The Politics of Nuclear Power

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1. The Political Importance of Nuclear Power

Modern capitalism has turned increasingly towards technological ‘advances’ that are suspect in the extreme. They are marked by their dubious or plainly negative contribution to human welfare, and by their destructive effects on the environment. There are some whose harmfulness is now widely recognised - as, for example, the replacement of efficient mass transit by a commitment to the private automobile, the switch to detergents, the massive use of pesticides, the waste of energy in packaging (particularly the non-returnable bottle and the aluminium can). (1)

It is now clear, however, that one particular development - the nuclear power industry - looms above all others, in its ominous implications for the future of humanity, and in its significance as an issue on which mass action against the system’s irrationality is likely.

Its predominance derives, firstly, from the sheer magnitude of the economic commitment involved. The leading capitalist countries intend to generate most of their electrical power by nuclear means before the turn of the century, necessitating an unprecedented speed of construction. Over the next decade alone, the US government hopes to see nuclear capacity increased eightfold; France and Japan aim at roughly fifteen-fold growth. These programs imply that the USA for instance, is to spend well over a trillion dollars (that is a million million) on the nuclear industry in the next two and a half decades. (2) It has been estimated that, if the 1985 target is achieved, the nuclear power industry will absorb over fifty per cent of gross US capital formation over the next decade.

Next in importance is the transparency of the irrationality involved. It is not a matter of waiting till consequences difficult to foresee have come to pass - as, for example, it was necessary for the polluting effect of detergents actually to show themselves, or for the cities to
become congested, polluted and deformed by the automobile. The damage inherent in the nuclear development can be clearly foreseen at this very moment.

The third feature is one of special significance for social change: it concerns the response of the populations in the advanced capitalist countries when they are reached by the arguments over nuclear power. Outstanding here is the example of Sweden, the only country where the issue has been made the subject of more or less formal nation-wide discussion. These discussions, carried on in the course of the year 1974, saw the population swing from approval of the nuclear program to better than two-to-one opposition. As a result, the government cut its ten-year nuclear target to one-seventh of its former size (from fourteen reactors to two). (3)

Similar responses on a more local scale have been evident in the USA where the nuclear industry openly expresses its fear that nuclear moratoria (federal or state) will be imposed as a result of public opposition. (4)

Thus it is not simply a question of a valid issue, implying a struggle for all concerned with humanity's future. The campaign against the nuclear commitment also has the character of a transitional demand, striking at the very assumptions of consumerist society, and yet understandable to and acceptable by the people affected.

In countries of the Third World, the political context of the nuclear issue is different but the validity of the struggle is no less clear. It is necessary to emphasise this point, particularly since the proponents of nuclear power often advance arguments allegedly based on the interests of a power-starved Third World. *

II. Why the Nuclear Programs are Unacceptable

The dangers associated with nuclear power have been adequately explained in a number of publications, and here we will simply refer the reader to them. (5) They fall under the following main headings:

1. Unscheduled discharges of radiation to the environment, in amounts exceeding the low levels prescribed in normal operation.

2. Catastrophic releases of fuel or waste materials, following on a 'melt-down' of the fuel after an accident.

3. Deliberate release, or the threat of it, of radioactive materials, by criminal extortionists or the insane ("nuclear malevolence").

4. Environmental damage arising from nuclear wastes (whose disposal remains an unsolved problem).

5. Undesirable political and social measures adopted to cope with these hazards.

The possible magnitude of some of these dangers can be judged from the simple facts concerning the highly toxic element plutonium. The maximum permissible annual intake of plutonium is at present one millionth of a gram, a quantity known to be capable of causing cancer (and considered too high a risk by many authorities, including Britain's Medical Research Council. (6) But the most common type of nuclear reactor, in normal operation, over one year, produces about 200 kilograms of plutonium.

Of course, stringent precautions are taken to ensure that this and other radioactive poisons are contained and never reach the atmosphere. But no system of containment can be perfect, nor verified with absolute accuracy. (Today, for example, the inventory of plutonium in a reactor cannot be checked to better than one per cent).

Suppose then that, by the end of the century, when upwards of 2,000 reactors are envisaged, a small fraction of the plutonium generated in a year 'leaks' to the atmosphere - whether by accident or malevolent design. If the leak is as small as one hundredth of one per cent of the total, this still constitutes a maximum permissible dose for every person in the world, ten times over.

The nuclear program thus embodies a proposal to organise power production around stocks of highly poisonous substances in quantities almost unimaginably vast in relation to their toxicity. To accept such a program, one would need to be supremely confident of the social system in which it is to be implemented - confident both of its ability to maintain unprecedentedly high standards of technical skill with absolutely infallible rigor, and of its political and social stability over many generations. The reader can be presumed to lack such confidence.
Despite the quite extraordinary and often ingenious safety routines implemented by the nuclear technologists, whose efforts to achieve the impossible must compel admiration, the safety of the US nuclear industry has already been the target of damaging criticisms. These concern the workings of about fifty reactors in the world's most industrially advanced country; what can be expected when perhaps 2,000 reactors are operating in dozens of countries throughout the world?

Some indications of an answer to this question was given by Jean-Claude Leny, managing director of Framatome, in March this year. It took the form of a broad hint to investors, that the profitability of nuclear power in France would not be allowed to suffer - like the American industry's - from an exaggerated concern for safety .... (7). As for the possibility of malevolent activity, the infant nuclear industry of the USA can already record, amongst other incidents, a threat to crash a highjacked plane into a reactor, a series of apparent sabotage attempts in a reprocessing plant, and the selection of nuclear plants for terrorist blackmail attacks by followers of Charles Manson. (8)

It should be remembered that the possible damage arising from nuclear catastrophes is not confined to the existing population in the country of occurrence. The very nature of the radioactive threat lends itself to dispersal in space over national and even continental boundaries, and to persistence in time so that generations remote from the present suffer illness and death (the genetic effects of radiation). The lesson from the USA in particular is that the industry's safety standards will tend to be proportional to public concern over the issue; in this light, the struggle against nuclear power can be seen also as a simple struggle for human survival on the planet.

The disposal of waste materials from reactors - and of the worn-out reactors themselves - remains an unsolved problem. Its magnitude can be gauged from one figure alone: the annual wastes from an average reactor today contain 1,000 times the radioactivity of the Hiroshima bomb. While research proceeds on possible methods of permanent disposal, the industry contents itself with 'waste management' - that is, retrievable and (it is hoped) secure methods of storage. Here it should be noted that the cost of this 'temporary' storage (which is by no means at a satisfactory level of security) will rise in the next two and a half decades to some seven billion dollars in the United States alone. It is easy, then, to understand the fear expressed by US Environmental Protection Agency experts, of "the possibility that an interim engineered storage system may become permanent solely due to economic costs". (9)

To understand the ominous implications here, one should first note that the interim methods make the poisonous waste 'retrievable' - or in other words, accessible. Thus they continually invite malevolently-inspired acquisition or atmospheric release. Also, the time scale of the 'permanent' storage required is not in dispute: the long-lasting component of the wastes (particularly plutonium) must be kept rigorously clear of the environment for hundreds of thousands of years - half a million, for safety. This poses the unprecedented problem of finding a storage which will not be disturbed by the geological processes that occur over such a time span. Research has not yet proved that such storage exists.

Here, once again, an issue of sheer survival is involved, in the struggle to prevent such irresponsibility towards future generations.

The nuclear industry has generally treated critics with disdain, making concessions to them reluctantly and only after public opinion has been roused. But in recent years, some of the more far-sighted proponents of nuclear power have started to recognise the strength of the opposition's case, particularly in the area of 'nuclear malevolence'. Their proposals for coping with nuclear hazards constitute in themselves an equally ominous political and social threat.

Thus the US Atomic Energy Commission has proposed a special federal police force devoted to the security of plutonium plants and shipments. It has complained of recent court rulings protecting individual privacy, and requested legislation which would facilitate security checks on nuclear industry personnel. (10)

With the projected growth of the industry, the number of workers affected by such restrictions of civil rights could run into the
millions. Already, according to the New York Times Texas state police keep dossiers on opponents of nuclear plants. (11)

The dangers involved here should not be underestimated. A few kilograms of plutonium make an ideal weapon for blackmailing a whole city, since it effectively disperses itself in small particles once exposed to the air.

Even graver is the real possibility of constructing a nuclear bomb from plutonium in a reactor's waste; impurities would make it inefficient but, as an experiment has convincingly shown, little skill would be needed to achieve a weapon with the destructive force of about 100 tons of TNT. (12) This would be within the capacity of 'amateurs'; any government with nuclear power plants would have the facilities to manufacture weapons 100 times more deadly. After an extortion threat, whether successful or not, an atmosphere of hysteria could well be envisaged, in which authoritarian 'law and order' proposals would be difficult to combat. They would even have a certain rationality, inside a globally irrational context.

III. The Many Levels of Irrationality

The risks just outlined justify the verdict that a major development of nuclear power is irrational, if our criterion is the welfare of humanity. But this is far from the only sense in which we can just apply the epithet 'irrational' to capitalism's nuclear perspectives.

It should first be appreciated that the current nuclear program is not a long-term solution to the problems of power generation, even in the opinion of capitalism's own analysts. It is projected as merely bridging the gap between the present period marked by diminishing stocks of oil, and the situation in perhaps three decades or so, when alternative sources of energy will be commercially viable. The tapping of the sun's energy is one important such alternative, to which capitalism is now belatedly starting to devote increased research and development funds. The primary aim here is to find ways of reducing the capital costs of large-scale solar power plants.

For reasons discussed below, solar power is still seen as less attractive than fusion power - a variety of nuclear plant working on a different principle from the current models. Existing 'fission' reactors rely on a controlled version of the nuclear reaction - the 'splitting' of a heavy atom such as uranium or plutonium - which in its convulsive release produced the explosion of the Hiroshima bomb. A 'fusion' reactor would be based on taming the nuclear reaction underlying the hydrogen bomb, in which light elements 'fuse' together to form a heavier element. Steady progress is being made in the research on controlled fusion, particularly since a Soviet break-through in this field some years ago - the 'Tokomak' development. It is generally believed however, that several decades will elapse before commercial fusion reactors enter into service, even after a basic design has proved itself in the laboratory.

Thus, present nuclear programs are supposed to justify themselves by their contribution to power needs in the next few decades. But it is precisely in this short term that there arise the most serious doubts of the program's utility.

In the first place, the cost of a unit of nuclear-generated electricity is claimed to be now competitive with, and (in the USA at least) even cheaper than, the cost when oil or coal is used as in conventional power stations. But it is well known that this competitiveness is based on comparatively cheap fuel costs, using uranium extracted economically from high-grade ore; and the estimated world supplies of this ore fall far short of the fuel needs over the lifetimes of the reactors now planned. (13)

Once the reserves of this ore are exhausted, uranium must be mined from the low-grade reserves - containing perhaps 30 or 40 times less metal per ton. This could double the cost of nuclear-generated electricity, and destroy its commercial viability.

The remedies hoped for by the industry are all either ineffective or highly speculative. Plutonium could be extracted from reactor wastes and used as fresh fuel; but this would 'stretch' the supply only by a matter of 15 per cent or so, while multiplying enormously the dangers associated with plutonium handling. (14) Improvement in extraction methods might lower the cost of treating the low-grade ore; but the improvements would need to be qualitative. Escalating oil prices might keep level with increased uranium price; but no such rise can be anticipated for coal.

The industry's major hope here lies in the breeder reactor, whose operating core is
wrapped in a 'blanket' of natural uranium. Such a reactor will convert the bulk of this uranium into a suitable fuel (normally, less than one per cent of it is available), thus producing (or 'breeding') more fuel than it uses up. The world supplies of 'burnable' uranium could thus be effectively increased perhaps seventy times over.

Before agreeing with the US administration that breeder reactors thus represent the solution to the nuclear fuel shortage, some facts should be noted. The inherent dangers of the breeder reactor vastly exceed those of the current models, and justify the greater concern and opposition of aware scientists. (15) A whole series of technical difficulties have resulted in repeated postponements of the expected date of operation of a commercial breeder, the latest estimate (probably optimistic) now landing in the 1990s. The significantly higher capital costs, as compared to today's power stations, are likely to result in yet more delays before the buying reluctance of electrical utilities is overcome. And even then, a breeder will take somewhere between 20 to 40 years to produce enough fuel for one reactor.

Thus, reliance on the advent of breeders to 'stretch' fuel supplies represents a dubious gamble. Yet what the industry is thereby gambling on, is the whole cost-competitiveness of nuclear power.

It is irrationality of another sort which emerges here: the nuclear program is not even rational on capitalism's own criterion of cost efficiency. Reactors already planned are not assured of a fuel supply which can keep them competitive. Thousands of billions of dollars are to be invested in the hope that something will turn up ....

Even with the cheap uranium supply available today, the industry can establish the competitiveness of new plants only by ignoring well-established trends, that would send the price of nuclear-generated electricity skyrocketing. The most important of these trends are, firstly, the staggering escalation in the capital cost of nuclear plants, and secondly, the severe drop in efficiency of nuclear plants after about five years' running.

In May 1975, the Friends of the Earth showed how woefully the relevant utility had underestimated costs, when they testified against the proposed Rancho Seco 2 reactor near Sacramento (California). Adopting realistic figures for capital cost, interest rates and capacity factor (i.e. efficiency), and for operation, maintenance and decommissioning, the FOE calculation showed that the true costs of a unit of power was nearly four times the figure submitted by the utility. (16)

A study by the Grenoble Institute has shown that, in France, nuclear-generated electricity cannot compete with oil at today's prices. In the heating of a household, for example, we can deduce from the study that oil will be cheaper so long as its price remains below $45 a barrel (price in mid-1975: $11). (17)

The escalation in capital cost (we consider its explanation later) shows no sign of abating. Of course, that of coal-fired plants also shows an increasing trend, but nothing like as severe - a 1975 study estimated that the difference in price between a coal and a nuclear plant was itself increasing by $19 per kilowatt per year. (18) In other words: every year the price of a 1000-megawatt nuclear plant leaps another $19 million above that of its coal-burning rival ....

The curves of capacity factor against reactor age also show a dismal trend: that the efficiency is low and becoming even lower. (19) All this may make the nuclear commitment seem extraordinary enough; but we have not yet mentioned the most astonishing irrationality of all. Some preliminary remarks are needed:

The power output of a generator of any sort can never represent pure gain, since some power is inevitably consumed in building and running it. In the case of a nuclear reactor, a great deal of power is required merely to set up in business - to build the station, mine and mill the initial fuel supply, etcetera. A most important part of this power input occurs at the stage where natural uranium is treated so as to increase the fraction of it which can be 'burnt' as fuel - the 'enrichment' process.

All this means that the station will be running for some time before it has 'paid back' the power used to set it into operation. Calculations of the 'break-even' time have been carried out for various reactor designs; they indicate that about two years of normal operation will be needed to repay the power input for construction.
Now consider the effect of a rapid nuclear program, with the number of reactors doubling every few years. To see this effect, let us adopt some definite, (though fictitious) figures: suppose a reactor’s ‘pay-back’ time is one year (this is unrealistically low), and that the number of reactors is doubling every year (this is unrealistically fast). Suppose also that a reactor takes a year to build (instead of the actual six to nine years).

In year one, no reactors are operating but one is being built: so no power is produced, but one year’s output is consumed. In year two, one reactor is operating, but two are under construction; so one year’s output is produced but two are consumed. In year three three reactors are operating but four are being built; so three years’ output is produced, but four are consumed ....

If the calculation is continued, it will be found that the program uses up more power than it produces in every year of its operation. Of course, in the real world such a program must come to a halt at some stage; the number of reactors cannot go on doubling each year indefinitely. It is at this point that the nuclear industry will become a nett power producer, but until then, it will actually be a nett consumer of power.

In the real world, also, the figures are not as they are given in the example. But the effect still persists, in a modified form, even after we insert the correct data for power input during construction, power output in operation and building time. We still find that the program will not ‘break even’, in the sense of producing more power than it consumes, for a certain number of years.

Just how many years will depend on a number of factors: the type of reactor, its operating efficiency, the grade of ore mined, the power consumed in regular operation. But the most detailed calculations available, (20) suggest that, inserting the figures appropriate to current programs, this ‘break-even’ time can easily be upwards of fifteen years, or even twenty.

But this is precisely the period in which the nuclear program is supposed to compensate for the exhaustion of oil supplies, while the world awaits the arrival of fresh power sources .... In other words, the nuclear program will quite possibly consume more power than it produces, in the very period when it is supposed to be the key factor in power generation!
It should be pointed out that a program with oil- and coal-burning stations substituted for nuclear, but expanding just as quickly, would make an even worse showing. It is the sheer **speed** of the projected construction programs which determines their short-term energy inefficiency. But of course, no one plans to build conventional power stations at such a breakneck pace - since no one has the illusion that such a program would solve any 'energy crisis'. This illusion attaches only to plans for nuclear power stations, when one 'forgets' the energy needed to build them; to puncture the illusion, the sort of energy analysis sketched above is required.

Before arriving at an overall judgment on capitalism's nuclear project, we should appreciate the element of uncertainty which runs through the above analyses. Some of the needed data - what fresh reserves of uranium will be discovered for instance, or what long-term efficiency (capacity factor) will be achieved by nuclear stations - can only be estimated. Some of the relevant calculations require time and manpower that have not yet been devoted to them, so that only suggestive approximations are available.

However, this very absence of reliable information is itself highly revealing. Let us adopt some of the criteria advanced, **within** a framework of capitalist assumption, for implementing a new technology and consider how they are met in the case of nuclear power. Let us see what preconditions should be fulfilled to justify the investment of capital involved:

First, the safety of the new industry should be sufficiently guaranteed, as to obviate the risk of the whole development being aborted at some future date. (This would occur, for example, as a sequel to the catastrophic release of radioactive material, by a plant accident or malevolent design. The public reaction could well make it politically impossible to continue operation of the existing plants, and force the abandonment of the large amounts of capital they represented.)

Secondly, the programs adopted should actually achieve their declared goals: that is, to produce significantly more power than they consume, in the vital period of the next few decades.

Thirdly, the electricity produced should be competitive in cost with that generated by 'conventional' (oil- or coal-fired) stations.

Fourthly, plants should not be projected unless they are guaranteed a suitable supply of fuel over their working lifetime.

Fifthly, the financial mechanisms should exist that will enable the 'consumer' (i.e. the electrified utilities) to obtain the capital needed to buy the reactors concerned.

It is when we review these reasonable criteria that there emerges the full irrationality of capitalism's nuclear plans: it has not been demonstrated that they satisfy a single one of these basic requirements.

At best, the nuclear industrialists can be regarded as undertaking a colossal gamble. They are gambling that no catastrophic accident will occur in the short term, despite the narrow squeaks already in the record. They are gambling that fresh high-grade ore reserves, or a technically and commercially viable breeder reactor, will be available in time. They are gambling that the trend to ever-higher capital costs, and the decline with age in the efficiency of the functioning reactors, will be reversed, or economically compensated for by increased cost of conventional fuels ....

In the USA, they are even gambling that 'something will turn up' in the way of finance, to permit the purchase of reactors by the electrical utilities. (Early in 1975, some 60 per cent of reactor orders in the USA had been cancelled or postponed mainly because of the refusal of finance houses to lend the purchase money. (21)

It is true that capitalist enterprises have been known to 'gamble' before this - to spend on research and development, or to launch on the production of a new commodity whose market was not assured. But we remind the reader of the sums involved in this particular gamble: a thousand billion dollars, or thereabouts, in the remainder of this century, in the United States alone.

It would be easy to conclude that the gods of history, with the destruction of capitalism high on their agenda, are staging their proverbial prologue of induced lunacy. But a pat verdict of 'guilty but insane', even if supported by the evidence, hardly goes far enough; it is also necessary to **understand**. The attempt to
reach even a partial understanding is mandatory, and not only because of the importance of the nuclear program in itself, both economically and politically. There is another issue involved: that of the dynamic of the capitalist economy in the present period. It may be that the nuclear industry can serve as a paradigm, showing in not-so-small-miniature - the emergence of new trends or changes in the relative weight of ones already known.

IV. The Energy Company's Gamble

There are few industries, even today, as heavily monopolised as the nuclear industry. When one says 'pressurised-water reactor', one says Westinghouse; and 'boiling-water reactor' likewise means General Electric. And these two types, built by two giants directly or through subsidiaries and licensing agents throughout the capitalist world, account for over 80 per cent of the reactors already built, under construction or on order. (41)

The powerful pressure of these multinational corporations exerts itself even on those countries possessing their own proven reactor designs. Thus Francis Perrin, formerly the French high commissioner for atomic energy, has recently complained of the 'monolithism' of the French nuclear program (even while rubbishing the anti-nuclear campaign as "based on totally false assertions" and on declarations "devoid of all objective value"). He recalls General de Gaulle's decision (December 12, 1967) to proceed with the construction of two large reactors of a French design (graphite-moderated, gas-cooled, fuelled by natural uranium) that has elsewhere proved itself. The blocking of this decision he lays to the account only of some unnamed highly-placed civil servants, also responsible for the present plan to instal 'almost exclusively' the pressurised-water reactors of .... Westinghouse.

He calls, but without much apparent faith in the likelihood of success, for the French program to include more 'diversification', a feature not sufficiently provided by the present inclusion of some boiling-water reactors from .... General Electric. (22)

The weight of the multinationals has been felt even in Britain, the country whose own design of gas-cooled reactor pioneered the commercial generation of nuclear electricity. Hot debate raged in the last year, after the Central Electricity Generating Board and the National Nuclear Corporation both recommended a switch to the American light-water reactor. But under intensive questioning before a House of Commons Select Committee, they were unable to justify their recommendations, and the government decided not to switch - for the time being, at least.

The revelations from Lockheed and other firms have made notorious one of the processes by which the multinationals 'conquer' foreign markets: old-fashioned bribery of influential natives. It should not be assumed, however, that this is always the predominant factor. Sheer size counts for a great deal - as illustrated in the unhappy case of the design of an international computing language. The world's experts agreed on a suitable language, and devoted much effort to its elaboration. But their eugenic offspring, Algol, runs a very poor second in its breadth of social acceptance to the inferior language, Fortran - which was born with a silver spoon in its mouth, sired by the market-dominating IBM ....

In another direction, a still vaster oligopolistic structure is shaping up, as the leading oil companies complete their transformation into what has been accurately described as 'energy companies'. Already in 1971, the oil giants were responsible for the milling of some 40 per cent of US uranium; their coal production amounted to 20 per cent of the US total, and their acquisition of coal reserves guaranteed their future dominance in the industry (one oil company alone - Humble - was the nation's second largest coal owner). In the nuclear field, Gulf Oil (with the third largest assets - about $9 billion - of any oil company) had set up Gulf General Atomic. (23)

This latter company threatens Britain's lead in gas-cooled reactors, and already in 1972 there was "consternation in the nuclear industry" as a consequence, according to one writer. (24) Gulf promises delivery of high-temperature gas reactors (an advanced design) around 1980.

But if this represents competition with the dominant light-water American reactors, is similar consternation apparent among the ruling giants? Hardly; the chairman of Gulf General Atomic, E. Prockett, happens to sit on the Board of Westinghouse also.
A thrust towards monopolisation is built into the nuclear project. A single plant of today's typical size - a thousand megawatts of electrical power - costs upwards of half a billion dollars, and smaller units are neither readily available nor called for in quantity. Companies with assets not running into the billions can hardly hope for a sizeable share of such a market, nor risk the investments needed to establish themselves.

The dynamic of capitalism's nuclear project has been spelled out - with some naive admiration - by Simon Rippon, the editor of a technical journal noted for its fervent, not to say fanatical, nuclear partisanship:

"... The big industrial concerns have not entered the business for quick profits - indeed, most of the companies that have entered the nuclear business around the world have been shaken to their foundations by losses on early projects and few can see dramatic profits in the future. For the supply is going to be increasingly in the direction of nuclear power and therefore for the wellbeing of their company they must establish a foothold in this sector of the business in spite of the heavy initial costs. (25)"

It may be doubted whether the 'foothold' is being seized as reluctantly as Rippon makes it sound. For the larger giants, nuclear power spells centralisation, size, growth. The prospect before them is an intoxicating one: the power industry swollen to a size unheard of, its relative weight in the economy enhanced several times over, and all of it within the grasp of one or two amicably-coexisting combines ....

The power industry as a whole can of course anticipate an increase in its relative share of the gross national product, since the power needs of industrial capitalist society grow faster than the GNP itself. In Japan, for instance, official projections are for a growth of four per cent in the GNP, compared to 6.2 per cent for the electrical output. (26) Using this data, a simple calculation shows that the proportion of the GNP represented by electricity output (i.e. its relative weight in the economy) will be double what it is now, in a little over 30 years.

It is only this perspective which can explain the gambles they are taking, and pressuring governments to take. They are not really gambling that no catastrophes will occur, that no hitches will hold up the breeder reactor when it is needed, that the nuclear project will remain cost-competitive.

What they are really gambling on - and from their viewpoint, it is a 'rational' risk to take - is that their economic and especially their political weight in society will be so massive, that society has no option but to make their bets come home.

"It is the next decade which is crucial for this outcome. By 1985, the nuclear share in electricity production is designed to reach, in the leading capitalist countries, the 10 per cent level or close to it (the USA, 13 per cent; the EEC, 17 per cent; France, 30 per cent).

"Within the present structure of industrial capitalism, it is hard to envisage a situation in which such proportions of the power supply could simply be switched off, no matter how powerful the arguments in terms of human welfare or even of economic efficiency.

Perhaps a catastrophic 'melt-down', releasing millions of curies of radioactivity, killing tens of thousands of people, damaging property to the extent of billions of dollars? Studies by the American Atomic Energy Commission have shown that accidents could well have such a scope. (27) But if society really depends on the nuclear branch of its power industry in order to continue along its accustomed path, and if this path can still claim an overall acceptance, then an alternative to a shut-down would be the adoption of 'firm measures', allegedly ensuring that such disasters could not recur.

Such measures, whose shape was sketched in the AEC report mentioned earlier, would be repressive and authoritarian in the extreme; and there can be little doubt that among the movements heavily repressed would be any spreading panic or mobilising action in connection with nuclear power ....

But if nuclear power reveals itself as unarguably wasteful? Suppose the tendencies for nuclear plants to decline in efficiency with age, and to require more and more capital for their construction, become so pronounced that, on economic grounds, they should simply be replaced by non-nuclear methods of power generation. Would not this be a situation disastrous to the nuclear industry, one in which their gamble had definitively failed?
Possibly - if they allowed such a situation to arise. But as a Harvard-MIT study pointed out in the Technology Review:

The price of usable energy from oil, coal or uranium now has little to do with the marginal production cost of any of these resources.... Instead the price of energy from alternative technologies is the result of a complicated process of assigning relative values to a variety of energy-producing resources and technologies by those who either control or require these resources and technologies. This process is both intensely and inherently political. (28)

In assessing the degree of control over energy prices, it is vital to realise that we are not dealing with an isolated handful of reactor manufacturers - more and more, the Energy Company becomes a powerful reality, and the relative pricing of the various methods of electricity generation falls increasingly under its control. 'Free competition' between the various primary fuels started to lose its reality many years ago, as the oil companies moved over into the mining of coal, of uranium, into the processing of uranium and - through subsidiaries and affiliates - into the building of reactors. Their influence will be exerted to fix prices that reflect, not the resultant of competitive forces, and not the realities of cost-effectiveness, but simply the interests of their own needs for expansion, investment and profit.

Thus, if the nuclear industry is gambling, it knows in advance that the dice will be loaded in its favor. And even if its luck turns unexpectedly bad, and the table runs against it incessantly, there remains a further and decisive recourse: it can have a word with the management....

Consumerist capitalism needs the power industry; it even needs its continuous and sizeable expansion. The state which administers that system never runs on the basis of one-capitalist-one-vote, or even one-million-dollars-one-vote; always some animals in that particular jungle play the role of the king of beasts. The Energy Company, more than half nuclearised by the turn of the century, will certainly supply a king or two, perhaps even a king of kings. Such personages do not need to fear bankruptcy, or even a missed dividend. If even the smaller predators like Lockheed, Boeing or Grumann can depend on sympathetic intervention by the state in their hour of need, what will be beyond the power of the Energy Company?

Indeed, nuclear power has already benefited crucially from state support, and not only in the billions lavished on research and development, whose results the corporations simply take over. Another important parcel of 'aid' has been delivered by the US government plants enriching uranium. The Westinghouse and GE reactors require fuel that has passed through this expensive process, and their success in penetrating the market is due in no small measure to the artificially low price assured by what amounts to a concealed state subsidy; an advantage which has not gone unnoticed by their competitors:

Ned Franklin, chairman and managing director of Britain's Nuclear Power Company ..... maintains that the price of uranium enrichment is now fixed by essentially political considerations. Enrichment is dominated by the US which supplies most of the enrichment requirements of the western world. According to people working in the US's nuclear industry, the prevailing price of enrichment is about half what it would be if the industry had to build new facilities and operate them at a profit. The problem is that enrichment is subsidised by the use of old plant that was paid for as part of the weapons programme: enrichment plants are supplied with subsidised electricity; and there is no charge for research and development. (29)

With such marks of favor already acquired, there seems little that the Energy Company needs to fear - unless, of course, it confronts an enemy whom even the state must treat with caution. As we will later see, such an enemy indeed exists....

V. Creating the 'Objective Facts'

The socialist movement has suffered for many generations from the illusion that technology is value-free. Adopting a misleading schema in which an essentially non-political 'base' (the forces of production) is simply to be taken over and endowed with a different 'superstructure' (socialist relations of production), it has failed to appreciate the political content of that technological base.

Even Lenin is on record as succumbing to this error, when he went so far as to laud the Taylor system (time and motion study) and urge its adoption in the Soviet Union. It should be noted that a question mark must now be put over the 'technological rationality' of the assembly-line method itself: can it really be justified even on the narrow criterion of 'stepping up production'? This most alienating
of all technological practices needs re­examination in the light of recent industrial experiments (particularly in Sweden) based on a self-managed working team, rather than a single worker permanently assigned to one stultifying operation on the line.

That technology, and the line of development of technology, are alike political, is nowhere more evident today than in capitalism’s nuclear project. It is illuminating to consider the non-nuclear alternatives for power supply, their undesirability from monopoly capital’s viewpoint, and the way that an apparently inevitable technological progress along nuclear lines is actually the result of highly political decisions.

A source of nuclear power has supplied mankind with the overwhelming bulk of its energy throughout history; it is the sun, a giant reactor successfully employing the fusion process without pollution and without wasting non-renewable fuel reserves (over a time scale of several billions of years, at any rate). Serious studies of the world’s energy problems almost invariably urge the priority of research and development in the field of solar power as the most attractive prospect for mankind.

But it might be asked: how real is this prospect of solar power? What are the technological data on its practicability as a large-scale resource? How does its level of development compare with other energy resources, and what is its promise in the short term?

Questions such as these are posed at the wrong level; they seek as answers a recital of ‘bare’ technological data, not themselves embodying politico-economic decisions, but supplying the value-free facts on which such decisions can be based. It is true that there are circumstances (very restricted, and usually of little social interest) in which such a dichotomy of fact and value has a relative validity; but the present questions are not located in a context even remotely appropriate to such a division.

Large-scale nuclear reactors actually exist; nuclear power moved out of the laboratory many decades ago, into the province of the architect and the engineer. Large-scale solar plants, on the contrary, remain in the anteroom of research and development. Is this a ‘bare’ technological fact? Only in the most abstract sense; in the real world, the genesis, understanding and future implications of this ‘fact’ must be sought in the sphere of political economy.

For there is no autonomous, independently-evolving sphere of ‘technological progress’ which thus made nuclear plants arrive before solar. Nuclear technology was developed in response to conscious decisions on the allocation of manpower and funds, inspired originally by the search for more destructive weapons, and later by the attractiveness for monopoly capitalism of the peculiar qualities of nuclear power.

The failure to allocate corresponding resources to solar power research was the complementary decision that helped to create the ‘technological facts’ as they now exist. And of course, similar remarks can be made about projects to tap the earth’s subterranean heat (geothermal power) or to utilise the tides.

Thus the facts are purely technological only in abstraction, inside a conceptual schema that isolates from its social context an abstract history of ‘technological progress’. In the concrete world of things as they have been and as they are, these facts are born already ‘dressed’ in a political-economic penumbra that accompanies them always, determines their significance and points to their future possibilities.

This can be seen very clearly, when we consider the prospects of solar power vis-a-vis nuclear, over the next couple of decades. The ‘facts’ involved here are being created right now, and a glance at US budgetary allocations will show us what facts the Energy Company hopes to bring about: for every dollar spent this year on solar research, more than eight dollars will be spent on one nuclear project alone - the breeder reactor. (30)

It is not hard to understand why monopoly capital is so lukewarm towards solar power. The latter lends itself admirably to decentralisation, small installations, a minimum investment of capital; these are fatal flaws from the viewpoint of the giant corporation. The ‘technical’ advantages - inexhaustible energy supply, absence of pollution, longevity of the installation, low maintenance expenses - cannot compensate for these inbuilt deficiencies .... It has been well said that solar power would fare very differently if only General Electric could buy the sun!
The sad fact is, however, that solar leases are not yet open to takeover bids; and so the corporations are doing the next best thing: planning to build their own sun.... For there is some corporation interest in solar power, provided the inbuilt vices just mentioned can be eliminated, and the project made capital-intensive, large-scale, highly centralised. These are precisely the qualities of the Satellite Solar Power Station, emanating from Arthur D. Little Inc., Grumman, Raytheon and Textron. A giant satellite a kilometre across will absorb sunlight, convert it to microwave radiation and beam it down to a seven-kilometre receiver on the Earth's surface, generating from three to fifteen times the output of a single large nuclear plant.... (31)

In principle, the solar power source can be a highly flexible device, adaptable in size to meet a wide range of demand and providing access to power for the most isolated community. A minimum of capital investment can provide a self-sufficient source for an indefinite period, and one uniquely compatible with ecological requirements.

These features can hardly be recognised in the satellite project, which achieves the near-impossible: a solar power source demanding an enormous capital investment, suitable for insertion into only the very largest national electricity grids, taking no advantage of solar radiation's great suitability for direct heating of homes and workplaces, and delivering, with its giant receiving antennae, an insult to the environment on a new and monstrous scale.

We do monopoly capital an injustice then, if we evaluate its nuclear program as nothing more than a technological project. Quite apart from its inherent hazards to humanity, its adoption would then become incomprehensible in view of the serious doubts as to nett energy production, security of investment, reliability of fuel supply and cost-competitiveness. But actually it must be seen as a project in a much wider sense: namely, as a social project, predicated upon a definite social structure and aiming to develop that structure in a definite direction.

The social structure concerned is that of capitalism in its consumerist phase, where a
widening gap between a potential of self-managed fulfilment, and a reality of hierarchical repression - is papered over with a policy of consumerist concessions. Destruction of the environment is implicit in such a society; this connection has been analysed in some detail elsewhere, and will not be further discussed here. (32)

The power needs of such a society are vast and ever increasing, and it indeed faces a 'crisis' in the prospect of exhaustion of oil reserves, combined with a severe pollution problem from coal-burning power sources. But, for reasons which will be clear from the discussion above, the giant corporations which dominate its technical development can hardly be enthusiastic about the rational lines of solution advocated even by its own experts: elimination of wasteful energy consumption, reduction in the growth of the electrical power industry, development of alternative sources such as solar, geothermal and tidal power.

It is true that nuclear power, too, has its disadvantages - it may, for example, weaken the fabric of social control by the destructive or blackmailing opportunities it creates for dissident groups. But in lending itself to centralisation, expansion and domination by a few industrial giants, it accords well with the dynamic of consumerist capitalism - which would be hard put to accommodate policies of energy conservation and the strangling of growth.

Of course, the system will have to adjust itself to the peculiarities of this new power source. The Energy Company may have to distort market and pricing mechanisms more grotesquely still, to nudge along the consumption of nuclear-generated electricity and the purchase of nuclear reactors. Massive and direct state intervention may be required to ensure the industry's future, with the perhaps grudging consent, or even against the opposition, of industrialists in other sectors. And measures of social discipline will almost certainly be called for, restricting civil rights and limiting the activities of protest movements, to provide the safeguards needed once society depends for its life-blood - electrical power - on one or two thousand incredibly poisonous sources. Such expectations may well appear repugnant, but they cannot be dubbed fantastic; they are solidly based on existing values and assumptions, those which demand the constant expansion of the commodity market and, to an even greater extent, of electricity output.

But these values and assumptions do not go unchallenged, and there is nothing fatalistically inevitable about the scenario sketched above. We have been looking at the political economy of capitalism today; but a different political economy is also shaping itself, already in conflict with its older rival and by no means invariably vanquished. We must now look at the forces behind this alternative view, take note of their accomplishments up to the present and estimate their possibilities in the future.

VI. The Political Economy of Contestation

After seeing how powerful is its support both corporative and State, we might expect the nuclear industry to glow with health and optimism. But the facts are, surprisingly, quite otherwise.

'Things can't get worse, or can they?' was the gloomy title of an editorial in Nuclear News (April 1975). The New York Times (Nov. 16, 1975) summed up the major troubles in a story headlined: 'Hope for cheap power from atom is fading'. The annual conference of the nuclear industry in November 1975 convened with over 100 nuclear plant orders cancelled or delayed during the year; with Gulf Oil's subsidiary, General Atomic, announcing its close-down; and in a state described by one writer as 'on the verge of panic'. (33)

Have some 'bare' economic facts thrust their way through the corporations' screen of figure juggling and misrepresentation? Is nuclear power just too costly? .... Actually, the truth is far more complex - and more interesting - when one probes a little deeper.

Nuclear plants must be sited well away from the densely-populated areas that use their electricity. As Hohenemser points out (34), this entails a two-fold economic penalty: no consumers are nearby for the (significant) waste heat, and distribution costs are heavily increased. Furthermore, conservative (and costly) operating procedures are adopted to prevent possible accidents.

It is not hard to see that these 'economic' penalties derive from sources that can rightly be termed 'political': public suspicion of nuclear power, and the consequent support of
activist intervention (to relocate plants, to raise standards of radiation exposure, to enforce higher and more costly safety criteria). Nor is this all:

Perhaps the most important single factor telling against the economic future of nuclear power is the continuing escalation in capital cost of the nuclear plants, as compared to coal-burning plants. The reasons for this escalation have been carefully analysed in Technology Review (February 1975) by Bupp (Harvard) and Derian, Donsimoni and Treitel (M.I.T.).

They find that total cost is strongly correlated with the length of the licensing period, i.e. the time elapsed before the plant is licensed by the Atomic Energy Commission (AEC) to enter into operation. Under US law, citizens can "intervene", on safety, environmental and other grounds, to oppose the granting of the licence or secure its postponement.

It is this intervention process, they show, which carries the responsibility for prolongation of the licensing period and the correlated rise in capital costs:

"The American administrative and judicial processes afford .... critics ample opportunity to impede the rate of reactor commercialisation. The principal consequence has been dramatic cost increases. The extreme critics of nuclear power have been at least partially successful in their efforts to force a downward re-evaluation of the social value of reactor technology."

".... The issue here is not merely technical or economical, but is inherently political: Present trends in nuclear reactor costs can be interpreted as the economic result of a fundamental debate on nuclear power within the US community. Beyond its economic effects, the real issue of this debate is the social acceptability of nuclear power ...."

(It should perhaps be recalled that critics of nuclear power are not free to hold up construction at will; they must show that the particular project fails to satisfy environmental requirements, existing radiation-release standards, AEC regulations .... And it is precisely this kind of deficiency that they have been able to establish, time and again.)

Perhaps the second most ominous trend for nuclear-power competitiveness, is that of declining capacity factor (efficiency) as plants grow older. A detailed study of the reasons for this decline is still in progress, but some contributing factors are already apparent, which are associated with the radioactive dangers in a nuclear plant and the public consciousness of them. For instance, the discovery in September 1974 of cracks in the cooling pipes of a US reactor resulted in the shutting down (for inspection) of all reactors of the same type; this would hardly have been done in the case of conventional power stations. Nor would it have been done, in all probability, if the public were less inclined to associate danger with the word "nuclear".

Unprecedented maintenance difficulties can arise in nuclear reactors; the simple welding of a crack becomes a large-scale operation in which hundreds of workers have to be deployed, when the crack occurs in a region of such high radioactivity that each worker can remain there for no longer than a few minutes .... Here again, the long campaign which forced the AEC to tighten up its radiation standards, and the heightened public awareness which resulted, should not be overlooked as a relevant factor.

We see, then, that the Energy Company has not got the field to itself; there are other political choices and actions which are significantly affecting the "bare economic facts" of nuclear power production. And of course, their effect on the political decisions in this field is even more noticeable - as shown, for example, by the severe reduction in the Swedish nuclear program for the next decade (from fourteen reactors to two already mentioned above).

We will not go on to list the successes of the anti-nuclear campaign in such other countries as Japan; the above is enough to show that significant effects can be achieved. This is all the more remarkable, being given that most of the radical left, in most of these struggles, have followed a policy of more-or-less benevolent abstention ....

It would be premature, however, to celebrate the end of the nuclear nightmare. For 1975 was the year of the great backlash, when the nuclear forces mobilised their counter-offensive on an international scale.

An unprecedented pro-nuclear rally was scheduled for May in Washington (37); a report of the European Nuclear Society.
meeting in Paris in April stressed its propagandist aspect (38); in distant Australia, the Atomic Energy Commission ran an internal study course to justify nuclear power; Westinghouse assigned a team of propagandists in Pittsburgh to the job of ‘rebutting’ the environmentalists. (39). In launching this propaganda offensive on a global scale, the corporations tacitly acknowledge how important to them are the nuclear programs, and how threatening is the level of mass suspicion. It is vital that the left equally appreciate these factors, participate wholeheartedly in the anti-nuclear campaign, and strengthen its connection with the overall struggle against an irrational social system.

But the left is hampered in fulfilling this role by the misleading theory (among others discussed further on) that the technological sphere evolves autonomously, independent of political action. The philosophical defects in this view have been surveyed above; after considering the particular case of the nuclear power industry, we can see how woefully it fails to explain the facts and the dynamic of this major component of capitalist planning in the decades to come.

Of course, the traditional marxist view was rarely a pure ‘technological determinism’; but it was usually content with a mere mention of the existence of ‘reciprocal interaction’, or of the ‘mutual interdependence’ of the various sectors of the social ‘totality’. The analysis itself, however, usually proceeded in a strictly one-way direction, with the political exercising little if any direct influence on the technological or economic.

It would be wrong to claim that this method has now lost all validity; but it is apparent that, in the case of nuclear power, it does not give even a good first approximation to the truth. It is hard to believe that this industry is just one special and exceptional case, when it looms so large in terms of economic significance and investment allocation. May we not rather be looking at a paradigm of capitalism’s development in this present phase, with deep lessons for the left and its program of radical reconstruction?

Marxism separates itself decisively from all varieties of technological determinism by its standpoint of class analysis - it sees the technological sphere as effectual only after mediation through the prevailing class interests. Now, the interests of the capitalist class cannot be summed up as simply the making of a fast buck. They include also the preservation of a structure of industry which will enable the capitalist system to continue; and it is precisely this continuance of the centralised, large-scale, ever-expanding economy, based on a market of ‘created demand’, which the environmental crises today put in serious doubt.

In this situation, the larger investment decisions must be seen as political decisions, in which the longer-term interests of the system take precedence over narrowly-conceived ‘economic’ interests. But as political acts they become vulnerable to the attacks of political opponents - a vulnerability which the outstandingly irrational nuclear industry knows only too well, as it nurses its wounds and lashes back ....

Thus, when intervening in struggles over the shape of the economy, the left should not be hampered by any lingering compunctions, perhaps based on alleged lessons from the ‘Luddite’ period, from the ‘utopian machine-wreckers’ (lessons which are revealed as obsolete by the facts above, and which were often historically dubious anyway). Otherwise, they will be leaving unchallenged some of the most significant political decisions of the giant corporations, carrying immediate threats to the world of today and even sowing the seeds of disaster for humanity’s whole future.

VII. The USSR and the Third World

The analysis above is focused on the advanced capitalist countries, and should not be extrapolated beyond them. The other major sectors of the world merit a separate if briefer discussion.

With a total list of only 25 plants, including those under construction or on order, the nuclear program of the USSR is insignificant in comparison to that of the USA, which is some 15 times greater in power output. Indeed, France’s alone outstrips the Soviet’s in capacity (by about 50 per cent). (41)

This lesser level of development is not to be explained by an initial technological lag - the first Soviet nuclear station opened in 1958, ahead of every other country in the world save one (Britain).
Nor does it stem from any ideological aversion to nuclear power. Official Soviet doctrine sees no problem in the inherent centralised nature of nuclear power; no problem in the superhuman standards demanded for safe operation in the long term; no problem in the disposal of radioactive wastes ....

Indeed, the absence of genuine public discussion on the issues involved in nuclear power has allowed the Soviet nuclear industry to "solve" its disposal problems with a breathtaking lightmindedness: high-level radioactive wastes are simply pumped under pressure into deep permeable zones. Thus they are irretrievable; and moreover, in insecure liquid form; and (because of the high pressure of the injection), a threat to the stability of the whole region; disposal methods with these objectionable features would never be permitted in the USA or Europe. (42)

In explaining the Soviet tardiness in nuclear development, one cannot overlook the abundance of its coal, oil and hydropower resources. But the absence of private ownership also seems relevant here, saving the USSR from some of the more spectacularly irrational features of capitalism's technological policies. At least, its power supply will not be shaped by the imperial adventures of an Energy Company ....

The situation of nuclear power in the Third World is of direct relevance to the controversy in the industrially advanced capitalist countries. For defenders of nuclear power there often rest their case on the needs of Third World countries; short of coal, faced with rising oil prices, and yet starved of energy for their economic take-off, their only hope, allegedly, is the power of the atom ....

This argument is either cynical or simply ignorant. A United Nations analysis has revealed the true situation, referring first to the Third World's -

".... very poor infrastructure of technology and non-availability of trained manpower to handle the reactors and other nuclear plants. The probability of nuclear accidents and consequently of dangers to human environment are bound to be far greater in these countries. Further it is doubtful whether those countries can afford to spend an additional $3-4 billion towards the foreign exchange cost of nuclear facilities during the next 25 years which will be the years of financial stress in these countries arising from pressure of population and scarcity of food. Moreover, the small size of the national electric power grids can integrate only small nuclear power plants which are at present not being manufactured ...." (43)

This last point is at present vital: the leading corporations are simply not interested in building reactors small enough to fit Third World needs. And they appear to remain adamant despite pleas by nuclear protagonists in the specialist literature, and even by leading figures at the September 1974 conference of the International Atomic Energy Authority. (44)

Evidently, they prefer to fight one battle at a time. Once the developed "heartland" has been conquered for nuclear power, it may be time to think of the outskirts.

The people of the Third World have no interest in speeding up the process of their "nuclearisation"; the UN comments above show this clearly enough. Financially, the higher capital cost of nuclear plants would deepen their dependence on the imperialist countries, who are skilled in exacting a political price for "development loans". Technologically, an important part of their industry would be in the hands of metropolitan experts for several decades. Economically, even a medium-sized plant would usually constitute, by itself, a high degree of concentration of power supply; and favor a centralisation of industry and a grandiosity of construction squarely opposed to the real needs of the bulk of the population. (When the majority of the population have no access to a power point, the arrival of a nuclear plant can hardly do otherwise than distort the economy further. What benefits have flowed through to the mass of people in those underdeveloped countries already boasting nuclear stations - Pakistan, India, Spain?)

VIII. The Role of the Left

In the campaign against nuclear power - as in most of the campaigns on environmental issues - it has been exceptional to find the political vanguards actually in the van. Those with a pro-Moscow orientation have usually endorsed nuclear power as whole-heartedly and irresponsibly as the Soviet bureaucracy
itself. Others have remained on the sidelines, or grudgingly joined in at the rear, because of ideological suspicions about the movement's purity in general, and its compatibility with their program in particular.

In its most extreme form, this suspicion leads to a dismissal of the anti-nuclear struggle - indeed of environmentalist issues in general - as a trendy middle-class phenomenon that does not interest the working class, and hence is no concern of the true revolutionary, who will concentrate on the real issues: those at the point of production and in the realm of state power.

Such a class characterisation of the environmentalist movement has greater difficulty reconciling itself with the facts now, than it might have had a few years ago; a weakness more serious still, is the implied judgment of an issue, not on its merits as a valid transitional demand, but on its present level of working class penetration.

It might be worth pointing out how neatly this attitude reverses the approach to social problems that was typical of Karl Marx. Absorbed above all else by humanity's need for the overthrow of capitalism, Marx had an eagle eye - whether as journalist or theoretician - for movements which contained the seed of revolution. Seeing the revolutionary potential of the working class, he thereafter focused his theoretical and practical activity on the needs and development of the working class movement.

The attitude we are examining turns this upside down. An attachment to the role of the working class - or rather, to a particular selection from Marx's writings about it in his day - serves as a reason for ignoring what was Marx's first concern: evidence of revolutionary potential in any movements or strata in the contemporary world. If such schools of thought turn a blind eye to the environmental movement, their vision is not much keener
when it comes to the liberation movements of women, blacks or gays. Eventually, after the passage of time, some Galileo may be able to persuade them to look through his telescope. But they will need first to be convinced that the sights they will see can somehow (perhaps tortuously) be reconciled with the true reality - which for them (as it never was for Marx) is constituted by their **doctrine**.

To appreciate the damage inherent in such an attitude, it is only necessary to consider its effect on a talented and perceptive analyst such as Hans-Magnus Enzensberger.

In his article "A Critique of Political Ecology" (40) Enzensberger dissects and exposes some of the best-publicised analyses of the ecological crises, from such spokesmen as Ehrlich - characterised by political puerility when they are not blatantly pro-imperialist in their recommendations. These comments alone give the article a high value. A fair exposition of its merits should not, indeed, stop with that comment; but it is cited here not to give a balanced appreciation, but precisely to examine a serious defect it contains.

For Enzensberger fails on the most important question of all: what should we do about it?

"The Left .... functions chiefly as an instrument of clarification, as a tribunal which attempts to dispel the innumerable mystifications which dominate ecological thinking ...." Thus Enzensberger: and we could expect a blast to follow, pointing out just how sectarian and elitist (and ineffective) it is, to observe a real movement and simply stand to one side and clarify it. Would it be valid for the Left, to see its relation to the trade union movement as that of an instructor in the art of ideologically correct thinking?

But no such blast is delivered. In the quotation above, it might be thought that the word "chiefly" gives him an escape route; but it has no significance, since he does not describe any other role for the Left - and nor does he express his disagreement with the sectarian role he has described.

But perhaps he sees no revolutionary potential in the ecological movement that would justify the Left going beyond the distribution of "clarifying" analyses and actually participating in it? Perhaps it is all just trendy stuff, with no possibility of involving broad masses?

No, this is not his opinion. His analysis of the crises is far from implying this naive dismissive view, and his perspective of their possible development rules it out entirely. He actually canvasses the possibility of "ecological rebellions" and of "uncontrollable riots"! A disconcerting picture emerges: there are the major cities of the capitalist world racked by rebellions and riots as the crises deepen, and standing apart on the sidelines are the theoretically advanced Left, busily clarifying, clarifying ....

One cannot help believing, as one reads the article, that Enzensberger knows better, that he would like to say what he carefully never does say, that the Left has a duty to participate in these movements, and to do any clarifying from **within**. Why, then, does he so conspicuously refrain from saying it?

Perhaps because of a political environment dominated by the naive dismissive view sketched above, and the consequent fear of being labelled a "revisionist". Indeed, his article abounds with evasive formulations that could betoken such a fear.

"It is after all easy to understand that the working class cares little about general environmental problems ...." Yes, indeed; and now that we have understood it, what do we say about it? Is it right or wrong - progressive, like their lack of interest on phony "participation" schemes, or backward, like male workers' lack of interest in women's liberation? Enzensberger is silent.

"In these circumstances it is not surprising that the European Left holds aloof from the ecological movement .... " Very true - we record our lack of surprise; and now, is the Left right or wrong in doing this? Again, a deafening silence.

At one point he squares his shoulders and bravely asserts, straight out: "By no means all ecological movements based on private initiative put themselves at the service of the interests of capital with such servility (as those dominated by monopoly - A.R.). That is demonstrated by the fact that their emergence has often led to confrontations with the police".

Now, surely now he will come right out and say what the Left should do about **these** movements at least! But no - the denouncers of revisionism are always on the prowl, and with his very next sentence he saves himself just in
time: “The danger of being used is, however, always present.”

(Should the women workers of Petrograd really have taken to the streets on International Women’s Day in February 1917? After all, there was always the danger of being “used” by bourgeois feminism - even if in fact what resulted was the Russian Revolution.)

Uneasily brooding on the “danger”, he falls back in the sentence after next on a safe and familiar remedy for all political ills: “A long process of clarification will be necessary .... ” And we are once more home safe, back in the sheltered world of non-participatory analysis.

By confining itself to the study and to a role of instruction from afar, the left will indeed avoid the risk of being ‘used’ - just as an army is in no danger of being tricked and out-maneuvered if it keeps clear of the battlefield. But, specializing from environmental issues in general to the nuclear question in particular, it must be asked whether the ground should really be surrendered to the enemy so easily.

The historical import of the nuclear power program derives from the current plight of modern capitalism: based firmly on consumerist values and concessions, it sees the development of that consumerism heading inexorably towards the destruction of the environment. The coming exhaustion of oil reserves is one harbinger of the crisis, and has promoted a reckless acceleration of the nuclear programs, in an attempt to censure, at whatever cost, that consumerist capitalism will have available the centralized sources of power it needs.

The struggle over nuclear power thus poses questions about the very shape of society itself - as any intervention in this struggle quickly reveals. For it is impossible to adopt a purely negative stance, attacking nuclear power by proposing no alternative energy policy. Many of the reformist critics understand this well, and offer programs which envisage the attainment of social energy goals without the use of nuclear power, but which usually involve sizeable reductions in energy consumption by various methods of conservation.

But such a conservation policy would represent an extraordinary historical ‘turn’ by a consumerist capitalist society, wedded as it is to continual expansion; a society, moreover, in which the relative weight of the ‘Energy Company’ grows day by day. Can such a society significantly restrict its energy consumption over a whole business cycle - for example, in a time of recession, will it throttle down on vitally needed expansion plans, simply because they are energy-expensive? And what would be the social and political reverberations of such energy-conserving policies as were adopted?

These important questions usually get scant consideration from moderate advocates of conservation. In contrast, those already convinced of the need for radical social change are less inhibited, and will not play down the severe strains which an energy crisis implies for capitalism today. But their own social project will not escape a similar critique, unless it has at least the basic outline of a solution to the problem - unless it can point to the satisfactions it envisages as replacing the dubious rewards of the commodity culture.

One project which sketches such a solution is that of self-managed socialism. The substitution of the principle of self-management for the present dominant principle of hierarchy, in every walk of life - a substitution possible only if the power of the capitalist is overthrown, and that of the bureaucrat severely limited at least - implies, on the level of the individual, the possibility of changing the values one lives by. If new channels of self-expression and autonomous action can be opened up in every social sphere, beginning with the factory floor, it will not be so crushing a catastrophe if beer must be bought in bottles rather than in energy-expensive aluminium cans.

This point has been made in greater detail elsewhere (32). It illustrates how the campaign against nuclear power must be finally unconvincing, unless it is prepared to delineate an alternative social path that does not lead to a poisoned world. A receptive atmosphere for such an exposition is created by the striking irrationality of the nuclear program which must condemn by association the system that gives rise to it, and encourage the consideration of rational alternatives.
FOOTNOTES

3 Nuclear News, April 1975, p. 80.
4 Nuclear News, April 1975, p. 80 (editorial).
5 The best source here is “Non-nuclear Futures”, by Amory B. Levins and John H. Price (Ballinger Publishing Company, Cambridge Mass.), October 1975, which contains an encyclopaedic list of references.
7 Investir, March 24, 1975. Quoted in Basquet, Le Nouvel Observateur, April 21, 1975, p. 46.
8 For the latter two incidents, see respectively Environment, 16 October 1974, p. 21, and Time, September 22, 1975 (“Fromme: There is a Gun Pointed”).
11 Ibid, p.20.
12 New Scientist, March 27, 1975, p. 799.
13 A 1000 Megawatt (electrical) reactor requires about 4,500 tons of uranium over its lifetime. Thus a world total of 2,000 reactors (one of the lower estimates) by 2000 A.D. would need some 9 million tons; but the estimated world inventory extractable at less than $39 a kilogram is not much over 4 million tons. (See e.g. “World Uranium Resources,” by L.G. Poole, Nuclear Engineering International, February 1975.)
14 See the discussion in Speth et al (ref. 10 above).
17 “Alternatives au nucleaire”, Presses universitaires de Grenoble, February 1975. The figure cited follows from Annexe 3, p. 89, on utilising the findings on capital cost from ref. 16 below, and those on capacity factor from ref. 19 below.
21 Nuclear Engineering International, February 1975, p. 73.
22 Le Nouvel Observateur, April 28, 1975, p. 86.
24 New Scientist, August 17, 1972, p. 334.
29 New Scientist, June 26, 1975, p. 710.
30 “A Poor Buy” (ref. 15 above), p. 12.
37 Nuclear Engineering International, April 1975, p. 301.
44 Nuclear Engineering International, “Market considerations of medium/small nuclear power reactors” by J. Greason (p. 37), and “The case for developing small power reactors,” by G. Webb (p. 39), both January 1974; “IAEA General Conference asks why no small reactors for developing countries?”