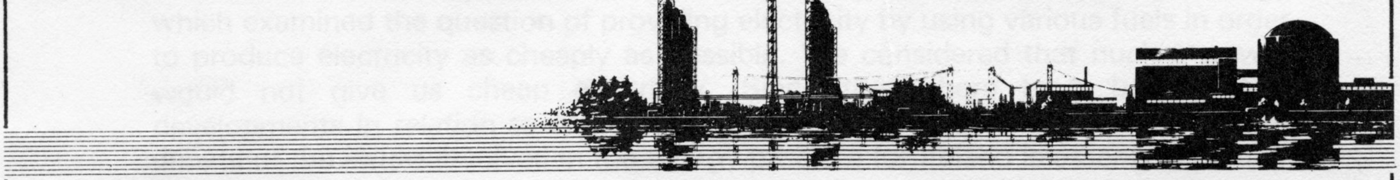
NUCLEAR POWER & IRELAND



Research Section
Department of Economic Affairs
Sinn Féin The Workers' Party

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INTRODUCTION

During the 1960's and 70's Irish industry developed at a more rapid pace than ever before in our history. Sinn Féin The Workers' Party has consistently called for further development of our industrial base.

Allied to industrial development is a growing demand for power and this demand has been met by one of our very successful State bodies, the ESB. Electricity has been generated using oil, coal, turf and water.

The ESB and the Minister for Industry, Commerce and Energy have said that, in order to continue to meet the demand for electricity from industry and the private consumer, a nuclear power generating station is needed and the site which they have chosen is Carnsore Point, Wexford. The Government have however agreed to hold a Public Enquiry into the question of whether a nuclear station should be built.

Sinn Féin The Workers' Party position

We welcome the decision to hold this enquiry because the outcome of the debate about the provision of electricity in this country will have a profound effect on the future industrial development of Ireland. In 1978 we published a pamphlet on Energy which examined the question of providing electricity by using various fuels in order to produce electricity as cheaply as possible. We considered that nuclear power would not give us cheap electricity. Since then there have been further developments in relation to energy sources and we believe that a full and public debate of the issues involved in the energy problem for Ireland is essential. Further sources of power are vital to the continued development of Irish industry but the selection of such sources must be based on full information regarding such sources: effectiveness; continuing stable supply; economic supply price; safety.

We have said that every effort must be made to use resources which are available to us in Ireland and that emphasis should be placed on the research necessary for this.

The forthcoming enquiry should examine the question in this context and should consider what is the most effective way to provide cheap electricity for the continuing industrialisation which is vital for the creation of employment.

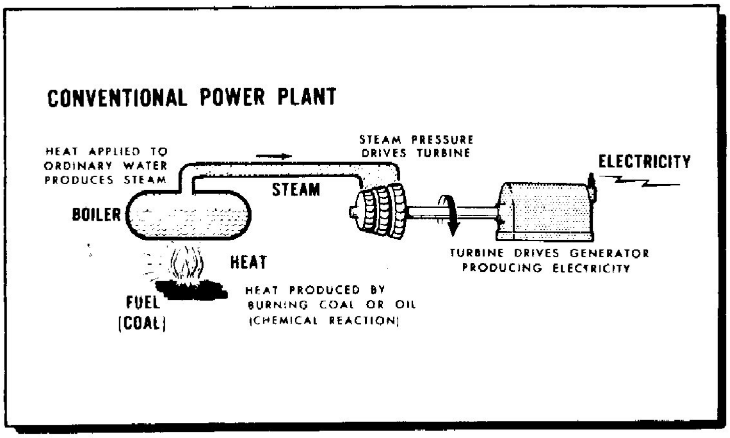
Nuclear Power

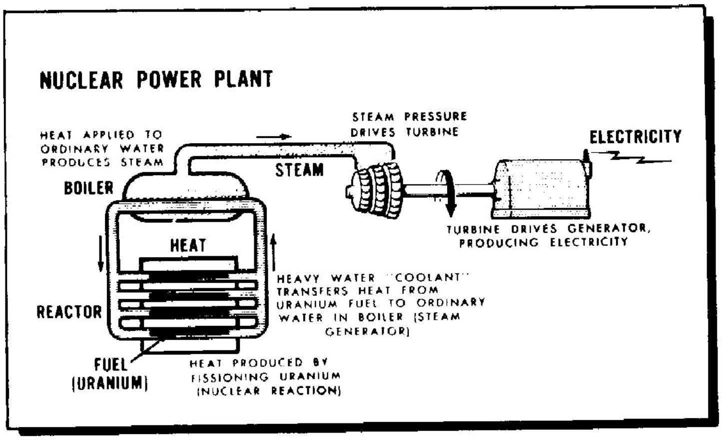
In order to assess the implications and the potential of nuclear power it is necessary to have at least some slight understanding of how a nuclear station generates electricity.

Atom Splitting/Fission

An atom is the smallest particle of a substance and the heart of an atom is called the nucleus.

When a neutron strikes a uranium atom the atom splits into two pieces called "Fission Products". The fission products fly apart with great energy. As they travel through the solid uranium metal they jostle the atoms and in this way heat the





The main difference between a conventional steam power plant (top) and a nuclear plant lies in the source of heat used to make the steam that drives the turbines. In the reactor (bottom), heavy water flows over hot uranium rods and becomes hot itself. It is then pumped through a boiler (heat exchanger) where it gives up its heat to ordinary water that is converted into steam.

uranium.

When a uranium atom splits, it gives off two or three neutrons, which are travelling too fast to readily split other uranium atoms and in this way maintain a chain reaction. These fast neutrons are slowed down (moderated) if they bounce against the nuclei of heavy hydrogen atoms in heavy water, just as a billiard ball is slowed down if it bounces against other billiard balls. Slowed down in this way (and now called "thermal" neutrons) the particles are much more likely to split uranium atoms when they bounce into either the uranium fuel rod from which they were released or a neighbouring fuel rod.

Chain Reaction

When a neutron splits a uranium atom, more neutrons are given off. If these neutrons are suitably slowed down so that they will split other atoms, these in turn give off neutrons which split other atoms, then a chain reaction is created. It is simply a successive splitting of uranium atoms.

What is the source of the first neutron that gets the chain reaction going? In any piece of uranium metal spontaneous fission is taking place at a very slow rate — at least a few atoms are splitting and giving off neutrons.

You can hold a piece of uranium metal in your hand without any fear that a chain reaction will take place in it. Why? Because the neutrons given off by each spontaneously splitting uranium atom are travelling too fast to readily split other atoms. Most neutrons escape from the surface of the metal.

To get a chain reaction with ordinary uranium, there must be something to slow down the neutrons (a moderator such as "Heavy Water" or "Graphide" and there must be a sufficiently large quantity of uranium so that the number of neutrons causing successive fissions increases steadily. This quantity is called "The Critical Size" At the reactor at Chalk River in Canada they need about 15 tons of heavy water (to moderate the neutrons) and about ten tons of uranium before the reactor "Goes Critical" — before a chain reaction is maintained in it.

As the chain reaction proceeds, more and more fission products accumulate. These products, which are a variety of elements such as Barium and Krypton, absorb neutrons.

Eventually, and before all the uranium can be "burned" (fissioned) the fission products absorb so many neutrons that the fuel rods must be removed from the reactor and new fuel rods must be put in.

All this information applies to reactors using natural uranium and Heavy Water or Graphide. The "Light Water Reactors" do not use a "moderator" to slow down the neutrons; they use "Enriched Uranium".

Uranium Enrichment

In natural uranium only 0.7% of the atoms are the fissionable isotope uranium -235; the remainder is largely the fertile isotope uranium -238. Before uranium fuel can be utilized in a light water reactor the concentration of uranium -235 must be increased to about 2—4%

In the USA the Federal Government owns all three existing enriching plants in the USA. They are Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. Tremendous amounts of electricity are required for this process.

Enriched uranium is used in nuclear weapons but the enrichment required for nuclear power stations is not sufficient for the production of nuclear weapons. Uranium -235 for use in light water reactors requires approximately 3% enrichment. A new type of reactor is being built in the USA called "A High-Temperature Gas Reactor" requires as fuel uranium -235 which is enriched 90 - 95%. This is weapons grade material.

The first HTGR has been built at Fort St. Vrain, Colorado and it is planned to construct 80 such stations by the year 2,000.

Uranium

Uranium ore is mined and transported to mills which crush, grind and chemically process it to produce a semi-refined uranium compound known as "yellow-cake" U_3O_8.

The "Yellow Cake" is further processed to give the grade of uranium which, if it is for use in Light Water Reactors, is suitable for enriching. This is then manufactured into pellets which are loaded into stainless steel tubes for use in nuclear power stations.

Power

The splitting of the atom involves the release of an enormous amount of energy and during the second World War intensive work was carried out investigating the possibility of an atomic bomb and since then on the useful application of atomic energy.

In order to use the energy produced, the neutrons must be slowed down to set up the chain reaction and the fission process must be controlled so that it does not become violently explosive.

Nuclear Reactors

These controls are exerted in nuclear reactors. Fission Reactors are of two main types — those using enriched uranium and light (tap) water and those which do not use enriched uranium and use 'heavy water' or 'graphide' to slow down the neutrons so that they split the uranium atom. The process of nuclear fission produces waste materials which are radio-active.

Waste

One of the major problems of nuclear power is the problem of the dangerous waste materials created by the process of fission. This waste is radio-active and in order to understand the dangers of radio-activity we set out some simple explanations below.

What is Radiation?

Radiation is energy moving through space as invisible waves. The type released recently from the Three Mile Island nuclear plant for example is called ionizing radiation. It creates elecrtrically charged, high-energy waves that — unlike light waves, for example — can penetrate the body, altering cell chemistry. At high enough doses it is lethal.

Everyone is exposed to some radiation naturally — through cosmic rays and radioactivity in rocks and soil. But exposure is slight — less in a year, in some cases than the amount residents near Three Mile Island plant have been exposed to in the last few days.

Medical radiation, including X-rays, accounts for more than 90% of all man-made ionizing radiation received by Americans, government figures report. These levels, typically, are also lower annually than the cumulative levels that Three Mile Island's neighbours have been exposed to in the few days after the accident at that plant.

How are we exposed to radiation?

Airborne radiation can penetrate our bodies just as an X-ray does. We also can inhale radioactive particles, eat them in food, or drink them in water.

How does radiation affect the body?

When radiation passes through the body, several things can happen. It can kill a cell or cells, cause cell damage that repairs itself, or maim the nucleus of a cell, where genes are stored, causing some type of defective multiplication of that cell.

Cells and their genes are most susceptible to radiation if they are actively dividing, as they are in fetuses, babies and young children. Also if a gene which controls the rate of cell division is damaged, the cell may divide in an uncontrolled fashion, eventually causing cancer, possibly leukemia.

What is a lethal dose?

Human exposure to radiation is measured in units called rems. A dose of 500 rems or more is believed to be fatal. A single dose of 100 rems can cause radiation sickness, with symptoms such as nausea, vomiting, dizziness and anemia.

What are the health effects of exposure to low-level radiation?

This is a matter of heated dispute among scientists. A recent report by a government task force said studies of populations exposed to very low amounts of radiation 'raise serious questions... and suggest that risks may be higher than earlier predictions'. The report said that doses as low as one fifth of a rem — only slightly above exposures to the residents around Three Mile Island — appear to increase the risk of childhood cancer.

From the foregoing it is clear that the question of disposal of radio-active waste materials is crucial to the nuclear debate.

The long-term storage or the ultimate disposal of high-level radioactive wastes

Some people believe that this is a problem which will never be satisfactorily solved by mankind. It might be more reasonable to say that this problem has not yet been solved to the satisfaction of all.

The question can, of course, be solved — the really dangerous wastes can be shot away into space. It is an expensive way to get rid of waste but even at present levels of technology it would only mean a small percentage increase in the cost of producing nuclear power.

The reason why this means of disposing of nuclear wastes is not used at present is because many people are convinced that some other methods of disposing of wastes now in use are adequate. Some waste is recovered and used again. This has the effect of reducing the total volume of waste to be disposed of in some other way.

The most difficult management problem concerned with the disposal of radio active wastes is the very long toxic lives of some of the elements. Elements with a particularly long toxic life are only a small part of the waste produced by nuclear power stations. The destruction of the two principal fission products of concern — strontium -90 and cesium -137 — is not technically nor economically practical on earth at this time.

Destroying radioactive waste

The conditions within a controlled thermonuclear fusion reactor are believed capable of destroying these elements in the future. It is for this reason that the separation of these two fission products from the rest of nuclear waste is being advocated by some concerned scientists. If the really dangerous elements were separated from radio-active waste with a much shorter life or waste capable of being reprocessed, at reprocessing stations, then this would increase the attractiveness of shooting the long-life radio-active wastes away from earth.

Some scientists consider storing waste in salt formations to be safe. Salt formations are considered to be geologically stable. Their existence proves the absence of underground water in the area and they are capable of dissipating large quantities of heat. Salt provides good radiation shielding.

Quantities of radio-active waste are enclosed in steel and concrete drums and dumped at sea. The reasoning behind this method of disposal is that the great volume of water in the seas will dilute even radio-active waste to an extent that it is harmless. The argument against this line of reasoning is that in time the dumping of waste will have an effect and therefore the practice must be challenged now.

Breeder Reactors

What is a breeder reactor?

A breeder reactor is a nuclear reactor designed to both produce power and "breed" new fuel at the same time. When fissionable uranium or plutonium is "burned" (fissioned) in such a reactor, the amount of new fuel produced from non-fissionable but "fertile" uranium or thorium, also in a reactor, exceeds the original fuel placed in the reactor.

How can a breeder make more fuel than it consumes?

Each time a neutron causes an atom to fission, two or three neutrons are ejected, only one of which is required to continue the chain reaction (cause another fission). Almost every time one of the extra one or two neutrons hits and is absorbed by a fertile atom, the fertile atom is changed to a fissionable atom. Plutonium is burned with the fertile material, uranium -238, to produce more plutonium, and uranium -233 is burned with thorium -232 to produce more uranium -233. In this way a breeder makes fuel (fissionable material) by consuming fertile material.

Why do we need breeders? Why not use the nuclear plants we now have?

Breeders are needed to conserve our nuclear fuel supply and to reduce the requirements for enriching facilities. There is estimated to be only 20 years supply of the uranium needed to fuel economically the non-breeded (burner) nuclear power plants planned; that is, although there is a great deal of uranium in the world, only about 7 atoms per 1,000 are in fissionable form U-235. Almost all the remaining 993 are fertile U-238. To be economical, uranium must be found in fairly high grade ore in accessible places. Many of the existing ores are not in this low-cost category. Breeders are needed to produce more fuel.

Do breeders pollute the environment?

In this respect breeders will be superior to most present nuclear power plant reactors.

If breeders are so superior why are we not using them now to generate electricity?

Breeder reactors in sizes large enough to be economical are being developed. Breeding has been demonstrated but they are not expected to be in extensive practical use before the late 1980's.

Can the plutonium produced in breeder reactors be used in atomic bombs?

Theoretically yes, but not easily. The plutonium-fission product mixture as taken from a breeder power plant is highly radio-active. Very special equipment is required to move it about — to the reprocessing plant. There the fission products are removed, and the plutonium in the form of a chemical compound is prepared for manufacture of new power plant fuel. To be useful for bombs it must be in metallic form. In the nuclear fuel cycle it is never in metallic form, being either an oxide (as in fuel elements) or a salt (as in shipment).

Plutonium is a health hazard in all forms and must be handled in special equipment in all operations.

How is the public protected against the health hazard of plutonium used in nuclear power plants?

The public is protected by a series of physical barriers in exactly the same way as in the water cooled reactors and by the same waste disposal methods. The only difference is that the quantities of plutonium involved are greater in the plutonium-based breeder fuel cycle.

Do breeder reactors require an emergency core cooling system to protect against a loss-of-coolant accident?

Yes. It is entirely different from that used with water-cooled reactors. The sodium which is used does not operate at high pressure like water — it will not flash to vapor like steam. The gas-cooled fast breeder reactor (GCFR) like the high temperature, gas-cooled reactor (HTGR) can not suffer a complete loss-of-coolant accident, since at least air will always be present. Provisions are made to ensure that coolant circulation is always possible.

The difference between nuclear fission and nuclear fusion

Nuclear fission generates energy by establishing a chainreaction by splitting heavy atoms by striking them with neutrons. It produces radio-active waste.

Nuclear fusion generates energy by fusing together light atoms in contrast to fissioning heavy atoms. It produces little or no radio-active wastes.

When two nuclei combine or fuse large amounts of energy are released. In the main industrial countries work is in progress to tap this source of energy. If hydrogen can be harnessed as an energy source then limitless supplies of cheap energy are made available. The initial costs of this development are really tremendous.

There are three types of hydrogen atom — protium, deuterium and tritium.

There are two approaches to the problem of harnessing the energy released by the fusion of hydrogen atoms.

Magnetic fusion

At present more electricity is used than is generated. The gases can be heated to very high temperatures. The highest was 6,000,000,000 degrees C at Oak Ridge USA. At the temperatures necessary for fusion all known materials on earth fail — they vaporize. The superhot gases must be confined in some other way — magnetic fields are used.

Gases at high temperatures — 100 million degrees C become ionized — the electrons which normally orbit the nucleus of an atom leave the atom which then are electrically charged particles called IONS. The hot ionized gas is called a Plasma.

There are several designs of plasma containers.

1. Low density piasmas, which are used only to study the properties of plasmas.
2. Medium density plasmas and under this heading various efforts have been made to restrict plasmas.

The two best known machines and processes are "Stellarator" (Princeton University USA) and "Tokamak" (Kurchhatov Institute USSR). "Stellarator" was converted to "Tokamak" in the late 1960's.

The British have been researching the problem at Harwell and the name of the machine and process is "Zeta".

The emphasis in the last few years has been on Laser fusion, which avoids the problem of plasma containment. This method uses laser beams to ignite a pellet of frozen deuterium/tritium fuel in a liquid lithium blanket which then heats and is used to generate steam.

About 10% of the pellet vaporises prior to the strike by laser. On impact by the laser the pellet vaporises and begins to expand as plasma. Some deuterium and tritium ions fuse and temperature rises a few hundred degrees in a millionth of a second and expands. The expansion is absorbed by air bubbles. Twenty-five per cent of the energy released is as alpha-particles which create X-rays from the ions. These X-rays give up energy and some lithium vaporises. Vaporised lithium together with expanding plasma induce a blast wave.

In the deuterium/tritium cycle 80% of the energy is released as energetic neutrons. These by being absorbed by the liquid lithium shield can be used to heat water and produce steam.

The countries following this line of research are the USA, the USSR, West Germany, Britain and Japan.

By establishing the performance of the devices now being built and on what is already known it is generally believed that a break-even energy generation point will be reached under laboratory conditions in the next five to ten years. It is estimated from experience with fission reactors that it takes twenty to twenty-five years to develop from the first proof-of-principle demonstration to a competitive, engineered power plant. It is considered fairly safe to assume that the first electricity will be delivered from fusion plants at the turn of the century.

A step beyond using fusion to heat water, and not a great step beyond it, is the direct generation of electricity from plasma.

The fusion fuel supply is considered to be inexhaustible because one material is heavy hydrogen. One out of every 7,000 molecules of water is a heavy water molecule containing an atom of deuterium. The oceans contain a sufficient supply to last many millions of years without seriously reducing the supply.

Nuclear fusion would solve several most important problems. It would make possible the use of a fuel in limitless supply and which is available in its basic form at next to no cost. The development of plants to use this material will be much more costly than any sort of plant now in use for any purpose.

The development of this technology will make possible the distruction of radioactive wastes which are now a major problem.

Why develop breeder reactors when we can wait for fusion reactors?

Breeder-reactor based power plants are being developed and are expected to be in use in the 1980's. Fusion reactors are not likely to reach the same point before about 2,000 or later. Breeder reactors are needed to assure an economical nuclear-based power supply for perhaps the next sixty years.

What happened at Harrisburg?

On January 26th 1979 "The Union of Concerned Scientists" (The USA's foremost anti-nuclear group) called for an immediate shutdown of sixteen reactors which it claimed had known safety problems. Among the plants named was the "Three Mile Island" plant at Harrisburg.

On March 13th the United States Nuclear Regulatory Commission (a government body) ordered five nuclear plants to be shut down because of uncertainty over whether the plants could withstand earthquakes.

On March 28th 1979 a series of mechanical and human failures led to a release of low-level radiation into the atmosphere around the Three Mile Island plant.

What type of radiation was released from the Three Mile Island plant?

Reports are conflicting. The Nuclear Regulatory Commission says Iodine 131, Krypton 85 and Xenon 133 have been detected in steam that has escaped the plant. Officials at the plant recently were claiming that they had not measured Iodine 131.

Krypton and Xenon are gases that dissipate fairly quickly into the upper atmosphere, scientists say. They are not retained by the body, and they lose much of their radioactivity in a matter of days. There is, however, no way to prevent their penetration into the body, although staying indoors offers some protection.

Iodine 131 can settle to the ground in particles and be absorbed by grazing cows. It then can be passed through the food chain in milk. Iodine 131 can be particularly dangerous if absorbed by humans because it concentrates in the thyroid gland. There, a concentrated dose of radioactive iodine could create cysts that might be cancerous.

Ingestion of Iodine 131 can be controlled, however, by testing for it in milk, which both Pennsylvania and New Jersey are doing. None has been measured. Cows near the plant still are feeding mostly on the winter stock of hay, rather than on fresh grass. Since Iodine 131 loses most of its radioactivity in slightly more than a week, the threat is slight.

What would be the effect of a total core meltdown — the worst imaginable *catastrophe — on Northern New Jersey? (New Jersey is 100 miles from the accident site.)*

No one really knows. Among the unknown are how much radioactivity would be released and where it would go. The latter would depend a lot on whether the cloud of radiation is blown in this direction and whether it rains, in which case radioactive particles would be dumped on the ground.

Dr. Frank Von Hippel of the Centre for Environmental Studies in Princeton speculated that the radiation from a core meltdown wouldn't cause any immediate deaths in the area, but could lead to an increase in the cancer rate and contaminate some land.

How did the world react to Harrisburg?

The anti-nuclear lobby seized on the accident as proof positive that all nuclear reactors are unsafe and, therefore, should all be closed down.

Countries with nuclear power plants, the vast majority of them, did not see the wisdom of closing down nuclear power plants.

The nuclear accident at Harrisburg caused expressions of concern around the world. Energy officials in the Soviet Union and elsewhere let it be known that while increased precautions may be taken the nuclear power programme will go forward.

In an interview with the newspaper *Trud* Fyodor I. Ovchinnikov, the Deputy Minister of Electricity and Electrification, said that the possibility of a slip-shod attitude existed where private interests, in this case those of the owner of the nuclear energy station, were regarded as of paramount importance.

In Stockholm, The Atomic Energy Inspection Board announced that nuclear power plants would have to be rebuilt to avoid problems like those which occurred at Harrisburg. Their plants are similar to the plant at Harrisburg. The board said that Ringols 2 plant which was shut for repairs to a leaking cooling system, and Ringlols 3, a new reactor not yet in service, would get a system that would allow deflation of any hydrogen gas bubble.

In West Germany there was little official comment but its thirteen nuclear reactors are still in operation.

Energy sources — monopolies

In the USA the giant Oil Companies control most of the sources of energy. Most of the really powerful oil companies are based in the United States. They are already making provisions for the time when the oil runs out. The Rockefeller interest says: "The United States might run out of oil one day but there will always be an Exxon".

It is said that Exxon, Mobil and Gulf cannot acquire the sun but they have invested in the hardware and technology which some day will make sunshine a saleable commodity — through home heating units and small generating plants.

A large part of the raw material for all sorts of energy generating is controlled in the United States by a few giant Corporations. Twelve oil and gas companies control approximately 51% of US domestic uranium resources. Twenty-four oil and gas companies control approximately 44% of leased coal reserves in the US. Five oil and gas companies control approximately 62% of domestic uranium milling capacity.

In 1977 the US Federal Government gave the oil industry $211 million for research in non-oil fuel sources.

The following list of the top 20 holders of domestic uranium reserves in the USA shows oil companies marked with an X

Kerr-McGee X
Gulf Oil X
United Nuclear
Continental Oil X
Western Nuclear
Getty Oil X
Utah International X
Exxon X
Anaconda X
Philips Petroleum X
Rio Algon Mines
Reserve Oil and Minerals X
Union Pacific X
Sahio X
Union Carbine
Atlas
Socol X
Ranchers Exploration
Houston National Gas X
Federal Reserve

Top ten holders of domestic uranium milling capacity in USA

Kerr-McGee X
United Nuclear Corporation
Homestate Mining Corporation
Anaconda Company X
Utah International Inc. X
Exxon Nuclear Co. X
Union Carbine Corporation
Continental Oil Company — Pioneer X
Nuclar Inc. X
Atlas Corporation
Federal Reserves Corporation
American Nuclear Corporation

Top twenty holders of domestic coal reserves in USA

Continental Oil X
Burlington Northern
Union Pacific X

Peabody Coal
Exxon X
Amex X (25% Rockefeller owned)
North American Coal
Occidental Petroleum X
U.S. Steel
Kerr-McGee X
Gulf Oil X
Eastern Gas and Fuel Association X
Mobil Oil X
Pacific Power and Light
Sun Oil X
Arco X
Shell Oil X
Philips Petroleum X
Texaco X
Bethlehem Steel

These giant corporations also engage in all sorts of joint operations.

ALTERNATIVES?

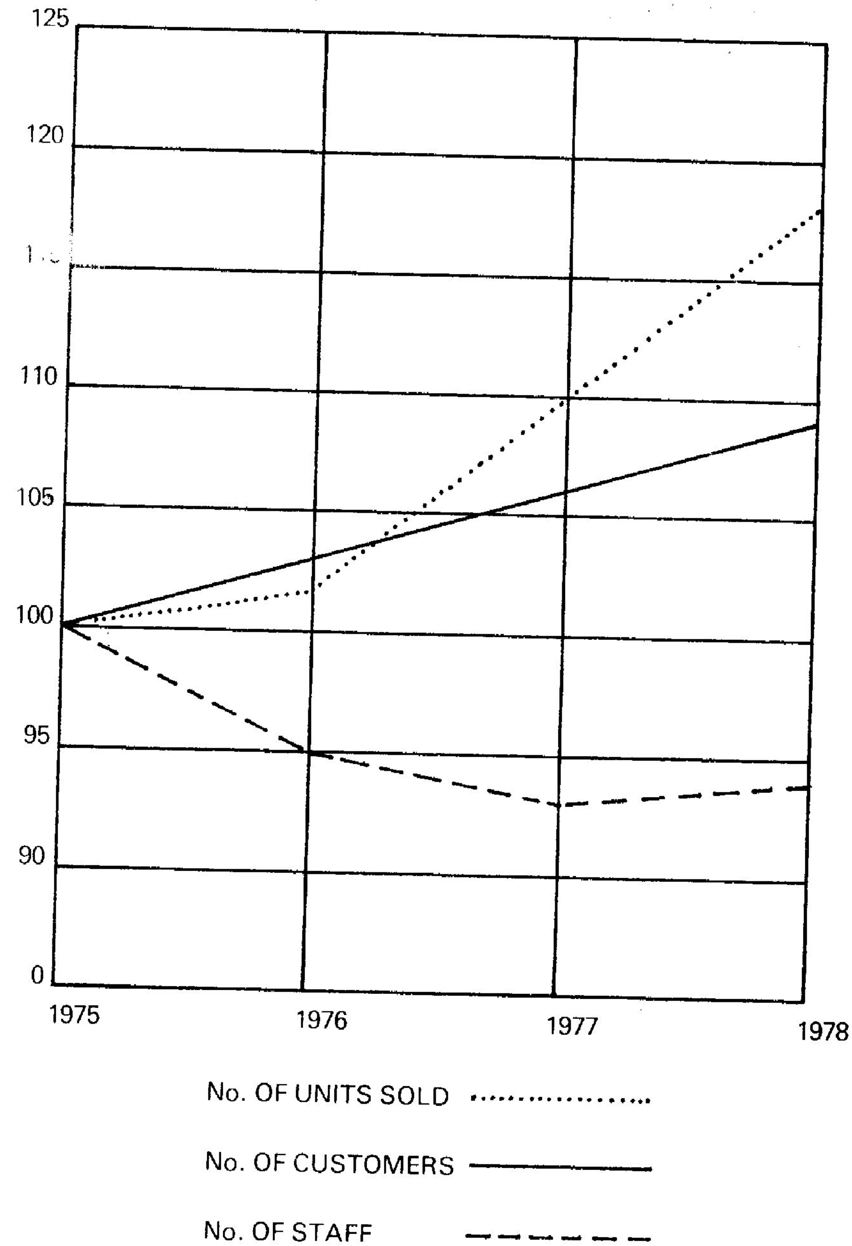
Wave, wind, tidal and solar electricity generation

The idea of generating electricity by means of wave or wind power or solar or tidal power is often said to be the answer to using nuclear power to generate electricity. It is an argument much used by a very large section of the anti-nuclear lobby. If it were possible, at the present time, to examine generating stations producing great amounts of energy by this means then it would be possible to make a decision on the basis of fact.

What the anti-nuclear lobby are asking countries with an urgent and vital need for supplies of cheap energy to do is take a theory on trust, to make an act of faith in the possibility of producing great quantities of electricity in this way. The biggest and most efficient windmill in the world is capable of producing only 2MW. The smallest electricity (ESB) generating station in Ireland — one at Leixlip for example — can produce 4MW. The total ESB capacity, from Hydro and steam, three years ago, was 2,540MW and a lot more electricity is needed if we are to develop much-needed heavy industry — oil refineries and smelters.

No wave or tidal power generating units exist anywhere in the world putting large amounts of electricity into a national grid. This technology does not give any sign of providing large amounts of vitally needed cheap electricity.

Windmill power was experimented with in the USA in the 1940's. For a time a 1250KW wind-powered generator was part of the Central Vermont Public Service Corporation system. This unit was disabled because of metal fatigue and never reactivated. A very large number of very small units putting small amounts of electricity into a national grid would be a very expensive way to provide the



The ESB's total installed capacity for generating electricity in March 1978 was 2,539.5 MW. This graph shows the pattern of ever increasing demand for electricity. If much needed heavy industrial development takes place then the demand for electricity will increase sharply.

electricity we need.

Variations on the windmill system are under experiment. One of the systems is called "Vortex Generators" and these can increase the velocity of wind seven or eight times. Extravagant claims are made for these machines but no large scale model has yet been constructed. It is claimed that the "Ducted Systems" can increase wind speed through a turbine by a factor of 1.5 compared to free-flow wind speed.

The electricity generating capacity of all these machines is given in KWs. It is important to note that 1,000 KWs equals 1 MW. The smallest ESB station has a capacity of 4 MW.

There is no evidence at present that our energy needs can be supplied by water, wave, tidal or solar power. Plant using these sources of energy are expensive to construct, are not nearly as reliable as conventional stations and produce small amounts of electricity.

What is this country going to do about energy?

Our electricity supply problem is in the hands of a State Company, the Electricity Supply Board. The ESB produces electricity by using hydro-power, turf, coal and residual fuel oil. There is no shortage of residual fuel oil in Ireland because we can import this oil from many countries and we do. Residual fuel oil travels well over long distances. In 1978 in addition to imports from Britain, our traditional supplier, we imported residual fuel oil from France, Belgium, Holland, Italy, USSR, Venezuala and other countries. Coal can also be imported from countries a long way from Ireland.

In the United States the "fuel for energy market" is more closely controlled by a few giant companies than shows by reading a list of companies showing a substantial degree of control. The corporation control is linked by joint ventures. Standard Oil (Exxon) and Mobil are working together on 62 joint ventures. Texaco and Standard Oil work together on 24 joint ventures. Texaco and Mobil on 31 joint ventures and so on. (See graph on facing page)

BUYING NUCLEAR POWER

If the government does intend to buy a nuclear station from the United States these are the people we would be forced to depend on for supplies of uranium. We all have reason to know what the giant oil corporations can do to continually increase prices while at the same time increasing their profits. Esso (Standard Oil-Exxon) also sharply increased the price of Naphtha — for the manufacture of town gas — as soon as Irish gas manufacturing plant was installed to use this fuel.

All sorts of outside influences have been blamed for increasing oil and oil product prices but it is very noticeable that the giant corporations also register a substantial increase in their profits every time the price of oil goes up. The attitude of the oil-coal-uranium corporations to price and supply can be judged from the fact that out of 24 petroleum companies with major coal reserves in the USA only eight have actually mined coal. They are sitting on their assets waiting for the price of coal to double before they commence mining.

President Carter's statement on the power of the oil lobby in the USA gives some idea of what they can do. He said: "It is impossible to be elected without oil lobby support and it is impossible to rule with it".

Nuclear power plants manufactured in the United States have a record of unreliability. The fact that they skimp on safety systems in order to increase profits is not just an opinion voiced in Socialist countries; it was also an opinion stated by Ralph Nader after the Harrisburg accident. He wanted tax-incentives which encouraged the firm Babcock and Wilcox to complete the Harrisburg plant in the

FREQUENCY OF JOINT VENTURES AMONG THE 20 LARGEST OIL COMPANIES

Ranking		Standard (Exxon)	Mobil	Texaco	Gulf	Royal Dutch Shell Group	Standard (Ind.)	Standard (Calif.)	Phillips	Continental	Sinclair	Cities Service	Sun Oil	Tidewater	Atlantic Refining	Pure	Signal	Union	Sohio	Marathon	Sunray DX
1.	Standard (Exxon)																				
2.	Mobil	62																			
3.	Texaco	24	31																		
4.	Gulf	0	11	14																	
5.	Royal Dutch Shell Group	59	51	37	19																
6.	Standard (Ind.)	12	10	15	8	16															
7.	Standard (Calif.)	21	21	50	8	22	2														
8.	Phillips	8	10	9	5	9	6	4													
9.	Continental	13	11	11	9	21	10	5	8												
10.	Sinclair	5	11	9	7	6	10	1	7	13											
11.	Cities Service	16	7	18	5	8	8	1	5	24	14										
12.	Sun Oil	2	6	5	5	4	6	0	4	5	3	5									
13.	Tidewater	11	6	8	5	7	5	4	3	4	4	12	6								
14.	Atlantic Refining	9	8	10	6	8	9	5	13	8	7	8	11	7							
15.	Pure	2	3	7	7	4	7	1	2	5	10	8	8	1	3						
16.	Signal	3	6	5	2	5	1	7	9	2	1	1	0	2	4	2					
17.	Union	4	3	5	5	8	5	5	4	8	8	5	5	6	8	3	2				
18.	Sohio	2	4	1	3	2	2	1	1	0	2	3	4	2	2	5	2	1			
19.	Marathon	9	8	6	2	7	5	1	2	19	6	6	2	3	7	7	2	6	1		
20.	Sunray DX	4	7	6	5	1	5	4	24	10	2	9	3	9	1	1	7	4	1	3	

Source: U.S. Senate Commerce Committee Energy Act of 1974

shortest possible time to be investigated to see what bearing they have on the history of difficulties at that particular plant.

CONCLUSION

Sinn Féin The Workers' Party calls for a comprehensive enquiry into what is obviously a very complex question. We call for the provision of energy supplies to be a priority for that enquiry and for its consideration to be based on a realistic examination of the various sources and options available to us. In particular, we call for an enquiry based on rational assessments and not on emotional and scare-mongering lobbying.

The population of Ireland is increasing and that means that if people are to continue to live in the country that they were born in, industries must be developed to provide employment. Modern industry needs plentiful supplies of cheap electricity.

A serious consideration of the problems of using nuclear power would put a big safety question mark against purchasing a nuclear power station from the United

States at this stage of the development of nuclear power in that country; the private enterprise approach to nuclear power is obviously not making sufficient safety provisions.

Nuclear power stations built in socialist countries are more advanced on safety because dual safety controls are fitted. This may mean that they are more costly to build and therefore will not compare favourably with the cost of stations run on conventional fuel.

Breeder reactors are more safe but they will not be on the market for perhaps another ten years.

Power stations based on the fusion principle do not yet exist but their commercial development is only a matter of time. The successful development of this process opens the way to limitless supplies of energy and is the only sensible way to solve the energy question in the long term.

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