. WE AGREE ON FUNDAMENTAL APPROACHES TOWARD COOPERATING WITH OTHER NATIONS AND WE HAVE BOTH COME TO REALIZE THAT THE DIFFERENCES THAT EMERGE FROM TIME TO TIME CAN BEST BE SETTLED BY QUIET DIPLOMACY. WE DO NOT BELIEVE THAT OUR POLICIES BECOME ANY MORE CREDIBLE BY TALKING ABOUT THEM IN A LOUD VOICE.

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THIS ADMINISTRATION HAS A NEW VIEW OF THE APPROPRIATE FEDERAL ROLE IN ENERGY. THE NATIONAL ENERGY POLICY PLAN PUBLISHED IN JULY 1981 PROVIDES THE CONTEXT FOR THINKING ABOUT ENERGY RESEARCH AND DEVELOPMENT. IT NOTES THAT THE U.S. ENERGY PROBLEM IS PART OF THE LARGER ECONOMIC PROBLEM AND THAT THE SOLUTION TO THE ENERGY PROBLEM WILL COME ABOUT ONLY AS PART OF THE SOLUTION TO THE LARGER ECONOMIC PROBLEM. LOOKING AT ENERGY IN ISOLATION, AS WE HAVE TENDED TO DO, IS INAPPROPRIATE.

THE REAGAN ADMINISTRATION'S ENERGY POLICY PLAN PLACES HEAVY RELIANCE ON THE MARKET PLACE TO ENCOURAGE PRODUCERS AND CONSUMERS TO MAKE THE BEST CHOICES FOR INVESTMENT AND OPERATION. THIS MARKET-ORIENTED STRATEGY MEANS SEVERAL THINGS:

o IT MEANS DECONTROL OF OIL. WE REMOVED PRICE AND ALLOCATION CONTROLS LAST JANUARY.

o IT MEANS RELIEF FROM EXCESSIVE AND BURDENSOME REGULATIONS WHEREVER POSSIBLE. WE HAVE ALREADY REDUCED THE PAPERWORK BURDEN BY 1.1 MILLION MANHOURS.

o IT MEANS DOING AWAY WITH SUBSIDIES FOR PROJECTS THAT ARE BEYOND THE PROOF OF CONCEPT STAGE.

WITH REGARD TO ENERGY R&D, THIS ADMINISTRATION DOES NOT PROPOSE TO PREEMPT BY REGULATION, BY EXPENDITURE, OR BY ANY OTHER FEDERAL ACTION, THOSE DECISIONS THAT ONLY INDIVIDUAL ENTREPRENEURS AND CONSUMERS ARE IN A BETTER POSITION TO MAKE.

HOWEVER, THIS POLICY DOES NOT MEAN THAT THE U.S. INTENDS TO SURRENDER ITS LEADERSHIP ROLE IN ENERGY R&D. ON THE CONTRARY, THE ADMINISTRATION INTENDS TO MAKE BETTER USE OF THE TAXPAYERS' DOLLAR IN THOSE AREAS THAT ARE APPROPRIATE FOR FEDERAL SPONSORSHIP WHERE RESULTS FROM ENERGY R&D HAS GREAT VALUE. THE RESULTS OF MOST GOVERNMENT SUPPORTED R&D ARE AVAILABLE TO EVERYONE. NO SINGLE INDIVIDUAL SHOULD EXPECT TO PROFIT UNDULY, OR TO CAPTURE THE SOLE BENEFITS OF THIS R&D.

THE ADMINISTRATION INTENDS TO SUPPORT LONG-TERM, HIGH RISK R&D WHERE THE POTENTIAL PAYOFF IS LARGE AND AVAILABLE TO SERVE MANY PEOPLE. BY LONG-TERM, I MEAN THAT THE BENEFITS, THROUGH ULTIMATE APPLICATION, ARE DECADES AWAY, AND THAT ONLY A PROLONGED, STEADY PROGRAM OF INVESTIGATIONS WILL ENABLE US TO ACHIEVE OUR GOALS. BY HIGH RISK, WE DO NOT MEAN THAT THE RESEARCH IS A THREAT TO HEALTH OR SAFETY BUT RATHER THAT THERE IS A HIGH DEGREE OF UNCERTAINTY ABOUT THE TECHNICAL OR ECONOMIC SUCCESS OF THE CONCEPT. THUS, IT ISN'T JUST "HIGH RISK" BUT ALSO "HIGH POTENTIAL PAYOFF" THAT IS IMPORTANT.

FUSION RESEARCH, ONE OF THE PROGRAMS I OVERSEE, IS A GOOD EXAMPLE. THE HIGH POTENTIAL PAYOFF OF FUSION IS OBVIOUS -- A VIRTUALLY UNLIMITED SUPPLY OF ENERGY. THE PROBLEM IS THAT IT HAS NOT YET BEEN DEMONSTRATED THAT PRACTICAL QUANTITIES OF FUSION ENERGY RELEASE CAN BE ACCOMPLISHED IN OUR TEST FACILITIES, LET ALONE IN A COMMERCIAL POWER PLANT. FUSION IS A COMPLICATED PHYSICS AND ENGINEERING PROBLEM, AND THE COST OF SOLVING IT AND THE TIME NEEDED TO DEVELOP FUSION INTO A COMMERCIAL REALITY ARE LONG ENOUGH THAT IT IS UNREALISTIC TO EXPECT PRIVATE INDUSTRY TO MAKE LARGE INVESTMENTS IN THIS KIND OF ACTIVITY. INCIDENTLY, WE EXPECT TO PROCEED INTO THE DEMONSTRATION STAGE OF THE ENGINEERING FEASIBILITY OF FUSION WITHIN THE NEXT FEW YEARS, AND, BASED UPON PAST EXPERIENCE, LOOK FORWARD TO FURTHER SUCCESSFUL INTERNATIONAL COLLABORATION AS FUSION ENTERS INTO THIS STAGE.

THE ADMINISTRATION ALSO INTENDS TO SUPPORT NUCLEAR RESEARCH WITHIN THIS POLICY FRAMEWORK. THE BREEDER REPRESENTS A LONG-TERM DEVELOPMENT PROGRAM THAT WILL YIELD A SUBSTANTIAL BENEFIT. IT WILL NOT HAVE A MAJOR IMPACT ON OUR ENERGY SUPPLY UNTIL THE NEXT CENTURY, BUT ITS CONTRIBUTION WILL BE VERY SIGNIFICANT ONCE IT BECOMES A COMMERCIAL REALITY. THE BREEDER IS SO CAPITAL INTENSIVE THAT IT IS TOO RISKY FOR THE PRIVATE SECTOR TO DEVELOP ON ITS OWN. WE ARE ALSO SUPPORTING HIGH-LEVEL NUCLEAR WASTE MANAGEMENT, A GOVERNMENT RESPONSIBILITY, BUT STARTING IN 1983, WE PLAN TO HAVE THE UTILITIES PAY THE COSTS OF WASTE DISPOSAL AS THE WASTE IS BEING PRODUCED.

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AS YOU KNOW, WE HAVE REDUCED OUR SPENDING IN ENERGY R&D AND IN COMMERCIALIZATION SIGNIFICANTLY IN THE PAST TWO YEARS. WE HAVE HAD TO MAKE SOME DIFFICULT CHOICES IN ORDER TO FORGE A BUDGET THAT SUPPORTS THE PRESIDENT'S ECONOMIC RECOVERY PROGRAM. WE HAVE TERMINATED PROGRAMS THAT THE PRIVATE SECTOR SHOULD TAKE OVER, AND WE HAVE HAD TO LET SOME PROGRAMS SLIP A LITTLE. WE ARE CONFIDENT THAT OUR PROPOSED BUDGET FOR FISCAL YEAR 1983 WILL SUSTAIN A HIGH-LEVEL OF ACTIVITIES IN THOSE AREAS THAT WE THINK OUGHT TO BE FUNDED BY THE GOVERNMENT.

NOW, LET ME TURN TO THE STATUS OF THE DOMESTIC AND INTERNATIONAL NUCLEAR POLICIES AND PROGRAMS OF THE REAGAN ADMINISTRATION. AS YOU KNOW, THE PRESIDENT ISSUED A POLICY STATEMENT ON OCTOBER 8, 1981, OUTLINING THE STEPS THE FEDERAL GOVERNMENT WILL TAKE TO RESTORE NUCLEAR ENERGY AS A VIABLE ENERGY OPTION, AND EARLIER ON JULY 16, HE ISSUED A STATEMENT ON NUCLEAR NONPROLIFERATION.

THE BASIS OF BOTH THESE STATEMENTS IS THE RECOGNITION OF THE IMPORTANCE OF NUCLEAR POWER, TO THE U.S. AND TO THE REST OF THE WORLD.

NUCLEAR POWER TODAY GENERATES ABOUT TWELVE PERCENT OF ALL U.S. ELECTRICITY. IN SOME STATES SUCH AS ILLINOIS, NUCLEAR PLANTS MEET MORE THAN HALF OF THE AREA'S ELECTRICITY NEEDS. WE EXPECT THAT NUCLEAR POWER WILL ACCOUNT FOR ABOUT TWENTY FIVE PERCENT OF AMERICA'S ELECTRICITY GENERATION BY THE EARLY 1990's.

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NUCLEAR POWER IS ALSO PLAYING AN IMPORTANT ROLE IN THE ENERGY PICTURE OF MANY COUNTRIES. THE NUMBER OF COUNTRIES POSSESSING AND BENEFITTING FROM NUCLEAR TECHNOLOGY CONTINUES TO GROW. THE MEMBER STATES OF THE ORGANIZATION OF ECONOMIC COOPERATION AND DEVELOPMENT (OECD) ALREADY DERIVE MORE THAN 10% OF THEIR ELECTRICITY REQUIREMENTS FROM NUCLEAR POWER AND BY THE YEAR 1990, THAT WILL RISE TO 25%. NUCLEAR POWER WILL HAVE TO GROW IF NATIONS ARE TO MEET THEIR FUTURE ENERGY NEEDS.

IN THE U.S., WE ARE WORKING CLOSELY WITH INDUSTRY AND THE CONGRESS TO FIND WAYS TO DEAL EFFECTIVELY AND EFFICIENTLY WITH THE PROBLEMS THAT HAVE SLOWED THE GROWTH OF NUCLEAR POWER IN THE U.S. IT SHOULD BE STRESSED, HOWEVER, THAT THESE PROBLEMS ARE NOT PRIMARILY TECHNICAL.

PRESIDENT REAGAN'S NUCLEAR POLICY STATEMENT OF OCTOBER 8 IS THE FIRST STEP TOWARD IMPROVING THE CLIMATE FOR THE GROWTH OF NUCLEAR POWER IN THE U.S. IT RECOGNIZES THAT IN THE U.S. RELIABLE, REASONABLY PRICED ENERGY SUPPLIES ARE ESSENTIAL TO RESTORING ECONOMIC GROWTH AND NUCLEAR POWER NEEDS TO PLAY A KEY ROLE IN MEETING OUR NEEDS. THIS ADMINISTRATION REGARDS NUCLEAR POWER AS ONE OF THE BEST POTENTIAL SOURCES OF NEW ELECTRICAL ENERGY SUPPLIES IN THE COMING DECADE AND IS COMMITTED TO EXPANDING ITS ROLE IN THE UNITED STATES.

THE HISTORY OF COMMERCIAL NUCLEAR POWER PLANTS AND FUEL CYCLE FACILITIES IN THE UNITED STATES PROVIDES A COMPELLING CASE THAT THIS TECHNOLOGY IS A SAFE, ECONOMICALLY EFFICIENT AND ENVIRONMENTALLY ACCEPTABLE ENERGY SOURCE. THE DIFFICULTIES SLOWING THE GROWTH OF U.S. NUCLEAR INDUSTRY ARE PRINCIPALLY INSTITUTIONAL AND FINANCIAL IN CHARACTER.

FOR EXAMPLE, MOVING FROM THE PLANNING STAGE TO AN OPERATING LICENSE FOR A NUCLEAR POWER PLANT IN THE U.S. TODAY INVOLVES SOME 10-14 YEARS COMPARED TO 6 TO 8 YEARS IN SOME OTHER COUNTRIES. SUCH LEAD TIMES FOR PUTTING REACTORS ON LINE ARE SIMPLY TOO LONG, PARTICULARLY WHEN INTEREST RATES ARE SO HIGH IN THE U.S.

EXCESSIVE GOVERNMENT REGULATION HAS CREATED CONSIDERABLE ADDITIONAL COST AND UNCERTAINTY. THE ADMINISTRATION IS MOVING TO RESOLVE THESE PROBLEMS BY IMPROVING THE REGULATORY CLIMATE IN WHICH INDUSTRY MUST OPERATE -- WITHOUT COMPROMISING THE PUBLIC HEALTH AND SAFETY. THE ADMINISTRATION IS COMMITTED TO REVERSING PAST REGULATORY EXCESSES AND TO PROVIDING A MORE FAVORABLE CLIMATE FOR EFFICIENT ENERGY PRODUCTION, THUS ALLOWING NUCLEAR POWER TO COMPETE FAIRLY IN THE MARKETPLACE WITH OTHER POTENTIAL SOURCES OF ENERGY SUPPLY. TOWARD THAT END, THE PRESIDENT IN HIS OCTOBER 8 POLICY STATEMENT DIRECTED SECRETARY EDWARDS TO GIVE IMMEDIATE, PRIORITY ATTENTION TO RECOMMENDING IMPROVEMENTS IN THE REGULATORY AND LICENSING PROCESS IN ORDER TO REMOVE UNNECESSARY OBSTACLES TO THE DEPLOYMENT OF CURRENT GENERATION OF NUCLEAR POWER REACTORS. WE ARE MOVING RAPIDLY TO IDENTIFY WAYS TO MEET THAT OBJECTIVE. AT THE SAME TIME WE ARE STRONGLY COMMITTED TO ASSURING THE SAFE OPERATION OF NUCLEAR POWER PLANTS. BOTH GOVERNMENT AND INDUSTRY ARE WORKING TOGETHER TO TAKE ADVANTAGE OF THE LESSONS OF THREE MILE ISLAND IN ORDER TO MINIMIZE FUTURE RISKS.

THE PRESIDENT ALSO RECONFIRMED IN HIS OCTOBER 8 STATEMENT THAT WE WILL PROCEED WITH THE DEMONSTRATION OF BREEDER REACTOR TECHNOLOGY, INCLUDING COMPLETION OF THE CLINCH RIVER BREEDER REACTOR.

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THE UNITED STATES HAS SUBSTANTIAL DOMESTIC RESOURCES OF URANIUM ORE CAPABLE OF LASTING WELL INTO THE 21ST CENTURY IF USED IN THE CURRENT GENERATION OF LIGHT WATER REACTORS. BREEDER TECHNOLOGY MULTIPLIES THE EFFECTIVENESS OF THESE RESOURCES SIXTYFOLD, SO THAT THEY COULD LAST EASILY FOR SEVERAL MORE CENTURIES. OUR BREEDER PROGRAM IS, WE BELIEVE, A VIGOROUS ONE BASED ON A SOUND AND SYSTEMATIC PROGRAM OF DEVELOPMENT. IT IS STRUCTURED AROUND THE DESIGN, CONSTRUCTION AND OPERATION OF DEVELOPMENTAL PLANTS IN PROGRESSIVELY LARGER SIZES. THE 400 MWT FAST FLUX TEST FACILITY (FFTF) IN RICHLAND WASHINGTON, WHICH IS INTENDED TO TEST FUELS AND MATERIALS AMONG OTHER TASKS, HAS ALREADY CONDUCTED INTENSIVE SAFETY TESTS AND THE FIRST LOAD OF TEST FUEL AND MATERIALS IS NOW ON HAND FOR FULL OPERATION. THE 375 MWE CLINCH RIVER BREEDER REACTOR PROJECT WHICH HAD BEEN DELAYED BY THE PREVIOUS ADMINISTRATION, IS NOW BACK ON TRACK. OUR NEAR TERM OBJECTIVE IS TO BEGIN SITE PREPARATION ACTIVITIES NEXT YEAR, AND WE PLAN TO HAVE THE CLINCH RIVER BREEDER REACTOR IN THE LATE 1980s. WE ARE ALSO MOVING FORWARD WITH THE CONCEPTUAL DESIGN AND PLANNING FOR A LARGE 1,000 MWE LMFBR.

WE WERE DISAPPOINTED BY THE ACTION TAKEN MARCH 5 BY A MAJORITY OF COMMISSIONERS OF THE U.S. NUCLEAR REGULATORY COMMISSION IN DENYING OUR REQUESTS TO BEGIN SITE PREPARATION THIS MONTH FOR THE CLINCH RIVER BREEDER REACTOR PROJECT. WE BELIEVED THAT WE HAD CLEARLY DEMONSTRATED TO THE COMMISSION THAT THE IMMEDIATE START OF SITE PREPARATION WOULD HAVE REDUCED THE PROJECT SCHEDULE BY ONE TO TWO YEARS AND THEREBY AVOIDED INCREASED COSTS TO U.S. TAXPAYERS. WE HAD HOPED THAT THE

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COMMISSION WOULD HAVE ACTED FAVORABLY TO AVOID FURTHER PROCEDURAL DELAYS, ESPECIALLY SINCE NO SAFFETY ISSUES WERE INVOLVED IN OUR SITE PREPARATION REQUEST. ALTHOUGH DISAPPOINTED, WE ARE STILL RESOLVED TO COMPLETE THE CLINCH RIVER PROJECT AT THE EARLIEST POSSIBLE DATE. WE WILL CONTINUE TO ADVANCE THE PLANT DESIGN, TO PROCURE MAJOR PLANT HARDWARE, AND TO MOVE FORWARD IN OUR LICENSING REVIEW WITH THE COMMISSION'S STAFF.

THE OCTOBER 8 PRESIDENTIAL STATEMENT HAS ALSO LIFTED THE INDEFINITE BAN WHICH THE PREVIOUS ADMINISTRATION PLACED ON COMMERCIAL REPROCESSING IN THE UNITED STATES. WE BELIEVE THAT THE PRIVATE SECTOR SHOULD TAKE THE LEAD IN BRINGING ITS ENTREPRENEURIAL AND FINANCIAL RESOURCES TO BEAR IN DEVELOPING COMMERCIAL REPROCESSING SERVICES IN THE UNITED STATES. WE ARE TAKING STEPS TO DEVELOP STABLE LONG-TERM POLICIES WHICH WILL ELIMINATE UNNECESSARY REGULATORY BARRIERS TO THE ESTABLISHMENT OF A PRIVATE INDUSTRY FOR THE REPROCESSING OF LIGHT WATER REACTOR SPENT FUEL, WHILE ENSURING ADEQUATE SAFEGUARDS AND PHYSICAL PROTECTION. THE PRESIDENT HAS ORDERED A STUDY TO BE UNDERTAKEN ON THE FEASIBILITY OF OBTAINING ECONOMICAL SUPPLIES OF PLUTONIUM FOR THE DEPARTMENT OF ENERGY BY MEANS OF COMPETITIVE PROCUREMENT.

WE FACE THE CHALLENGE OF CLOSING THE BACK END OF THE FUEL CYCLE. FINDING WAYS TO RELIEVE SPENT FUEL STORAGE CONGESTION AND EFFECTIVELY MANAGE HIGH LEVEL WASTE ARE PROBLEMS WHICH ARE CLOSELY LINKED TO PUBLIC CONFIDENCE AND ACCEPTANCE OF NUCLEAR POWER. THERE ARE NO MAJOR TECHNICAL BARRIERS TO THE SAFE DISPOSAL OF HIGH LEVEL OR VERY LONG LIVED REACTOR WASTES. TECHNICALLY ACCEPTABLE METHODS OF DISPOSAL

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EXIST. HOWEVER, THERE IS SOME PUBLIC CONERN IN THE U.S. AS IN OTHER COUNTRIES. WE ARE CONFIDENT THAT THE SAFE DISPOSAL OF RADIOACTIVE WASTES CAN BE ACCOMPLISHED WITH THE MINIMUM RISK TO MAN AND THE ENVIRONMENT, AND WE INTEND TO MOVE RAPIDLY TO DEMONSTRATE TO THE PUBLIC THAT THE PROBLEMS ASSOCIATED WITH MANAGEMENT OF SUCH WASTES CAN BE PROPERLY AND SAFELY RESOLVED.

THE PRESIDENT HAS INSTRUCTED THE SECRETARY OF ENERGY, WORKING CLOSELY WITH INDUSTRY AND STATE GOVERNMENTS, TO PROCEED TOWARD THE DEPLOYMENT OF MEANS OF STORING AND DISPOSING OF COMMERCIAL HIGH-LEVEL RADIOACTIVE WASTE. WE ARE NOW ENGAGED IN A DETAILED AND INTENSIVE EVALUATION OF A SMALL NUMBER OF POTENTIAL LOCATIONS FOR MINED REPOSITORIES. WE PLAN TO DEMONSTRATE BY THE END OF THIS DECADE THE TERMINAL ISOLATION OF NUCLEAR WASTES IN MINED REPOSITORIES LOCATED IN STABLE, GEOLOGICAL FORMATIONS.

FINALLY, THE PRESIDENT RECOGNIZED IN HIS OCTOBER 8 STATEMENT THAT NONE OF THESE REMEDIES -- REDUCING AND ELIMINATING REGULATORY PROBLEMS, PROCEEDING WITH THE DEMONSTRATION OF BREEDER TECHNOLOGY, ALLOWING COMMERCIAL REPROCESSING ACTIVITIES, AND CLOSING THE BACK END OF THE FUEL CYCLE -- WILL GET NUCLEAR POWER MOVING AGAIN UNLESS THE UTILITIES CAN RAISE THE CAPITAL NECESSARY TO BUILD NEW NUCLEAR POWER FACILITIES. HIGH INFLATION RATES AND THE HIGH COST OF CAPITAL HAVE RESULTED IN THE CANCELLATION AND POSTPONEMENT OF MORE THAN 90 POWER PLANTS IN THE LAST FEW YEARS, MANY OF THEM COAL-FIRED. THE ALLOWED RATES OF RETURN ON INVESTMENT IN POWER PLANTS HAVE SIMPLY NOT BEEN COMMENSURATE WITH THE RISKS INVOLVED.

IN FEBRUARY, SENIOR ADMINISTRATION OFFICIALS CONCERNED WITH ENERGY MET WITH VICE PRESIDENT BUSH AND WITH LEADERS IN INDUSTRY AND THE UTILITIES TO DISCUSS MEASURES NEEDED TO HELP THE UTILITIES OVERCOME THEIR FINANCIAL PROBLEMS. AN INTERAGENCY WORKING GROUP TO FOCUS ATTENTION ON THIS MATTER AND TO RECOMMEND SOLUTIONS HAS BEEN ESTABLISHED.

THROUGH THE COMBINATION OF PROGRAMS WHICH I HAVE OUTLINED ABOVE, AND WITH THE CLOSE PARTNERSHIP WITH PRIVATE INDUSTRY, THE REAGAN ADMINISTRATION IS CONFIDENT THAT WE CAN REVITALIZE NUCLEAR POWER IN THE UNITED STATES TODAY AND CREATE A SOLID BASIS FOR THE USE OF ADVANCED TECHNOLOGIES SUCH AS THE BREEDER TO MEET TOMORROW'S ENERGY NEEDS.

SINCE THE BEGINNINGS OF INTERNATIONAL NUCLEAR COOPERATION IN THE 1950s THE UNITED STATES HAS MADE A MAJOR CONTRIBUTION TO THE PEACEFUL USES OF NUCLEAR ENERGY AS A MAJOR SUPPLIER OF NUCLEAR TECHNOLOGY, EQUIPMENT AND MATERIAL TO OTHER COUNTRIES. WE RECOGNIZE THAT OUR NUCLEAR EXPORT POLICIES IN RECENT YEARS HAVE CREATED SOME CONCERN. HOWEVER, PRESIDENT REAGAN'S JULY 1981 STATEMENT ON INTERNATIONAL NUCLEAR COOPERATION AND NONPROLIFERATION HAS MADE ABUNDANTLY CLEAR THAT THIS ADMINISTRATION IS COMMITTED TO STRENGTHENING COOPERATION WITH OTHER COUNTRIES AND TO RESTORING THE POSITION OF THE UNITED STATES AS A RELIABLE AND PREDICTABLE NUCLEAR SUPPLIER UNDER ADEQUATE SAFEGUARDS.

WE FULLY RECOGNIZE THAT WE LIVE IN A HIGHLY INTERDEPENDENT WORLD AND THAT OUR NUCLEAR POLICIES AND OUR APPROACH TO NUCLEAR EXPORTS CAN HAVE A MAJOR IMPACT UPON THE ENERGY PROGRAMS OF OTHER NATIONS.

SINCE WE REGARD NUCLEAR POWER AS ESSENTIAL TO IMPROVE ENERGY SECURITY AND SPUR ECONOMIC DEVELOPMENT IN MANY NATIONS, WE ARE DETERMINED TO MAINTAIN A LEADERSHIP ROLE IN INTERNATIONAL NUCLEAR AFFAIRS, AND TO COOPERATE WITH OTHER NATIONS IN THE PEACEFUL USES OF NUCLEAR ENERGY ON STABLE AND ATTRACTIVE TERMS. PRESIDENT REAGAN MADE THIS OBJECTIVE QUITE CLEAR IN HIS POLICY STATEMENT OF JULY 16. WE ARE VERY SENSITIVE TO THE FACT THAT WE WILL BE JUDGED MORE BY OUR ACTIONS THAN OUR WORDS. ALTHOUGH THE IMPLEMENTATION OF VARIOUS DETAILED ASPECTS OF THE NEW U.S. POLICY IS STILL UNDERGOING REVIEW, THE PRESIDENT SPECIFIED SOME OF THE CONCRETE STEPS WHICH HIS ADMINISTRATION WILL TAKE TO RE-ESTABLISH THE UNITED STATES AS A RELIABLE NUCLEAR TRADE PARTNER AND TO PREVENT THE SPREAD OF NUCLEAR WEAPONS.

THE PRESIDENT HAS INSTRUCTED EXECUTIVE BRANCH AGENCIES TO ENSURE THAT EXPORT REQUESTS AND APPROVAL REQUESTS WILL BE HANDLED EXPEDITIOUSLY WHEN THE NECESSARY U.S. LEGAL REQUIREMENTS ARE MET.

THE PRESIDENT ALSO ANNOUNCED IN HIS JULY STATEMENT THAT WE WILL NOT INHIBIT OR SET BACK CIVIL REPROCESSING OR BREEDER R&D IN COUNTRIES WITH ADVANCED NUCLEAR PROGRAMS WHERE IT DOES NOT CONSTITUTE A PROLIFERATION RISK. IN ACCORDANCE WITH THE PRESIDENT'S INSTRUCTIONS, WE ARE

DEVELOPING A POLICY FOR EXERCISING U.S. CONSENT RIGHTS FOR REPROCESSING AND PLUTONIUM USE. THIS REVIEW IS NOT YET COMPLETE BUT WE RECOGNIZE THAT COUNTRIES WITH LARGE PROGRAMS REQUIRE LONG TERM CONFIDENCE AND PREDICTABILITY IN THEIR SUPPLY ARRANGEMENTS AND WE ARE AIMING AT DEVELOPING POLICIES WHICH WILL FACILITATE LONG TERM PLANNING BY OUR COOPERATING PARTNERS. IN THE INTERIM, WE WILL PROMPTLY APPROVE, SUBJECT TO STATUTORY REQUIREMENTS, REQUESTS FOR RETRANSFER OF SPENT FUEL TO THE U.S. AND FRANCE AND WILL CONSIDER REQUESTS FOR PLUTONIUM USE ON A CASE-BY-CASE BASIS.

WHILE THIS ADMINISTRATION IS TAKING CONCRETE STEPS TO FACILITATE INTERNATIONAL NUCLEAR COMMERCE, WE ARE ALSO GIVING ATTENTION TO EFFORTS TO REDUCE PROLIFERATION RISKS AND STRENGTHEN THE INTERNATIONAL NONPROLIFERATION REGIME. PRESIDENT REAGAN HAS CHARACTERIZED THE PREVENTION OF THE SPREAD OF NUCLEAR WEAPONS AS A FUNDAMENTAL NATIONAL SECURITY AND FOREIGN POLICY OBJECTIVE IN HIS JULY STATEMENT.

CLEARLY, THE ACQUISITION OF NUCLEAR EXPLOSIVE DEVICES BY ADDITIONAL STATES WOULD HAVE SEVERE, ADVERSE CONSEQUENCES FOR INTERNATIONAL PEACE AND FOR THE SECURITY OF ALL COUNTRIES. IT WOULD ALSO SERIOUSLY THREATEN INTERNATIONAL COOPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY.

THE U.S. IS TAKING A NUMBER OF STEPS TO HALT THE SPREAD OF NUCLEAR WEAPONS. RECOGNIZING THAT PROLIFERATION IS AN INTERNATIONAL POLITICAL AND SECURITY PROBLEM AND NOT JUST A MATTER OF CONTROLS ON THE CIVIL

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NUCLEAR FUEL CYCLE, WE WILL STRIVE TO REDUCE THE MOTIVATION FOR ACQUIRING NUCLEAR EXPLOSIVES BY WORKING TO IMPROVE REGIONAL AND GLOBAL STABILITY AND BY PROMOTING UNDERSTANDING OF THE LEGITIMATE SECURITY CONCERNS OF OTHER STATES.

THE UNITED STATES WILL ALSO CONTINUE TO SUPPORT ADHERENCE BY ADDITIONAL COUNTRIES TO THE TREATY ON THE NONPROLIFERATION OF NUCLEAR WEAPONS AND TO THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA, BETTER KNOWN AS THE TREATY OF TLATELOLCO (TLA-TEL-OL-CO). THESE TREATIES ARE ESSENTIAL ELEMENTS IN THE INTERNATIONAL NONPROLIFERATION SYSTEM. ON NOVEMBER 19 PRESIDENT REAGAN SIGNED THE U.S. INSTRUMENT OF RATIFICATION OF PROTOCOL I OF THE TLATELOLCO TREATY AND ON NOVEMBER 25 SECRETARY OF STATE HAIG PERSONALLY DEPOSITED THE INSTRUMENT OF RATIFICATION WITH THE MEXICAN GOVERNMENT IN MEXICO CITY. THIS ACTION, FOLLOWING EARLIER U.S. RATIFICATION OF ADDITIONAL PROTOCOL II, COMPLETES U.S. ADHERENCE TO THIS IMPORTANT NONPROLIFERATION INSTRUMENT IN ALL RESPECTS OPEN TO THE U.S.

IT IS ALSO IMPORTANT THAT WE STRIVE FOR AS WIDESPREAD ACCEPTANCE OF SAFEGUARDS AS POSSIBLE, AND THE U.S. WILL CONTINUE TO URGE SUPPLIERS TO REQUIRE SO-CALLED FULL SCOPE SAFEGUARDS AS A CONDITION FOR ANY SIGNIFICANT NEW SUPPLY COMMITMENTS.

BEFORE I CLOSE, LET ME JUST SAY A FEW WORDS ABOUT THE REORGANIZATION OF THE DEPARTMENT OF ENERGY AS OUTLINED IN THE ADMINISTRATION'S FY 1983 BUDGET REQUEST.

THIS ADMINISTRATION BELIEVES THAT THE REORGANIZATION WILL ALLOW THE FEDERAL GOVERNMENT TO MEET MORE EFFECTIVELY ITS FOUR BASIC, UNIQUE ENERGY RESPONSIBILITIES; NAMELY, PROTECTING AGAINST ENERGY SUPPLY DISRUPTIONS, PRIMARILY THROUGH PLANNING AND MAINTENANCE OF THE STRATEGIC PETROLEUM RESERVE; PROVIDING SUPPORT TO LONG-TERM, HIGH RISK, HIGH-PAYOFF RESEARCH; SUPPORTING NATIONAL DEFENSE NEEDS THROUGH CIVILIAN CONTROL OF RESEARCH, DEVELOPMENT, PRODUCTION AND TESTING OF NUCLEAR WEAPONS; AND PERFORMING TASKS SUCH AS OPERATION OF THE FEDERAL RESOURCE RESERVES, POWER MARKETING, AND UTILITY REGULATIONS REQUIRED BY LAW. A DETAILED PROPOSAL IS NOW BEING CONSIDERED.

IN SUMMARY, I HAVE GIVEN YOU THE REAGAN ADMINISTRATION APPROACH TO ENERGY R&D: MUCH GREATER RELIANCE ON MARKET FORCES AND INCENTIVES FOR DIRECTION, AND GOVERNMENT-MANAGED PURSUIT OF R&D THAT IS LONG-TERM, HIGH RISK, AND WITH LARGE POTENTIAL PAYOFF.

THE PRESIDENT ALSO MADE TWO IMPORTANT STATEMENTS. ONE SET IN MOTION STEPS WHICH WE ARE TAKING TO STRENGTHEN THE ROLE OF NUCLEAR POWER IN THE UNITED STATES. THE OTHER SET OUT THE POLICY TO FACILITATE INTERNATIONAL COOPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY.

WE ARE CONFIDENT THAT THE INITIATIVES PRESIDENT REAGAN IS TAKING WILL BREATHE NEW LIFE INTO OUR COMMERCIAL NUCLEAR POWER INDUSTRY SO THAT IT CAN PLAY AN INCREASINGLY IMPORTANT PART IN MEETING FUTURE U.S. ENERGY NEEDS UNDER SAFE AND ECONOMIC CONDITIONS. WE ARE EQUALLY CONFIDENT THAT THE U.S. WILL STRENGTHEN ITS ROLE IN INTERNATIONAL NUCLEAR AFFAIRS AND WILL RESTORE ITS POSITION AS A STABLE, RELIABLE AND PREDICTABLE TRADE PARTNER. AT THE SAME TIME WE WILL REMAIN VIGILANT

N OUR EFFORTS TO PREVENT THE SPREAD OF NUCLEAR WEAPONS. I HOPE
OU SHARE MY BELIEF THAT IF WE ARE ABLE TO OBTAIN A STRONG AND WIDE-
PREAD COMMITMENT BOTH TO INTERNATIONAL NUCLEAR COOPERATION AND TO
ONPROLIFERATION, NUCLEAR POWER WILL MAKE THE IMPORTANT CONTRIBUTION
O MEETING GLOBAL ENERGY NEEDS THAT IT SHOULD.

(3)

発表は 3月 9日 午前/午後 時 以降に願います。

EMBARGO UNTIL a.m. p.m.

Towards Vitalized Nuclear Power Development

- An Examination of the Development Strategy for Light Water Reactors -

Ichiro Hori
Executive Vice President
The Tokyo Electric Power Co., Inc.

1. Light Water Reactor Development and its Problems:

- The Replacement of Oil as an Energy Source and Nucelar Energy:

The energy problem is one of the most serious problems that the world now faces.

The situation as regards oil, presently the world's main source of energy, eased somewhat in 1980-81 as a result of the energy conservation and alternative energy policies of advanced industrial nations.

However, the international energy situation is very fluid, and in the middle and long term, a trend towards tighter oil supplies is unavoidable due to the policies of the OPEC countries aimed at conserving their resources and to the reduced development of new oil resources.

At the Venice Summit in 1980, it was decided that the degree of the participating nations' dependency on oil should be reduced to 40% by 1990 through the expanded use of nuclear energy.

This policy was reaffirmed at the Ottawa Summit, and nuclear power generation became established as the most stable and certain energy supply source.

The growth of nuclear power generation throughout the world from 1968 to 1977 averaged a remarkable 25% per year, but since 1978, this rate has tapered off to about 10% as the result of various difficulties.

However, according to current plans, the scale of nuclear power generation in 1985 is expected to be between 3-10 times larger than in 1977, and it is thus evident that nuclear energy is the most important means of solving the energy problem.

o Status of Nuclear Energy Development in Various Nations:

By the end of 1981, there were 259 nuclear power generations units in operation throughout the world for a total capacity of about 160,000MW. If units under construction or in the planning stage are included, the total rises to 704 units, with a capacity of about 600,000MW.

In the United States which leads the world in nuclear power generation, no new projects have been initiated in the past few years because of lagging electric power demand, the sharp rise in construction costs and the longer time required for licensing to build nuclear plants. This situation appears to be peculiar to the United States, which is blessed with a variety of energy resources.

However, judging from the positive nuclear energy development policy of the Reagan administration, the indications are bright for the future of nuclear power development in the United States.

In Europe, France is in the process of pursuing large-scale nuclear power generation plans and by the end of 1980 had become number two in nuclear power generation in the world.

The new Mitterrand government continuing the policies of the former administration, has decided to continue the construction of the nuclear power stations that have already been ordered and, although the pace of construction will be somewhat reduced, will continue the development of new plants.

The USSR is proceeding steadily with its nuclear energy development plans on a scale that is comparable to that of France.

West Germany, which has rich coal resources, is tending towards postponement of nuclear energy development as a result of Germany's energy policy of dependence on domestic energy resources, the long-term interruption of nuclear power plant construction due to various litigation, the increased complexity of the procedures for obtaining governmental approvals and the anti-nuclear movement.

In England, nuclear power development has concentrated mainly on gas-cooled reactors, but starting in 1982, light water reactors will be introduced at the rate of one unit per year for ten years to reach a total of 15,000MW.

In Canada, nuclear power development is proceeding smoothly based on heavy water reactors developed in Canada with Canada's rich uranium resources in mind.

Japan is now in third place in the world nuclear power generation. It was feared that the trouble at the Tsuruga power plant last year would have an adverse effect on nuclear power development, but thanks to the efforts of all organizations concerned, development has been proceeding comparatively smoothly.

o Light Water Reactors in Various Countries and Related Technical Improvements:

Light water reactors, the main topic of this session, now constitute about 81% of the world's nuclear reactors.

Light water reactors were first put into commercial operation in the United States with the completion of the Shipping Port power plant (PWR), with a capacity of 60MW, and the Oyster Creek plant (BWR), with a capacity of 600MW.

In the U.S., General Electric and Westinghouse, with their superior technology, have been playing a leading role in the enlargement of reactor capacity to the 1,300MW level and in the standardization of equipment in response to demands for increased reliability and rationalization of operation.

In Europe, West Germany was active in the development of nuclear power from 1956.

In the beginning, due to Germany's late start in nuclear energy development, KWU and others introduced light water reactor technology from the U.S., but during the ten years starting in 1963, the government invested some 4.7 billion marks in research and development in order to produce a West German light water reactor. As a result, the development of a 1,300MW reactor was completed in 1976.

In France, initial work was directed toward the development of gas-cooled reactors, but in 1969, emphasis was shifted to the development of light water reactors, and relevant technology was introduced from the U.S. Thereafter, Framatome and others concentrated on utilizing French experience and have been constructing standardized 900MW plants since 1970 and 1,300MW plants starting in 1976.

ASEA Atom in Sweden is carrying out a BWR development program concentrating on such special areas as internal pumps, fine motion CRDs and so on.

In this way, European countries have been promoting the development and improvement of light water reactors and the establishment of their use.

As a result of the efforts of all of these nations, the availability factor for light water reactors in 1981 rose to 57.5% in the U.S., 67.8% in West Germany, 66.2% in France, 65.7%

in Sweden and 61.2% in Japan, and the average availability factor throughout the world rose to about 61%.

At last, all of the efforts put into the development of light water reactors are producing notable results.

o Light Water Reactors in Japan - Policies for Improvement and Standardization:

The first commercial reactor in Japan was the Calder Hall reactor at Tokai Nuclear Power Station (166MW) built with English technology.

However, all regularly operating reactors built since then have been light water reactors.

In Japan, light water reactors were initially constructed based on American technology, and in 1970, the first 350MW class BWR and PWR reactors began operation.

Since then, development has proceeded smoothly, and there are now twenty-one light water reactors with a total capacity of 15,345MW in operation. If those under construction or in the planning stage are included, the total is thirty-eight units with a capacity of 31,560MW.

This total consists of twenty-two BWRs and sixteen PWRs. The largest of these units has a capacity of 1,175MW.

The availability factor in Japan fell to the 40% level in 1977 due to problems in the early stages of operation, but after great efforts to achieve improvement, in 1980 the availability factor passed the 60% level, and Japan's power companies are aiming at a figure of over 70% in the future.

On the basis of this construction and operation experience and these accumulated technological developments, a substantial portion of the light water reactor technology being used in Japan is now Japanese technology.

Almost 100% of the relative hardware is now produced in Japan, and thus, Japan has reached the stage of constructing entirely domestic nuclear reactors.

Between 1975 and 1980, the Ministry of International Trade and Industry (MITI) guided the First and Second Improvement and Standardization Program, based on domestic technology.

These programs aimed at, among other things, the enlargement of reactor containers and the improvement of equipment systems in order to improve maintenability and availability and to reduce radiation exposure.

MITI is now pushing ahead with the Third Improvement and Standardization Program, a five-year plan to achieve a light water reactor appropriate for Japan through the improvement of reliability and operability.

- Development of ABWR, APWR and KPWR:

The improvements and developments with regard to light water reactors have been proceeded along the line with the improvement and standardization program.

In addition, the development of Japanese-type light water reactors is being carried out under the leadership of the end-users through the ABWR development program, which is being promoted jointly by GE, Toshiba, Hitachi and electric power companies that own BWRs, and the APWR development program, which is being promoted by Mitsubishi Heavy Industries, Westinghouse and electric power companies that own PWRs.

So far, Japan has been concentrating on the improvement of American-type reactors, since it was this type that was introduced initially, but in order to improve the overall reliability of Japanese power supply facilities, diversification of reactor type is also being considered.

As an option for this purpose, a group of manufacturers consisting of Toshiba and Hitachi (which have experience with BWRs) and Fuji Electric (which has for a long time had connections with Siemens) are at present investigating the adaptability for use in Japan of the PWRs made by KWU (KPWRs), which have been put into operation in West Germany with excellent results.

Depending on the results of their study, the Tokyo Electric Power will consider the use of KPWRs.

In these ways, the superior features of European technology and of Japanese domestic technology, which is based on American technology, are being brought together, and an element of competition, in the best sense, is being introduced into the industry, thus contributing over the long term to the improvement of Japanese light water reactors as regards both technology and economics.

Furthermore, these developments are extremely significant in the development of new policies and directions in Japan for the election of reactor type.

o International Cooperation:

International cooperation on light water reactors is being promoted through cooperation on the development of the ABWR, etc. and also, through participation in the high burnup fuel evaluation project being carried out mainly by EPRI, the development of structural materials, safety tests at Marviken and so on.

Japanese electric power companies have exchanged information with utility companies overseas, particularly those in the United States, with regard to operation and improvement of light water reactor containers, steam generators, etc., licensing problems, technical information on the Three Mile Island incident and so on, and the results of these exchanges are reflected in the construction and operation of light water reactors.

In this way, international cooperation is very important for the electric power companies, not only for the establishment of stable nuclear power generation but also for the efficient management of capital, personnel and so on.

2. Present Nuclear Fuel Cycle and Future Prospects:

1) The outlook for Nuclear Power Generation in Japan and Uranium Demand:

o In November 1980, the Japanese cabinet set up targets for the supply of alternate forms of energy, including, for nuclear power generation, a target of 292,000,000Mwh per year by 1990, or in terms of crude oil, 75,900,000kl.

The total capacity of the facilities required to reach this target by 1990 is currently estimated at between 51,000MW and 53,000MW and accordingly, it is necessary to construct about 20,000MW in additional capacity by that time.

However, the long-term forecast for electric power demand is being reviewed by MITI, and it is believed that it will be adjusted downwards somewhat.

- Japanese demand for natural uranium will total 126,000 short tons during the years up to and including 1990, and 193,000 short tons of natural uranium have been secured through long-term and short-term contracts.

  Thus, enough uranium for the first half of the 1990s have been secured.

  However, the demand will increase thereafter, and it is anticipated that after the year 2000, Japan will need a considerable percentage of world uranium resources. It is necessary to develop policy for securing the as yet unsecured portion in order to assure Japan of a stable long-term supply of uranium. Japan must also promote the recycling of uranium and plutonium in order to reduce the amount of uranium and enrichment services that Japan requires.

2) Problems in the Nuclear Fuel Cycle:

- One of the upstream problems that Japan faces in the nuclear fuel cycle is uranium enrichment.

  Although enrichment services are to be supplied to Japan under existing long-term contracts with the United States Development of Energy and Eurodif of France, it is predicted that these services will be insufficient from around 1990 on.

In order to make up for this insufficiency, the diversification of supply sources is being considered, and simultaneously, it has been decided to build an enrichment plant in Japan and to give priority to this means of making up the insufficiency.

For this purpose, it is necessary to move ahead with the construction of a commercial enrichment plant, which is to begin partial operation in 1989 and reach full capacity (3,000 tons SWU/year) within about ten years. Work on a prototype plant (200 tons SWU/year) in advance of the commercial plant is scheduled to start in 1982 and will be undertaken primarily by the Power Reactor and Nuclear Fuel Development Corporation (PNC).

Primary among downstream problems in the nuclear fuel cycle are reprocessing and radwaste disposal. Reprocessing services are at present supplied by the United Kingdom and France. However, with the aim of establishing a domestic reprocessing system, PNC is now operating the Tokai reprocessing plant, and a second commercial plant (1,200 tons/year) is being planned mainly by Japan Nuclear Fuel Service Co., Ltd.

o It has been decided that Japan's medium and low level radioactive wastes will be disposed both on land and at sea. Before this can actually be carried out, it is necessary to develop concrete plans for ocean dumping, and this should be done as early as possible.

Regarding high level radioactive wastes, research on glass solidification is in progress at the JAERI and PNC.

In addition, electric power companies are also studying the possibility of receiving reprocessed waste in connection with reprocessing services to be provided abroad, and it is necessary for industry and the government to cooperate in completing the necessary preparations.

o Decommissioning of nuclear power plants is essential for smooth promotion of nuclear development, and thus, the development and testing of decommissioning technology and the treatment of the radwastes resulting from decommissioning are required, as is the preparation of means for financing decommissioning.

3) Problems in Resource Policy:

o In Japan, nuclear power development is centered on light water reactors, but it is essential for Japan to develop and introduce FBRs in order to reduce uranium consumption and to make the most of natural uranium resources. Therefore, the basic view in Japan is that FBRs will succeed LWRs.

o Under the Japanese FBR development program, a test reactor, the Joyo, is now in operation, and this will be succeeded by a prototype FBR, the Monju, followed by a demonstration plant and an initial-stage commercial plant. Thereafter, the full-scale introduction of FBRs will begin.

In the interim before FBR introduction, the maximum possible use of plutonium is being considered with a view to conserving natural uranium resources.

There are two ways of utilizing plutonium.
One is in ATRs, and a prototype ATR, known as the Fugen, has been developed in Japan. The other is plutonium recycling in thermal reactors. It is expected that these plans will be realized through the cooperation of the public and private sectors.

Finally, with regard to total energy systems, which aim at minimizing primary energy requirements, one of our future tasks will be the development of small and medium-size multi-purpose reactors that can be used to supply heat for area air-conditioning systems, the pulp and paper industry and the chemical industry, in addition to generating electricity.

In this presentation, I have described the current situation in Japan with regard to a variety of topics concerning LWRs and hope that our discussion on Vitalized Nuclear Power Development will center on the following points:

* The role of LWRs in energy policy and plans and policies for the promotion of LWRs.

* LWR development policies in various countries and their special features.

* Effective international cooperation (technological competition and cooperation).

* The export strategies of various countries.

* The establishment of the nuclear fuel cycle to promote LWRs.

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Presentation for 15th JAIF
annual conference
March 9th, 1982
Dr. W. Stoll

Plutonium utilisation in the Transition period before the economic breakthrough of fast breeder reactors

- Definition of Transition period
- Need for Reprocessing
- Plutonium availability
    - in the FRG
    - in Japan
- Modes of Plutonium utilisation
- Requirements and conditions
- The existing record for Recycle demonstration
- Common aspects in optimising the transition period between Japan and FRG

Definition of Transition period

- Growth of nucleare capacity occurs in today's industrialized nations through LWR's.
- Every operating year of 1000 MW LWR breeds about 250 kg's of fissile Plutonium (annual world breeding rate 1981: about 30 tons)
- Reprocessing is considered the safest way so far demonstrated to deal with spent fuel
- the appearance of fast breeders on the market is delayed:
  - because of the extended Uranium availability
  - because of the time required for demonstrating fast breeders
    - as being safe enough
    - as being competitive with LWR's
    - as having a reliable fuel cycle
- Reliability and economy of fast breeders depend to a large extent on the fuel cycle.
- Establishing and demonstrating the fuel cycle takes a long time and a substantial effort.
- Plutonium recycle into existing LWR's with excess Plutonium originating from reprocessing is therefore a natural and economic precursor for later on optimised Plutonium use in fast breeders.
- The duration of Transition period may vary from country to country between 10 and 50 years.

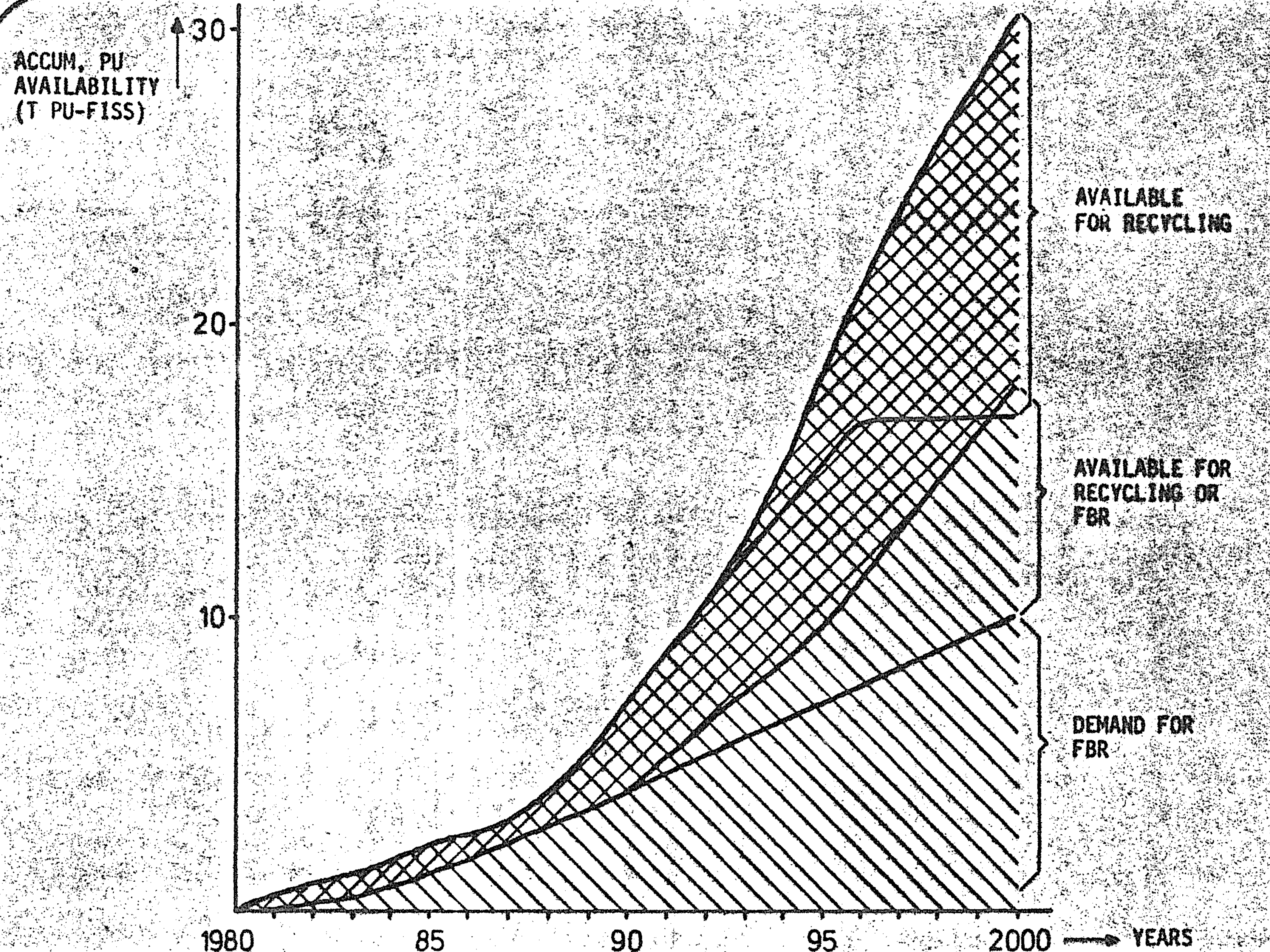
Need for Reprocessing

- Reprocessing transforms every group of fission products into the optimised storage form. (especially high active waste into durable glass blocks)

- Reprocessing saves 30 % or more of the necessary Uranium, when fissionable Uranium and Plutonium is utilized in LWR's.

- Reprocessing limits the accessible amount of fissionable Plutonium at any point in time in a nuclear economy. This helps Nonproliferation.

- Without establishing the technology of reprocessing there is no possibility to proceed into the fast breeder cycle.



PLUTONIUM RECYCLING IN GERMANY - AVAILABILITY AND DEMAND

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	tons of spent fuel	Estimated Cumulative Pu-Availability in kg Pu-fiss 1990	1995
Old Contracts (Cogema)	100	800	800
New Contracts (Cogema)	2200	5000	13000
Antizipated Throughput Tokai	200/year	8000	16000
		13800	29800

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Estimated Plutonium Availability in Japan

Modes of Plutonium Utilisation

- Present days LWR's do not substantially distinguish between fissionable Uranium and Plutonium. Within later phases of burn-up of present LWR-fuel half of the energy comes from Plutonium anyway.

- Recycling selfgenerated Plutonium into the reactor of origin results in complex fabrication-, safeguards-, transport- and loading scheme questions. It can be done and has been successfully demonstrated. Because of the multiple effort the net Plutonium value in an average nuclear economy may stay between 0 and 10 $/g fissile Pu.

- When Plutoinium is concentrated into reactors specially optimised for their use, because of simplifications, bigger batch sizes, element standardization, uncoupling of fabrication and loading schemes and concentrated transport and safeguards efforts the net Plutonium value increases to the 10 to 25 $/g fissile range.

- Conversion ratios of today's LWR's (around 0,56) are no law. They are defined through the exceedingly thermal neutron spectrum.

  There are concepts under consideration, where LWR's can be operated safely with tighter lattices and higher Plutonium concentrations, resulting in higher burn-up and higher conversion ratios. Plutonium values above 30 $/g fissile together with important stretchouts of Uranium reserves can be calculated. These systems however still await their overall demonstration.

Requirements and conditions

- For LWR-power stations:

  Because of the nonuniform distribution of Pu containing rods or fuel elements in the core recalculation of lattices, temperature coefficients, control rod worth and other safety margins are required before first recycle fuel insertion.
  Question of transport and handling, radiation exposure and safeguards play only a minor role.

- For Fabrication

  There are several reasons for a uniform distribution of the Plutonium in the UO_2-matrix of the MOX fuel which require additional precautions in fabrication. One of the more recent requirements is a high degree of solubility of the spent fuel in nitric acid. This is dictated by the present reprocessing technology and the concept of mixing UO_2 and MOX fuel in reprocessing. Major achievements have been made in this direction in the ALKEM production plant.

- Within of the transition period a fabrication facility will have to have a minimum capacity to provide a reliable production. In the FRG this will be around 1200 kgs of Pu/year to be fabricated into MOX fuel either for fast or thermal reactors. This means a certain flexibility in geometry and specifications of the product.

- For Reprocessing

  Reprocessing plants can accept MOX fuel only, when solubility is guaranteed and when the additional Plutonium introduced is tolerable in the flow sheet of the plant and causes no criticality problems. This may limit today's LWR-reprocessing plants to accept somewhere between 10 and 25 % of their fuel as MOX. This however is sufficient for the lifetime of the existing and planned plants of today.

REACTOR		TYPE OF REACTOR	QUANTITY OF PINS	QUANTITY OF MOX (KG)	PERIOD OF IRRADIATION
VAK	(KAHL)	BWR	1133	1500	1966 - 1979
MZFR	(KARLSRUHE)	PWR	296	390	1972 - 1975
KWO	(OBRIGHEIM)	PWR	6120	9350	1972 - 1984
KRB	(GUNDREMMINGEN)	BWR	2800	9600	1974 - 1976
GKN	(NECKARWESTHEIM)	PWR	820	1430	1982 - 1986 UNDER FABRICATION
DRESDEN	(USA)	BWR	110	280	1969 - 1973
GARIGLIANO	(ITALY)	BWR	48	150	1970 - 1974
SENA	(BELGIUM)	PWR	416	570	1975 - 1978
EXPERIMENTS		PWR, BWR	378	448	1968 - 1983
TOTAL			12121	23718	

PRODUCTION AND OPERATION EXPERIENCE WITH THERMAL RECYCLING IN GERMANY

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Common aspects in optimising the transition period between Japan and the FRG

- Plutonium arisings beyond the fast breeder requirements of today are substantial, but still below an operational margin for economic recycle fuel fabrication plants in Japan as well as in FRG.

- It is in the interest of utilities to preserve MOX fuel fabrication capabilities as viable options for the future.

- Support of these few facilities until the Plutonium returning from COGEMA contracts and future own reprocessing capacities allow economic operation, can be organized by sharing of uncovered excess costs including research and development efforts by the utilities jointly with the government.

YEAR	QUANTITY OF PLUTONIUM (KG PU-FISS)	QUANTITY OF PINS	QUANTITY OF MOX (KG)	REACTOR	TYPE OF REACTOR
1981	10	180	275	KWO	PWR
1982	60 - 90	1300 - 2000	2100 - 3200	KWO, GKN	PWR
1983	60 - 90	1300 - 2000	2100 - 3200	KWO, GKN	PWR
1984	100 - 200	2100 - 4200	3500 - 7000	KWO, GKN, KKU	PWR
1985	100 - 200	2100 - 4200	3500 - 7000	KWO, GKN, KKU	PWR

KWO: OBRIGHEIM (300 MW)

GKN: NECKARWESTHEIM (800 MW)

KKU: UNTERWESER (1300 MW)

FUTURE PROGRAMME FOR PLUTONIUM RECYCLING IN GERMANY

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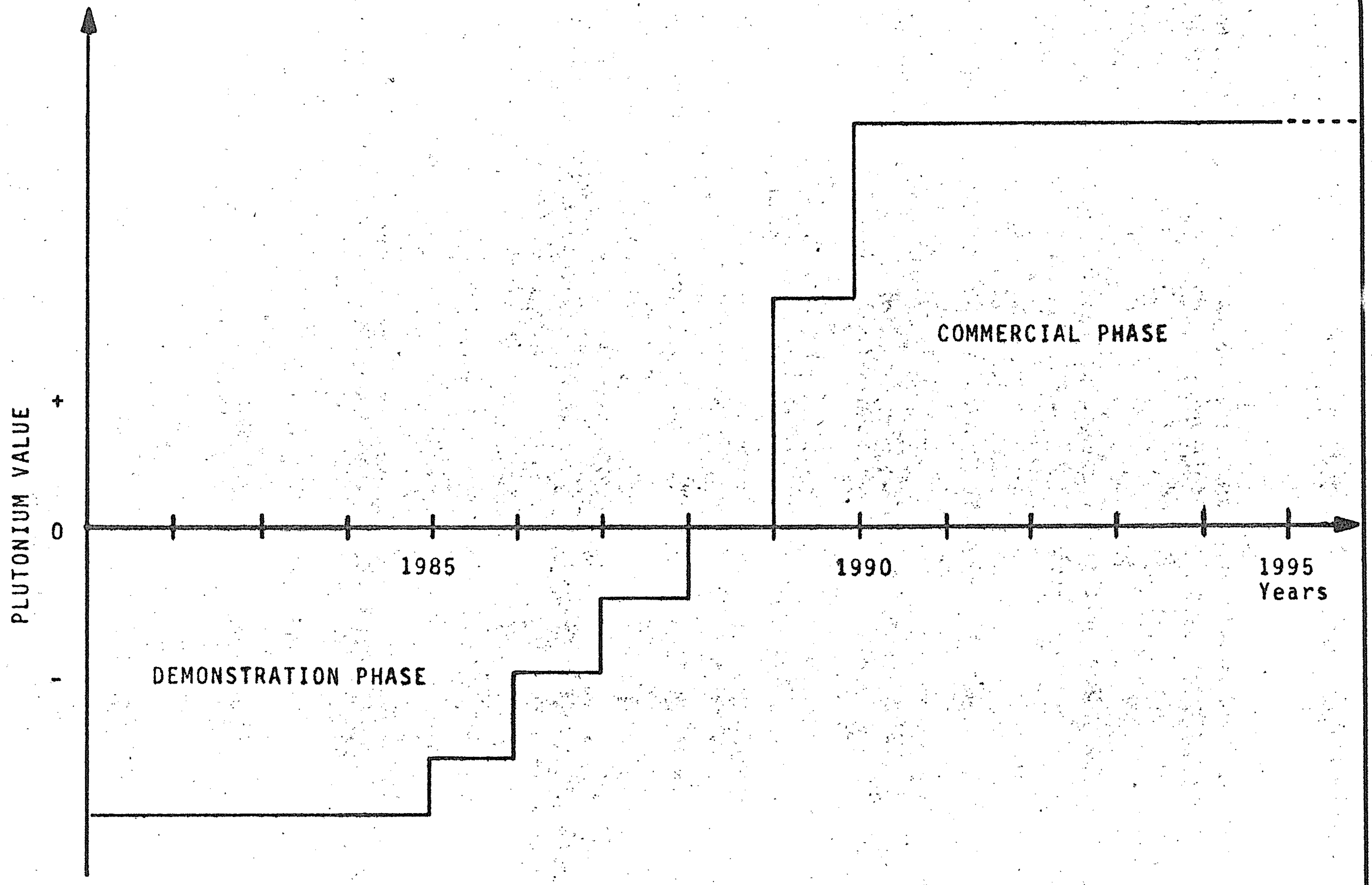

CONCEPT OF THE EVALUATION OF THE PLUTONIUM VALUE
ACCORDING THE GERMAN PLUTONIUM RECYCLING PROGRAMME

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DEMONSTRATION PHASE: - SUPPORT FOR THE DEVELOPMENT OF PU TECHNOLOGY FINANCED BY GOVERNMENT AND UTILITIES.

- DEMONSTRATION OF RECYCLING IN PWR REACTORS (300 - 1300 MW), PU VALUE = 0

- POOL BY UTILITIES FOR
  - TAKE OVER OF ADDITIONAL FABRICATION COSTS OF MOX FUEL (NEGATIV PU VALUE)
  - TAKE OVER OF ADDITIONAL REPROCESSING COSTS OF MOX FUEL
  - OPTIMIZED SUPPLY OF PLUTONIUM
  - OPTIMIZED STORAGE OF PLUTONIUM (AMERICIUM BUILD UP!)

COMMERCIAL PHASE : - RECYCLING OF PLUTONIUM ON A COMMERCIAL BASIS POSITIVE PU VALUE

- OPTIMIZED RECYCLING

- OPTIMIZED FABRICATION AND DESIGN

- INTRODUCTION OF HIGH CONVERTING SYSTEMS

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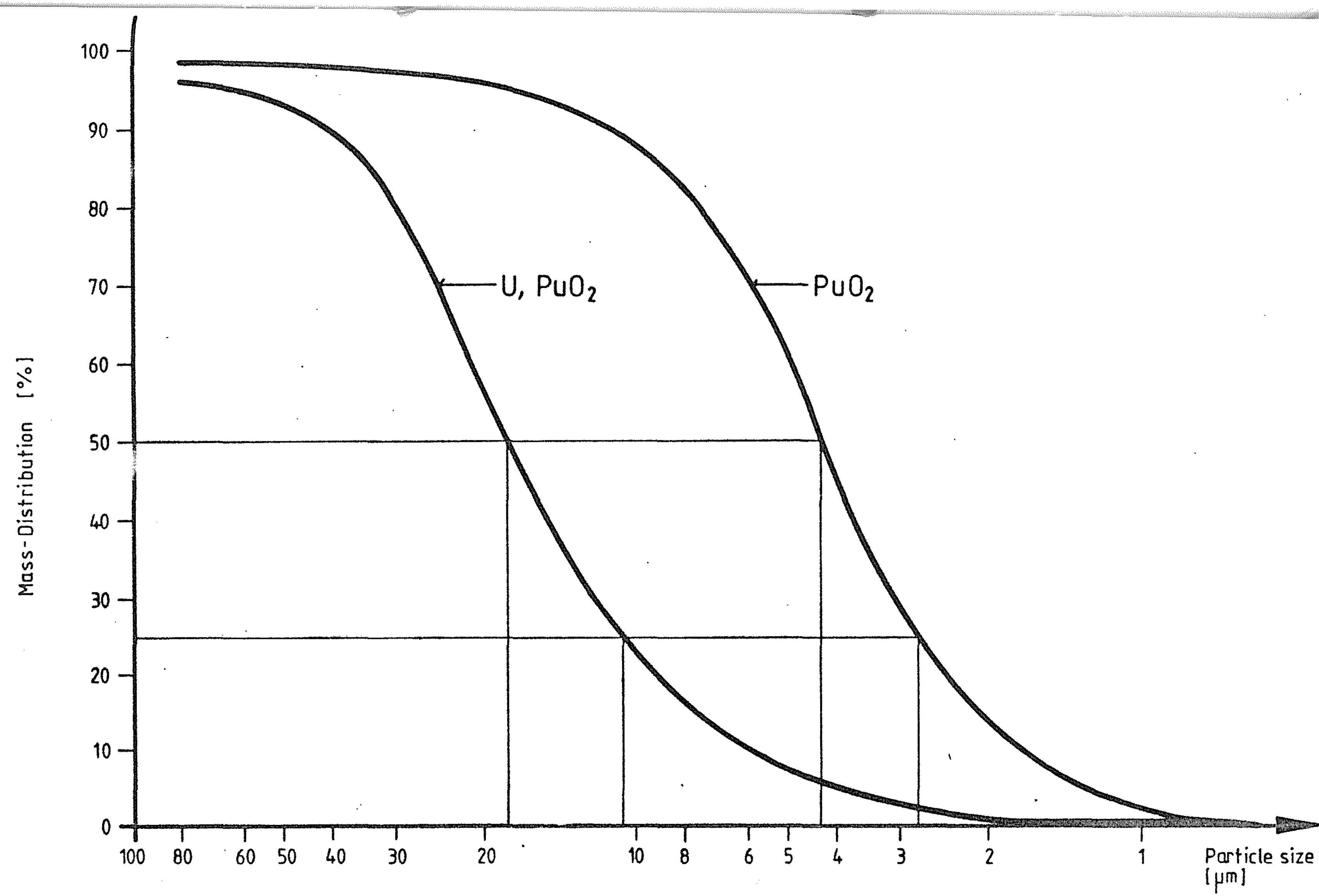

Particle size from U, PuO_2 ex AUPuC and PuO_2 ex Oxalat

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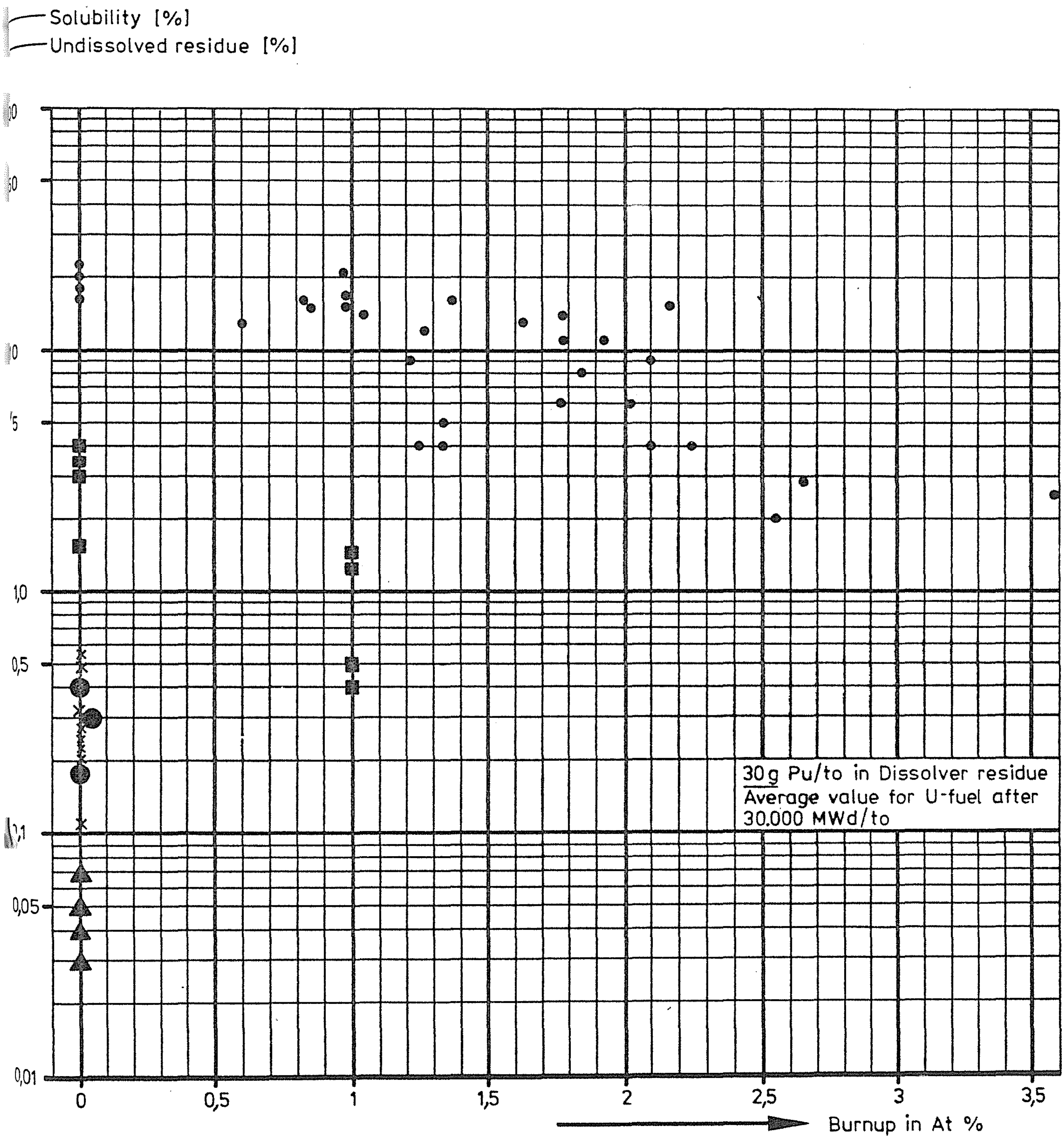
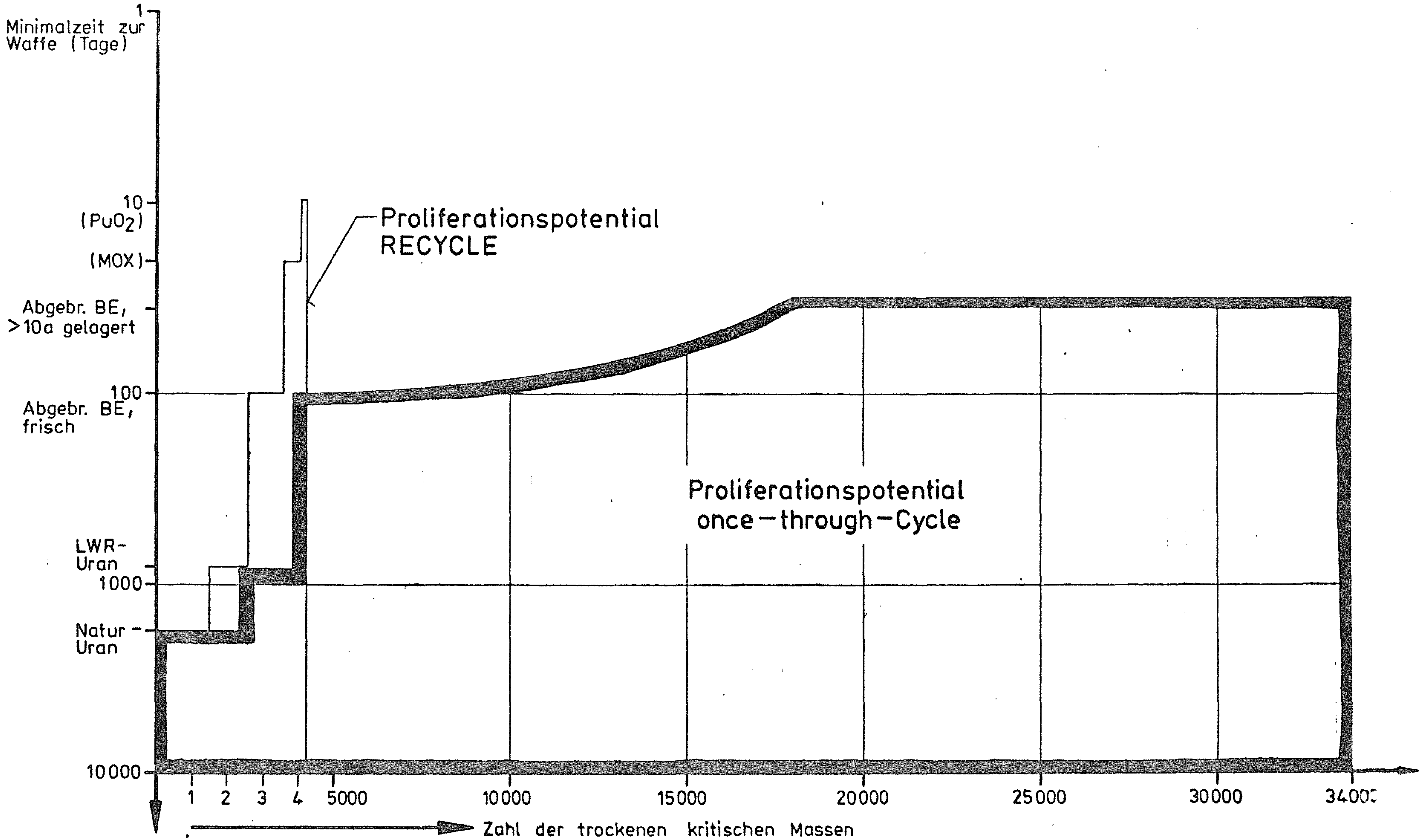
Solubility tests on irradiated and unirradiated MOX-fuel (4 % Pu)



MOX:

- blended powders after sintering
- milled
- double milled and sintered
- OCOM-Process
- A (U, Pu) C - process

Table



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Vergleich des Proliferations-potentials einer Kernenergienutzung mit 50 GW_e – LWR nach

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ALKEM REFERENCE LIST (SUMMARY)

1 9 8 1

	CUSTOMER / REACTOR	REMARKS	NUMBER OF FUEL PINS	QUANTITY (KG) U + Pu	Pu	YEARS OF DELIVERY
1. THERMAL REACTORS						
1.1 Plutonium Recycle	KWU/KRB, VAK, KWO	UO_2/PuO_2-pellets	9.802	20.620	660	1968.1977.1981
	GfK/MZFR	UO_2/PuO_2-pellets	296	3[illegible]	2	1971
	Un.Nucl.Corp., USA/ Dresden	UO_2/PuO_2-pellets	110	280	11	1969
	ENEL, Rom/Garigliano*	UO_2/PuO_2-pellets	48	150	1,6	1970
	FRAMATOME/SENA	UO_2/PuO_2-pellets	416	570	31	1975
			10.672	22.010	705,6	
1.2. Experiments	KWU/KWO*	UO_2/PuO_2-pellets	21	34	1,4	1975.1980
	KWU/Lingen	PuO_2/ThO_2-pellets	15	40 (Pu+Th)	1	1970
	GfK/FR-2	Pu/AI-alloy	144	1,5	1,5	1969
	OECD/HALDEN	vibrocompacted UO_2/PuO_2-pins	8	100	2	1068
	Un.Nucl.Corp., USA	UO_2/PuO_2-pellets	190	272	4	
			378	447,5	9,9	
2. FAST REACTORS						
2.1. Mixed Oxide	GfK/SNEAK-plates	UO_2/PuO_2-pellets		1.350	300	1966.1967
	RAPSODIE, DFR, SNEAK BR-2, RAPSODIE, KNK-II	UO_2/PuO_2-pellets	3.500	937	229,5	1968.1977.1981
	SNR	UO_2/PuO_2-pellets	4.900	800	200	in production
			8.400	3.087	729,5	
2.2. Mixed Carbide	GfK/DFR, BR-2, VG5	(U,Pu)C-pellets, Na- and He-bonded	127	30	21,2	1970.1975
			127	30	21,2	
1. + 2.			19,577	25,574	1,466	

* Testpins Granulat I (2)

Granulat II (3)

A(U/Pu)C (5)

2 (10)

ANNUAL J.A.I.F. MEETINGS, SESSION II

"PROBLEMS IN VITAL NUCLEAR POWER DEVELOPMENT -

EXPLORING LWR DEVELOPMENT STRATEGIES"

Abstract of Remarks by

T. Stern, Exec. Vice President, Westinghouse

Westinghouse is committed to the nuclear power industry and is moving ahead with aggressive plans to develop new products and services and adding the necessary resources to accomplish these goals.

The current domestic market in the United States is characterized by a lack of need for new generation capacity while there is an ever increasing demand for analysis, fuel and services for the growing number of operating nuclear plants.

The international market has a continuing demand for new capacity including oil replacement capacity. The needs of each country are unique, and Westinghouse is flexible in responding to their varying needs. There has been an overwhelming acceptance of PWR design for country programs worldwide.

Westinghouse is responding to the increased demand for nuclear technology by adding or expanding facilities and increasing the number of qualified personnel. The scope of products and services has also been expanded to meet this new demand.

Westinghouse is cooperating with Japanese PWR utilities and MHI to develop a version of the Westinghouse Advanced PWR to meet Japanese utility requirements.

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第2セッション
キーノート

JAIF SPEECH

A. PHILIP BRAY

TOKYO, JAPAN - MARCH 9, 1982

THANK YOU HORI-SAN FOR THAT VERY WARM INTRODUCTION/ -- A VERY GOOD MORNING FELLOW PARTICIPANTS AND ATTENDEES AT THIS MORNING'S SESSION/ IT IS ALWAYS A GREAT PLEASURE TO VISIT OUR MANY FRIENDS IN JAPAN TO DISCUSS MY FAVORITE SUBJECT/ -- NUCLEAR POWER GENERATION BY THE BOILING WATER REACTOR/ I THANK THE FORUM VERY MUCH FOR INVITING ME TO DO SO AT THIS MEETING/ JAPAN'S NUCLEAR PROGRAM IS IN GOOD HEALTH AND GENERAL ELECTRIC IS PROUD OF THE ROLE WE HAVE IN ITS GROWTH/ WE WERE HONORED TO SUPPLY JAPAN'S FIRST COMMERCIAL LIGHT WATER REACTOR, JAPC'S TSURUGA I/ THAT WAS FOLLOWED CLOSELY BY TEPCO'S FIRST GE BWR UNIT AT FUKUSHIMA DAIICHI / THOSE SIX BWRs SUPPLIED BY GE AND OUR ASSOCIATES HITACHI AND TOSHIBA MAKE IT THE WORLD'S LARGEST OPERATING NUCLEAR STATION/ I BELIEVE GE BWR DEVELOPMENT STRATEGY AND PLANS, WHICH I WILL SHARE WITH YOU THIS MORNING, WILL SHOW THAT GENERAL ELECTRIC INTENDS TO ENSURE THAT THE BWR CONTINUES TO BE A LEAD CONTRIBUTOR TO HEALTHY, SUCCESSFUL NUCLEAR GENERATION PROGRAMS/

DEVELOPMENT STRATEGY

ALL COMMERCIAL LIGHT WATER REACTORS HAVE EVOLVED FROM THE SAME ANCESTOR: THE PRESSURIZED WATER REACTOR DEVELOPED FOR THE U.S. NAVY IN THE 1950s FOR USE IN SUBMARINES/ GENERAL ELECTRIC HAS BEEN A PARTICIPANT IN THAT EFFORT FROM THE BEGINNING/ OUR EARLY BWRs SUCH AS DRESDEN I WITH THEIR VESSELS, STEAM GENERATORS AND PRESSURIZERS BEAR WITNESS TO THIS ANCESTRY/ HOWEVER, OUR MANDATE WAS TO SIMPLIFY THIS EARLY SYSTEM/ BECAUSE WE BELIEVED THAT A SIMPLIER LIGHT WATER REACTOR OFFERED THE BEST POTENTIAL FOR A CENTRAL STATION POWER PLANT WITH THE HIGHEST LEVELS OF SAFETY, RELIABILITY AND ECONOMIC ADVANCEMENTS/

FROM THE EARLY BWRs WITH A FULL COMPLEMENT OF PWR COMPONENTS/ WE PROCEEDED IN AN ORDERLY SIMPLIFICATION PROGRAM/ WHEN WE WENT TO INTERNAL STEAM SEPARATION AT KRB IN 1963 WE ELIMINATED THE PRESSURIZER, OR STEAM DRUM/ WE ELIMINATED THE STEAM GENERATORS AT OYSTER CREEK AND TSURUGA IN 1965/ WE ELIMINATED A NUMBER OF THE COMPLICATED RECIRCULATION LOOPS BY INTRODUCING INTERNAL JET PUMPS AT DRESDEN II AND FUKUSHIMA DAIICHI/ THEN WE HAD A LIGHT WATER REACTOR-- A SIMPLIFIED BWR WITH DIRECT CYCLE STEAM TO THE TURBINE/

THE PURPOSE OF THIS LITTLE REVIEW IN BWR HISTORY IS TO ILLUSTRATE THE MAJOR ELEMENTS IN THE GE BWR DEVELOPMENT STRATEGY, NAMELY:

1. CONTINUOUS SIMPLIFICATION OF THE DESIGN;
2. EVOLUTIONARY INTRODUCTION OF CHANGE, AND
3. MAINTENANCE OF A FIRM TECHNOLOGICAL BASE BY THOROUGH "TEST BEFORE USE" OF NEW FEATURES.

NSSS DEVELOPMENT

THE NEXT STEP IN SIMPLIFICATION OF THE NUCLEAR SYSTEM IS, OF COURSE, THE ADVANCED BWR, NOW BEING DEVELOPED JOINTLY BY GE HITACHI AND TOSHIBA FOR TOKYO ELECTRIC POWER AND FIVE OTHER UTILITIES: TOHOKU ELECTRIC POWER, CHUBU ELECTRIC POWER, HOKURIKU ELECTRIC POWER, CHUGOKU ELECTRIC POWER, AND JAPAN ATOMIC POWER. THIS STEP WILL ELIMINATE ENTIRELY THE EXTERNAL REACTOR RECIRCULATION LOOPS BY USING THOROUGHLY TESTED RECIRCULATION PUMPS LOCATED INTERNAL TO THE REACTOR VESSEL.

THIS EFFORT WILL DRAW UPON THE EXPERIENCE OF THE STRONG ASSOCIATION OF BWR DESIGNERS WORLDWIDE TO MEET MANY OBJECTIVES, AND GOALS// INCREASED OPERATIONAL MARGINS AND FLEXIBILITY/ DECREASED RADIATION EXPOSURE TO PLANT PERSONNEL/ FURTHER INCREASED RELIABILITY AND FURTHER INCREASED SAFETY MARGINS/ IN KEEPING WITH THE "TEST BEFORE USE" POLICY, THE NEW FEATURES ARE NOW BEING SUBJECTED TO AN EXTENSIVE BATTERY OF TESTING PROGRAMS BY GE, HITACHI AND TOSHIBA/ WE WILL THOROUGHLY DEMONSTRATE THEIR OPERATIONAL AND SAFETY CHARACTERISTICS/ OUR THREE COMPANIES ARE WORKING VERY CLOSELY WITH THE UTILITY PARTICIPANTS TO ASSURE THAT THE JAPANESE NEXT GENERATION NUCLEAR POWER PLANTS WILL INDEED BE THE ULTIMATE IN SIMPLICITY -- OUR GOAL FROM THE BEGINNING//

THE ABWR PROGRAM IS EXPECTED TO BECOME A FULL PROJECT EFFORT IN THE NEAR FUTURE UNDER THE LEADERSHIP OF GE, HITACHI AND TOSHIBA / WITH THE FIRST UNITS BECOMING OPERATIONAL IN THE EARLY 1990's HERE IN JAPAN/ EARLY IN THE ACTIVITY OF THE FIRST ABWR PROJECT WE PLAN TO SET OUR COURSE FOR APPLICATION OF THE ABWR DESIGN OUTSIDE OF JAPAN/ HOPEFULLY, THE U.S. NUCLEAR PROGRAM WILL BE REVITALIZED BY THEN/ AND WE CAN INTRODUCE THE ABWR TO OUR U.S. REGULATORY PROGRAM TO SEEK A TOTAL PRE-APPROVAL OF THE DESIGN/ WE ARE EXCITED ABOUT THE PROSPECTS FOR THE ABWR/ WE ARE VERY PLEASED TO BE A PARTICIPANT IN THIS IMPORTANT ENDEAVOR WHICH WILL LEAD THE WORLD'S TECHNOLOGY IN LIGHT WATER REACTOR DESIGN/

CORE AND FUEL DEVELOPMENT

IN THE FIELD OF CORE AND FUEL TECHNOLOGY WE HAVE APPLIED THE SAME STEP-BY-STEP, EVOLUTIONARY, "TEST BEFORE USE" POLICY WHICH HAS CHARACTERIZED OUR NUCLEAR SYSTEM DEVELOPMENT/

IN THE EARLY 1960'S WE INTRODUCED FUEL BUNDLES USING ZIRCALOY-CLAD FUEL RODS AND ZIRCALOY POSITIONING SPACERS/ WE HAVE PLACED IN SERVICE MORE THAN TWO MILLION ZIRCALOY-CLAD FUEL RODS/ WE ARE REALIZING EXCELLENT PERFORMANCE FROM THIS FULLY DEVELOPED FUEL DESIGN /-- BUT WE ARE CONTINUING TO INVEST IN FUEL TECHNOLOGY AND TO DEVELOP FURTHER IMPROVEMENTS/

SINCE 1972 GE HAS VIGOROUSLY PURSUED PROGRAMS TO UNDERSTAND AND PROVIDE SOLUTIONS TO THE INDUSTRY WIDE PELLET CLAD INTERACTION FUEL FAILURE MECHANISM/ EXTENSIVE POWER RAMPING IN TEST REACTORS HAS SHOWN THAT A FUEL DESIGN INCORPORATING A LAYER OF ZIRCONIUM METALLURGICALLY BONDED TO THE INNER SURFACE OF THE ZIRCALOY CLADDING PROVIDES AN EFFECTIVE BARRIER AGAINST THIS TYPE OF FAILURE/ BARRIER FUEL RODS HAVE ALREADY BEEN TESTED/ ALL OF THESE BARRIER RODS REMAINED SOUND AT POWER AND BURNUP LEVELS ABOVE THOSE WHERE IN THE PAST NOT ONE OF THE RODS WITHOUT THE BARRIER WOULD HAVE SURVIVED/ LEAD TEST ASSEMBLIES OF BARRIER FUEL ARE NOW IN THEIR SECOND CYCLE OF SUCCESSFUL OPERATION AT QUAD CITIES I/ IN ADDITION, A BATCH OF 144 BARRIER BUNDLES RECENTLY WERE INSERTED IN THE

QUAD CITIES 2 REACTOR TO START FOUR-YEAR DEMONSTRATION OPERATION THIS WILL PROVIDE STATISTICAL CONFIRMATION OF BARRIER FUEL PERFORMANCE/ I AM PROUD TO SAY THAT SOME OF THE BUNDLES OF THIS DEMONSTRATION BATCH CONTAIN TUBING PRODUCED HERE IN JAPAN. THEY ARE PART OF A JOINT EFFORT IN FUEL DEVELOPMENT BY GE AND HITACHI AND TOSHIBA/ FURTHER, GE HAS NOW INTRODUCED THE BARRIER FUEL FOR COMMERCIAL APPLICATION IN THE U.S/WE WILL BE WORKING WITH OUR JAPANESE ASSOCIATES FOR ORDERLY APPLICATION HERE IN JAPAN/

GENERAL ELECTRIC IS ALSO CONDUCTING PROGRAMS TO EVALUATE AND DEMONSTRATE FEATURES WHICH HAVE BEEN DEVELOPED TO FURTHER IMPROVE CORE OPERATION, AND FUEL CYCLE COSTS IN BWRs/

FURTHER
CORE OPERATION HAS BEEN SIMPLIFIED BY RECENT INTRODUCTION OF THE CONCEPT OF THE CONTROL CELL CORE/ THIS ELIMINATES THE NEED FOR CONTROL ROD SEQUENCE EXCHANGES/ TEN BWR PLANTS, INCLUDING TEPCO'S FUKUSHIMA DAIICHI UNIT 2 AND JAPC'S TSURUGA, ARE ALREADY EXPERIENCING THE BENEFITS OF THIS CORE OPERATING CONCEPT/ LONGER RANGE PROGRAMS ARE NOW IN PLACE FOR EXPLORING STILL HIGHER BURNUP CAPABILITY AND LONGER RESIDENCE TIME FOR FUEL BUNDLES, AS WELL AS IMPROVED IN-PLACE PRODUCTION AND BURNING OF PLUTONIUM/

OPERATING PLANT SERVICES DEVELOPMENT

OF COURSE, DESIGNING AND BUILDING GOOD NUCLEAR POWER PLANTS AND FUEL IS ONLY THE START/ IMPROVEMENTS IN REFUELING, MAINTENANCE AND OTHER SERVICES SUPPORTING PLANT OPERATION BECOME INCREASINGLY IMPORTANT AS THE NUMBER OF OPERATING PLANTS INCREASES/ CURRENTLY, GE, HITACHI AND TOSHIBA HAVE 53 GE-TYPE BWRs IN OPERATION/ THIS WILL GROW TO MORE THAN 75 UNITS, REPRESENTING MORE THAN 60,000 MWe IN THE NEXT FIVE YEARS// THUS, WE ARE REACHING THE POINT WHERE EVERY ADDITIONAL POINT OF CAPACITY FACTOR IMPROVEMENT FOR THIS TOTAL FAMILY OF PLANTS IS EQUIVALENT TO ADDING ANOTHER BWR AS FAR AS OUTPUT IS CONCERNED/-- WE ARE CONTINUING TO MAKE THE TECHNOLOGY AND RESOURCE INVESTMENTS TO REALIZE THESE ADDITIONAL POINTS OF CAPACITY FACTOR/ MOST PROMINENT IS OUR NEW MAINTENANCE TRAINING FACILITY IN SAN JOSE, CALIFORNIA/ THIS 23,000 SQUARE FOOT FACILITY INCLUDES A FULL SCALE BWR REFUELING FLOOR AND REACTOR VESSEL MOCKUP TO TRAIN UTILITY CREWS IN ALL ASPECTS OF FULL SCALE REFUELING AND MAINTENANCE ACTIVITIES/ WE CAN ALSO DEVELOP AND TEST THE INSTALLABILITY AND MAINTAINABILITY OF RETROFITS AND REPAIRS WITH THIS UNIQUE FACILITY./

INTERNATIONAL COOPERATION

FINALLY, I WOULD LIKE TO COMMENT UPON THE CONTINUING PROGRESS AND SUCCESS OF INTERNATIONAL COOPERATION AND TECHNOLOGY TRANSFER. IT HAS BEEN GRATIFYING TO SEE THE GROWING MATURITY OF OUR RELATIONSHIPS -- PARTICULARLY HERE IN JAPAN. GE'S RELATIONSHIP IN JAPAN IS NOT MERELY AS A SUPPLIER. WE HAVE ARRANGEMENTS WITH JAPANESE PARTNERS TO FABRICATE FUEL, TO FABRICATE ZIRCALOY TUBING, TO SUPPLY COMPONENTS, AND TO ASSIST THEM IN THE DESIGN AND OPERATION OF A FACILITY TO CONVERT UF_6 TO UO_2. GE AND SEVERAL OF ITS TECHNICAL ASSOCIATES, INCLUDING HITACHI AND TOSHIBA, ESTABLISHED A BWR DEVELOPMENT BOARD SEVERAL YEARS AGO TO FACILITATE AND COORDINATE MORE EFFECTIVELY OUR BWR DEVELOPMENT EFFORTS. LAST YEAR WE REPLACED OUR LICENSE AGREEMENT WITH HITACHI AND TOSHIBA WITH A BROADER AGREEMENT CALLING FOR TOTAL TECHNICAL COOPERATION. THE GE AGREEMENT IS ~~UNDER~~ UNIQUE IN ITS ABSENSE OF RESTRICTIONS ON OUR PARTNERS IN ITS TRUST IN COOPERATION. AND LAST JULY, I WAS PLEASED TO PARTICIPATE IN FINALIZING CONTRACTS ON THE JOINT DEVELOPMENT OF THE ADVANCED BWR. THESE UNDERTAKINGS EPITOMIZE THE MATURING OF OUR RELATIONSHIPS.

SUMMARY

IN SUMMARY, THE BWR FAMILY CAN BE JUSTLY PROUD OF THE ROLE IT IS PLAYING IN CONTRIBUTING TO THE SOLUTION OF THE WORLD'S ENERGY PROBLEMS THROUGH NUCLEAR ENERGY/ GE AND ITS WORLDWIDE BWR FAMILY ARE RAPIDLY APPROACHING THE ULTIMATE IN NUCLEAR SYSTEM SIMPLICITY/ WE HAVE FUEL AND SERVICES DEVELOPMENTS IN HAND WHICH TRANSLATE INTO SEVERAL ADDITIONAL POINTS OF CAPACITY FACTOR AND REDUCED OPERATING COSTS/

FURTHER, THE WORLDWIDE TECHNICAL COOPERATION WHICH HAS BEEN ACHIEVED WITHIN THE BWR FAMILY IS ESSENTIAL TO ENDORSING THE VIABILITY OF THE NUCLEAR INDUSTRY/ I'M VERY PROUD OF OUR ROLE IN THAT ENDEAVOR.

2(12)

Tokyo, March 8, 1982

W. K. Ringeis
Contribution to panel discussion
Session 2
Summary

The topic for this session needs from the viewpoint of my country, the Federal Republic of Germany some introductory remarks. In 1981 primary energy consumption was again retrograde due to the continuing unfavourable economic situation and strong efforts to conserve energy. With an equivalent of 372 X 10^6 TSKE energy consumption was somewhat below the value of 1973 (378 X 10^6). Nuclear energy contributed 4.6%. Electric power consumption showed with 0.4% increase a slight growth. Nuclear power production amounted to 53.5 Billons kWh versus 43.8 in 1980 which is an 22% increase. Approx. 17% of the public utility electricity production was nuclear a value which could be reached due to a better availability of existing plants. Despite these promising numbers we still lack approx. 10,000 MW nuclear capacity as economical base load which we have to replace by high priced coventional thermal energy. This situation is caused by massive delays of plants unden construction and a consisting de facto moratorium for building new units. The last construction license was granted 5 years ago and in the last three years only one unit could be brought into service. Ever changing safety rules, growing public opposition, a flood of law suits have brought about so time consuming licensing procedures that construction times of 8,10 or even more years are quite usual. Public and political discussions about the best way for energy conservation possible, hazards of nuclear energy use and in our country the specific political preference for the use of domestic hard coal had barred the issue of new construction licenses for nuclear power plants. Nevertheless the insight is growing among politicians and in the public that the use of nuclear energy is a necessity for our country. Joint efforts are made by the federal and state governments, licensing authorities, manufacturers and utilities to overcome the problems. Right now, our installed nuclear capacity amounts to 10,300 MW, nine units with a capacity of approx. 10,000 MW are under construction. As a first result of the above mentioned efforts we hope expectfully that out of eight planning projects three units will obtain their construction license within the next few months and the others within the next two to three years.

In this situation top priority for German utilities is seen in getting new nuclear power stations licensed at all and that the overall plant economics can be stabilized. The tremendious rise of investment costs must be stopped, construction times be brought back to 5 to 6 years and safety requirements have to be consolidated for a period of time to allow standardized system and component design and keep it at least during the construction time of a plant. In the opinion of utilities the LWR which is the basis for our commerical nuclear capacity has for its both types the PWR and the BWR reached such a technical and safety standard that there is no need for setting new spectacular safety bench marks or a fundamentally new development. The main goal for our utilities is to further improve the availability factor of our plants which means reducing planned and forced outage times. With a basically reliable component design, a strategy of preventive maintenance, improved operator training and preplanned mainly automatic inservice inspections we try to contribute to the above aim. Reducing the number and length of routine inspection periods by altering the operation cycle of the plants from 12 to 18 months for instance is an other objective.

J.C. LENY'S COMMUNICATION

at the J.A.I.F. Conference

(Tokyo - March 1982)

France which is a country with limited energy resources is concerned with securing long-term energy independence. France presently imports 68. % of the energy it needs (a figure which is expected to drop to about 60 % by 1990) and has implemented a large-scale nuclear program aimed at ensuring optimum utilization of uranium and recycling of all plutonium produced. This program which is based on the series production of standardized PWR plants and on the development of fast breeder reactors currently includes orders for 60 plants units (23 of which are already in operation) and 6,200 tons of fuel.

France's energy policy which has been continuously applied with great determination has been the long-term development of nuclear energy and has required considerable efforts in the following areas :

1. CAPITAL INVESTMENTS :

1.1 on the manufacture of PWR components :

- more than one billion Francs have been invested in this area by Framatome and its subcontractors.
- Framatome's production at Le Creusot and Chalon which are specialized in manufacturing PWR components have manufactured 39 reactor vessels, 35 pressurizers and 99 steam generators.

1.2 extensive capital investments in PWR fuel manufacture,

made by subcontractors, allowed the construction of the Romans and Dessel factories which had a combined annual capacity of 800 tons in 1981 and an anticipated capacity of 1000 tons

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in 1982. Construction of a third plant is expected to increase the total production capacity to 1500 tons in 1986 as shown by the following projected figures :

- 1983 .... 1000 tons
- 1984 .... 1200 tons
- 1985 .... 1400 tons
- 1986 .... 1500 tons

2. RESEARCH AND DEVELOPMENT :

In 1981, some 500 R & D operations were undertaken by Framatome in collaboration with the CEA and EdF. Framatome alone spent 210 million Francs in 1981 in R & D. At the beginning of 1982, close to 150 patents had been filed in R & D activities, 24 of which were received in 1981.

A complete system of quality management combining the design, construction and installation operations was implemented. This resulted in a sizeable reduction in the overall time required from the authorization to proceed to the commissioning of a plant unit which was reduced from 7 years and 2 months to 5 years and 5 months despite the ever increasingly stringent safety regulations.

Constant improvements in the finished product were made possible through :

2.1 specific requests by client

- load regulation was tried and used at the Fessenheim and Tricastin plants,
- plant design was adapted ; new safeguard systems and an operator aid computer were incorporated and the overall plant layout was improved,

- improved maintenance techniques were developed to shorten maintenance operations and reduce the time of personnel exposure to radiation.

2.2. experience

- defects, in particular underclad cracks, were detected, analysed and eliminated,
- the fuel was improved by increasing the neutron efficiency.

2.3. standardization of French codes

- French rules referred to as RCC (Design and Construction Rules for PWR Plants) were standardized in the following areas :

 . process
 . mechanical components
 . electrical components
 . civil works
 . fuel

The fuel efficiency was improved by adopting an Advanced Framatome Assembly (AFA) with a redesigned cladding.

The operating performances of PWR plants were improved in the following areas :

. a high availability factor (70 % which is 10 % higher than the basic figure used in calculating projected economic conditions).

. continuous reduction in doses absorbed by plant personnel,

. low generating costs :
  - 16.5 centimes/kwh for units commissioned in 1990.

Efforts aimed at improving plant performance are continously being made and Framatome which has achieved status as one of the world's leading manufacturers of PWR components has undertaken the design of an advanced PWR :

- the power rating will be slightly increased,
- the main components (reactor vessel, fuel, reactor coolant pumps, steam generator) and reactor control system have been redesigned,
- instantaneous load follow will be possible. Qualification testing of fuel performed under actual operating conditions by the CEA and EdF has been in progress for the past two years.

Framatome which has terminated its initial licensing agreement with Westinghouse has undertaken cooperation on an international basis :

- with Westinghouse through agreements providing for high level technical cooperation and for joint R & D programs,
- with several other countries, in particular with South Korea ; bilateral cooperation on an informal basis has also been established with Japan.

At a time when the demand for electricity has begun to fall off in the Western World and a certain number of nuclear programs have been delayed or have come to a halt, we believe that it is necessary to continue present efforts to develop light water nuclear power plants to-day and to develop fast breeder technology in the years to come. For the only sure source of progress lies in a sustained effort.

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PROBLEMS OF INTERNATIONAL COOPERATION IN NUCLEAR ENERGY

Keichi Oshima

Professor Emeritus
University of Tokyo

Now that nuclear power has become more economical than oil-fired electric power generation, we believe that it is our responsibility to rededicate ourselves to the development of the "peaceful atom" as the common property of all mankind, rather than to allow it to become the preserve of a limited number of advanced industrial countries.

We must admit, however, that because of the potential military applications of nuclear technology, and because of problems of public acceptance stemming from concern over plant safety and the management of radioactive wastes, the peaceful use of nuclear power is not progressing satisfactorily on a world-wide basis.

Even among the advanced countries, with a handful of exceptions where nuclear programs are proceeding on or near schedule, such as France, the Soviet Union, and Japan, nuclear power plant construction has been suffering a de-facto moratorium. Among many developing countries there is strong demand for oil-alternative energy resources, but the advanced countries often hesitate to offer positive support for nuclear power development because of proliferation concerns and because of daunting financial, technological, and other obstacles.

The level of discussion on many of the concerns highlighted by INFCE seems to have subsided temporarily, and US nuclear policies, both domestic and foreign, seem to have moved in slightly new directions Lively discussion is expected at the UN's International Nuclear Power Conference to be held in 1983. With these developments in mind, it will henceforth necessary to take a drastic new look at international cooperation in nuclear energy.

First we must recall that since the early days of international nuclear power development initiated by the "Atom for Peace" program, nuclear power has been developed by virtue of a subtle balance of political and technological consideration, managed in a spirit of international cooperation. It seems that current trends are leading to the advent of one-sided restrictions that in effect ignore this history of progress through cooperation.

Nuclear power technology has been established on a practical, commercial footing; we must therefore work in each country toward strengthening cooperation among the various sectors engaged in the "nuclear enterprise", and also promote industrial cooperation across national lines not just in the field of plant construction, but also in regard to the nuclear fuel cycle, the disposal of radioactive wastes, safety, and the promotion of improved operating techniques.

In order to achieve these goals we must overcome obstacles in such areas as : 1. cooperation between government and industry in the advanced countries regarding the development of advanced light water reactors and of fast breeder reactors; 2. supply assurance pertaining to nuclear power plants and fuel services for developing countries; 3. the establishment of a more effective nuclear nonproliferation system to reconcile peaceful uses and security concerns.

We must make continuous efforts for international cooperation, giving full consideration to the various viewpoints, best mutual interests and the potential contributions of the advanced countries, the developing countries, and international organizations.

Dr. Wolf-D. Schmidt-Küster
Contribution to Session 3

シュミットキュスター
キーノート

I am pleased to have the opportunity of participating in this panel in front of such a distinguished audience.

I believe that there is consensus among us that - because of well-known reasons - worldwide energy demand will grow continuously during the years to come and that nuclear energy has to play an important role to add to or substitute oil cover this demand. So I shall not deal with this aspect of the discussion, but try to concentrate on the German situation of nuclear power utilization and on how we are involved in international cooperation with regard to nuclear power development.

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State of the art in the Federal Republic of Germany

Most of you have followed what is going on in my country so that I can be relatively short about that point. Today 15 nuclear power plants with a total capacity of 10.4 GW are in operation, among them 4 reactors for research and demonstration. In 1981 they again demonstrated their high reliability; with an average of 6000 operating hours they produced 54 Twh, or 17 % of our total electricity generated.

9 plants with a capacity of 10 GW are under construction and another 10 power plants are in an advanced planning stage.

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With regard to long-term nuclear energy utilization we regard the advanced reactor systems as important. Government funding therefore concentrates on the development of the Fast Breeder and the High Temperature Reactor and the construction of a 300 MWe Prototyp power plant of each type.

One of the most important prerequisites for the utilization of nuclear energy is a coherent solution for a completely closed fuel cycle. Its manifold different steps from uranium processing, uranium enrichment, fuel element fabrication to reprocessing as well as interim storage and final disposal of radioactive wastes have been technically developed in the

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Federal Republic of Germany and have been demonstrated or are in the phase of being demonstrated.

The Federal Republic's nuclear energy programme ranks second in Europe. It is above all for the following two reasons that we do not need a more rapid increase of our nuclear capacity and that therefore its extension takes place at a lower speed as for example in France:

- Due to our policy of energy conservation we have been successful in reducing our energy demand, in particular in reducing the percentage of imported oil considerably. Last year mineral oil contributed only 44.5 % to our energy supply compared with 55.4 % in 1972.

...

- Due to the use of our indigenous sources of energy, hard coal and lignite, for a large part of our electricity supply we are relatively independent of imported oil in this field. It accounts for only about 6 % of public electricity supply in Germany.

As in many industrialized countries we also have a small but very dedicated minority opposing nuclear energy utilization; and a controverse discussion can be observed in nearly all groups of our society. The Government has, however, clearly decided to "follow the nuclear path", and made it clear only recently, in its new energy programme, that nuclear energy

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has to play an important role for our future energy supply.

Some progress has been made in this direction during the last few months, and I would like to list them up in a few words:

Measures have been taken by the Government to facilitate and streamline the licensing procedure for nuclear power plants. Not least due to this fact a so called "convoi" of three plants with a total capacity of about 3.800 MWe has been given green light by the Federal Government for licencing.

A construction licence has been issued for the first enrichment plant in Germany within the framework of the trilateral

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cooperation in this field with Great Britain and the Netherlands. This plant has been designed to have a capacity of 1000 t Uta per annum.

- A licence has been given for an away-from-reactor interim storage facility in transport casks lately developed in Germany. Construction has started some weeks ago.
- Drilling tests at the envisaged site for the final storage of radioactive wastes, the salt-dome near Gorleben, have been concluded. Now underground exploration has been prepared with the aim to have the final depository available by the 90es.
- Die financing for the construction of the prototype fast

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breeder, the SNR 300 at Kalkar, has been secured by a voluntary share taken by our utilities, which will amount to appr. 1 billion DM. The commissioning of the plant is now foreseen for 1985.

International cooperation

From the very beginning of nuclear power development the Federal Republic of Germany put great emphasis on international cooperation, above all for the following reasons:

Securing energy supply is a complex problem which cannot be solved by one country in "splendid isolation". This applies in particular to a country with nearly no resources of its own such as Germany.

...

- The Federal Republic has a rather export-oriented economy. The export of sophisticated technologies such as reactors plays a key role.

Therefore we have concluded cooperation agreements with all important industrialized countries, with countries where industrial development has started and with developing countries as well.

When we talk about nuclear cooperation we do not think of just selling a plants and leave it at that. We are aiming at a long-term partnership based on mutual confidence and understanding and promoting the exchange of knowledge and technologies.

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Therefore we generally include all levels concerned in such a cooperation, comprising scientists and engineers as well as experts from the manufacturing and operating industries and the licensing bodies. Our research centres have concluded comprehensive cooperation agreements with partner institutions in other countries; and we have supported our firms in concluding similar agreements with industry in other countries.

For the construction of nuclear power plants Germany has chosen the "turnkey principle". It is my personal belief that this principle to a large extent accounts for the high standard of such plants, does not necessarily impede the transfer of technology other countries are so much interested in.

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It could be provided by delegating personal, or by establishing joint affiliated companies in the respective country. Argentina and Brazil are particulary good examples for the cooperation as we understand it, and I would therefore like to say a few words about these examples.

In order to make use of the uranium produced in its own mines Argentina in the sixties wanted to have a heavy water reactor system using natural uranium as fuel.

On the basis of scientific and technical relations maintained for many years, nuclear cooperation was arranged very soon and reached from universities and research centers to the

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construction and operation of reactors and the production of fuel elements. In 1974 Atucha I, a 340 MWe heavy water reactor, started operation and the excellent experience made in constructing and operating the reactor have encouraged Argentina to order another one: Atucha II with 745 MWe, now under construction.

Having concluded a frame agreement on joint R+D in 1963, Brazil and the Federal Republic of Germany decided in 1975 to cooperate in nuclear technology. This agreement applies to the construction of reactors and provides for an increasing contribution of Brazilian producers of components. It also pertains to the foundation of joint companies, such as heavy component works, and to cooperation with regard to the fuel cycle.

...

This cooperation with Brazil is an illustrative example for the step-by-step approach in nuclear development.

In the first phase the general agreement between the two governments on joint research and development has mostly served as "basis of activities".

In the second phase cooperation in energy matters consisted in individual agreements between research centers, universities scientific institutes, licensing authorities and experts.

In the third and final phase the transfer of technology in its proper sense took place. To a very large degree this phase

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of know-how-transfer has to be organized by the industrial partners of the countries involved. Licence arrangements, joint ventures in specific fields such as uranium prospection, production of fuel and components, exchange of information on operation and maintenance of nuclear plants, training arrangements for key personal having to do with nuclear programs and reactor operations

- these are the activities which help the foreign partner to self-determine his way of taking increasing advantage of nuclear energy.

Besides Argentina and Brazil I should mention other partners of nuclear cooperation such as Spain, Egypt and Indonesia.

...

In all these cases our activities do not center around some reactor or component business. They always aim at true co-operation "hand-in-hand" on a long-term-basis via exchanges of scientists, managers, engineers, of knowledge and skill, and they are not restricted to the nuclear field but comprise many other areas such as e.g. solar energy.

The Federal Republic of Germany has always underlined that nuclear energy utilization should not be reserved to countries with an advanced economy but that it could also be useful for countries facing the beginning of industrialization. For this reason we have alsways been prepared to promote and support activities going in this direction.

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We are of course aware that nuclear energy should be exclusively used for peaceful purposes, and we therefore continuously advocated efficient non-proliferation measures. From the start the Federal Republic of Germany took an active part in all efforts of this kind. As early as by the mid-fifties we completely renounced nuclear weapons. All of our own nuclear plants are subject to Euratom and IAEA controls.

The same attitude is taken by the Government of the Federal Republic of Germany with regard to international cooperation and the export of nuclear facilities. We always stood and will stay to our various international non-proliferation

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obligations and - I may say - we have been a reliable partner so far and will be in future.

INTERNATIONAL NUCLEAR COOPERATION
THE INITIATION NEEDED TODAY

PRESENTED AT

THE 15TH JAIF ANNUAL CONFERENCE

MARCH 8 - 10, 1982

TOKYO, JAPAN

PREPARED BY

JOHN M. MARCUM
ASSISTANT DIRECTOR
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
EXECUTIVE OFFICE OF THE PRESIDENT
UNITED STATES

INTERNATIONAL NUCLEAR COOPERATION

MARCH 9, 1982

JOHN M. MARCUM

JAPAN ATOMIC INDUSTRIAL FORUM

GOOD AFTERNOON, I AM PLEASED TO HAVE THIS OPPORTUNITY TO ADDRESS THIS CONFERENCE OF THE JAPAN INDUSTRIAL FORUM ON THE ISSUE OF INTERNATIONAL NUCLEAR COOPERATION--THE INITIATION NEEDED TODAY. AS WE MEET TODAY, THE WORLD IS CONTINUING TO ENJOY A WELCOME RESPITE FROM THE SO-CALLED "ENERGY CRISIS", ACTUALLY AN OIL SUPPLY INTERRUPTION AND MARKET MANIPULATION, THAT PREOCCUPIED US DURING MUCH OF THE LAST DECADE. TODAY, LARGELY AS A RESULT OF THE WORLDWIDE CONSERVATION MEASURES OF RECENT YEARS, OIL SUPPLIES ARE AGAIN ABUNDANT AND PRICES ARE SLOWLY DROPPING. BUT WE CANNOT AFFORD TO BE COMPLACENT. CONSERVATION DOES NOT REPRESENT A SOURCE OF ENERGY AND THE REAL ENERGY CRISIS STILL LIES AHEAD. THAT IS THE CHALLENGE OF ENSURING ABUNDANT SUPPLIES OF SAFE, AFFORDABLE ENERGY IN AN ERA OF ECONOMIC RECOVERY AND INCREASING INDUSTRIALIZATION OF LESS DEVELOPED COUNTRIES.

THE ONE CLEAR LESSON FROM THIS SHARED EXPERIENCE IS THAT ENERGY SUPPLY IS A TRULY INTERNATIONAL PROBLEM ILLUSTRATING THE REALITY OF THE INCREASING INTERDEPENDENCE OF OUR ECONOMIES. THE KEY TO ENERGY SECURITY IS THROUGH DIVERSITY AND STABLE LONG-TERM INTERNATIONAL COOPERATION RATHER THAN FUTILE EFFORTS FOR ENERGY INDEPENDENCE. IN HIS POLICY SPEECH TO THE DIET IN

JANUARY PRIME MINISTER SUZUKI CALLED FOR INCREASED COOPERATION IN USE OF SCIENCE AND TECHNOLOGY TO "CONTRIBUTE TO DEVELOPMENT OF THE INTERNATIONAL COMMUNITY". WE IN THE U.S. SUPPORT THIS OBJECTIVE AND CONSIDER ENERGY AN IMPORTANT AREA FOR SUCH COOPERATION.

DURING THE FIRST YEAR OF HIS ADMINISTRATION, PRESIDENT REAGAN HAS APPROVED FUNDAMENTAL CHANGES IN U.S. ENERGY AND NON-PROLIFERATION POLICY WHICH HAVE IMPORTANT IMPLICATIONS FOR INTERNATIONAL COOPERATION. IN ENERGY RESEARCH AND DEVELOPMENT, THE U.S. GOVERNMENT WILL NO LONGER FUND DEMONSTRATION OF WELL-UNDERSTOOD TECHNOLOGIES SUCH AS SOLAR THERMAL AND CURRENT SYNTHETIC FUELS PROCESSES. WE BELIEVE THAT THE PROPER FEDERAL ROLE IN THESE AREAS IS TO REMOVE UNNECESSARY OBSTACLES AND ESTABLISH MORE STABLE, RATIONAL REGULATORY POLICIES SO THAT THE PRIVATE SECTOR CAN DEVELOP THEM WHENEVER THEY ARE JUSTIFIED ECONOMICALLY.

THE PRESIDENT IS COMMITTED, HOWEVER, TO MAINTAINING STRONG FEDERAL FUNDING SUPPORT FOR LONGER-TERM, HIGH-RISK TECHNOLOGIES SUCH AS SOLAR PHOTOVOLTAICS, BREEDER REACTORS AND FUSION THAT CAN CONTRIBUTE SIGNIFICANTLY TO OUR FUTURE ENERGY NEEDS. THIS SUPPORT IS REFLECTED IN THE FACT THAT EVEN IN THIS TIME OF BUDGETARY RESTRAINT, TOTAL U.S. R&D SPENDING IN 1983 WILL RISE BY OVER 10 PERCENT, FROM 40 TO 44 BILLION DOLLARS, WITH A GREATER PERCENTAGE INCREASE IN THE PHYSICAL SCIENCE AND ENGINEERING AREAS.

IN THE NUCLEAR AREA, THE PRESIDENT HAS APPROVED A NUMBER OF INITIATIVES IN AREAS SUCH AS WASTE DISPOSAL, REPROCESSING AND REGULATORY REFORM TO ENABLE US TO MORE FULLY UTILIZE THIS ENERGY SOURCE ALONG WITH COAL IN MEETING OUR FUTURE NEEDS. WE HAVE INITIATED A SERIES OF MEETINGS WITH THE VICE PRESIDENT AND OTHER SENIOR GOVERNMENT OFFICIALS, AND THE TOP EXECUTIVES OF OUR UTILITIES, NUCLEAR INDUSTRY VENDORS, AND BANKING INSTITUTIONS TO DEVELOP FURTHER INITIATIVES AIMED AT UNDERLYING PROBLEMS AFFECTING THE INDUSTRY, SUCH AS ORGANIZATION AND CAPITAL FORMATION PROBLEMS IN THE UTILITIES. INSTEAD OF AN "OPTION OF LAST RESORT", NUCLEAR POWER IS VIEWED BY THIS ADMINISTRATION AS ONE OF THE MOST PROMISING ENERGY SOURCES AND WE ARE DETERMINED TO PROVIDE A SOUND BASIS FOR INCREASING ITS CONTRIBUTION.

THE PRESIDENT HAS ALSO ANNOUNCED A MAJOR REVISION IN OUR NON-PROLIFERATION POLICY TO PERMIT A MORE STABLE INTERNATIONAL DEVELOPMENT OF NUCLEAR POWER. WE REMAIN FULLY COMMITTED TO FUNDAMENTAL NON-PROLIFERATION GOALS, BUT RECOGNIZE THAT PROLIFERATION IS PRIMARILY A POLITICAL AND MILITARY ISSUE RATHER THAN A TECHNICAL ONE. AS A RESULT, WE WILL COOPERATE FULLY WITH ADVANCED NUCLEAR STATES WHO ARE STRONG SUPPORTERS OF NON-PROLIFERATION OBJECTIVES AND WILL RECOGNIZE THAT FOR ECONOMIC OR ENERGY SECURITY REASONS, THEY MAY NEED TO DEVELOP AREAS SUCH AS THERMAL RECYCLE ON AN EARLIER TIMESCALE THAN IN THE U.S. AT THE SAME TIME WE WILL CONTINUE TO SEEK SPECIAL MEASURES TO INHIBIT THE TRANSFER OF SENSITIVE NUCLEAR MATERIAL AND TECHNOLOGY

TO PROBLEM COUNTRIES. WE STRONGLY SUPPORT THE IAEA AND WILL CONTINUE TO WORK WITH OTHER NATIONS TO STRENGTHEN ITS SAFE-GUARDS SYSTEM. WE ALSO LOOK TO PROSPECTIVE NUCLEAR COOPERATION WITH LESS ADVANCED COUNTRIES SUCH AS SPAIN, MEXICO, AND EGYPT AS EXAMPLES OF THE SORT OF COOPERATION THAT SHOULD BE EXTENDED TO RESPONSIBLE THIRD WORLD COUNTRIES WITH GOOD NON-PROLIFERATION CREDENTIALS. NOW I WOULD LIKE TO BRIEFLY MENTION SEVERAL AREAS OF POTENTIAL COOPERATION WHICH COULD SIGNIFICANTLY AID INTERNATIONAL NUCLEAR POWER DEVELOPMENT.

REPROCESSING. THE PRESIDENT HAS LIFTED THE BAN ON REPROCESSING IN THE U.S. AND WE WILL PROVIDE APPROPRIATE FEDERAL INCENTIVES TO FACILITATE A PRIVATE SECTOR OPERATION OF THE REPROCESSING PLANT IN BARNWELL, SOUTH CAROLINA. THIS WILL INCLUDE FEDERAL PURCHASE OF PLUTONIUM NEEDED FOR ADVANCED CIVIL REACTOR NEEDS, EXPEDITING REGULATORY STEPS, AND ENCOURAGING PARTICIPATION BY UTILITIES IN THE FRG AND OTHER COUNTRIES. WE WILL ALSO PROVIDE SECURE SAFEGUARDED STORAGE FOR THE PLUTONIUM PRODUCED IN THIS PLANT WHICH, WITH FOREIGN PARTICIPATION, COULD BE AN IMPORTANT STEP TO AN INTERNATIONAL PLUTONIUM STORAGE SYSTEM. THERE IS STRONG PRIVATE SECTOR INTEREST IN THIS APPROACH. I AM OPTIMISTIC THAT IT WILL SUCCEED AND WILL STIMULATE NUCLEAR POWER DEVELOPMENT THROUGH ITS BENEFITS FOR NUCLEAR WASTE DISPOSAL AND NON-PROLIFERATION.

NUCLEAR WASTE DISPOSAL. WE ARE ALSO MOVING RAPIDLY TOWARDS DEVELOP-MENT OF HIGH-LEVEL WASTE DISPOSAL FACILITIES AND ARE WORKING WITH OUR CONGRESS ON LEGISLATION TO PROVIDE A SOUND FINANCIAL AND PROGRAMMATIC BASIS FOR THIS PURPOSE. THIS IS CRITICAL TO NUCLEAR

POWER DEVELOPMENT IN ALL COUNTRIES AND IS A GOOD AREA FOR INTERNATIONAL COOPERATION.

URANIUM ENRICHMENT. ACCESS ON A RELIABLE BASIS TO URANIUM ENRICHMENT CAPACITY AND TECHNOLOGY IS CLEARLY A PREREQUISITE FOR INCREASED UTILIZATION OF NUCLEAR ENERGY IN BOTH ADVANCED AND DEVELOPING STATES. THE U.S. HAS A LARGE EXISTING ENRICHMENT PLANT TO SUPPORT THIS NEED AND IS UNDERTAKING A SIGNIFICANT EXPANSION OF ITS CAPACITY WHICH WILL UTILIZE IMPROVED, GAS CENTRIFUGE TECHNOLOGY. THE PRESIDENT HAS DECIDED THAT URANIUM ENRICHMENT IS A MATURE BUSINESS THAT SHOULD BE TRANSFERRED TO THE PRIVATE SECTOR. WE ARE NOW EXPLORING OPTIONS FOR ACCOMPLISHING THIS TRANSFER AND WOULD BE INTERESTED IN EXPLORING THE POSSIBILITY OF FINANCIAL PARTICIPATION BY OTHER COUNTRIES IN THIS ACTIVITY.

NUCLEAR SAFETY. THIS IS AN AREA WHERE COOPERATION IS MANDATORY-- AN ACCIDENT ANYWHERE IS DAMAGING TO NUCLEAR POWER EVERYWHERE. WE MUST ENSURE THAT WE TAKE ADVANTAGE OF OUR ACCIDENT AT THREE MILE ISLAND TO ENHANCE THE SAFETY OF CURRENT AND FUTURE REACTOR SYSTEMS. COOPERATION IN SAFETY R&D AND INFORMATION EXCHANGE IS CLEARLY IMPORTANT.

BREEDER REACTORS. WE ARE CONTINUING STRONG FUNDING SUPPORT OF THIS TECHNOLOGY WITH NEARLY HALF A BILLION DOLLARS IN FY 1983. OUR PRINCIPAL OBJECTIVE IS COMPLETION OF THE CLINCH RIVER BREEDER REACTOR (CRBR). IT IS ALSO TIME TO BEGIN DESIGN OF A LARGER, NEXT GENERATION BREEDER TO TAKE ADVANTAGE OF THE EXPERIENCE FROM THE CRBR AND BREEDERS IN OTHER COUNTRIES. IN VIEW OF THE SIZE AND

LONG-TERM NATURE OF THIS EFFORT, THIS IS A PARTICULARLY FERTILE AREA FOR INTERNATIONAL COOPERATION. FUNDS ARE INCLUDED IN OUR BUDGET FOR SUCH A LARGE COOPERATIVE DESIGN PROJECT TO ENSURE THAT WE HAVE THE BEST POSSIBLE BASIS FOR PROCEEDING FURTHER.

FUSION. IN LOOKING AHEAD TO MORE DISTANT TECHNOLOGY, FUSION ENERGY REPRESENTS A MAJOR AREA FOR CONTINUING AND EXPANDED COOPERATION AMONG ADVANCED NATIONS. THIS IS PROBABLY THE MOST CHALLENGING TECHNOLOGICAL PROJECT MANKIND HAS UNDERTAKEN AND MUCH BASIC RESEARCH REMAINS TO BE DONE. BASED ON RECENT RESULTS, IT IS UNLIKELY THAT FUSION ENERGY WILL BE AVAILABLE BEFORE THE MIDDLE OF THE NEXT CENTURY BUT ITS POTENTIAL IS SO GREAT THAT WE MUST CONTINUE THIS EFFORT AS AN INVESTMENT FOR POSTERITY. ENORMOUS AMOUNTS OF MONEY WILL BE REQUIRED FOR THE NEXT GENERATION MACHINES AND COOPERATION IS MANDATORY TO ENSURE THAT WE AVOID UNNECESSARY REDUNDANCY AND MAINTAIN ENOUGH DIVERSITY TO FIND THE RIGHT PATH.

IN LOOKING AHEAD TO EXPANDED INTERNATIONAL COOPERATION IN ENERGY TECHNOLOGY, IT IS ESSENTIAL THAT WE COOPERATE ON THE BASIS OF MUTUAL BENEFIT AND SHARING. BUDGETARY AND RESOURCE CONSTRAINTS WILL ALWAYS BE IMPORTANT AND WE SHOULD CONCENTRATE OUR COOPERATION IN MAIN LINE RATHER THAN MARGINAL AREAS TO ENSURE CONTINUED SUPPORT. ALL OF THE AREAS I HAVE MENTIONED ARE GOOD POSSIBILITIES FOR SUCH COOPERATION. ON THE BASIS OF THE ENERGY AND NON-PROLIFERATION POLICIES I HAVE DESCRIBED AND OUR CONTINUED TECHNOLOGICAL

LEADERSHIP, THE U.S. LOOKS FORWARD TO EXPANDED COOPERATION AS A RELIABLE PARTNER IN THE INTERNATIONAL DEVELOPMENT OF A MORE STABLE ENERGY FUTURE.

3 (17)

SESSION - 3 INTERNATIONAL NUCLEAR COOPERATION

- THE INITIATION NEEDED TODAY

Presented at

The 15th JAIF Annual Conference

March 8 - 10, 1982

Tokyo, JAPAN

Prepared by

Yong Kyu Lim

Standing Commissioner
Atomic Energy Commission
Republic of Korea

Mr. Chairman and Distinguished Guests:

It is a great honor to participate as a panelist in the 15th JAIF Annual Conference and to talk to you about international nuclear cooperation. Since nuclear energy was first put to peaceful uses only a little more than two decades ago to work for the development of mankind's welfare, this industry has become one of universal interest and concern requiring both international confidence and cooperation.

Allow me first briefly to describe the Korean nuclear power programme. As a result of the success of the economic development plans we have undertaken since 1962, Korea's industry has flourished and the overall living standard has improved greatly, which in turn has created an ever increasing energy demand. The average annual growth rate of this demand has been about 10% per annum for the past 20years. Since we have almost no demestic energy resources, dependence on energy imports, especially on imported petroleum has increased steadily. Petroleum imports last year, represented more than 60% of the total energy supply and all of it must be imported. This situation has pushed us to develop nuclear power programme as extensively and rapidly as possible, especially because nuclear power is becoming economically more attractive and less vulnerable to supply interruptions than petroleum.

Korea decided to build its first nuclear power plant in the late 1960s, and it has been in succefful operation since 1978. We are making every effort to add two more nuclear units to the grid this year, so the total nuclear installed capacity will soon reach about 1800MW. If 13 nuclear units, including 8 units now under construction, are added to the grid as scheduled by the Korean Government by 1991, nuclear power will come our major electric supply source.

To carry out this nuclear programme successfully and effectively, not only must such matters as financial arrangements, the localization of the equipment and systems and the long-term assurance of nuclear fuel supply be resolved, but also technical support for the development of skilled manpower are essential to the asurance of nuclear safety. This would of course be true for all the developing countries where nuclear power plants are either in operation, under construction, on in planning stage. These technical and economic problems which are generally associated with nuclear power development, are very difficult for a developing country to solve alone, they can be solved cooperatively with assistance from the more advanced countries.

2)......... If we take a look at recent

If we take a look at recent international nuclear cooperation, we find that those countries the more advanced in the development of nuclear energy are reluctant to transfer nuclear technology to the developing countries. For example, the so-called sensitive technologies including civilian reprocessing are not transferrable for peaceful uses to any developing countries even those which have fulfilled all safeguard requirements. One of the most urgent and important tasks we face is obviously to establish, through international cooperation, the ways and means for harmonizing the peaceful uses of atomic energy with the objective of nuclear non-proferation so that the development of nuclear energy does not lead to its use for destructive purposes. It must however be kept in mind that every country has the same soverign right to decide its own peaceful nuclear development policies and paths and to select relevant nuclear technologies according to its own view of how to strengthen and promote its technological, industrial and scientific potential. The developing countries which have demonstrated that their nuclear activities are limited to peaceful uses by such means as signing Non-Proliferation Treaty agreements should be permited to acquire, possess and use all the necessary technologies and relevant facilities associated with their peaceful nuclear development.

3)....... Since Korea joined International

Since Korea joined International Atomic Energy Agency as a member state late the 1950s, it has conformed to the spirit of the Statute of IAEA, has signed the full scope of Non-Proliferation Treaty safeguards agreements with IAEA, and has participated in almost all the international and regional nuclear cooperative activities to promote the peaceful use of nuclear energy. Korea will continue to adhere to this policy. Based on our long-term nuclear power development plan as mentioned earlier, there will be more than 300 metric tons of spent fuel discharged from 13 nuclear power plants annually by 1991, and this will increase almost exponentially thereafter if it is assumed that one or two nuclear units are to be added annually after 1991.

To solve this spent fuel problem effectively, we have been participating in such activities as the setting up of a regional reprocessing center, INFCE conference, IPS meeting and Committee on Assurance of Supply.

We believe, the problems which the tasks ahead of us, particularly in nuclear developing countries, should be solved through International Cooperation with spirit of reciprocity and mutual trust. Even though cooperation in the nuclear industry field requires particular care in comparison with other industries, international nuclear cooperation, especially cooperation between developing countries and advanced countries should be improved to make it more practical and dependable. It would be a good start for such improvement if nuclear supplier countries would cooperate in improving nuclear safety and the technological capabilities of the developing countries by providing adequate measures on nuclear fuel cycles or by taking such action as standardizing nuclear components after cooperatively considering the economic, technological and social aspects of the developing countries. In this connection, we are very interested in the recent improvement of plant reliability and the standardization of nuclear equipment undertaken by the Japanese industry and would like to participate in this kind of project as a joint partner if at all possible.

One of every one's common concerns with respect to nuclear development is how to protect the natural environment effectively. This may be one good reason why we can not take action on radioactive materials including nuclear spent fuel promptly until we find out how best it can be disposed of. In this respect, there will be a mutual cooperative research subject for the selection of adquate disposal site, development of technical criteria and standards for shallow land burial applicable to the countries where population density

5)....... is high and land is limited. Sea is high and land is limited. Sea disposal of solidified radioactive wastes is one of the concerned subject for Korean since our country is a peninsula surrounded on three sides by the Pacific Ocean. We must pay particular attention to sea disposal which should be carefully examined and discussed with adjacent nations before any action is taken. There should be an exchange of ideas on matters of mutual interest and cooperative research to preserve the environment as well as to promote peaceful nuclear uses.

Finally, I wish to say something about international cooperation as it relates to improving nuclear safety. To prevent nuclear accidents and to minimize the consequences of any accidents which might occur, the following points should always kept in mind. If we look at the cases of Japan and Korea in which there is very high population density as well as high nuclear density we must recognize that, the problem of one country's nuclear safety should be treated in equal seriousness by another country. In this respect, need for mutual assistance in connection with nuclear accident and of facilitating apprepriate international or regional cooperation in the area of nuclear safety should be given top priority in such areas

6)......... as the exchange of information and as the exchange of information and technologies on nuclear safety and joint research for emergency measures. I would therefore, like to suggest that a Nuclear Emergency Response Center be established to handle the problems associated with nuclear safety effectively, either on an international or a regional. Also I would like to support resolution adapted at February Board of Governor's meeting of IAEA alone the simular line.

Thank you very much

7)..........

NUCLEAR ENERGY DEVELOPMENT AND NATIONAL ECONOMY

H. Fukami
Professor
Keio University

On the premise that nuclear power as well as atomic energy development has already begun to take root in the socio-economic society, I would like to examine objectively and realistically macroscopic and overall aspects of nuclear power in order to clarify its role and evaluation.

Here, I would like to try to establish and apply practically the basic standards for this evaluation and assessment and to clarify its comprehensive significance in the national economy.

First, nuclear power has been evaluated so far exclusively from the standpoint of economic as well as energy security. Diversification of supply sources, stability of suppliers, the role of nuclear power as a semi-indigenous energy source, and easiness of stockpiling, provided grounds for the discussion. It has been generally believed that a considerable amount of investment has been needed to ensure energy security and that this has not been compatible with economic viability. However, as a result of the development of nuclear power and the skyrocketing of energy cost, particularly of petroleum, nuclear power is economically viable these days.

Therefore, secondly, the criteria and standpoint of economic viability assume particular importance. In determining economics of nuclear power, there are still many uncertain factors. Therefore, there remain problems relating to the quantitative clarification of the cost advantage of nuclear power. However, it is certain that nuclear power generation by light water reactors is economically viable and will continue to be so in the future. I shall make a detailed analysis, primary approach though, as regards the significance and effect which the posibility of energy cost reduction might have on the national economy (economic growth, national income in real terms, international balance of payments, international competitiveness, etc.).

Moreover, it is necessary for us to point out the advantage which nuclear power has over other sources of energy (easiness of stockpiling and low generating cost) from the standpoint of cost of energy security.

Thirdly, nuclear power has an economic advantage not only in the limited aspect of cost but also from the standpoint of social cost or external non-economic factors. Although carbon dioxide emitted from thermal power plants and acid rain that falls in their neighborhood have become big issues of public concern today, nuclear power has an advantage over other forms of thermal power generation as far as these nuisances are concerned. Since there is little difference between nuclear plants and other thermal power plants as far as the waste heat is concerned, this advantage is very important.

Fourthly, we must take note of the ripple effects which research and development concerning nuclear energy has on other technologies as well as of the effects that it might have on related industries. Effects of research and development in promoting switchover of one industry to another, subsequent to the establishment and development of the nuclear power industry, must also be noted. I will clarify the significance and role which nuclear power development will play in establishing and promoting new technical innovations and in sophisticating Japan's industrial structure into a technology- and knowledge-intensive one. New technical inovation and sophistication of industrial structure are the fundamental targets of the future development of the national economy.

Fifthly, it is also necessary to point out and evaluate the role which nuclear power fulfills in the promotion of regional economy and in rectifying regional disparity within the overall framework of the national economy.

Nuclear energy development involves a great number of uncertain factors, such as the social cost of assuring the opposition of local residents to nuclear power plant siting and to win public acceptance, the costs of measures for back-end of nuclear fuel cycle and decommissioning of reactors, expansion of the range of application of nuclear energy to fields other than power generation, commercialization and ensuring economic viability of fast breeder reactors and advanced thermal reactors.

Further, vigorous efforts must be made so that nuclear power may become firmly established in the socio-economic society.

In this report, I shall exclude futile and extreme evaluations and opinions and discuss objectively the effects of nuclear power on the national economy, including the question of its energy balance, in an attempt to clarify the overall significance and evaluation of nuclear power.

Generating Cost and Economic Feature of Nuclear Power

by

Shuichi Ishibashi
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1. Introduction

To promote nuclear power for a social consensus it is essential to ensure and even enhance its safety further, and is likewise important to bring its economic feature to light. As a number of favorable effects have been experienced in some 140 reactor-years of nuclear operating history to date, and this tendency is expected to last for sometime, it may be timely for the utilities to take this subject up for public dialogue. Also discussed are how nuclear power should be further improved in the same feature.

2. Experience in Nuclear Power

Dispite early year expectations for it, much has been drastically revolved over nuclear power since the first introduction of LWRs in 1970's. It was in the initial years that cost hikes continued over nuclear plant constructions, above long lasting unexpectedly lower plant availabilities due largely to first-experiencing technological obstacles and extremely stringent plant operations and maintenance behavior.

The nuclear plants have, however, soon begun to display their grossly appreciable superiorities in generating cost over the thermal units in the existing grid as it entered into the high fossil-fuel cost age in the post oil-crises years. This effect can be clearly seen in thermal-nuclear comparison in generating cost in the recent years.

3. Future Prospect over Nuclear Power

There still exist various uncertainties in long-term prospect, particulary under the expanding trend of coal-fired generating capacities, but it is likely that nuclear power will be cheapest, in generating cost at the first year of plant operation, compared with the coal-, LNG-, and oil-fired, in that order. This can be derived from those forecasted increases in construction cost and fuel cost up to 1990 as in the published studies. Included in this nuclear generating cost are the prorated fuel-cycle backend costs, such as for reprocessing-waste disposal, and plant decommissioning costs. It is also conceivable that this gap in generating cost could be largely enlarged for those units coming into the grid in later years. This is because the fuel cost is much less sensitive in generating cost for nuclear power compared with thermal power. This trend can be seen over the range of plant availability before it goes off extremely low.

4. Conclusions

Based on the years experience with large capacity central stations to date, it is expected that nuclear power will play an overwhelmingly dominant role in energy supply in Japan for ~~a~~ the foreseeable ~~time span~~ future. This will call for intensified efforts to further improve nuclear power in every aspect as the picture could be seriously ~~destoried~~ distorted if extended delays should take place in plant construction, or inflation and monetary interest run at an exceedingly high rate. Challenges must therefore be ~~made~~ met to attain effective improvements in all areas of plant availability with reliability furtherance, construction cost, uranium utilization efficiency, and fuel cycle, while the safety will persist as a premise for further development of nuclear power.

Over and above the foregoing discussions in terms of generating cost, nuclear power as an highly intensive technology could also greatly contribute to the national economy as well as the world's energy situation, when being developed, and when developed.

EMBARGO UNTIL 3/10 a.m. p.m. 4 (20)

J.A.I.F. 8th-10th March 1982

THE COST OF THE FUEL CYCLE IN THE OVERALL COST OF NUCLEAR POWER IN THE U.K.

発表は 3 月 10 日 午前 午後 時 以降に願います。

by

Sir John Hill

Chairman, BNFL

In the year to the 31st March 1981, nuclear stations in the Central Electricity Generating Board system which covers the whole of England and Wales generated 11% of the total electricity output compared with 80% from coal and 9% from oil. At the same time nearly 30% of Scotland's electricity was provided by nuclear power. For the United Kingdom as a whole, nearly 14% of the electricity generated was nuclear.

Three more nuclear stations each with two reactors are now in an advanced stage of commissioning and when they are in full operation next year the proportion of electricity generated by nuclear plants in the United Kingdom will have risen to 20%.

For all the difficulties associated with nuclear industries world-wide, the development of the United Kingdom nuclear programme is continuing steadily. In addition to the nuclear stations described above two further twin reactor stations, one in England and one in Scotland, were started about two years ago and construction is proceeding to programme. The fuel cycle services provided by British Nuclear Fuels are being expanded to meet all the requirements of the British nuclear programme and also to provide fuel cycle services on a world market.

In their latest Annual Report the CEGB confirmed that nuclear stations were the cheapest on the system in 1980/81. If they were all to be shut down the cost of replacing their output from coal and oil-fired stations would add £300-£400 million per year to the total costs of generation.

In France the very large programme they have undertaken has enabled them to get the advantages of replication and standardisation to a greater extent than in those countries where the programme has had to proceed more slowly. The economic advantage of nuclear power over the use of conventional fuels is therefore, in France, correspondingly greater than in those other countries. Electricité de France forecast the costs of production from nuclear stations coming on line in 1990 as 16.5 centimes per kWh compared with 34.6 for coal and 58.3 for oil. All figures being in 1981 money values.

In spite of these impressive figures and confirmation of the essential correctness of this analysis from utilities in many different countries there remains an element of public doubt about the economics of nuclear power. British newspapers, for example, print articles and letters questioning the analysis. They pick on the fact that some steps of the fuel cycle are carried out in plants originally built for defence purposes and question whether the prices are fair. But more important they point out that some parts of the fuel cycle related to waste management have not been completed and therefore cannot be accurately costed. They imply that costs will be very high and nuclear power is really uneconomic.

It is therefore perhaps appropriate to consider the position we have reached in the nuclear fuel cycle, our experience in each section and the reliability that can now be placed upon the estimates of cost of each aspect of the cycle.

Uranium is produced as yellow cake to a fairly uniform specification by a large number of producers in many countries. Some produce uranium from rich ores some from poor ores. Some is produced as a by-product of gold, copper or phosphate. Some mines are deep underground, others huge open pits. For all the political sensitivity of uranium production and supply there is essentially a free competitive market and a world price of uranium which moves up and down - sometimes very violently as in other metal markets - in response to supply and demand.

Spot uranium prices were at the beginning of 1982 as low as $23 per lb U_3O_8. Three years earlier they were nearly double this figure. The majority of uranium is however purchased on long term contracts under price mechanisms agreed at the time of signing. The actual cost of uranium to any particular utility is therefore dependent upon the timing and details of the contracts under which it is being supplied.

The steps in the conversion of yellow cake to uranium hexafluoride are carried out in Britain by BNFL at their Springfields uranium factory. They use a combination of modern kilns and fluidized bed plants giving high conversion efficiency producing the minimum of effluents and efficient use of reagents. Substantially all the plant has been installed since large scale operations for Defence purposes ceased. The BNFL plants provide about 15% of the world requirement for uranium hexafluoride.

As with the supply of yellow cake there is a sufficient diversity of converters operating in several countries of the world for there to be effectively a world price for the conversion service. This price is influenced by the supply and demand situation although, because of the cost of the chemicals used in the conversion process, not to the extent of the yellow cake market. It is, however, currently depressed because there is substantial world over-capacity with prices for the conversion of yellow cake to uranium hexafluoride of about $7/kgU.

The supply of enrichment has until recently been dominated by the huge American diffusion plants built originally for defence purposes. These plants were able to supply enrichment at substantially lower costs than the much smaller diffusion plants in Britain and France and moreover these small plants did not have the capacity to meet any significant world demand. Utilities ordering nuclear power plants felt it essential in these circumstances to contract for long term supplies to ensure continued operation of their investment.

Today the situation is very different. The United States is still the largest supplier but the shortage of capacity that was at one time feared has been replaced by substantial over-capacity. Enrichment can now be obtained - subject of course to safeguards which apply to all aspects of the fuel cycle - on commercial terms from the U.S., Russia, the Eurodif grouping of which France is the major interest, or from the Urenco ~~centirufge~~ centrifuge partnership of Germany, Holland and Britain.

Although the centrifuge is the more advanced technology, the diffusion plants are at the present time providing the major proportion of the world's enrichment supply. Prices are in theory subject to supply and demand but in practice the very high electricity consumption of the diffusion plants has resulted in costs and prices being determined by electricity prices with production being adjusted to meet contractual commitments.

Centrifuge plants are without doubt potentially capable of undercutting diffusion plant costs substantially. The present situation is however that hardly any new nuclear stations are being ordered and the majority of those in operation or under construction have long term contracts for the supply of enrichment from the big diffusion plants. The rate of expansion of the centrifuge plants is therefore very limited by demand constraints which are preventing them from demonstrating their full potential.

We must expect therefore that for some years the cost of enrichment will be dominated by the costs of the large diffusion plants and these will be greatly dependent upon electricity costs in the United States which many observers suggest will continue to rise. Later on when the market starts to grow again, the expansion of the centrifuge should restrain further cost increases.

The cost of separative work from the suppliers at the beginning of 1982 was effectively a world price of about $130/SWU, but we now know that the U. S. price will rise to $139/SWU in August of this year. Some utilities are substantially over bought on enrichment as a result of unexpected delays in getting their nuclear stations approved, built or commissioned. Some old contracts are being traded between U. S. utilities at discount prices in an attempt to reduce the inventories.

Fuel fabrication processes are well understood and undertaken on a very competitive basis. Costs are significantly influenced by throughput since sophisticated processes can only be justified by high utilisation of expensive equipment. Plants of optimum size are running in many countries which give a good marker as to a world price. Restrictions in the market do, however, result from tariff barriers where the duty on the contained uranium as well as the fabrication can in some cases effectively exclude suppliers from outside the tariff barrier. Most countries with significant nuclear programmes have moreover decided that it is necessary to have a local fuel fabricator and where the market is small it is impossible to match the efficiency or costs of the larger producers.

In Britain, BNFL is fortunate in being the only nuclear fuel supplier which gives it the advantages of scale that result from a substantial nuclear programme. Some of this advantage has, however, been lost due to major differences in the processes needed for the fabrication of Magnox and oxide fuel. BNFL has, however, developed a most efficient single-stage process for converting enriched UF_6 into oxide powder suitable for pelletting for any oxide reactor system - again introduced since the days of large-scale work for Defence. The process has been licensed overseas in two countries already and there are several other expressions of interest.

The effect of the cost of fuel fabrication on the kWh cost of electricity is of course determined by the combination of cost per tonne of fabricated fuel and the exposure the fuel will withstand in the reactor, the equivalent of the calorific value of the fuel. Nuclear fuel can now be made to such high quality that it will continue to operate in the reactor until so much of the fissile content has been burnt that the reactor will no longer develop full power.

The enrichment of the fuel and the exposure are thus chosen to meet a specific reactor operating cycle including refuelling, inspection and maintenance. No uncertainty remains in this area.

Reprocessing is perhaps not quite so well defined in economic terms as the other parts of the fuel cycle. The reason is not lack of experience or understanding of the reprocessing technology. Reprocessing has been undertaken continuously at Windscale since 1952, a period of nearly 30 years. The chemistry and the processes are well established and well understood. The uncertainty lies in the changing standards and regulations that have been imposed upon the nuclear industry in recent years. These changing conditions and regulations have affected all parts of the nuclear industry but those areas such as reprocessing that have highly active nuclear materials in an exposed condition and, in addition, waste management problems, have been affected more than most.

The higher standards now demanded of reprocessing plants have necessitated re-building or replacement of much of the Windscale factory for the expanded civil requirements with plant of higher environmental and operating standards. The need for these higher standards was recognised before Government approval was sought for the expansion of Windscale to reprocess oxide fuel from AGR and LWR stations. There has therefore been no change of policy or significant change in external requirements imposed on the plant by comparison with the intentions at the time of the Inquiry.

The detailed engineering design of these plants has, as expected, shown that some parts were more expensive and some less expensive than were predicted from the outline global design. Changes in the order or construction and the balance of plant have been made in the interests of economy and efficiency. The cost of highly active storage tanks to the very high standards demanded today is, for example, substantially higher than earlier experience would indicate and the advantage of earlier glassification of the waste to avoid the need to build additional storage tanks is a good illustration of this re-optimisation.

The knowledge of the costs of reprocessing plant and auxilliaries built to the new operational and environmental standards makes it possible to say that the cost of the plants can be estimated to the precision of well understood engineering costing of a detailed design of plant of known technology and engineering standard.

The reprocessing plants at Windscale and La Hague are new plants which for contractual purposes will be amortised over ten years. They will almost certainly have a substantially longer life, perhaps with the need for some additional expenditure on refurbishment, in which case existing customers will have first option on the additional capacity at an appropriate tariff.

It is difficult to give a single all-embracing figure for the cost of reprocessing because payments are made partly as an advance towards the capital component and partly against operating costs which will be incurred when the plants are in operation in say eight to eighteen years' time. If one also discounts for future payments at 5% p. a. net of inflation one arrives at an effective cost for reprocessing LWR fuel of about $650/kg in today's money terms. The cost for AGR fuel will be somewhat higher due mainly to the greater complexity involved in dismantling the elements.

The conclusion is that there is now no greater uncertainty in the cost of reprocessing than there is in the cost of products from any other major production plant which will come on stream in eight years' time. The uncertainty is more in the way any particular utility chooses to account for its costs. Some of the costs are incurred very early or as a capital contribution to the cost of the reprocessing plant. Some are incurred when the fuel is first reprocessed and some will be incurred many years later when the last charge is processed on de-commissioning the nuclear power station.

The one area of the nuclear fuel cycle where there is still uncertainty beyond the normal spread of engineering cost estimating accuracy is waste disposal. Decisions have not yet been made about the routes to be used for the disposal of all types of wastes, but the principles are now sufficiently clear for design concepts to be developed for the plants that will be required for the conditioning of the waste either for disposal or for such further storage prior to disposal as many be thought desirable.

Highly active waste - the concentrated fission products - will be glassified at the earliest opportunity to avoid the necessity of building more than the absolute minimum of additional highly active storage tanks.

The British Government has recently announced that it is now satisfied that geological disposal of these wastes is acceptable in principle. However, since a period of storage of some decades before disposal is desirable to allow fission product heating to decay to a convenient level, the Government has decided on storage of glassified wastes on the surface in engineered stores for an extended period, say fifty years, before decisions on specific disposal sites need be taken. The costs of the vitrification process and subsequent storage are well understood, thanks primarily to the work of our French colleagues, and the Government decision, which BNFL entirely supports, means that future generations will have the option of ultimate disposal at that time or retention (a negligible task) for another period of cooling. These costs of ultimate disposal are not known at present since the disposal route has not been decided. The costs will, however, be incurred far in the future and are likely to be small in relation to other costs.

Very low level activity wastes - bulky but with very low levels of activity are being disposed of by land burial. These costs are minimal.

Low level plutonium contaminated waste is disposed of by sea burial. The amount of activity that can be disposed of is small but it is nevertheless a very valuable route because of the bulk of the contaminated material and all scientific studies suggest that the use of this route could be expanded to some degree with no significant risk to the environment.

The one area not yet defined is the medium active waste - cladding material, sludges from precipitation plants, ion exchange resins etc. It is in relation to these materials that decisions are now most urgently needed. Although these decisions are required by the designers and operators of reprocessing plants, the resultant effect on reprocessing costs is likely to be relatively small.

Conclusions

Most parts of the nuclear fuel cycle are now available on a competitive basis from a substantial number of suppliers in many nuclear countries. The costs at any one time are fairly well known but they vary sometimes very markedly as a result of supply and demand and changing exchange rates. A utility may be paying a range of prices for the same part of the cycle depending upon when the contracts were placed.

In reprocessing the new generation of plants are still under construction but even here work has proceeded to the stage where it can be said that both the technology and the engineering design are fully understood and known and the issue is the precision of engineering costs estimates. The remaining uncertainties relating to waste disposal are important from the point of view of policy but are unlikely to have a significant impact upon total costs.

Typical current costs (converted to $US) which I suggest could be used for planning purposes for the various stages in the fuel cycle for Pressurised Water Reactors evened out over the reactor lifetime are:

	Typical Service Price Assumed $	Fuel Service Cost US cents/ kWh	%
Uranium	25/lb U_3O_8	0.22	26
UOC to UF_6	7/kg U	0.02	2
Enrichment	139/kg SWU	0.29	35
Fabrication	200/kg U	0.11	13
Reprocessing	650/kg U	0.20	24
Vitrification	110/kg U	0.04	4
Uranium credit	25/lb less conversion penalty of $7/kg U	-0.04	- 4
		0.84	100

第15回 原産年次大会

第5セッション 須江 誠氏 資料

57年3月10日

昭和56年6月調査

Research in June 1981

（NHK世論調査所
Source: NHK Public Opinion Research Institute）

調査者 Answerers
- 東 京 Tokyo 1,290人
- 福井県 Fukui 644人

1. 原子力開発は必要か？ （%）
Generally, do you think development of nuclear power is really need?

	東 京 Tokyo			福井県 Fukui Prefecture		
	全 体 Whole	男 Men	女 Women	全 体 Whole	男 Men	女 Women
1 必 要 Need	78.4	88.1	69.9	77.6	83.1	72.2
2 不必要 Not Need	9.7	7.8	11.4	20.7	15.6	25.6
3 その他 Other/Don't Know	11.9	4.1	18.8	1.7	1.3	2.2

2 —(1) 原子力発電所の安全性について （%）
In your opinion, are nuclear power plants safe?

	東 京 Tokyo			福井県 Fukui Prefecture		
	全 体 Whole	男 Men	女 Women	全 体 Whole	男 Men	女 Women
1 安全 Safe	6.9	11.9	2.5	4.8	6.6	3.1
2 どちらかといえば安全 Rather Safe	28.6	34.3	22.4	19.9	23.8	16.0
（小計 Sub-Total）	(34.9)	(46.2)	(24.9)	(24.7)	(30.4)	(19.1)
3 どちらかといえば危険 Rather Dangerous	44.2	37.3	50.2	43.8	42.2	45.4
4 危険 Dangerous	15.1	13.3	16.7	17.1	16.9	17.3
（小計 Sub-Total）	(59.3)	(50.6)	(66.9)	(60.9)	(59.1)	(62.7)
5 その他 Other/Don't Know	5.8	3.2	8.2	14.4	10.6	18.2

2 —(2) 安全と考えない理由
Why do you think nuclear power plants are not safe?

	東 京 Tokyo			福井県 Fukui Prefecture		
	全 体 Whole	男 Men	女 Women	全 体 Whole	男 Men	女 Women
1 わずかでも放射能が出ている Power plants are scattering rodioactive material even if it's a little	27.5	24.3	29.6	36.5	33.9	38.9
2 廃棄物がたまる一方 Waste from power plants goes on accumlating	44.7	45.9	43.9	26.3	28.0	24.6
3 管理体制・安全対策に不安 Control and safety systems are not always reliable	74.8	79.0	72.0	67.6	69.8	65.5
4 大事故のおそれ There is some chance a serious accident will happen	52.3	44.6	57.4	44.9	48.7	41.4
5 その他 Other/No Opinion	1.6	1.0	2.2	4.3	4.2	4.4

3 東京だけの調査 Research Only in Tokyo (支持政党との関連)
(Relation to the supported parties)

3 —(1) 原子力開発は必要か？
Generally, do you think development of nuclear power is really need?

	全 体 Whole	自 民 The Liberal Democratic Party (LDP)	社 会 The Japan Socialist Party (JS P)	公 明 The Komei Party	民 社 The Democratic Socialist Party (DSP)	共 産 The Japan Communist Party (JCP)	新 自 The New Liberal Club (NLC)	社 民 The United Democratic Party (Shaminren)
必要 Need	78.4	83.9	75.3	72.0	85.5	70.8	79.5	88.2
不必要 Not Need	9.7	7.6	13.9	10.0	4.8	18.5	17.9	11.8
その他 Other	11.9	8.5	10.8	18.0	9.7	10.8	2.6	0.0

3 −(2) 安全性について

In your opinion, are nuclear power plants sofe?

	全体 Whole	自民 LDP	社会 JSP	公明 The Komei Party	民社 DSP	共産 JCP	新自 NLC	社民 Shamin-ren
1 安全 Sote	6.9	8.9	3.6	3.0	17.7	1.5	5.1	0.0
2 どちらかというと安全 Rather Safe	28.0	37.9	19.3	32.0	30.6	9.2	38.5	11.8
3 どちらかというと危険 Rather Dangerous	44.2	39.4	52.4	43.0	41.9	50.8	38.5	47.1
4 危険 Dangerous	15.1	9.9	21.7	16.0	8.1	33.8	12.8	41.2
5 その他 Other/Don't Know	5.8	3.9	3.0	6.0	1.6	4.6	5.1	0.0

3 −(3) 安全と考えない理由？

Why do you think nuclear power plants are not safe?

	全体 Whole	自民 LDP	社会 JSP	公明 The Komei Party	民社 DSP	共産 JCP	新自 NLC	社民 Shamin ren
1 わずかでも放射能が出ている Power plants are scattering radioactive material even if it's a little	27.5	28.3	20.3	28.8	9.7	49.1	15.0	13.3
2 放棄物がたまる一方 Waste from power Plants goes on accumulating	44.7	42.5	41.5	32.2	38.7	52.7	65.0	40.0
3 管理体制・安全対策に不安 Control and safety systems are not always reliable	74.8	70.1	70.7	67.8	83.9	85.5	80.0	80.0
4 大事故のおそれ There is some chance a serious accident will happen	52.3	52.8	56.1	52.5	35.5	61.8	55.0	46.7
5 その他 Other/No Opinion	1.7	2.0	3.3	1.7	0.0	0.0	0.0	0.0

3 -(4) 東京に原子力発電所を作ることについて
How do you feel about constructing nuclear power plants in Tokyo?

	全体 Whole	自民 LDP	社会 JSP	公明 The Komei Party	民社 DSP	共産 JCP	新自 NLC	社民 Shamin-ren
1 賛成 Approve	21.6	29.3	13.9	19.0	25.8	6.2	33.3	5.9
2 反対 Oppose	62.4	57.9	73.5	70.0	41.9	75.4	46.2	82.4
3 その他 Others	26.0	12.8	12.6	11.0	32.2	18.4	20.5	11.7

4 福井県だけの調査
Research Only in Fukui Prefecture

県内の原子力発電所について
How do you feel about the number of nuclear power plants in Fukui Prefecture?

	全体 Whole	男 Men	女 Women
1 もっとふやしてほしい Hope to increase power plants	10.4	14.4	6.5
2 ふやしてほしくない Hope not to increase power plants	58.1	64.4	51.9
3 へらしてほしい Hope to reduce power plants	10.4	7.2	13.6
4 なくしてほしい Hope to remove power plants	4.8	5.3	4.3
5 その他 Other/No Opinion	16.8	8.8	23.8

(Research in each district)

	福井 Fukui	奥越 Okuetsu	丹南 Tannami	坂井 Sakai	嶺南 Reinan
1 もっとふやしてよい Hope to increase power plants	12.8	11.3	9.3	7.5	8.3
2 ふやしてほしくない Hope not to increase power plants	64.2	64.5	51.0	45.0	60.2
3 へらしてほしい Hope to reduce power plants	4.9	8.1	11.3	11.3	22.2
4 なくしてほしい Hope to remove power plants	3.7	1.6	6.6	7.5	4.6
5 その他 Other/No Opinion	14.4	14.5	21.9	28.8	4.6

5 (22)

3/8 最終稿

クック 3/10 発表

EMBARGO UNTIL
a.m.
p.m. 10 March

発表は 3 月 10 日 午前 午後 時
以降に願います。

AMERICAN WOMEN AND ENERGY ISSUES

* * *

BY

S. RENAE COOK

Program Manager, Nuclear Energy Women

* * *

BEFORE

THE JAIF SESSION: Nuclear Power and Public Acceptance

TOKYO, JAPAN

* * *

MARCH 10, 1982

It is an honor to receive this invitation to be with you, and to discuss how American energy policy has been affected by involvement on the part of women and citizen groups.

I have a unique occupation-unique not only in the United States, but to my knowledge, in the world. I am program coordinator of Nuclear Energy Women (NEW), which is an organization of over 600 women throughout the United States who support nuclear energy development through public information programs. Primarily, my duties are directed toward establishing liaison with a variety of Special Audiences - with women's groups and citizen advocates bing a major emphasis. My work with Nuclear Energy Women is possible though the sponsorship of the Atomic Industrial Forum (AIF). The AIF is, like the JAIF, an international association representing a wide variety of organizations engaged in the development and application of nuclear technology.

The nuclear industry's interest in working specifically with women as a special constitutency was intensified when opinion polls measuring attitudes on nuclear issues revealed that women were more opposed to nuclear energy than male counterparts. Over the last 5-6 years women have continued to rate the desirability of nuclear at an almost constant 20% below men.

Recongnizing the importance of reaching this influential audience, 14 women from within the nuclear industry took the matter under consideration and in 1974 approached the AIF to reuqest that a Task Force on Women be established. The goals of the Task Force have been to identify and implement programs to work cooperatively with women's organizations providing information on nuclear energy. From this beginning AIF continues to sponsor this Task Force, called Nuclear Energy Women (NEW), and places a strong emphasis on interfacing with women through a variety of public information programs that are undertaken.

Because the nuclear industry was pushed early on into recognizing the coorelation between women and their influence on energy issues, we have become a willing leader in the energy field in establishing liaison with women as a special target audience. The continuing public and political controversy that surrounds nuclear has only strengthened our committment to keeping communications open and direct, and across the nation special programs are being designed by AIF and our member companies which allow for an exchange of information with women leaders.

It is unfortunate, but true, that too often these days the role of energy in American society, and particularly its relationship to the women of our country, has been ridiculed with simplistic statements about the frivolity of such gimmicks as electric can openers and carving knives. The crucial issue behind the energy policy debate is whether it is desirable for the nation to continue its present rate of energy consumption and economic growth, or whether the nation should instead actively support the concept of limited growth.

Surely the resolution of this issue will have an enormous impact on the lives of women and, of course, the general citizenry in terms of economic opportunity. Because of the women's movement and simple economic necessity, more women than ever are seeking employment or have entered the job market. It is a simple fact that today in America the labor force includes more than 51 million women who collectively earn over $380 billion, and, of course, the emerging role of women in the work force is made possible in great part by a reliable supply of electricity. It is estimated that the work force in our country will grow by 26% by the year 2000. It is only in an expanding economy, stimulated and sustained by an abundant supply of reasonably priced energy that those seeking employment find opportunities for the jobs that offer possibilities of upward mobility in both pay and standard of living.

It is a simple fact that the bottom line of any energy program, whether national policy or local project, is public acceptance; and half of the voters are women. It is indisputable that minorities and women have long emerged as interest groups with a particular awareness of economic disparities and deprivations, and in the last 2-3 years most of the leading, influential women's organizations have drafted formal energy positions. The divergence of the statements taken by these women's groups is considerable and the membership of these organizations view those positions seriously. Furthermore, they use the statements to determine the direction of their lobbying efforts regarding energy issues.

We are seeing that the organizations that represent the interests of many women have chosen to, in many cases, endorse limited growth, the decrease of electric plant construction, and they are banking on alternative energy sources for even near-term electricity supplies.

If some of these vocal, influential women do not view energy availability as basic to continued progress, what kinds of reasons can be found to explain the lead women have assumed in the energy arenas? Why have they remained more skeptical of economic growth and of nuclear energy, in particular?

All sorts of explanations for the how's and why's of this issue have emerged, as you can well imagine; and many of the questions remain unanswered. Yet, perhaps by airing some of the expert's findings on this phenomena, a better definition of how pro nuclear citizens can counter these objections can be reached, and this will contribute to the design of more effective programs.

In recent years we have experienced in America a skepticism of any activity that smacks of the establishment. Nuclear power probably deserves this skepticism, a legacy of official patronization and industrial oversimplification has been characteristic in the past. With nuclear energy's origins based in secrecy and war, the negative traits cannot be easily detached from the nuclear power industry's peaceful applications today.

Harvard University Professor, Dorothy Zinberg, in her article, "The Public and Nuclear Waste Management," addressed the subject of the early years' secrecy and how special interest groups have continued to view secrecy as a major issue in the energy debate. Citizen participation groups are demanding greater access to reports from private industry and government bureaucracies. Dr. Zinberg notes that, "Although protection of the environment is a rally cry of most citizen groups, one of the coalescing factors is the shared belief that the public is not being informed of the real risks involved." With the advent of the Vietnam War, followed by the Watergate revelations, skepticism was intensified, while the institutions and professions once held sacred began to drop in public esteem.

The nuclear industry was dealt a severe blow with Three Mile Island and we will have to regain credibility. I believe a good start has already been made -- more and more disclosure, more public document rooms, and more candor have all become a daily routine throughout the industry. Traditional reluctance to speak out is being replaced with a strong effort by the industry to depolarize the issues and put into perspective the knowledge that there are no technologies that do not involve trade-offs and risks.

In a 1980 study presented before the American Sociological Association on "Sex Attitudes Toward Nuclear Power," sociologists Reed and Wilkes reviewed numerous proposed factors as possible explanations for the differences in male/female endorsements of nuclear energy. In their summary statement, the researchers noted that, "Women's opposition does not stem from lack of knowledge about nuclear power or from anti-technological attitudes. But the sex differential can be explained in terms of the combined effects of two variables -- safety and economic growth." From their study women were also seen as being more "moral and less pragmatic" about nuclear issues than their male counterparts. This study also argued that the difference in value orientation arises from "the position of men and women in the social structure."

In the 1981 article which analyzed at length women's involvement in anti-nuclear groups, Dorothy Nelkin of Cornell University deduced that women's participation stems from moral and ideological concerns. "Women are nurturers, or caretakers of life, responsible for opposing life-threatening technologies." The author noted that by developing issues in terms of morality and political frameworks, some of the more radical feminists "have used the issue of nuclear power to crystallize their visions of social and political change tying it (nuclear power) to concerns about male dominance and exploitation."

We must challenge those who claim to represent women's interests to take a hard second look at the energy policy emanating from the use of these symbolic feminist issues to design energy policy. The involvement of women in energy policy making is a matter to be taken seriously not only by industry and government but also by women themselves. The activists include many well educated women who have the time, the resources, and the interest in making a commitment to a developmental project of their choosing. It is because of industry's recognition and concern for anti-nuclear sentiment among so many women's organizations that Nuclear Energy Women has gained industry support in developing projects that will provide women with the facts about our industry.

(11日)ここからスタート

NEW is a nationwide network of over 650 professional women, predominantly from within the nuclear industry, who feel that we can speak to other women on the need for nuclear as a continuing source of electricity.

NEW has maintained a set of simple objectives:

1. To promote knowledge and understanding about today's energy picture to women and to women's groups;

2. To foster and encourage organizations as they search for energy information;

3. To provide definitive information on nuclear energy from the perspective of women working in the industry, and;

4. To provide a forum for women's organizations to consult with energy experts.

With the coordination and operation of NEW being both national and regional in scope, programming efforts consist primarily of the following:

* working with the staff and officers of 30 - 40 national women's organizations to offer them energy speakers for national meetings;
* designing workshop programs for annual women's conferences;
* arranging tours of energy facilities for groups of women leaders and decision makers;
* making educational publications and films available and recommending additional sources of information;
* writing articles for their national publications and newsletters;
* placing their membership in contact with NEW members around the country, and;
* providing educational exhibits for national and regional conventions.

The mechanics of NEW are relatively simple. With a Task Force of just 15 women representing 15 different regions of the country, the Task Force operates as a coordination body for this information network. At the same time there is inherent autonomy for the local and state groups allowing them the freedom to design programs that are most fitting to the issues and groups of that particular section of the country.

Through monthly mailings from the AIF office, I am able to maintain contact with 650 pro-nuclear women nationwide from a variety of backgrounds including: nuclear engineers, consumer affairs representatives, meteorologists, political scientists, computer programers, journalists, and housewives, to name a few.

The monthly mailings and twice yearly meetings allow for the Task Force to provide updates on activities in the industry and to suggest action on current nuclear issues. At the same time the mailings provide an avenue by which we can alert our members to newly developed communication tools that are available for their use in carrying out education programs with other women's organizations at the local level.

To provide the Task Force and the general NEW membership with a focus for project planning, several objectives have been identified as the most urgent for advocacy work. They are:

1. To work with legislators at the state and national level for a definite plan for waste disposal. Hopefully, this year we will see Congress pass legislation on waste disposal. This question has emerged as a number one issue of concern for the American public, and is also the issue which opposition has flaunted as the "unsolvable problem" of the commercial industry.
2. With it taking 12-14 years to build a plant in the U.S., citizens are working with lawmakers and the Nuclear Regulatory Commission to urge that the licensing process for nuclear facilities be streamlined. This is getting some action in the Nuclear Regulatory Commission and Congress but citizens urging support for this unpopular political stance is an absolute necessity.

3. With the cancelation of 24 plants over the last two years, industry's credibility is low and the public is viewing our industry as faltering, if not already dead. The press constantly assaults the citizens with negativism, yet with strong networks of educational groups we have a method by which to inform the public to the facts about the current status of the industry. More than ever before, there is a role that grass roots groups can play in putting out positive news on the industry and to some degree soften the onslaught of setbacks our industry has experienced in recent months.

Nuclear Energy Women and the 250 identified pro-energy groups across the country have the ability to bridge the gap between industry and the public. This is exemplified by diverse and ambitious activities, and their successes are due in large part by the higher level of credibility that they enjoy.

Although public affairs work is constantly beset with the problem of how to quantify the results of "behind the scenes" work, it seems that by highlighting examples of projects undertaken by NEW and pro-nuclear citizens you get a taste of how effective such participation has been for the American nuclear industry.

* In 1979 NEW, with the industry in general, sponsored a very successful educational project called NEED, Nuclear Energy Education Day. This by far has been one of the most ambitious undertakings NEW has launched and has netted continuing paybacks mainly in the

form of expanding the base of supporters for nuclear energy. The objectives of the project were:

1. involve NEW members and other nuclear advocates on a decentralized basis;
2. to provide facts about nuclear energy to tens of thousands of people through local gatherings and special events, and;
3. to reach millions of more people through the media, by being able to use local and regional outlets covering events in local areas.

Without any doubt, all of these goals were exceeded. An estimated 100,000 citizens were directly involved in NEED. However, the significance was not just the impressive numbers, but in the expanded base of supporters identified and in the improved skills that will continue to be key for more effective pro-energy messages in the future.

* Of course the main premise for organizing NEW in the first place was to provide educational information to women's organizations thereby affecting energy policy decisions. As I stated earlier, most of the groups with which NEW interacts consists of well educated women who take their programs and lobbying seriously. Therefore, NEW has closely followed the evolution of the policy positions taken by these organizations, and has worked diligently to influence positions. For example, out of the 14 more influential women's groups 8 have supportive positions on nuclear. These 8 groups represent approximately 1 1/2 million women. With considerable effort, NEW has been able to defer, and in some cases completely reverse, the passage of anti-nuclear resolutions among 5 of these women's groups.

* Since 1976 11 states have had 15 anti-nuclear resolutions brought to the voting ballot dealing with such issues as waste disposal, the complete shut down of already operating nuclear plants, transportation of nuclear materials, and mining of uranium. In the campaign to oppose these state initiatives, pro-nuclear groups like NEW have been an effective component. For example, in 1980 when the northeastern state of Maine had an initiative on the ballot that would shut down the Maine Yankee Nuclear plant, NEW members were busy testifying, distributing literature and speaking in public forums. As you know, the nuclear industry has not won all of these initiative battles. In fact, 5 state initiatives have passed, however, I would venture to say that the cooperation of credible and energetic pro-nuclear groups has lessened our industry losses.

* One of the projects that offers immediate feedback is the sponsorship of tours of nuclear facilities for women leaders. Each year at the national level NEW arranges a tour for women leaders including officers of national women's organizations, regulators, legislators, and journalists. They spend 2-3 days visiting research facilities and various electricity generation sites. Most of the women begin the tour as skeptics but come away more informed and more positive about nuclear in general. On an ongoing basis NEW offers tours at the local level in cooperation with AIF member companies. This cooperative effort continues to provide payback with improved attitudes among local community leaders and better relationships between local decision makers and utility management.

* The industry had assisted with the planning of two National Conferences on Energy Advocacy held in 1979 and 1980 offering citizen leaders a couple of days for issues discussion and training. In 1981 and 1982 regional advocacy conferences have taken place among our supporters. These conferences have been instrumental in maintaining the momentum and enthusiasm of advocates and has certainly improved the effectiveness of these grass roots groups.

These activities and programs have netted positive results. There is an important and urgent role that concerned citizens can play. The importance of the industry's continued outreach to groups that are willing to listen to us and support us cannot be overemphasized.

I would underscore that communications and communication voids are a two way street. Those of us in the energy industries must learn to listen, as well as to speak. Women have judiciously taken an active and leading role in formulating U.S. energy policy, however, we must continue to closely scrutinize the factions that endorse, across the board, plans that will not allow for maintenance of an economy that is healthy and supportive of upward bound citizens seeking their rightful place in our society. The answers must be sought with citizens continuing to add their voice, and actively leading the way.