

COMING TO TERMS WITH NUCLEAR IMAGERY

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ABSTRACT

The nuclear industry has accepted that it is essential to explain their work to the public. Developments of the industry are thoroughly researched and soundly based on verifiable technology. Technical publications set out the arguments and explanations and a great deal of simplified information for the public is abstracted from these technical documents and is widely available. Additionally, the industry uses conferences, exhibitions and educational material to explain the technological developments.

These endeavors to inform the public are essential, so that the public has access to explanations of the intention of the industry. However, few of the public are motivated to seek an understanding and the fact that the information material is technological and scientific is a further impediment as most of the public do not relate to scientific logic. They react in a more emotional manner. There are no rights and wrongs in this. It is just a fact that people are different and make their decisions by many and various routes.

This paper argues that the industry must research how people react and interpret information. The paper suggests that those of the public who are not scientifically minded should have the nuclear story explained to them less in terms of scientific logic and more by the use of images, poetry, music and even dance.

INTRODUCTION

Internationally the nuclear industry has been fortunate in having a great number of highly committed people who have thrown themselves wholeheartedly into the development of nuclear power. This has meant that a source of energy which was but a notion a few decades ago is now a highly developed and internationally used commodity.

The discussion of this paper is to question why such a highly successful, scientific and technological achievement has not gained public support. This is particularly strange when the product of the development is available to all levels of society, in those countries where nuclear power is generated. This was not so for many technological developments like railway trains and aeroplanes, where the benefits for many decades were for the privileged few.

Many suggest that the fact that nuclear developments commenced with the creation of nuclear weapons causes the fear and uncertainty which leads to the lack of public support. This must be part of the reason but most technological developments have military and peaceful applications and one of the most recent, the jet engine, is not hampered by its war application development. The enormous scale of the energy release available from nuclear power was demonstrated by the bomb and this will have contributed to the present perception by the public.

For many reasons the present position is that there remains a wide gulf between the technical and the popular perceptions of the risks of the nuclear power, and these fears are tending to home in on wastes resulting from the nuclear industry. The public can see no adequate solution to their safe management and disposal.

It is therefore important that the industry takes just as

thorough an analytical approach to understanding why the public has its perceptions as it does to its other scientific challenges.

This will require the industry to move outside its normal areas of study and, indeed, to go further than that, as it will need to take account of emotional matters which are considered to be taboo in areas of scientific assessment. In fact, in the past when the industry has attempted to assess public reaction, it very quickly got into statistics and graphs and if the data were not available or not in the correct form, it soon concluded there was not much of a problem, when in fact there was a wealth of information about them. Yet if, for example, they wanted to discover how radioactive waste might be contained in a particular underground rock formation, they are willing to spend a large amount of resources looking at some very few specimens of such rock, where the statistical coverage was indeed limited, yet would consider they had arrived at a general conclusion.

It is therefore necessary to decide if a useful analysis of the perception of the public about nuclear power can be made and if so, is it likely this will assist in narrowing the gulf between the technical and popular perceptions.

Public Perception in the UK and the EEC

Recently, in the UK, nuclear opinion tracking surveys have been carried out on behalf of the Nuclear Energy Information Group. The surveys are carried out in a professional manner, to high standards, and are conducted face-to-face in the home. The survey is comprehensive but a key question in the survey is: Are you in favor or not in favor of Britain producing electricity by means of nuclear power stations? The results of the answers to this question are presented in Fig. 1. The reader should note that the values

of the percentage in opposition rise from the 0% level and the values for those in favor drop from the 100% level. Also, the timescale on the X axis is somewhat compressed for the earlier years. Never-the-less the trend is quite clear. Comparison of mid 1985 percentage figures with those of mid 1989 gives:

	<u>1985</u>	<u>1989</u>
In Favor	47	39
Don't Know	16	11
Opposed	37	50

The rapid change against nuclear power after the April 1986 accident at Chernobyl can be seen in the December 1986 figures but although some of this change did reverse, the general trend continues against nuclear power.

There are some interesting figures from the European Economic Community on public attitudes to nuclear in Europe. In all the countries of the Community identical questions were put to national samples of the population - in this case those aged 15 and over.

People were asked which of three statements came closest to their opinion on nuclear power.

Thirty one per cent considered it worthwhile; eight per cent thought it offered no particular advantage and fifty per cent of this whole international sample considered it posed unacceptable risks. It is worth pointing out that although the results of that European survey were published in 1988 the results were based on field work conducted during 1987, not all that long after Chernobyl.

The first poll run by the EEC - in the somewhat smaller community of 1978 - produced rather different answers to the same questions. 44% then considered nuclear power worthwhile but even at that time - well before Chernobyl and also before Three Mile Island - 36% considered it unacceptable in risk terms.

Public Support or Acceptance

There are many uses of radioactivity for the benefit of Man in medicine, industry etc but obviously the largest application will be in power generation and the arguments of this paper should apply to all areas but will tend to use power generation as the prime example.

The benefit to Mankind of a source of energy on the scale of nuclear power and with availability into the far future must be attractive, but of course its application can only go forth with public involvement. In all these arguments it is assumed that the industry does, and has to, present its information in an open and honest manner to build up trust and reliability. The industry requires public agreement to the use of nuclear power and this agreement will come in many forms from those of the public who do agree. Some

will support and others will accept. This is, of course, a simple sub-division and there will be many shades of agreement. The two sub-divisions will be useful to show how it is necessary, in seeking public agreement, to take account of the various attitudes to an industry which has risk levels which are variously perceived over the range from tolerable to intolerable. What is the essential difference between the two groups, ie the supportive group and those who accept?

The supportive group are those who do not work in the industry but have had unplanned connections with it and, in an informal way, have built-up the necessary trust and understanding to be supportive. There are those who have benefited from the industry, perhaps relatives of these who work in the industry, and are supportive because of the benefits that they have received. More removed from the industry are those who have, because of their curiosity, read about or visited the industry, and have arrived at their own level of support. So this is a group of people who are so open minded that they can come to a level of understanding and agreement, mainly by some direct contact with the industry, and they are prepared to support the industry. The industry attempts to discover the opinion formers of this type and encourages them to carry the message to others.

The other group, those who express some level of acceptance, have come to this position for very different reasons. The author suggests that this group of people would not be self motivated to explore the basic logic of nuclear power, would not want to spend time enquiring about the methods of the industry and would not be interested in visiting a nuclear establishment. They may be relatives of workers in the industry, they may have had other connections with the industry, but it is not their scene. Never-the-less if the industry can supply relatively safe, clean energy without impacting too much on them, these people in the acceptance group will not interfere with the operations of the nuclear industry.

It is most important that the industry takes account of these different public attitudes and, in its information services, it must provide for the requirements of both groups.

The industry has, to date, tended to focus their information on the supportive group, and hence has supplied the information in a form which assumes that the audience will be capable of understanding the subject in some scientific or technological depth. In fact, the information is presented in reasoned argument, in scientific, textural language with statistics and diagrams, which again are mainly academic. Some video material is also available, but in general the subject is still treated in a technical manner.

This type of information often meets a very high standard, is necessary and should be continued. The question is

it appropriate for those who are only likely to grant acceptance?

The Acceptance Level

In any cross-section of society, for any subject, the majority of people are quite happy to leave the analysis of most subjects to a few people and to consider their conclusion. Very few are willing to cross check the facts or even keep a systematic record of their own experiences in the same area. They hear the messages of the media, which always tends to be in a colorful form, and they form their opinions from these messages. The degree of acceptance that the public arrives at depends mainly on the trust that they have in the sources of information.

Those in the acceptance group do not want technical explanation. They will, of course, be glad such information exists for others to analyze but it is not for them. They themselves want to be assured that nuclear energy is safe and clean but their message will have to arrive by links other than scientific or technical information.

This group would claim that they have an interest in science, but perhaps that is as far as it goes. According to the results of two parallel national surveys carried out in the Summer of 1988, levels of British and American public interest in science and technology were relatively high but levels of knowledge of each area were far lower. Although an impressive 66% British and 62% American respondents clearly understood the implications of simple probabilistic statements, only 34% of British and 46% of Americans appear to know that the Earth goes around the Sun once a year (1).

In no way are the perceptions of these people of less importance than those who are more scientifically informed. The opinions of all members of the public blend to form the public perception of a given topic, and the nuclear industry does require a positive perception for its activities from most of the public including all interests.

In the 1930s the scientist Rutherford, already famous for proving that the source of radioactivity was from the nucleus of the atom, was stating that no process yet discovered could produce atomic energy for practical use. Yet the author H G Wells, in 1913 in his novel *The World Set Free*, foresaw travel in atom powered air cars, life in atomic powered garden cities etc (2). It is good that no one part of society has a dominant role in filling the canvas of the picture of life but each part of society contributes its techniques, textures and hues to the ever developing spectacle.

Acceptance will come from many who are non-scientific if the benefits of nuclear energy are communicated in the language they understand and are familiar with. The science and logic, the every day communication tools of the

technologist, must be curtailed and imagery, poetry, music and dance developed to make the messages meaningful.

To develop communication with those of the humanities and arts will also require the industry to do more listening and less preaching. Not only will it discover some truths about itself but it is the only way it can analyze out the best communication methods for use with those people in other walks of life.

Non-Scientific Communication

Is there a prospect of meaningfully expressing the benefits of nuclear power in non-scientific language? To the public, radioactivity is an abstract and its application as nuclear power, hence, is also somewhat abstract.

Parallels are never adequate but sometimes help. It has been argued previously that logic presented in text will not complete the story for the non-scientific person. In religion the text books, the Bible or the Koran etc, are sufficient for a few of the supporters of these religions but many need the religious building, the sculptures, the stained glass, the organ, the psalms and the processions to secure their acceptance.

Again, the abstract "time" can be easily assimilated from a few figures. To many, however, it becomes more meaningful by different expressions from electronic pips to gongs from bells, to grandfather clocks, Townhall clocks and many other symbolic interpretations like Old Father Time.

Spencer R Wearts *Nuclear Fear* (3) has a sub-title of "A History of Images" and one of its reviewers H Bruce Franklin, (science) states of it "An admirable call for synthesis of art and science in a true transmutation that takes us beyond nuclear fear".

What use can be made of some of the art forms? Let us consider imagery in the visual sense as an example. When scientists illustrate their work they do use useful photographs of equipment and devise diagrams of their ideas or processes. These certainly assist other technologists to comprehend the arguments.

When addressing a wider public things could be more imaginative. A good example is the *Nuclear Age* by Jacques Leclercq (4). This beautiful volume gives good descriptive text with copious photographs and other illustrations. Additionally it draws on the skill of the artist.

Let us compare a fuel cycle diagram as used by a technological group (Fig. 2). This sets out the component parts of the fuel cycle. Compare that with the artist's interpretation of the fuel cycle (Fig. 3). The author has invariably found that comparing the effect of showing these two figures to members of the public secures attention for Fig. 2 and indifference for Fig. 3. It is claimed that the pictorial fuel cycle immediately commands attention and allows the pre-

sender to develop the explanation to the level required. In general, Fig. 2 is a non event.

So, there is a different language of imagery which artists use. The pictorial fuel cycle is only a small step down this road. Consider a common subject like the Earth and the sky. We technologists know that we could readily illustrate a version of that. Now consider Fig. 4 which is an imagery interpretation of the Earth and the Sky. This does indeed show a different language of imagery.

The above examples are but simple cases of the use of art. Consider the wealth of their communication routes that the nuclear industry has not explored - plays, poetry, music, dance. These communication forms have been used throughout history to portray all forms of human relationships including industry, agriculture, fishing, transport and others and have been wonderfully developed in the art world, and mostly to the advantage of the particular industry. Certainly these very unsafe and uncomfortable industries, as they were in former days, and in many cases still are, became desirable occupations with harmonious conditions when presented through the arts. Of course this is not the whole story, but can be an important contribution to public perception.

What Should be Done

The first requirement is to talk to a wide range of people in the humanities and arts. From this it should be possible to discover their impressions of the value of nuclear power. It is important that these initial contacts do permit a basic analysis, as it is all too easy to influence the situation before the existing impressions have been assessed. It is surprising how many people still have only a vague appreciation of the impact of nuclear power and have not given it any real consideration. This phase of the analysis will probably show that many in the art world are not aware of the need to plan for the supply of energy on a worldwide scale, assume that energy is a readily available and safe commodity, and have no more than some vague impression of some difficulties about its safety.

The next stage is to discover how they address the subject when it is brought to their attention. The author is at this stage with a number of professionals in the art world and they want time to consider it - months pass without a response.

After due consideration the next stage is to bring them into contact with the nuclear power scene. Do they want to start with people or plant? Some want to meet people for a

discussion, others want to roam with their camera among nuclear facilities.

They then should be in a position to give their first impressions.

It will take time and care to understand how non-scientific people are influenced by the nuclear industry and how best to build from their initial impressions. By analyzing their uninfluenced reactions it should be possible to discover what in the industry affects their judgement, and how they react to these aspects.

By this time the exchange should lead to discussions on how best the industry can communicate with them to allow them to gain further impressions of the value of the industry.

As yet there is no way of judging what the outcome of these exchanges will be, but some possibilities are as follows:

Firstly, it would be pleasing if some people in the non-scientific world found the procedures and objectives of the nuclear industry commendable and expressed it through their own professional work, be it art, music, poetry or whatever. This would mean it would influence people like themselves. Of course, the message might be critical of the industry and it would have to take note of that.

A second possibility is that these members of the art world might invite members of the industry to have exchanges with their colleagues, and these exchanges could take a form which best brings out the attributes of the industry which are meaningful to non-scientists.

A third possibility is that these non-scientists inform the industry where it is seen by their colleagues to be inadequate. There is a vast range of possibilities here, from the methods of communication through to topics like the discharge of waste or site landscaping.

Many other possibilities exist but we, as technologists, must refrain from pre-judging the outcome. This we would not do in scientific research, and human reactions are even more complex than most material matters.

One of the difficulties for the industry is that its people are primarily technologists, or those who have been highly influenced by technology, so few in the industry can ever conceive any approach but that of the scientist to an appreciation of the application of nuclear energy. It will therefore be necessary to ensure that any exchanges of the type suggested above are nurtured by sympathetic people.

CONCLUSION

It is important that the nuclear industry has public acceptance, if not support, and to achieve this the industry

WHETHER IN FAVOUR OR OPPOSED TO NUCLEAR POWER

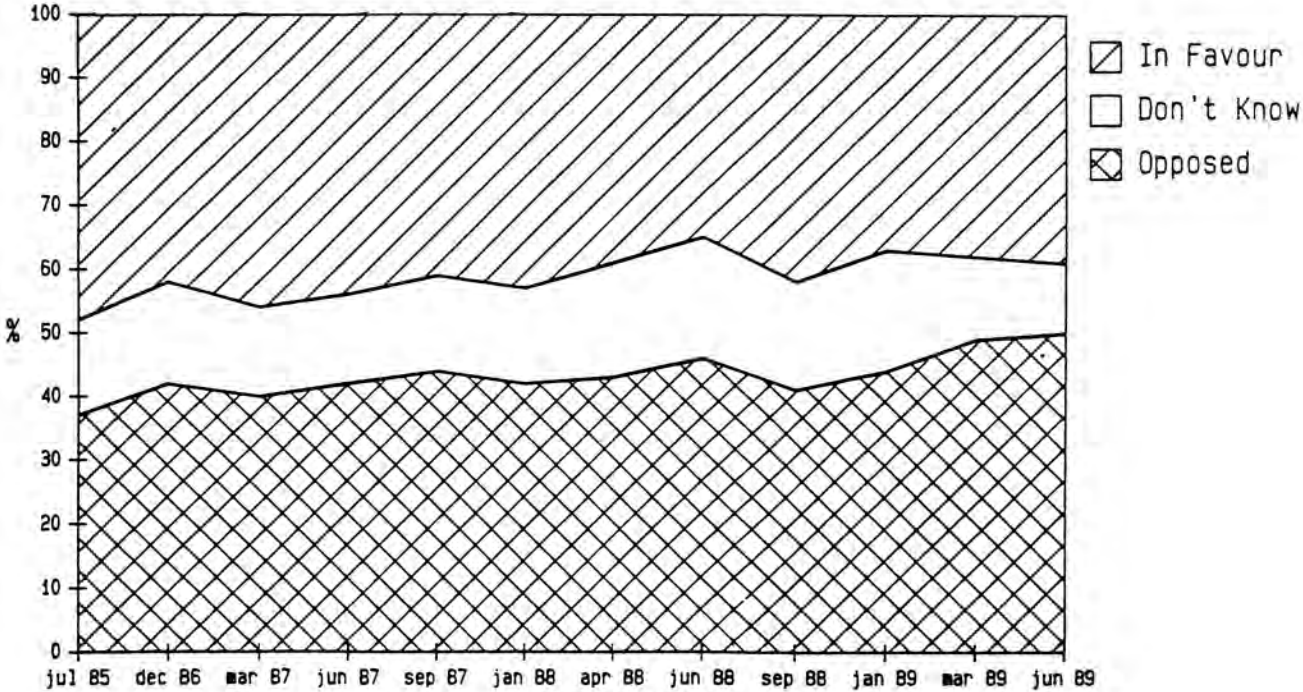


Fig. 1. NEIG Survey.

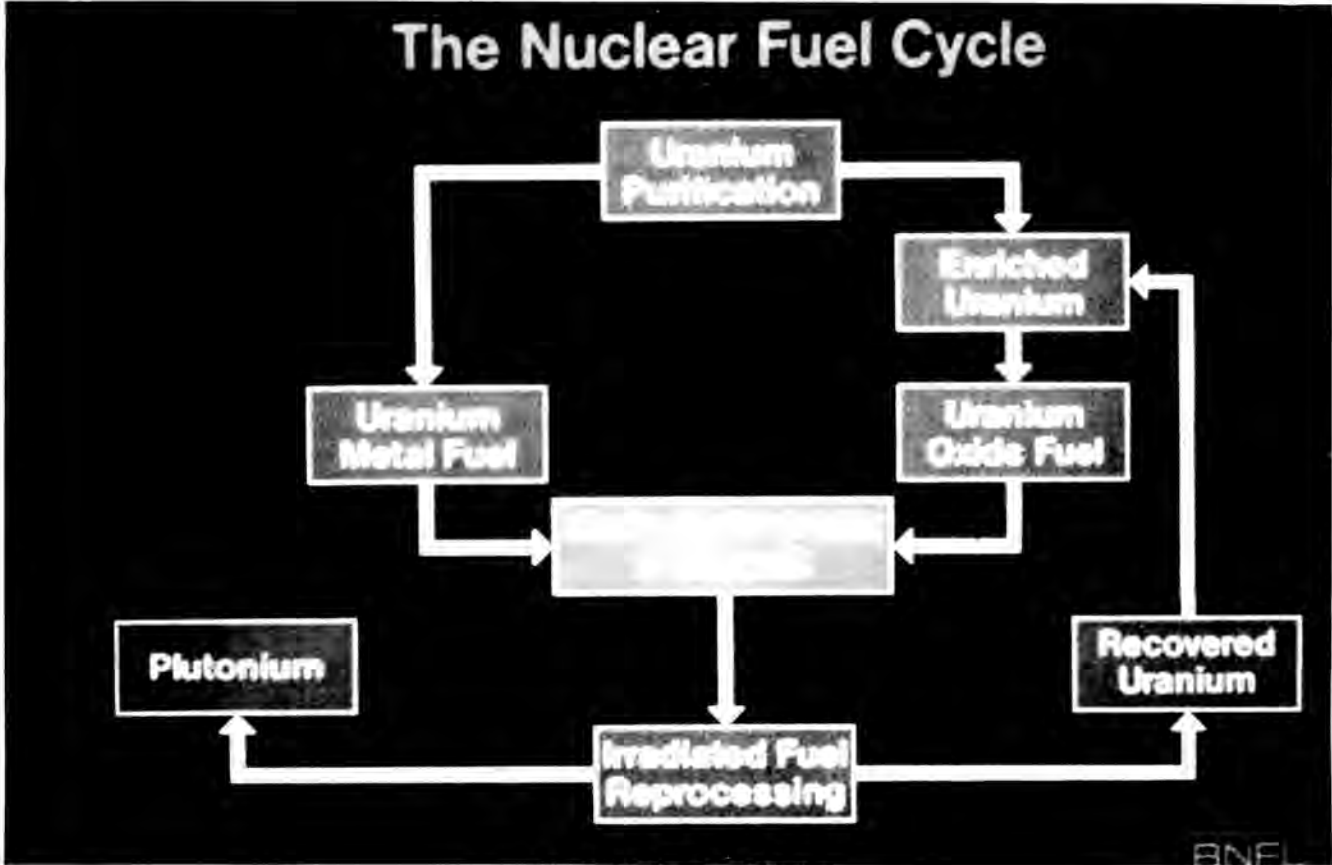


Fig. 2. Nuclear Fuel Cycle.

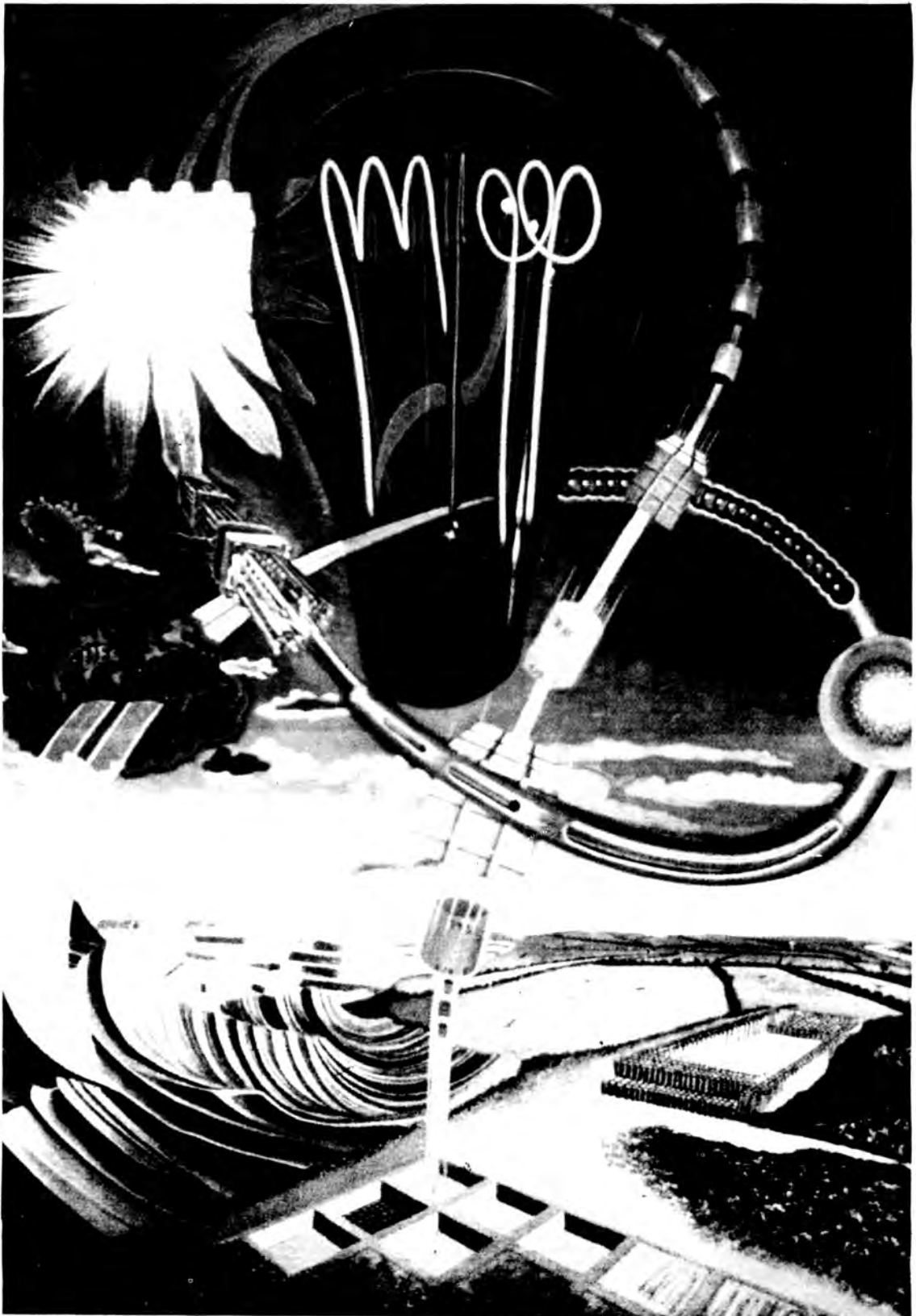


Fig. 3. The Nuclear Fuel Cycle by Xavier Degans.



Fig. 4. La Terre et le Ciel by Jean Bazaine. Copyright ADAGP, Paris and DACS, London 1990.

must communicate with the full spectrum of public interests.

There is evidence that the nuclear industry is not communicating with those of the public who are not interested in technology.

A positive initiative is required by the industry to discover how those of, for example, the art world, see the industry and hence what communication links with such people would give them a better appreciation of the industry.

The industry should build on these communication links and make use of art, poetry, plays, music and dance to make the objectives of the industry more meaningful. The development and supply of clean, safe energy from an al-

most infinite supply, when fully appreciated, must be something that we all want to sing about, and that is in fact what nuclear power offers.

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