"Peaceful uses": New Zealand atomic architecture

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ABSTRACT: Prior to the 1968 National power plan, which identified the need for nuclear power in New Zealand, the New Zealand government entertained serious proposals for nuclear power generation. Peaceful uses of atomic energy were seen as the answer to post-war power shortages. This paper will examine the context and the architecture which promoted the building of atomic and nuclear power plants in New Zealand during the 1950s, including the international models considered, and the "proposed atomic power plant for Auckland."

> A new source of power to light the homes of the people and turn the wheels of industry; an order to build a ship that will cross the seas without coal or oil fuel. This atomic age is indeed beginning to show signs of an assured future.
> *The Dominion*, 17 October 1956.[1]

Introduction: electric consumption

The story of atomic architecture in New Zealand is one of war, an electrically-exhausting lifestyle, and the perennially ambiguous, if not difficult, relationships between architects, engineering and science. The war had interrupted the increasing uptake of electricity in the home, at work, and in the street, extending the day, as well as expectations of a way of living. As Leach remarks:

> As conditions became more favourable, the load on power supply increased, until, by the outbreak of World War Two in 1939, the demand for electricity from domestic and industrial consumers exceeded the Government's ability to supply. Power cuts ensued.[2]

Yet by 1940 the Department of Internal Affairs had observed that the "all-electric house" was "the present demand of most New Zealand women."[3] Leach also refers to the use of electricity at the New Zealand Centennial Exhibition in Wellington (1939-40) to emphasise "the Dominion's modernisation and industrialisation. ... By night, one could be awed by the lighting display flooding Edmund Anscombe's Centennial Tower."[4] The cessation of war was consequently accompanied with the increasing number, size, and use of appliances,[5] twinned with an increasing population of electricity consumers due to the baby boom and immigration. Consequently, New Zealand veraciously consumed both electric goods and the electricity they expended. Every aspect of society became enchanted with electricity. Every aspect of domestic life was electrified: cooking, cleaning, entertainment, food storage, lawn mowing, laundering, waking up, bodily hygiene, hair drying, and home heating.[6]

Previously luxury items, washing machines and refrigerators became ordinary and included in mortgages when houses were purchased.[7] In 1956 just under 60 percent of houses had electric washing machines which increased to 88 percent ten years later.[8] 54 percent of houses had refrigerators by the late

[1] Priestley *Mad on Radium* p 155.

[2] Leach "Power Architecture" p 34.

[3] Department of Internation Affairs quoted, Leach "Power Architecture" pp 28-29.

[4] Leach "Power Architecture" p 29.

[5] Labrum *Real Modern* pp 28-29.

[6] Labrum *Real Modern* pp 23, 30 [caption], 31 [caption], 56.

[7] Labrum *Real Modern* p 67.

[8] Labrum *Real Modern* p 69.

1950s.[9] Not only was there a greater number of electric appliances, but, the comparative ease of housekeeping encouraged greater frequency of use. For example, "women who owned electric washing machines found they simply washed more often."[10] As Perrin notes, radio purchases quadrupled from 1952 to 1960, cooking methods, such as deep-fried frozen food, especially potatoes, also increased electricity use.[11]

More houses had hot-water.[12] Refrigerators, which automatically defrosted, replaced domestic food safes.[13] Wet-back stoves became redundant with hot-water cupboards, and coal ranges were increasingly replaced by electric stoves.[14] Bench tops in kitchens became larger in order to accommodate new electric appliances, which, by the early 1960s, included: electric frypans, pop-up toasters, juice extractors, sandwich toasters, waffle irons, and electric carving knives.[15] Post WWII life-style also had consequences for electricity consumption. The pre-war and wartime practice of weekly baths, for example, increased to a daily frequency post war.[16]

Simultaneously there was a reverence, at least officially, for the proper use of electricity. Leach records that the:

> Officers of the AEPB were empowered, even as late as 1952, to enter the homes of electricity "wasters" to disconnect appliances. The misuse of electricity was taken seriously in this time of shortage. This was not only because of the potential damage to industry (cutting off the factories' life-blood, electricity), but because it represented a retrogression in civilisation, a demodernisation process, an admission that the New Zealand Government and the New Zealand people had overstepped themselves.[17]

Import restrictions meant that New Zealand industry produced many of these electric goods, particularly at the beginning and end of the decade. Fisher & Paykel, for example, struggled to fill orders of washing machines, refrigerators and vacuum cleaners until import controls relaxed in 1953.[18] But these controls were re-introduced five years later, in 1958, for electric ranges, washing machines and vacuum cleaners.[19] By 1965, "ownership of electrical household goods in New Zealand was at one of the highest levels in the world."[20]

Electricity was hence a precious sign of progress; one which Leach has stated "became a *condition* of modernisation for both industrial and emerging nations."[21] In this way it was apparently both distinct from architectural modernism, but also inherent to it. Eggener has argued that modern materials and construction techniques, rather than a functionalist aesthetic, were key to an American modernity.[22] This was because:

> Architects in the United States ... were expected to offer up a measure of continuity and stability in a country where change was a pervasive fact of daily life. European avant-gardistes may have extolled machines in obscure manifestos, but Americans mass-produced and mass-consumed them. So the new architecture did not need to look entirely modern to be modern. It was modern ... by being ... "... the architecture which attempts to solve the problems resulting from modern social conditions, by modern methods of construction, and

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9 Labrum *Real Modern* p 31.
10 Labrum *Real Modern* p 69.
11 Perrin *Dining Out* pp 124, 148.
12 Labrum *Real Modern* p 70.
13 Labrum *Real Modern* p 31; Ministry of Culture and Heritage quoted, Labrum *Real Modern* p 31.
14 Labrum *Real Modern* pp 29, 31.
15 Labrum *Real Modern* pp 29, 31.
16 Labrum *Real Modern* p 73.
17 Leach "Power Architecture" pp 34-35.
18 Labrum *Real Modern* p 67.
19 Labrum *Real Modern* p 31.
20 Labrum *Real Modern* p 67.
21 Leach "Power Architecture" p iii [abstract]
22 Eggener "Nationalism, International and the "Naturalisation" of Modern Architecture in the United States, 1925-1940" p 246.

using materials and resources we can now command."[23]

Similarly, Leach connects New Zealand to American and Canadian generation of national pride through explicit practices that understood modernity as technological, rather than visibly architectural, progress, and converted:

natural resources into powerful capital tools. For all three countries, national pride was generated, not from a depth of history as in old-world culture, but from an embrace of modernity and its characteristics. ... Through the process of modernisation - and the widespread control of natural resources fell firmly within that process - New Zealanders could emulate the progress of the "New World" as a forward moving element of the "Old Order" Empire.[24]

He argues that, for New Zealand, "electricity is inextricable from the process of modernisation explored in the twentieth century."[25] This occurred through its impact on domestic and urban life, but also in the control of the landscape in the production and distribution of electricity, through, for example, the damming of a powerful river to produce electricity, or the visible march of electric transmission lines through the landscape "forcing a literal connection between landscape and the city."[26] While Leach does not comment on atomic power in this regard, if the control of rivers demonstrated national power and modernity, the harnessing of the atom, with a New Zealander having led international science in this field, must have been an even greater symbol of national modernity. He does however observe that: "despite the growing strength of the European nations, by ... [the end of WWI] only the United States and Canada exceeded New Zealand's distribution of power to homes."[27] He also locates architecture, specifically that of the hydro station, as a key articulation of the nationalistic project of harnessing nature to produce electricity.

In a different architectural sphere, the shift to electric appliances meant that domestic interiors appeared clean, white and spacious, now absent of the gas lighting which required dark papers to disguise increasingly smoke-stained walls. Gas and coal had also encouraged separate rooms; [as] gas emitted odours and burned oxygen to the point where families had to air out rooms regularly. The "spring cleaning" ritual had started here, with the systematic cleansing, room by room, of soot built up from a winter's heating and cooking.[28]

Leach quotes Nye who argues that the adoption of electricity:

"encouraged more open floor plans, the elimination of doors, and a more fluid treatment of all the living areas. Electric lighting also made it far easier to abandon the characteristic Victorian colour schemes of dark reds, greens, and browns that once had hidden the soot from gas burners. A house with electricity could adopt lighter colours for walls and ceilings, making it much brighter than before. Electricity was also much more flexible as a lighting source, compared to gas. A gas burner could not be placed anywhere in a room, while an electric light could, making it easier to move furniture into new arrangements."[29]

The invention of the corridor, which Robin Evans observes effectively removed the presence of servants from living rooms,[30] was now eclipsed with the servantless house (due to electric appliances), and open planning (due to the clean power of electric light and

[23] Eggener "Nationalism, International and the "Naturalisation" of Modern Architecture in the United States, 1925-1940" p 247.
[24] Leach "Power Architecture" p 8.
[25] Leach "Power Architecture" p 10.

[26] Leach "Power Architecture" pp 12-13.
[27] Leach "Power Architecture" pp 26-27.

[28] Leach "Power Architecture" p 18.
[29] Nye quoted, Leach "Power Architecture" pp 18-19.
[30] "According to him [Roger Pratt], the passage was for servants: to keep them out of each other's way and, more important still, to keep them out of the way of gentlemen and ladies" Evans *Translations* p 71.

heating). These technologies were supported by, or enabled, the informality advocated by modernists, who sought open planning and, as seen in Treadwell's 1957 Blumhardt house in Wellington, complemented it with spatial amplifications of electric sound and heating. In the Blumhardt house:

> the top floor [was] one continuous open space divided only by a free-standing partial-height storage cupboard, set with a distinctive mono speaker. ... The living room was warmed by a space heater prominently displayed and proudly mechanical.[31]

The inevitability of nuclear power

More than most countries, New Zealand was in a unique position in relation to scientific expertise and motivation for nuclear power. Ernest Rutherford's role in spitting the atom in 1917, and his identification as the founder of nuclear science, provided credibility and opportunities for New Zealand in the field, even if indirectly. Rutherford's former student Ernest Marsden came to New Zealand, on Rutherford's recommendation, to head the DSIR (Department of Scientific and Industrial Research).[32] His reputation, due to his work with Rutherford, meant that during WWII New Zealand scientists worked on the Manhattan Project in America, and, more importantly, they had significant roles in "the Canada-based British-led project ... [which developed] the first nuclear reactors in Canada and subsequently in the United Kingdom," including ZEEP (zero-energy experimental pile) in September 1945, the NRX (National Research eXperimental) reactor in July 1947, and GLEEP (graphite low-energy experimental pile) in August 1947.[33] New Zealander Charles Watson-Munroe, for example, was considered to be "one of the world's experts on construction of nuclear piles" following his work on GLEEP and ZEEP.[34] Consequently, Marsden and Watson-Munroe were keen advocates for "a low-energy atomic pile in New Zealand" to produce radioisotopes "for industrial and agricultural research; and to serve as the nucleus of an atomic research project."[35] However by the end of the 1940s Marsden was posted overseas, the Minister of Scientific and Industrial Research preferred that New Zealand nuclear scientists were trained offshore, and the focus of DSIR nuclear research had shifted to measuring radioactivity and experimenting with carbon dating.[36]

As noted above, by the early 1950s New Zealand was suffered from an under supply of electricity. In 1955, DSIR physicist Tony McWilliams observed that we were ""probably the only country in the world with a relatively high standard of living which has a continuing and serious power shortage.""[37] Options for supply included nuclear power and a Cook Strait cable, to bring South Island generated power to the North Island.[38] Priestley identifies the stated advantages of nuclear as: reliability (over weather-dependent hydroelectricity), flexibility (regarding siting), and anticipated cheapness of supply,[39] and it was assumed by many that the future would see nuclear power stations being built in New Zealand. Auckland University College physics senior lecturer, Francis Farley, for example, predicted, based on contemporary electricity demands, that "we might expect to have 10 nuclear power stations by 1975 to 1980."[40]

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[31] lloyd-Jenkins *At Home* pp 126-127.
[32] Priestley *Mad on Radium* pp 32-33.
[33] Priestley *Mad on Radium* pp 36, 56, 57.
[34] Priestley *Mad on Radium* p 58.
[35] Priestley *Mad on Radium* p 59.
[36] Priestley *Mad on Radium* pp 62, 63.
[37] McWilliams quoted, Priestley *Mad on Radium* p 187.
[38] Priestley *Mad on Radium* p 188.
[39] Priestley *Mad on Radium* p 188.
[40] Priestley *Mad on Radium* p 188.

The confinement of the growing opposition to atomic bombs at this time, following the commencement of nuclear testing in Australia and the Pacific, is important, as during the 1950s America launched the "Atoms for Peace" programme, and began to initiate a series of bilateral agreements encouraging non-nuclear countries to build research reactors.[41] While the programme was explicitly promoted in terms of peaceful uses of atomic energy, the agreements sought to "promote the United States' own atomic energy interests, and any nuclear materials provided by them to another country ... [was required to] be returned for reprocessing in the United States."[42] American advances to New Zealand for a bilateral agreement were cautiously received, with the "representatives of the government's scientific and engineering agencies ... mindful of the hidden costs of the United States's offers."[43] Arthur Davenport, Secretary of the State Hydro-electric Department, opposed any bilateral agreement that required the construction of a research reactor.[44] Bill Hamilton was likewise hesitant, concerned about the consequences of any bilateral agreement with scientific relationships with Britain.[45] Sidney Holland's National government's reduction of funding for the DSIR had resulted in the scientists with nuclear experience leaving New Zealand, and the DSIR opposed to any agreement because of the ""high capital cost involved and the cost of maintenance [which] would be out of all proportion to the benefits"."[46]

Hamilton considered that if the Cook Strait cable was feasible, New Zealand "would have no need for nuclear power for 30 to 40 years,"[47] and he drafted a policy statement indicating that there was no intention to establish a research reactor in the short term. This contradicted Cabinet's interest in the US agreement, and Cotton rewrote Hamilton's report, resulting in the Permanent Heads Committee on Atomic Energy, a committee that Hamilton chaired, recommending conclusion of the bilateral agreement asap, the establishment of an institute of nuclear sciences, and a research reactor to be in operation in three years time, at the end of the decade.[48] The agreement (which allowed for the exchange of information regarding the design, construction and operation of research reactors, and the lease of up to 6 kilograms of enriched uranium for use as reactor fuel"), was signed on 13 June 1956.[49] New Zealand was well on its way to participate in the American-led programme of atomic energy.

Designing an atomic power station

In New Zealand architects had access, through architectural journals, to professional articles on atomic architecture.[50] Such titles included *The Architect's Journal* (UK), *Architectural Forum* (US), *Architectural Record* (US), *Progressive Architecture* (US), and *Architect and Building News*, and they described a world of new materials as well as the components of a nuclear power station and an architect's role in their design.

The articles in the mid-1950s from *Architectural Forum* and *Architectural Record*

[41] Richards "Protecting the environment" pp. 301 [abstract], 305; Priestley *Mad on Radium* p 155.
[42] Priestley *Mad on Radium* p 160.
[43] Priestley *Mad on Radium* p 162.
[44] Priestley *Mad on Radium* p 162.
[45] Priestley *Mad on Radium* p 162.
[46] Priestley *Mad on Radium* pp 157, 162-163.
[47] Priestley *Mad on Radium* p 167.
[48] Priestley *Mad on Radium* pp 167-168.
[49] Priestley *Mad on Radium* p 169.
[50] For example, during interviews Bill Alington, Bill Toomath and Jim Beard identified *Architectural Forum*, *Architectural Record*, *Architects' Journal* and *Progressive Architecture* (originally *Pencil Points*) as some of "the key sources for the dissemination of Modernist theory." Dudding "Memory, evidence, and artifice" pp 39-40.

are speculative. The September 1954 issue of *Architectural Forum* proclaimed that "atomic power is on the verge of transforming the art of peaceful construction as decisively as it has transformed war."[51] Its interest was in potential new materials resulting from irradiation, which it described in terms of alchemy, through the tightening up of the molecular structure[52]:

> massive doses of gamma radiation have been harnessed to make an ordinarily soft sheet of plastic stronger than the same thickness of today's structural steel. ... It can also be made transparent, translucent or opaque at will. It is said to be so hard that it will probably have to be formed before irradiation.[53]

Burchard's 1954 "Architecture in the Atomic Age" variously speculated on the potential of new materials and associated new plastic forms, the potential of cleaner industry due to abundant electricity, and new places of habitation through climate-control and increased speed of transport.[54] Yet he concludes that rather than nuclear power, solar energy might be "the way [for the West] to save the rest of the world and, in saving the rest of the world, save itself."[55]

Significantly more technical articles occur in the late 1950s, complete with diagrams of nuclear fission, and cross-sections through planned or built atomic power plants, and specific technical and professional advice. Commentary was sought from engineers, as well as architects, and only from those with specific experience or qualification in atomic power station construction. This contrasts with earlier writing, Burchard's qualification being the Dean of the School of Humanities and Social Studies, MIT.

Progressive Architecture's November 1958 "Atomic Architecture" is highly illustrated. It identified the "enclosing structure and ancillary elements" as the work of the architect, and referred to the collaborative nature of such projects.[56] The article describes and illustrates the components of a research reactor and a power reactor: the Reactor core, the Cooling towers, the Control rods, and the Shield materials.[57] Power reactors were distinguished from research reactors because they omit irradiation facilities and need to maximise temperatures and pressures.[58] Issues pertaining to containment during a malfunction were also described.[59] The article though acknowledged unresolved difficulties with making nuclear power stations economic; and concludes by examining built and proposed examples, this section being subtitled "the search for appropriate form."[60]

"Building for atomic power plant" (1956) commences by discussing the relationship between architect and engineer, expressing the hope that the next time the journal examines atomic architecture that:

> the respect which the architectural staff enjoy with their engineering colleagues will have deepened still further and will enable them not merely to articulate with colour but to produce a genuine *order* - in fact as well as in appearance."[61]

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51 "Does atomic radiation promise a building revolution?" p 94.
52 "Does atomic radiation promise a building revolution?" p 96.
53 "Does atomic radiation promise a building revolution?" p 94.
54 Burchard "Architecture in the Atomic Age" pp 121, 127.
55 Burchard "Architecture in the Atomic Age" p 129.
56 "Atomic Architecture" pp 101, 102, 108.
57 "Atomic Architecture" pp 109-111.
58 "Atomic Architecture" p 111.
59 "Atomic Architecture" p 112.
60 "High costs created by unusual environmental conditions and overly conservative designs due to lack of experience are discouraging impediments to economic power." "Atomic Architecture" pp 114, 116-117.
61 "Building for Atomic Power Plant" p 507.

Woven through the article and its examination of a number of power plants is commentary on this relationship, but also the description of atomic power plants as accommodating "simply another industrial process."[62] This positioning also contextualises the architect's role, for example, "it is nothing new for the architect to have to house some process which he can never fully understand."[63] The architect is identified as an aesthete, "the only member of the team who is specifically trained in the humanities," and inappropriately "in control of the least costly part of the work," rather than being "responsible for the total balance" of the work.[64] Yet these traces of bitterness - for want of a better word - are balanced with recognition of needed team work surpassing professional divisions.[65] The inherent aesthetic conservativism of the work is highlighted with the awareness of: its potential danger ("if experimental, it had to be experiment with no possibility of failure"), site constraints due to reusing ordnance and airfield buildings ("Thus in the worst instance Springfields has never managed to rise from the mediocrities of the wartime gas factory from which is has been adapted"), and the greater importance of function over architectural detail ("But it is precisely in the sum of these humble details that there lies the margin between industrial architecture and industrial building").[66]

Aesthetic issues also arise in the 1957 article "Atomic Power." Rather than a sub-narrative niggling, these are more proactively stated, identifying scale as the prime aesthetic challenge:

> The rules of composition, proportion and so on apply in just the same way to an enormous building as to a small one, but as well as achieving a fine general massing it becomes necessary to relate each part satisfactorily right the way down in scale to the unit of human size. Provided it is of a strong, bold, pleasing composition, not simply a formless mass without emphasis, an enormous building of this kind can be a great asset to a landscape ... Such large buildings will be seen from a very great distance, thus all these square miles will become no longer wild but sterilized, in a way, by the visible presence of a power station. This is not a matter for the architects of the buildings but one of national policy.[67]

Back in New Zealand

These articles were read in New Zealand, but they were also to some extent enacted - not in the end with nuclear power stations, but with the equally ambitious building of hydropower stations. Leach identifies the distinct professional roles of architect and engineer in terms of the effectiveness of hydro-dams to, not only perform their electricity producing roles, but to also convey the nationalistic ambitions for the provision of electricity that they represented. He contrasts the 1947 Karapiro dam with later architect-involved designs and claims that:

> Primarily an engineering feat, Karapiro was not equipped to communicate its importance to the country, and the full *significance* of that structure, with all its tonnes of cement and hundreds of man-hours, was lost in the formwork. Engineers, taught the skills of calculation and problem solving were not equipped to *communicate* through their design solutions.[68]

He identifies the role of Frederick Newman in designing "cathedrals of power"[69] as pivotal,

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[62] "Building for Atomic Power Plant" p 513.

[63] "Building for Atomic Power Plant" p 508.

[64] "Building for Atomic Power Plant" pp 508, 514.

[65] For example: "the difference between success and failure is marginal and depends on joint effort rather than on a preoccupation with professional precedence." Also: ""it is interesting to notice that the absence of segregation between the different professions was a precondition for success." "Building for Atomic Power Plant" pp 515, 517.

[66] "Building for Atomic Power Plant" pp 515, 525-526.

[67] "Atomic Power" p 773.

[68] Leach "Power Architecture" p 38.

[69] Newman *Lectures* ["Architecture in Hydro design" (1959)] p 119.

stating that:

> The projects emerging from the Hydroelectric Design Office from the time of his involvement offer an architecture of power that is highly conscious of its purpose. Newman communicated the importance of electricity to the nation, but also the importance of the designed generating structures and power halls in supplying that energy.[70]

He locates dams constructed in the 1950s, including Roxburgh (1949-53) and Maraetai (1950-53) as designed to communicate the power of electricity, and presumably a security of supply.

Newman was explicitly conscious of these issues as underpinning a modern architecture. Contextualised by Corb's *Vers une architecture [Toward an Architecture]*, he argued for the absorption of a building's purpose, social importance, engineering and architectural fundamentals "to an extent where the boundaries between knowledge and love for the work, between creation and theory become indistinguishable," and for the possibility of what he calls engineering-architecture.[71] As Newman puts it:

> The national importance of these large structures must ... find architectural expression. It is imperative that these works become cultural assets because they are part of out [sic] social life. Production of power - though their primary function - is not all that matters.[72]

Newman also understood the impact of these huge structures on the landscape, thus entailing "a problem of great responsibility."[73] His one reference to atomic power stations is found within this context as he asks: "How far this applies to other types of power generating stations and particularly to the atomic plants of the future remains to be seen."[74]

Conclusion

Priestley attributes New Zealand's lack of nuclear power to economic factors and the 1978 Royal Commission of Inquiry's rejection of it due to "a reduction in projected electricity demand and the recent discovery of the Maui natural gas field,"[75] but, as Richards likewise argues, in relation to the significance of the 1950s for the emergence of New Zealand's anti-nuclear tradition, Newman's ability to articulate an electric confidence through his monumental hydro station designs of the 1950s might at least, in part, be held responsible for the persistent deferral of New Zealand committing to nuclear as a power source. The hydro stations promoted a notion of self-sufficiency due to a control of natural resources, reinforced, rather than undermined, by the discovery of Maui.

Such an argument appears to have some plausibility in both the stated opinion, in May 1957, of Leonard Cronkhite, director of the United States Atomic Industrial Forum that:

> New Zealand was "fortunately situated with natural power resources, such as rainfall, fast-flowing rivers, and geothermal power resources. ... [and] could probably use the money required by an atomic reactor to much better advantage by producing power by these means,"[76]

and in the State Hydro-electric Department's acknowledgement of the promise of atomic energy, while committing in the shorter-term to the more economic "natural sources."[77] As Leach suggests, belief in hydro-power was a

[70] Leach "Power Architecture" p 43.

[71] Newman *Lectures* ["The Interrelation of Engineering Design and Architecture" (c1951)] pp 47-49, 57.

[72] Newman *Lectures* ["Architecture in Hydro design" (1959)] p 126.

[73] Newman *Lectures* ["Architecture in Hydro design" (1959)] p 126.

[74] Newman *Lectures* ["Architecture in Hydro design" (1959)] p 126.

[75] Priestley *Mad on Radium* p viii.

[76] Cronkhite quoted, Priestley *Mad on Radium* p 191.

[77] Priestley *Mad on Radium* p 192.

nationalist belief in New Zealand modernity and civilisation, via the very mechanisms that Eggener identifies as underpinning American architectural modernism.

Meanwhile, in 1954, Obninsk, near Moscow, became the first atomic power station to be built,[78] and two years later in 1956, Queen Elizabeth opened Calder Hall in Cumbria, proclaiming nuclear energy to be "harnessed for the first time for the common good of our community."[79] The power station promised the English electricity "too cheap to meter,"[80] and Calder Hall's existence, apparent in the architectural press, was no doubt heralded more popularly in New Zealand.

What was no doubt at stake in the mind of New Zealanders, during one of our most prosperous periods in history, was the ability to sustain a particular lifestyle, full as it was with electric frypans, pop-up toasters, juice extractors, toasted sandwich makers, waffle irons, electric carving knives, and deep-fried frozen potatoes in light-coloured interiors - free from the soot of gaslight and coal fire. This was not simply an issue of electricity supply, nor directly economics, but was also cast in the ever-growing shadow of a Cold War (1947-91). Peace, as well as the supply of electricity, was necessary to sustain a desired way of life. Smith has observed, the outbreak of war in Korea in 1950 made the communist threat feel near,[81] while Richards argues that the July 1962 Starfish Prime nuclear test above Johnston Atoll, seen throughout New Zealand, and described in the *New Zealand Herald* as:

> "A deep red "aurora" striped with jets of white light ... seconds after a United States task force exploded a high altitude nuclear device ... 4000 miles to the north,"[82]

cemented New Zealand resistance to an anti-nuclear stance. By this time, Calder Hall's prime purpose had became public a year earlier, in 1961,[83] that it, like "many of the reactors that followed, was [primarily built] to produce weapons-grade plutonium."[84] Atomic energy was very much a secondary, and very expensive, role.

At this point it might appear that New Zealand had no atomic architecture, but there is no doubt that it was an active player in both the politics and science of nuclear energy. The architectural skills advocated in overseas journals were well understood by practitioners such as Newman. To deny a New Zealand atomic architecture is clearly a position that can be argued, but it is a stand that can only be sustained if deciding *not to build* is designated as outside the realm of architecture.

[78] Priestley *Mad on Radium* p 186.
[79] Priestley *Mad on Radium* p 186.
[80] Brown "First nuclear power plant to close" np.
[81] Smith *A Concise History of New Zealand* p 178.
[82] *New Zealand Herald* quoted, Richards "Protecting the environment" p 306.
[83] Brown "First nuclear power plant to close" np.
[84] Priestley *Mad on Radium* p 186.

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