1984 HOPKINS LECTURE

"The Ethic of Environmental Engineering"

Delivered by Ken Piddington, Commissioner for the Environment
Christchurch Town Hall, Wednesday 18 July 1984

Mr Chairman
The President and distinguished members of the Institution of Professional Engineers, Ladies and Gentlemen

It was a great honour to receive in late 1983 the invitation to present this evening's lecture. I was encouraged to know that the Organizing Committee saw the concerns of the Commission for the Environment as a logical focus for the 1984 Lecture. I was challenged by the prospect of presenting the view of a non-engineer to this gathering. I accepted with alacrity.

It is also a special privilege to be addressing you in the finest building of one of our finest cities. Do not however expect me to turn a blind eye to the fact that at this time of year you are subject to episodes of gross air pollution. I hope that by the end of the evening you will be convinced that this issue, like any environmental problem, lends itself to diagnosis and treatment by the engineering profession. The excellent work of the Clean Air Society needs and deserves your active support.

After the challenges, the salutations. The quality of this Town Hall has another meaning. It conveys to me a harmony between technical excellence and the cultural vitality of the centre of Canterbury. This harmony, it seems to me, was one of the precepts which Professor Hopkins incorporated into his teaching at the School of Engineering. It is an ideal which has a long history in the traditions of academia. I was brought up in those traditions and will happily offer you an identical theme as sub-title to this lecture on "The Ethic of Environmental Engineering - the Marriage of Technical Excellence with New Zealand's Cultural Identity". To Professor Hopkins and his successors and colleagues at the School I therefore give a bilingual greeting which can be used to reflect the two most important threads in that identity:

Vivat academia! vivant professores!
Tena koutou, tena koutou, kia ora koutou katoa!

New Zealand in its Environment

I would like to open with a geological cameo which demonstrates the essential nature of our environment. The compacted coral comes from Atafu, the northernmost atoll in the Tokelau group, 7° south of the Equator. The red granite is from Granite Harbour in the Western Ross Sea where the Commission has been involved in research on icebergs; the latitutde is 77° South. The pile of dirt in the middle is New Zealand. More accurately, it is sand from

the shellfish beds of Kati Mamoe on the Otago Peninsula, right opposite the proposed site of the Aramoana smelter. The latitude is of course 45° South.

Environmentally we are not a small isolated country in a forgotten corner of the world. We are directly linked to, and have shared responsibility for, two vast ecosystems, the Pacific Ocean and Antarctica. We are at the centre of the unpolluted hemisphere. When we travel beyond it we are stuck by the degrading state of the other hemisphere. But we do not make the connection between that degree of pollution and the development process which has been dominant since the invention of the steam engine. It is a pattern which we have adopted, just as we have adopted the imperfections of economic analysis which made it possible for so-called developed countries (both Western and Communist) to impose the real costs of pollution on future generations.

Engineers are heavily involved in development world-wide. They are thus involved in what is becoming a global crisis. Acid rain and the loss of tropical forests are vivid examples of what is happening to the environment world-wide. For the purpose of this lecture, I want to establish that there is an opportunity for the New Zealand engineer to become identified with the urgent assault on environmental problems. In the vital debate on the world-wide reduction of nuclear armaments. I am aware that the Engineers for Social Responsibility have become engaged in that direction. I will argue however that for most environmental issues, the professional adjustment has to take place in our own backyard.

Indeed, the first task is to turn New Zealand from a pale replication of what has happened in the Midlands or the Mid-West into a vibrant statement of our determination to avoid the mistakes which have been made elsewhere, a determination to build a culture which is at harmony with this utterly powerful environment and a determination not to discount any one of the many value systems which could be accommodated within such a culture.

I will return to the global perspectives on environment and resource use. Before defining the professional problem in the New Zealand context in greater detail, I would like to say something about money. Quite frequently, cash benefits and cash transactions are represented as the purpose of development. It is a short step then to argue that the environmental approach will deny citizens the benefits of jobs, higher incomes and higher consumption. Perhaps because engineers are numerate and prefer clear linkages of cause and effect, they often back away instinctively from soft-core environmental evaluation and retreat into hard-core cost-benefit analysis. Instinctively they regard these as opposites. This is where they make a basic error of judgement. Last month I led the New Zealand delegation to the OECD Conference on Environment and Economics. It reached the following central conclusion:

"Continued environmental improvement and sustained economic growth are essential, compatible and interrelated policy objectives for OECD Member countries... The environment and the economy, if properly managed, are mutually reinforcing; and are supportive of and supported by technological innovation."

Let us therefore restate the purpose of development. Society's interest in development is motivated by the wish to increase the welfare of all its citizens, including those of future generations. Gross national benefit (GNB) would be the appropriate measure of success, but no technique exists for calculating GNB in a way which is objective and which allows comparisons to be made in different places and at different times. In a democracy we have to rely on, and have just relied on, the political process as an indicator of the trend in GNB. By default, we often turn in other situations to GNP and its component statistics as a yardstick of forward progress. Many components of GNP, for example, an increase in medical costs reflecting poor health and high accident rates, will in fact reflect lower GNB. The retention and enjoyment of high environmental quality clearly contributes to GNB; it can to some extent be assessed on the basis of willingness to pay, but even then defies incorporation in GNP measurements. I would therefore suggest that the engineer should have the GNB concept clearly in his or her mind when looking at the advantages to society of a given development project. Otherwise the socio-economic impacts will not be accurately assessed and will tend to be disregarded.

New Zealand beyond the Turning Point

This is an adaptation of the title of the report which was produced in 1976 by the Task Force on Economic and Social Planning. It gave strong emphasis to the need for all professional groups to come to grips with the deep-seated changes which were under way in New Zealand society. It argued that these changes were more significant than had generally been appreciated and that any planning process would have to take into account the particular nature of the "turning point".

Eight years on I don't think there is any need to set up another task force to establish that during the seventies New Zealand did indeed change in a number of important ways. Family structure, the role of women, the dictates of the external economy and the structure of the internal economy, the dialogue between Maori and Pakeha, technology, lifestyle - right through to the patterns of eating and drinking - hardly any feature of New Zealand life remained unaltered.

Neither do I believe that one has to delve too far into the nature of the various changes or attempt to describe exactly when the "turning point" was reached. Both at the Planning Council and in my task as Commissioner for the Environment I have simply accepted it as a fact. It has heavily influenced my attempts to put the issues of public policy in a framework more appropriate to our times. It has convinced me that the nature of social responsibility for all professional groups is now different. We do not for example serve a homogeneous society; there are many diverse groups in New Zealand with different values and different perceptions of progress. We need to understand the professional problem which this creates.

As far as the environment is concerned let me point out that the change which has taken place is simple and fundamental; the fact is that we are no longer a frontier society, there are no free resources out there up for grabs. Everything we want to develop will generate conflict of interest. Instead of simply using more of the same resources to produce more of the same goods we are getting used to the idea that development needs to be geared to the best mix of resource use. We are also coming to accept that conservation of renewable resources needs to be part of this philosophy because it offers New Zealand the best economic return in the long run.

The Manapouri campaign in the early seventies is regarded as the start of environmental activism in the modern sense. Our last environmental Audit dealt with the proposal to export water from the Manapouri tailrace at Deep Cove. From Manapouri to Deep Cove is only a few miles over the Wilmot Pass. For New Zealand's environmental ethic it has been a much longer road; twelve years of solid learning, at the end of which I detect a new and exciting commitment to link our identity as a nation to the stewardship of a unique environment which has virtually unlimited capacity to contribute to GNB.

The Professional Problem

I will tackle this by setting out the way in which the public service has found it necessary to adapt professionally to a new set of circumstances. I will then identify the special problems which seem to confront these engineers who are also a public servants. This will lead to a set of questions for the Institution to consider, and which revolve around the degree to which the engineer who is not employed by the state still shares with his or her public service colleague at least some elements of professional responsibility to New Zealand society as a whole.

The public servant has not been completely sheltered from the effects of change in New Zealand society. It is unfortunate however that bureaucracies tend to be slow learners, and the larger the bureaucracy the easier it is to shield its members from the real impact of historical change and new ideas. It is quite apparent, in Wellington

as in other capitals, that innovation and energy find a natural home in the smaller units of the government machine. In the area of environmental policy there are whole sections within larger departments who have not yet come to accept the end of the frontier society. Indeed many public servants would be hard put to describe the implications of this change for the area of public policy with which they are concerned.

There has been another, more subtle, obstacle to adaptation in the public service. Loose thinking and loose language has created the illusion that we are "government servants". Fortunately, the Official Information Act and the training programmes of the State Services Commission serve to remind us that our job is to serve the public of New Zealand. For a very small number of public servants for a relatively small proportion of the time this service will take the form of offering confidential advice to governments. This advice will be based not on what the government wants to hear but on a professional judgement about how the public interest can best be promoted through a given policy. The right of elected governments to define what the policies are and to be accountable to the public remains the indispensible counterpart of this aspect of the public servant's role. My colleagues understand this and all of them welcome the creative partnership you can have with a Minister who also understands the rules.

There can be little doubt however that the professional detachment of the public servant is frequently misunderstood by politicians and by the media, as well as by members of the public. There is a tendency for public servants and sometimes for whole departments to become identified with a given set of policies or a given philosophy of development. Sometimes, and this is the major trap for the engineer in the public service, the identification will be with a particular project. If I encounter a departmental officer who does not accept that the environmental aspects of "his" project represent a legitimate area of the public interest, then I know we are in trouble.

I think it will help to be even more precise about the area of difficulty. We have seen a period in which energy-related projects have assumed a special place within the development process. With the end of the frontier, the resource use implications of these and other government programmes have generated a high degree of public interest and debate. One area for debate has been the question of which group in society stands to benefit and which group will be at a disadvantage. Broadly, this is defined as social impact.

No development in history has been neutral in terms of social impact. But the Industrial Revolution predates the founding of Christchurch and we now know that a great deal can be done in planning a project to reduce adverse impacts. There are for example impacts when a construction workforce is brought together and another set of impacts when it is wound down. There are significant impacts when a community is created around job opportunities solely for the male

workforce and this has to be tackled by promoting activities which will create jobs for women. I would like to see a sponsor for horticulture using waste heat from our big industrial plants. A Maori community will have its own ideas about what it expects and does not expect from an industrial project. And so on.

Governments may or may not give priority to social impacts. Since they are accountable, it is their prerogative to ignore them if they wish. This is often justified by stressing the employment or economic benefits to society at large.

The public servant cannot however take it on himself or herself to ape the attitude of the politician and claim that social impacts are of little consequence. On any interpretation of what the taxpayer pays us for, the handling of social impact must surely receive constant and priority attention.

In environmental assessment around the world, it has been found that the impacts on the physical environment merge into and are inseparable from these social impacts. I will be dealing shortly with the sequence of events at Motunui, where it was quite apparent that the physical impact of constructing an effluent pipeline across traditional shellfish beds generated conflicts specific to Maori culture and Maori values. It has been a matter of great disappointment to me to find that a number of engineers in the public service take their cue from these politicians who argue against the acceptance of social impacts as an essential part of the environmental assessment process.

To sum up on the public servant, therefore, both the engineer and the non-engineer have to be clear in their minds about two things:

(i) the way in which their concern for the broader public interest needs to be reflected in their professional actions, and

(ii) the degree to which they can legitimately claim the right to operate in secrecy and avoid public discussion on the solutions which they advocate.

We will miss valuable opportunities and we will fail to increase gross national benefit unless there is a change from traditional reticence on these two issues. Let us therefore look at the problem for the engineer in dealing with such issues.

The Engineer's Response

My work at the Commission for the Environment has brought me into contact with a wide range of engineers. Generally, I would claim we get on very well together. I notice and enjoy the many professional attributes - the ability to plan, to prepare a sequence of action that will move us from point A to point B without going around in circles,

the instinct to test hypotheses and allow for contingencies and above all the awareness that design is always a compromise. There is no project which is neutral in its impact on the environment, you just have to find the formula which comes as close as possible "within reason" to the ideal.

I believe from observation that the profession as a whole accepts the same requirements that I have listed for public servants. I think it is recognized that the difference between the mercenary and the professional is that the latter recognizes a factor of social responsibility. I believe also that many professionals have come to see the advantage of public discussion on design options at an early stage. When properly used, the environmental procedures create that opportunity and I am constantly struck by the wealth of technical imagination which comes out of the public submissions which we receive. Build a submerged pipeline down the Sound to protect the National Park ... Don't put a road to the top of the mine, but drive the bottom adit first and work the reef from the bottom up... Shift the ironsand by slurry pipeline and bury it to avoid building anything on top of the farmland... Each Audit seems to reap a crop of these and more and more of the ideas put forward by the public are being picked up by the proponents.

What about secrecy? Isn't it a nuisance to have to explain everything to the layperson? If they don't want LPG storage tanks down the road no amount of technical explanation is going to help... Why make people worried about toxic substances when they don't even know that salt is toxic?.. Our clients don't pay us to go out and give slide shows to the local community ... The fact is you can't make an omelette without breaking eggs ... And so on ...

This issue came up last year when we were meeting with the Council of IPENZ. The Commission team was taking the line that you needed to open up with the public because if you didn't do it you would face greater problems later on. I don't think we were winning the debate. Then one Council member intervened and told us he agreed with our approach. He lived in Hillsborough in Auckland and the first he knew about a high-pressure gas line crossing his property was when the machines arrived to dig the trench!

On secrecy, therefore, I come back to the issue of marrying technical excellence with the cultural identity of New Zealanders. We are patently a society with many faces and a society in transition. No textbook can tell you which approach is "right" for the gas pipeline through Hillsborough, a tailings dam in the Coromandel, opencast mining in the Waikato, an effluent disposal system on the Taranaki coast, or any one of the hundreds of possible projects through New Zealand. Just as you go out to employ someone to drill and provide you with the essential details on the geology of each site, so you must include the community and their perceptions in your general environmental survey of the site.

It is in the nature of social science that you will be left with data far less precise than that coming from the geologist. People do not come in sedimentary layers. In addition to cultures and sub-cultures you will have something like a pre-election poll of individual views to contend with. As it happens, however, any project team has to handle a lot of material which is equally inconclusive, and equally essential. The local weather, for example ... If we used the term "human meteorology" to describe this area of investigation it might convey more forcefully why social impact is important.

There is one feature of New Zealand society which is emerging very strongly and which differentiates us from many larger societies. We take a minute and painstaking interest in any physical change to our environment. I travel in a suburban bus and I can assure you that in our community not one garage is built, not one patch of road is sealed and not one pipe is laid without detailed analysis and comment by the self-appointed project committee in the back three rows of the bus. When it comes to environmental design New Zealand engineers have to operate in a goldfish bowl. My view on an environmental ethic for New Zealand engineers therefore is to ask that this be accepted as a potential advantage rather than a potential disadvantage.

The Good News

My comments may be seen as criticism by the "hard-hat" school of engineers. In essence, however, I am merely responding to some of the initiatives which the profession has been taking in recent months. By far the most important was the decision by IPENZ to have a code of environmental practice for engineers drawn up during 1984. A former President, and one of New Zealand's leading thinkers about engineering and environment, has been convening a group to develop such a code. I refer to Dave Thom, and would note in passing that he has also given a lot of weight to issues of culture and identity in his own writing on the environment.

It has been very stimulating for us in the Commission to work with this group and to clarify our own ideas about the framing of such a code. The challenge is heightened by the fact that nothing similar appears to have been attempted elsewhere. Once a New Zealand code has been adopted it may prove to be an exportable commodity. Certainly, it will have an influence on the work done by New Zealand engineers in third world countries. As I said at the outset there is a global as well as a New Zealand dimension to the topic before us.

Engineering is about getting things done and it is also valid to argue that you never have all the information necessary to an understanding of the environment. But no one is going to pay you for a project that stands still. So the idea of a code has forced me to think about what I expect from the engineer as he or she travels that road

from A to B in project development.

The closest analogy I can offer is that of a tramp through steep bush country. You are technically qualified to read the map and ascertain the best route. As you start out you will take some bearings and whenever there is a clearing in the forest you will check them out visually. If a short cut appears which was not on the map you will take it. In this analogy, the topography represents the technical and economic factors which determine acceptable engineering design. A lot of these can be quantified and you are very comfortable with them. Your route is manageable as long as it does not take you over a cliff and as long as the short cuts (for which read economic savings) do turn out to save time and do not send you round the mountain again (ie by having to deal with acute environmental effects later on) then the journey should go pretty well (project completed).

We forgot one thing, however - the weather forecast. I equate this to the totality of environmental factors which your project needs to take into account. "Human meteorology" and a lot of other things. Not only do you need the forecast before you start out, but when you come to the clearings this is something you will check out because the forecaster always gets it wrong. It is as important a factor as the topography. In certain weather conditions you will in fact deliberately take a longer route in order to be sure of arriving safely and avoid threats of slips or floods. Like all analogies, it can be taken too far, but at present I want to express my optimism that when IPENZ finally adopts a code for New Zealand engineers it will give proper coverage to what you have to do both before you set out and when you come to the clearings.

The Bad News

The IPENZ move is positive and therefore welcome. It is a pity of course that one has to put these things in writing. The environmental design of a Greek temple or a medieval castle was guaranteed by the culture. The architects and engineers moved in harmony with a broader concept of man's relationship to nature. These were however major public works with significant environmental impact. In this day and age, the Environmental Protection and Enhancement Procedures would apply; they replace the cultural constraints of other societies and other periods of our own history. The lack of clear signals to the engineer from the culture in which he or she moves is, I suggest, the first item of bad news.

There is however a culture taking root in New Zealand and it is influencing many aspects of our national life. A diverse group of people, from kindergarten teachers to potters, from national park rangers to members of the Maori Women's Welfare League, move in a style which is unmistakeably of New Zealand. They have a general view about the special values of the New Zealand environment, they have a sensitivity towards the community and many of them have

become effective communicators, not only of facts, but also of feelings. This group is male and female, but the latter tend to be the leaders, and the ethic is one of sustainability. I have summed up their objective as the "greening of New Zealand".

There is also that other view of the world, inherited from the yahoos of the frontier society. Get stuck in and keep moving (earth if possible, preferably using a big machine to do it) avoid pressure to communicate (especially about feelings) and don't get sidetracked by all this environmentalist claptrap. This group is predominantly male and is moved by the mining ethic. It is in a very real sense the New Zealand counter-culture and in my view it confuses and constrains those who serve society's broader goals.

So where are the engineers in all of this? Does their training equip them to identify with the culture? Are they supportive of the greening of New Zealand? Do they draw that fine professional judgement about design and balance from an instinct for what is right for New Zealand? Or do they tend to be cast as the hero-figures of the counter-culture, man against nature, slugging it out on an imaginary frontier that evaporated when they were at engineering school. I will not answer for you, except to say that New Zealand has a number of very sensitive and cultured engineers and some of them were born here.

What I think is sad, however, is that nothing in the training syllabus is geared towards a discussion of engineering and culture. If we have some cultured engineers, it is despite the long grind of professional training. If we have uncultured engineers, it is the price we pay for a syllabus that is too tightly defined, too closely linked to technical virtuosity and with little room for the lateral growth which is part of our best academic traditions. After the code of environmental practice is produced, I hope therefore that it will lead on to a debate about the revision and the broadening of the syllabus. I am regularly invited to address various university or training college courses on "Man and the Environment" or similar topics. To my knowledge, the Commission was asked once to explain environmental assessment procedures to engineering students in Auckland. It has never been asked by either Auckland or Canterbury to lecture on the question of man's responsibility to the environment. O professores, we are ready when you are!

The Case Study Approach

Let me run through the outline of what we might want to talk about to such a group of students. We would start, as I have done, by pointing to the wider dimensions of environment, we would ask them where and when they had direct experience of the New Zealand environment. We would challenge them to assert that the experience would still be available in fifty years' time, which is a reasonable time scale for a budding engineer to think about.

Then we would examine the environmental approach to resource use, deal with the way that economic analysis has to be complemented by environmental assessment. We would talk about the New Zealand procedures and remind them that these work best when approached in the right spirit. If they are seen as an obstacle or as a charade designed to placate public opinion, then the project will most likely suffer.

The evidence for this will be covered in the reading list to be supplied to the class (which will be lifted from the IPENZ Code). Collateral evidence from countries such as Canada and Australia is also available.

Then we would move into the case studies which I will give you in thumbnail version. As the President of IPENZ is aware, we often start with the choice of transport mode for New Zealand Steel's ironsand concentrate. The sequence demonstrates that without an environmental process the project would have ended up with a second or third best solution from the economic and operational point of view, as well as that of the local environment. In other words, the interests of the project should not be assumed to be in conflict with those of the environment.

This particular case study will also show that despite imaginative policies on the part of New Zealand Steel, there are some unresolved issues of concern to the Maori community. We move on therefore to the Motunui case study, which encapsulates the professional problem when it comes to dealing with the values of another culture. The initial Audit on the Synthetic Fuels plant argued for the protection of the Taranaki coast and the concept of bringing all waste streams together to Waitara, where the methanol plant was already under construction and where there was an existing problem with a defective outfall discharging freezing works and other effluent. We argued for a combined solution which would leave the coastline in a better state than before the new projects came along. This could be an "offset" against the inevitable impacts such plants would have on a rural area. I greatly regret that it took almost two years, a sitting of the Treaty of Waitangi Tribunal and a major political saga, before the logic of the environmental analysis was accepted.

This case study would tell the students about the need for project engineer to be aware of <u>all</u> the factors affecting the environment - including cultural values and the aspect I have described as "human meteorology". He or she cannot draw a boundary round the project, because there are no such clear lines in the environment. The financial and political managers may pretend for negotiating purposes that such lines exist, as they did in this instance. Sooner or later the holistic nature of interactions in the environment will however prove them wrong. The engineer is close to the boardroom, and sometimes inside it, but like the scientist he or she must resist the fictions which are part of the boardroom sub-culture. Professionally, it is probably as hard for an engineer as it is for a public servant to say it how it really is.

The next case study for the class would have to be a forestry project. It could be from Northland, the West Coast, Southland or Nelson. It would deal at one level with the processing plant and related impacts. But it would also open up the debate about employment, exotic forestry versus indigenous timber and the likely return to the New Zealand community in the longer run if total dependence on exotic production can be avoided. We would not discuss the protection of native remnants as a sacrifice of economic interests in favour of "environmentalism" - which is where the confrontational debate seems to have come to rest; instead we would project it as an economic investment because we would be looking after the botanical capital which we have in the bank. We might also argue that if the capital had not been so recklessly depleted by four or five generations, the present economic conundrum facing New Zealand would be much closer to solution.

I would at this stage point out to the class that we are working through a range of resource use options. I started with a situation in which a classical industrial project - the steel mill - could attain its objectives without unnecessa impact on the environment. (In that case study, however, I deliberately left the question of coal supply for next year's lecture to the class!) I am moving toward the options which allow environmental assets to be used in a way which increases both GNP and GNB. In other words, I would be asserting that New Zealand could enjoy the best of both worlds. The next case study is a perfect example.

Clean water. Back on the frontier nobody gave it a thought in terms of economic options or trade potential. It was important for agriculture and industry, as well as for human settlements, and we established through legislation that water was a public resource to be managed by statutory bodies in the public interest. But it was seen as a free good, like sunshine, the New Zealand coast and our plentiful fresh air. There was therefore no discussion of the appropriate pricing mechanism. This is the context in which the class should assess the proposal to export some of the cleanest water in the world from Deep Cove in Fiordland National Park.

We would look at the main recommendations of the Commission's Audit. The basic lesson from these for any engineer or project planner is that if an area is rated nine out of ten on a scale of environmental sensitivity, you must be able to demonstrate that your project cannot be located anywhere else. This conclusion would need to be based on a proper study of all the options. In the case of marketable drinking water it is quite apparent that there are many sources of supply around New Zealand and that the proposed carriage by tanker can take place more efficiently and with almost zero impact on the environment if it is loaded at an existing port.

In respect of the Manapouri tailrace, with a normal flow of around 300-400 tonnes per second, the real engineering challenge would be to find a way of shifting it further away from Deep Cove, to a point where it can be more easily loaded. Accepting that the water is of exceptional quality, which has been scientifically proven, and assuming that there is a growing world market which will pay a high price for the commodity, which has not yet been proven, then a technique would need to be worked out to avoid a situation in which most of the resource is wasted, ships are congested and sooner or later there is an accident. Some of the submissions favoured a submerged pipeline down the Sound. The class could think about that for their next project. What I would stress is that if you have a Rolls Royce product in a Rolls Royce environment you can afford to think about Rolls Royce engineering.

The final case study to examine is that of the Motu River, the first stretch of water to be covered by a National Conservation Order. It was considered to qualify because of its wild and scenic attributes. The profile of the river, which is fast flowing through a series of spectacular gorges, is a dream for both the photographer and the power engineer. It has also proved ideal for the fast growing sport of white-water rafting, most of which is now done on a commercial basis. When we approached the Tribunal hearings I was confident that the river would be protected but I was worried about two things:

(a) it would be argued that the resource had been "locked up by conservationists", and

(b) there would be a suggestion that the local community had been deprived of economic benefits.

I would present to the class the evidence which the Commission gave to the Tribunal. Briefly stated, this would demonstrate that:

(a) protection of a river or part of a river does not "lock it up"; it releases it for use in perpetuity if society so wishes. Whoever needed a key to get into a National Park?

(b) the economic return to the local community from some of those uses, eg tourism will be greater in the long run than that to be derived from a power scheme.

This approach can be applied to other rivers closer to Christchurch. For a class at Canterbury one would obviously pick these up and take the students through the same perspectives on management of natural resources.

This is where the threads of this lecture and the imaginary presentation to the students converge, so I shall conclude by restating the issues as I see them.

Engineers, Resources and Culture

The engineering profession is well-placed to use its talents to increase New Zealand's GNB as well as its GNP. It already has some outstanding achievements behind it - indeed the Manapouri scheme itself can now be judged in this category. But the New Zealand engineer is working in an environment which is special from a geological, meteorological and economic standpoint. Projects which make sense elsewhere will not automatically make sense in New Zealand.

The profession must also accept an increasing degree of social responsibility. Its influence on the lives of ordinary people is a major one; technological change and economic restructuring are pushing it further in this direction. This responsibility can only be exercised through an acceptance of social impact assessment and an acceptance of culture as an integral part of any mature human environment.

One must assume that New Zealand is developing its own cultural imprint. One must assume that all the cultural influences represented in this city, in our other cities, in the country and on our marae will have a bearing in that culture. One would expect the culture to have a view about the relationship of New Zealanders to their heritage, and about the way in which the natural resources within that heritage should be used to increase GNB. The hypothesis I have put to you is that the real cultural dynamic in this country in the 1980s is taking us towards "the greening of New Zealand" and to a very different philosophy of resource management.

The philosophy of the frontier is still there, and may survive for a while, but it is essnetially backward looking. It is dangerous because it discounts the need for environmental protection. The miner will always have a role, adding the occasional bonus to GNP - and to GNB, because mining can be imaginative and picturesque. But the mining of resources such as fisheries and forests, which can offer a higher return on a sustainable basis, will be unacceptable within the New Zealand ethic by the year 2000. Ecological energy will provide the mainspring of the economy.

In case this sounds like an unrealistic set of assumptions for your profession to adopt, let me remind you about the conclusion of the recent OECD Conference which I quoted earlier. It said that the environment and the economy, "if properly managed, are mutually reinforcing". This represents the considered view of Ministers and senior officials in one of the world's most hard-nosed clubs. The full four pages of the Conference conclusions will be referred to on the reading list for the IPENZ Code and it should be handed out to all final year students. What I have done this evening is to draw on that phrase "if properly managed" and tried to translate it to the context of New Zealand beyond the turning point.

It is the engineering profession which in effect decides how the New Zealand environment is managed. It is also coming to play a large part in managing the economy. Politicians and business leaders will listen to you. As Bob Norman has put it "good engineering is good environment". You are therefore going to be the most potent advocates for the New Zealand environment. But you cannot base this advocacy on sheer technical excellence. It must be blended with a sensitivity to the place you live in and the times we all live in. Without sensitivity, there is no culture and without culture there is nothing to pass on to future generations.

I have quite deliberately looked through the audience here to my younger audience of engineering students. They have an opportunity which a previous generation did not have. If they use it, I believe that New Zealand could witness an explosion of intellect and an explosion of vision. Many centuries have passed since men first came in canoes to this land and found it necessary to adapt their ways of doing things to a new environment. In its essential features, the environment is still the dominant factor in our lives. Understanding it and relating to it makes it exciting to be a New Zealander.

In the realm of ideas, the engineering profession is poised to make a much more significant contribution to our national development than any single project. New Zealanders take a very practical view of life. If it can be shown that environmentally sound engineering contributes to both our welfare and our income, we will warmly adopt it and support the practitioners who develop such techniques. We will then find out that the same techniques ahve a value for other societies through the world and they will turn to New Zealand as an example of how to put resources to work for the benefit of society.

As a country, we long to be relevant. We also know that it is a privilege to live in New Zealand and to enjoy the unpolluted hemisphere. The time has come when the world needs a flow of wisdom from this hemisphere about the best way in which to manage the environment. The engineers of Scotland migrated to bring the benefits of the Industrial Revolution to most every corner of the world. The Environmental Revolution is close and it could well be the turn of New Zealand engineers to take this new learning out into a world which is ready and waiting.

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