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THE 1989 HOPKINS LECTURE

UNIVERSITY OF CANTERBURY
Department of Civil Engineering

"TIME FOR A RE-THINK"
"The Case for Nuclear Energy"

by

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Christchurch Town Hall
8pm - Wednesday the 12th July, 1989

(Embargoed until delivery)

The Hopkins Lecture

The Hopkins Lecture is delivered annually to commemorate Professor H.J. Hopkins who retired in 1978 after 27 years as Head of the Department of Civil Engineering at Canterbury University.

Currently in New Zealand there is a widespread prejudice against nuclear energy. I believe it is important that we change this attitude and join the 20th Century.

The principal reason I call for this is that the prevailing attitude is measurably wrong. It is also a national embarrassment with its foundation of prejudice and ignorance, but there are other reasons of an economic and environmental nature and I shall deal with those later.

But firstly, let us examine just how this sentiment, founded in ignorance, arose in a nation which in every other respect is a sophisticated and advanced society.

ORIGINS

The origins for the anti-nuclear prejudice, now enshrined in law, go back to the 1984 election. Four principal parties contested that election which it will be recalled, was a more than usually contentious one eliciting widespread debate about many issues; as indeed is so often the case with elections when a Government goes out of office and a new one comes in.

An unusual election feature was that one of those issues was defence; that is whether it was necessary, whether our involvement in military pacts was desirable and arising from all of this, the clamour for a nuclear free South Pacific which ultimately spread to a general all embracing antipathy to things nuclear.

The New Zealand Party which I led, played a major role in instigating that debate.

Our general proposition was that we wasted valuable resources on a total anachronism in the form of defence. Such was the favourable public reaction to this advocacy that the Labour Party was obliged to enter the debate and they did so by pushing the anti-nuclear weapons and nuclear-free Pacific proposals. These proposals had been Party policy but were not of any moment and may indeed never have got the airing they did had the NZ Party not thrown so much focus on defence issues.

Yet the underlying reason that the NZP opted to promote this line stemmed from the fact we were not in any practical sense seeking office, as clearly that was politically improbable.

Rather we were seeking radical change in a whole host of economic and social areas. But to achieve that we needed to make the public grab at hitherto accepted attitudes and see how easy they could be changed simply by thinking radically yet rationally.

For example it was the New Zealand Party which was the original proponent of a floating exchange rate. Time and again people said they liked the idea but how on earth could the change be enacted? In fact it is the easiest thing in the world as was subsequently seen. One simply declares that henceforth we have a floating exchange rate and that is it, as indeed events were to prove. Yet we were unable to persuade people that the many reforms we were advocating, such as this, now all carried out by the current Government, were indeed achievable.

So we sought an issue that people could judge without specialist knowledge and in which we could propose a radical new approach, so as to accommodate their thinking not to be afraid of change.

Defence was perfect, thus our emphasis on it.

In itself it was of no great budgetary significance but it was chosen as the best possible vehicle to achieve such a radical re-thinking revolution, which re-thinking undoubtedly subsequently occurred, notably in its economic form via what was to be known as Rogernomics.

But with the benefit of hindsight it is supremely ironic that the consequence should be the warm, fuzzy and totally irrational attitude to nuclear energy that now exists in New Zealand. In short two revolutions in New Zealanders thinking occurred, one a giant step forward, that being on the economic front, and the other a giant step backwards in regard to nuclear energy, albeit that this latter issue is of symbolic rather than practical application in respect of New Zealand.

At the time it was widely claimed that the then three Opposition Parties, that is Labour, The NZP and Social Credit, were all of an accord in being for a nuclear free Pacific. In vain the New Zealand Party repeated itself that this was not its position.

We were never anti-nuclear.

On the defence issue, which spawned the whole ignorant anti-nuclear fiasco which now exists, our position was that we were against all weapons. To isolate nuclear weapons implied that there were good and bad weapons which seemed to us to be childish.

Killing people quickly with nuclear weapons or slowly by traditional means was still killing people and it was that we were against.

Nevertheless, Labour duly won and put in place appropriate legislation which in its consequences, notably with the ANZUS collapse, ensured the nuclear debate remained to the fore-front thereafter, although as confused as ever.

The result has been a disaster insofar as it has led to a wide-spread Ludditist attitude in New Zealand towards nuclear energy.

It is important that attitude is changed.

It is important that the issue be re-examined on more sensible grounds in which vague sentiments are set aside and instead the evidence is studied.

By all means prohibit warship visits, nuclear powered or otherwise but best of all start by prohibiting our own which in my view are totally unnecessary.

How curious it is that the consequences of all this should be the absurd purchasing of un-needed and redundant frigates.

Because of our abundance of alternative energy resources New Zealand can afford the luxury of its anti-nuclear sentiment as unlike most other developed nations it has no current need to use this energy source.

But that may not always be the case.

The time could arise when possibly we shall. Contrary to popular current belief in our country, the evidence is increasingly pointing to nuclear sourced energy as the most environmentally clean source of bulk energy for the future.

Additionally, with the massive amount of research being applied to nuclear technology the probability is that in the not too distant future it will be the cheapest energy source.

These then are some of the issues I wish to expand on tonight.

But before doing so there is one further matter I wish to touch on and that is the cowardly silence by so many New Zealanders on this subject over the past five years. I refer not just to our scientists and our intellectuals and many other informed people but all college science teachers and every university science student were fully aware of the unmitigated nonsense that was being talked on the subject, yet they kept their heads down and said nothing.

So often many have expressed in private to me, their embarrassment over the whole issue, yet by their reticence they have been party to a conspiracy of silence and the tolerance of ignorance. In behaving this way they abdicated their intellectual responsibility to speak the truth, moreso in the face of so much nonsense being poured out on the issue.

The Current Nuclear Energy Position

The developed world, notably North America and Europe including Eastern Europe, now derive a large part of their electrical energy supply from nuclear power.

Only after Chernobyl did they hesitate and question whether the technology was adequate for such dependency but as we know, these doubts were short-lived when the unexpected threat of the Greenhouse effect emerged, which of course is a direct consequence of the use of traditional fossil fuels, previously considered to be, relatively speaking, environmentally correct.

This in turn has caused a fresh look at other previously deemed environmentally "acceptable" energy sources such as for example hydro-electric power derived from large-scale dams.

Already the evidence is mounting of unanticipated environmental concerns from this means. By way of example the giant Aswan dam in North Africa is throwing up some serious adverse environmental by-products.

The world's largest nation, the Soviet Union, has for many years been planning the greatest engineering feat in history. I refer to the proposed re-direction of the extensive Siberian and Eastern Russian river network, currently flowing northwards into the Arctic circle, but which it was intended to reverse so as to flow down into the Southern republics for irrigation purposes.

It would seem unlikely that this project, at least in its original dimension, will now proceed, such is the concern by the Soviet environmental lobby, based on an increasing mountain of evidence, about the probable detrimental environmental consequences of such an action.

As a result and despite the Chernobyl disaster, the Soviet Union, led by their environmentalists, is re-focusing its future planning on nuclear power development.

Chernobyl arose of course through human error. That ought to give comfort rather than alarm for human error potential can be reduced and eliminated. Additionally the Soviet Union nuclear technology and particularly the Chernobyl plant, is or was, not up to the design standards of the West, primarily for cost reasons. Certainly the Soviet Union through information exchange programmes has equivalent knowledge to that of the West and wilfully took an unnecessary risk.

The Soviet Union does not subscribe to the International Atomic Energy Agency unlike all Western nuclear power users. This Agency sets extremely demanding safety standards but with the scare of Chernobyl it appears the Soviet Union has now taken a more enlightened approach and is decommissioning old outmoded plants and setting new standards. In short we are not dealing with the unknown as some anti-nuclear proponents would have it. But we most certainly are in terms of the consequences of a continuing reliance on fossil fuels although in that case the "unknown" is one of scale; that is just how devastating the consequences might be if we do not reduce and eventually eliminate fossil fuel usage.

The Greenhouse effect has certainly made Governments re-think any concern they may have harboured about nuclear unknowns.

Recently Australia's Prime Minister Bob Hawke called for a nuclear energy re-think. You will perhaps be aware that there is a strong Australian Labour Party anti-uranium mining faction which has caused an on-going debate across the Tasman on nuclear issues.

Hawke said, "Opponents of nuclear energy must reconsider their prejudices in the light of the threat to the world posed by the Greenhouse phenomenon.

We are facing a situation where the whole pattern of life and industry, of nations and people, may be totally changed within our life-time."

And even in that hot-house of rancorous debate, the Australian parliament, the Opposition indicated its support for the Prime Minister's views although predictably the anti-nuclear lobby condemned the P.M. as being financially motivated vis-a-vis uranium mining.

Two months ago in Great Britain following a special seminar held in the office of the Prime Minister, Margaret Thatcher, comprising thirty top scientists and six Cabinet Ministers, an official declaration resulted in which a programme was announced for the gradual substitution of fossil fuel usage by nuclear energy. Previously there was a policy in place which had as a general objective that nuclear energy should cap at 20% of Britain's electricity sources. Environmental concerns only has made that policy redundant.

As a matter of interest nuclear sourced energy was first fed into Britain's national grid over 30 years ago.

The O.E.C.D. has an agency arm known as the Nuclear Energy Agency.

A report from it published two weeks ago predicted that nuclear generated electrical energy will peak next year in O.E.C.D. nations, to provide 23.8% of total electricity consumption. Currently it is 23.5%.

But remember that non-nuclear nations such as New Zealand, Australia and Turkey to name but three, are O.E.C.D. countries thus the individual nuclear power using nations are currently using this source to varying but in many cases very much higher degrees than a quarter of their supply.

All in there are at present 320 nuclear power stations in the O.E.C.D. and currently a further 50 reactors under construction, 4 about to commence construction and 17 in advanced planning stages. In total there are in the order of 700 world-wide in approximately 30 countries.

Some nations and notably France are almost entirely dependent on nuclear energy as their primary source of electrical energy and as a matter of interest, far from causing any fear among the populace, French towns and cities clamour to be the location for new nuclear plants for exactly the same economic reasons as they do in New Zealand for any new industry.

TIME FOR A RE-THINK

As I have said, New Zealand has no immediate need to consider using nuclear energy. But the time may well arise

more quickly than generally believed when we might have to. In such an event, facing the change will cause real problems if the present immature and unsophisticated prejudice is allowed to continue as the prevailing attitude to the major accomplishment of mankind's technical development.

Despite Chernobyl and Three Mile Island, the latter incidentally which caused no loss of life, the safety record of the nuclear power industry is extremely good.

The attacks on nuclear power have stemmed from fears and anxieties based on what might occur rather than what actually has occurred.

Thus the nuclear debate differs from other environmental debates relating to pollution, whether of our waters, air, forests, animal species or whatever insofar as environmental lobby agitation pertaining to those is substantially based on hard cause and effect evidence and not vague fears.

The fact of the matter is that the globe faces its greatest ever man-made threat through the use of previously acceptable, traditional fossil fuels.

And when it comes to human lives the toll is quite horrendous from these traditional energy sources.

Detailed studies by the American Brookhaven National Laboratory show, that even with current State demanded pollution controls in place, emissions from coal-fired electrical stations are causing 37,000 deaths annually in the U.S.A.

Chernobyl is believed to have cost between 60 and 150 lives with the probability of some hundreds more being shortened while as already advised, Three Mile Island cost none.

The irony of that is that even though Unit One of Three Mile Island was undamaged and operable, local clamour insisted on Three Mile Island being permanently closed and replaced by a traditional coal-fired station, which to date has cost 250 lives based on the Brookhaven data.

What is embarrassing is the Ludditist aspect of it all, for while there are anti-nuclear proponents in every country, only in ours are they treated seriously to the extent of gaining the backing of law and the population at large, carried along by a sense of unease at the clamour.

The situation here is paralleled historically by the fears for safety which accompanied the arrival of the first internal combustion motor vehicles.

I imagine you are acquainted with what occurred.

Initially each vehicle was obliged to be preceded by a man walking in front carrying a white warning flag.

Subsequently when it was seen that this was perhaps an over-reaction, this requirement was abandoned but vehicles were confined to 12 m.p.h.

There was a great clamour to ban such self-propelling vehicles from London on the grounds of the number of people that might be killed.

Well we got over all of that, although for the record, at no stage since has the road toll in London ever matched the average number of annual deaths caused to pedestrians who were knocked over by horse-drawn carriages in the latter decades of the 19th Century.

In this country today, more people die every month through motor accidents, than have been killed throughout history by mishap with peaceful nuclear power usage.

Indeed much of the debate here in New Zealand is so confused through its mixing of military and peaceful uses of nuclear energy that an outsider would be astonished to think that we are a relatively advanced and developed society. In short New Zealand is the odd man out in the world community through adopting a posture analogous to that of the man walking in front with the white flag.

It is time the nonsense stopped.

Nuclear research and energy production has brought great benefits to society.

The contribution of radiation to medical science and to industry has been enormous.

Nuclear power is now measurably the most environmentally pure of the principal electrical energy sources and is on the verge of becoming the most economic, not simply in its net cost but additionally through its low man-power input.

One of our greatest ever citizens, Rutherford, our only ever Nobel Prize winner, earned his fame for his pioneering work in a dimension of this field.

Additionally there is a phenomenal amount of research going on world-wide advancing nuclear energy technology and knowledge towards the end of lowering costs and increasing the already high safety standards.

All of that is not to say that there are not concerns, particularly of mishap arising from human error and also radiation waste disposal, but continuing research is constantly reducing these risks.

One of the most exciting research activities of all is that in respect of nuclear fusion.

You will recall the world all but stopped in its tracks earlier this year when two scientists, an Englishman and an American, working in conjunction, claimed to have made the fusion break-through.

Current thinking is that they jumped the gun although whether that is the case is still unresolved.

But the fact is that nuclear fusion, which is being tackled across the globe, but most notably in Britain, the U.S.A., Japan, the Soviet Union and a number of Western European countries, is the most promising long term prospect for the material enhancement of the human condition ever known. Eventually we will probably get there and the mind boggles at the implications. Fusion overcomes the exaggerated concerns of the anti-nuclear faction but additionally has other features as well.

It is totally environmentally clean, totally safe insofar as there can be no domino effect chain reaction and most of all it uses extremely cheap and virtually inexhaustible fuel.

At this juncture it is admittedly only at the conceptual and experimental stage, presumably just as once was the wheel, the plow, the steam engine, the jet engine, etc.

In some respects the NZ Herald newspaper summed it all up with a feature article in May headed "There could be a 'Free lunch' with the use of fusion power".

That heading indeed captures its implications for to date the maxim that there is no such thing as a free lunch lies at the root of all human activities.

To summarise therefore, it is time for New Zealand to re-think its current anti-nuclear sentiment.

The "anti" argument has not been intelligently conducted nor could it be sustained if it was.

There is no future for a society that adopts a posture on any issue that is founded in wilful ignorance.

If it can be achieved with one issue then public debate in other important areas faces the danger of being concluded on wrong premises.

Nuclear power is the greatest tribute of all to man's ingenuity. It is an indictment on our country that we fail to recognize that and hide our heads in the sand in a deliberate medieval ignorance.

It is long overdue for our academics, engineers and scientists to enter the debate and put an end to the silliness currently prevailing by tolerating the myth that the anti-faction occupy the moral high ground. They do not. Morality is obeying the dictates of one's conscience which demands of our tens of thousands of scientists, engineers, academics and teachers that they speak up and end the mumbo jumbo.

Nuclear energy is the future. The day will come when we will seek to embrace that source for New Zealand.

Finally let me say that the debate albeit foolish, has not all been in vain.

If the absurd belief that nuclear powered ships or indeed nuclear armed ships, can somehow blow up while anchored in our ports, when the reality is that we face a much greater danger from the possibility of dams collapsing through earthquakes and the probability of our motor vehicle usage destroying the environment, well at least it got us out of ANZUS and that has to be a step in the right direction.