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COMMISSION FOR THE FUTURE

REPORT ON THE COMMISSION'S SEMINAR ON FORECASTING TECHNIQUES

31 March – 2 April 1977

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CONTENTS

INTRODUCTION

The Commission for the Future (CFF) was established by the Government in August 1976. Announcing the formation of the CFF, the Deputy Prime Minister (Hon B. E. Talboys) said that the Government attached great importance to the CFF, believing -

> that the complexity of modern living, the frequently unforeseen impact of present decisions and developing technology, and the need to ensure that human values and aspirations are not overlooked, require a detached long term look at the possible directions in which New Zealand could be heading and the choices for the future open to us.

The Commission's Terms of Reference appears at Annex A. Although the Commission is focussing on the period 5-25 years ahead, its functions are intended to be complementary to those of the recently established New Zealand Planning Council (chaired by Sir Frank Holmes) with which it is establishing close working relations. In this it is assisted inter alia by Dr R.O.H. Irvine's membership of both bodies. Legislation to cover the status and functions of the Commission is to be introduced during 1977.

The Government named nine people as members of the Commission. Their backgrounds reflect a wide variety of interests and experience. The Commission is a bi-partisan body. The Minister of Broadcasting (Hon H.C. Templeton) represents the Government, and the Opposition is represented by its nominee, the Hon R. O. Douglas. A list of the Commission Members is included in Annex B.

The Government had indicated to the Commission that one of its first projects might be to define those areas which most urgently required

study. It was suggested that these might include New Zealand's population patterns and projections, and social development in New Zealand's multi-cultural society. The Commission has decided that it should study not only these subjects, but also inter alia the options available in the economic, energy and resource fields.

To assist its members in their understanding of the techniques of forecasting in these subject areas, the Commission decided to hold a Seminar to which would be invited experts in each of these fields to brief it on their most important methodologies, to suggest (where possible) the implications of present trends, and to nominate areas of research which the Commission might usefully explore. A list of Seminar participants is set out at Annex B.

The Seminar was held at the Rutherford Hotel, Nelson, from 31 March - 2 April. It was organised by Mr R.M.D. Munro who was seconded from the Prime Minister's Department (EIB) for this purpose. Considerable assistance was provided by the Department of Scientific and Industrial Research which provided three of its officers to serve on the Conference Secretariat.

The Seminar was organised into six sessions. A copy of the Seminar Programme is at Annex C; it lists the sessions and the names of the chairmen, panelists, and discussants. It should be noted that Professor G. H. Hines, Professor of Business Studies at Massey University, was, unfortunately, prevented by illness from attending the Seminar. The Commission is grateful to Dr Hugh Barr for agreeing at very short notice to act as a panelist for the session on "The Systems Approach".

Formal papers of high quality were presented to the Seminar by the panelists listed below:*

- Dr G.S. Harris (et al.)	"Energy Scenarios for New Zealand".
- Mr P.D. Lucas	"Energy Forecasting - Electricity".
- Dr A.D. Meister	"Forecasting or Planning Resource Use".
- Mr C.J. O'Neill	"Population Projections and New Zealand: The Certainty of Uncertainty".
- Professor D.C. Pitt	"Population and Society in New Zealand's Future".
- Professor B.J. Ross	"Forecasting Techniques for Resources (Including Land Use)".
- Progessor G. A. Vignaux	"Systems, Systems Thinking and Future Studies".

To help provide background to the subjects under discussion at the Seminar, the Secretariat distributed to Commission Members a wide range of briefing material. A list of this material appears at Annex D.

This report is divided into three major sections. The first, "Presentations: Forecasting Techniques - and the Outlook," is a summary of the major substantive addresses made to the Seminar. The second, "Suggested Areas of Interest and Possible Projects", records suggestions made by various Seminar members concerning topics and techniques which they felt the CFF should be interested in; also noted are research projects and other work it was suggested the Commission could usefully initiate. The third section consists of Annexes which provide detailed information on the Seminar and its participants.

* Requests for copies of these reports should be directed to their authors.

The Commission is pleased to be able to express its gratitude to the following for their assistance with various aspects of the Seminar:

- The Panelists and other Seminar Participants.
- The Prime Minister's Department for making one of its officers, Mr R.M.D. Munro, available to serve as Conference Secretary.
- The Department of Scientific and Industrial Research for making available three of its officers, Mr P.J. Daymond-King, Ms S. Duignan and Mr T.C. Logan, to serve on the conference secretariat and for general administrative assistance.
- The Tourist and Publicity Department for the provision of one of its officers, Mr Ray Smith, to assist with public relations.
- The Canadian High Commission, Wellington, for the provision of films on Seminar subjects.
- The United States Information Service, Wellington, for the provision of display photographs.
- The Mayor and Corporation of the City of Nelson for assistance with publicity for the Seminar.
- Tasman Rental Cars (Nelson) Ltd for certain complimentary transport.
- The Management and Staff of The Rutherford Hotel, Nelson

PRESENTATIONS : FORECASTING TECHNIQUES - AND THE OUTLOOK

SESSION I : THE SYSTEMS APPROACH

CHAIRMAN: Mr R.M.D. Munro

PANELISTS: Professor G.A. Vignaux

Dr H. Barr

DISCUSSANT: Hon H.C. Templeton, M.P.

Professor Vignaux introduced his paper - "Systems, Systems Thinking and Future Studies" - by commenting that the "systems approach" is not a panacea but rather a way of structuring a complicated situation, of describing its characteristics and of assisting in its management or control.

Professor Vignaux said he would follow Churchman's definition of a system as "a set of parts co-ordinated to accomplish a set of goals".* Churchman had outlined five basic considerations to be kept in mind when thinking about a system. These were objectives, environment, resources, components and management. Professor Vignaux then discussed each of these factors in turn.

* C.W. Churchman, The Systems Approach, Delta Publishing Co., 1969, p.29.

It can be difficult to determine the real objectives of a system since, in many cases, they are not clearly known, much less enunciated. The scientist tries to move towards specific and quantitative measures of performance in terms of the objectives of the total system. This is valuable as it could help to clarify the problem (though it may not completely succeed in uncovering all the system's objectives). Futher, it produces a score which can be used to tell the observer how well the system is performing.

Environment : this is the aspect of the system which lies outside and surrounds it. The system is affected by it but cannot itself affect its environment materially. Aspects of the environment are called "exogenous". It is, however, often difficult to determine what is actually exogenous because the edges of a system are not necessarily well defined.

Resources are the means that the system has available to accomplish its ends and the components of a system are the interdependent parts that constitute it. Components are often sub-systems in their own right. It is useful to describe the system as a number of components because one can then attempt to discover how a particular component is assisting in the system's efforts to realize its goals.

The management of a system involves the measurement of performance, decisions to change the allocation of resources and, at a higher level, the modification or alteration of the system's objectives.

An additional factor of considerable importance is that of interaction between the system's various components. It is this property which ensures that the whole is more than the sum of its parts and makes the behaviour of systems both difficult to control and to forecast. If one is lucky and the boundaries of the sub-system are well-chosen, the interactions will be either small or at least easily describable. If one is unlucky or has chosen badly, the interaction effects can swamp the behaviour of the sub-systems quite dramatically and accuracy of modelling will then be wasted.

Professor Vignaux then described an example of systems thinking as used in a study of the agricultural area of the East Coast of New Zealand, north of Gisborne.

Discussing models and their uses, Professor Vignaux said that models are an amplification of the human thought process and, as such, form an important part of many systems studies. Models vary in type, design, implementation, and technique, but all have a common objective - to assist the analyst in the study of the systems being considered. In this context he discussed the Victoria Planning Model, the VUW-MER energy planning model, and the "Limits to Growth" model of the world human-ecological system.

For forecasting, Professor Vignaux said, modelling is particularly useful because no other method allows assumptions to be made quite so explicitly and because feedback can reveal the sensitivity of forecasts to these assumptions. The establishment of the Commission for the Future was itself an example of an adoption of the systems approach.

Dr Barr, who at the last moment kindly agreed to serve as a Seminar panelist in place of Professor Hines, who was ill, did not present a formal paper to the Seminar. Dr Barr did, however, circulate some notes on the systems approach and it was from these that he spoke.

The systems approach, Dr Barr said, is based on conceptual or mathematical models. Models were described as information processing devices. They reduce complexity by explaining a mass of data in a simple way. e.g., regression models. They are often only approximations or simplifications. Their use in planning is to investigate alternatives. Although the future is inherently unpredictable, models are useful in explaining and reducing the uncertainty of prediction.

The systems approach can be either 'mission-oriented' or 'descriptive'. When mission-oriented, concern is with control and how the managing group or decision makers can affect the system to achieve their objectives. The systems approach works best when objectives are easily understood and unanimously accepted by the people in the system; e.g., in wartime - win the war; in engineering - place a man on the moon; in business - maximise profit; in energy supply - meet the energy forecasts at least cost. However, when objectives are vague, or when there may be disagreement as to their suitability, the mission-oriented approach is less effective.

The descriptive approach is the scientific way of discovering new information. Here determining relationships is important, and control is a secondary consideration: e.g., human population systems, ecological systems, the system of the human body, the solar system. These systems do not have readily definable objectives, although the research on them could be

directed towards specific objectives. Knowledge, once obtained, can be used to manage the system; e.g., medicine, for the human body.

Dr Barr said that social, economic, and technical systems would be of most interest to the Commission. To the extent that these systems have vague objectives, and that their objectives change with time, the descriptive approach seems the more appropriate for investigating future behaviour. The advantage of the systems approach generally is that projections are based on inter-relationships between system components, including policy, rather than, for instance, on projecting past trends (a method that has been called "backcasting"). However, much data are needed before a quantitative system model can be attempted and not all situations can be usefully analysed with a systems approach.

A number of established techniques are used in systems studies. These range from the scenario approach, technological forecasting and technology assessment, corporate planning, planning programming and budgeting system (PPBS), and systems analysis, to specific modelling approaches such as linear programming, simulation and network analysis. Some of these are more appropriate for short-term policy decisions such as investment; e.g., corporate planning and PPBS. Many New Zealand examples of the systems approach are of this nature. Dr Barr then described a number of projects both in New Zealand and overseas which are utilizing systems studies.

Dr Barr warned that systems models, especially for purposes of control, necessarily entail centralization of information. It is then a small step to centralization of control, which is likely to lead to reduced individual freedom.

The systems approach does not resolve the political process of deciding society goals. Different sectors of society will see the objectives of a system in different ways. A systems approach reinforces the ability of the group who set the systems objectives to control or manipulate the system, in spite of disagreement with other groups.

There is no sure way to overcome such problems, but openness about model structure and publication of model findings, rather than secrecy, could be a help in reducing suspicion.

SESSION II : ECONOMICS

CHAIRMAN: Professor B. J. Ross

PANELISTS: Sir Frank Holmes
Professor A.J.L. Catt

DISCUSSANTS: Hon. Mr R. O. Douglas
Professor P. van Moeseke

Sir Frank Holmes did not present a paper to the seminar but addressed it on planning and its problems.

Planning was described as an exercise in the specification of objectives, goals, or targets in the light of an analysis of the capacity of the particular system under consideration to achieve them. For the Commission for the Future, the system to be considered was that of New Zealand as a whole.

Planning necessarily attempts to forecast the future. From these attempts the policy makers endeavour to develop an understanding of the likely consequences of adopting the most appealing options which lie before them.

Commenting specifically on forecasting in economics, Sir Frank said that the record had not been good and this was so

even in Britain and the United States where substantial resources had been involved. One of the major problems in this field lies in the serious limitations of trend projection. These limitations are caused inter alia by the constantly changing shape of today's complex economies, the expansion in the role of international banking and the increasing inter-dependency of economies linked by the rapid growth of international trade. Other factors include the general instability of the international monetary system, sharp changes in the prices of several key commodities, and increased capital flows which are often subject to large erratic fluctuations. The speed of technological change, varying policies of Governments, and shifts in weather-patterns all contribute to uncertainty.

For New Zealand there are special problems among which is its dependency on a narrow range of exports which are subject to wide price movement as well as political intervention in markets, particularly in Britain and the United States. While it is possible to moderate the internal impact of changes in export prices by the use of such techniques as farm stabilisation schemes, the manipulation of exchange rates, and fiscal and credit policies, it is much more difficult to moderate the impact of changes in import prices which have become a major factor contributing to New Zealand's inflation and balance of payments deficit.

Variations in import prices have added to the difficulties being experienced in the forecasting of the terms of trade and the balance of payments. Sir Frank said that as far as he knew, the extent of the increase in import prices which New Zealand had suffered had not been foreseen by any analyst.

The economic problems facing New Zealand have been aggravated by the still embryonic state of economic research in New Zealand

and the paucity of economists available to work in economic forecasting. Further, the emphasis to date has been almost entirely on forecasts for the short term. What little long term forecasting there was has been largely in forestry and power supply, but even in these areas research is insecurely based. Both the CFF and the New Zealand Planning Council (NZPC) have important roles to play in promoting more systematic approaches to all long term forecasting in New Zealand. Both bodies should be concerned about the shortage of people with special forecasting skills - a situation which is being accentuated by the emigration of qualified people.

The importance of contingency planning was then discussed. It would be most valuable, Sir Frank considered, to have studies conducted on such questions as the consequences of the discovery of oil in or around New Zealand and the possibilities of wool and butter being replaced by other products and the implications of this for New Zealand.

Sir Frank then described the major models being used for economic forecasting in New Zealand including those of the Reserve Bank, the New Zealand Institute of Economic Research (NZIER), and the Victoria University Economics Department.

On the NZIER Sir Frank noted that it is one of the few bodies that makes the effort to test the accuracy of its forecasts against what actually happened. For 1975/76 it had been found that the NZIER forecasts of the general level of activity had been considerably astray. In particular, they had underestimated farm incomes, company incomes, and capital formation. This was one indication of the uncertain basis of forecasting upon which decisions on policy and planning had to be made.

The Victoria University model was, Sir Frank said, not so much an attempt to forecast as an assessment of optimal growth paths and production mixes made on the basis of specific assumptions about, for example, the terms of trade, import ratios, and production functions.

Discussing the outlook for New Zealand, Sir Frank said that the Task Force had considered, and its views had been borne out by developments so far, that it would be unwise for New Zealand to rely on any significant improvement in the terms of trade to bring about an upswing in the economy. Even should there be an improvement in the terms of trade, the requirements to increase exports and restrict import values would continue.

Finally, Sir Frank said that there was a requirement for a body which could speculate about the possible future influences of developments in science and technology and about alternative futures for New Zealand. It would be most desirable that such a body maintain a bipartisan approach in its efforts.

It is essential that there be close co-ordination between the CFF and the NZPC. Their respective roles should be carefully and clearly defined. Every effort should be made to ensure the most efficient use of the scarce resources in New Zealand for planning and thinking about the future. To this end the two organisations should try to avoid duplication of effort.

Professor Catt introduced the abstract of his draft paper - "Economics Forecasting Techniques" - by defining the essential feature of Economics as a science as being the recognition that resources are limited, that they can be used for different purposes, that choices are therefore involved, and that the overall objective is to maximise welfare by correctly choosing the outputs to be produced and the means and techniques of production.

Economics forecasting, as distinct from other forms of forecasting, takes into account the resource constraints, the inter-reactions between them and the probability that the market mechanism will induce changes in the outputs over time and the proportions of inputs that are combined to produce the different outputs desired. In making forecasts, the economist takes as data, all the technical information available at the time, the sociological, philosophical, religious and political objectives of society at the time and in prospect, and he attempts to put them together to produce forecasts which are in accord with his basic acceptance of the truism that one cannot "get more than a pint out of a pint pot".

Notwithstanding the above, Professor Catt noted that there were many economic forecasts which could be made without taking into account the overall resource limitation, either because the item being forecast was of such small dimensions that its impact on the other variables could be ignored, or because the time perspective was so short that the ultimate reactions could be assumed not to have become effective. Such forecasts are said to be the result of "partial" analysis, and the techniques used probably differ little from those used in other disciplines.

The more specifically "economic" forecasts derived from "general equilibrium" analysis in which all the inter-relations, especially those relating to relative changes in prices and resource constraints, are taken into account. Professor Catt described the process by which the New Zealand Institute of Economic Research prepared its forecasts as being on a largely "ad hoc" or "judgmental" basis within the framework of the national income accounts. This process consisted of individual items in the accounts being first made independently by members of the staff who were required to be familiar with the data and with informed opinion in certain fields and to be in as good a position as possible to assess future changes. Once the independent estimates were made, they were put together and then, by a process of informal iteration in which the assumptions made in each estimate were made consistent throughout the exercise, eventually a final forecast would emerge which would at least have the merit of being internally consistent.

Professor Catt considered that this method was probably no less successful than that in which econometric models of the economy were used, but he believed that the best results were obtained by a combination of the two methods. When sophisticated mathematical models involving computer processing were used, it was possible to incorporate much more data and to allow for many more interreactions. But judgment and the other ingredients of "as hoc" forecasting were essential if large errors in forecasts were to be prevented, errors which resulted inter alia from changes in coefficients, or mathematical limitations.

Professor Catt felt that this form of forecasting would be appropriate to the Commission's work. Teams of experts in different fields could be established with a duty to produce estimates of change within each field; such estimates should then be amalgamated in such a way as to ensure both that resource

constraints were taken into account, and that the individual estimates reflect their inter-reactions with the other.

Where long-term economic forecasts had been made in the past, they tended to be of the "partial" variety and had really been the simple projection of trends from the past, adjusted for known changes in the factors on which the variable under consideration was believed to depend. The most elementary of these forecasts are simple extrapolations of the variable on the assumption that it is a function of time. Or these trends may be related to some other variable (e.g. population) in which case the future changes in population are deemed to have very definite effects on the demand for the product. More complicated extrapolations would allow for the fact that more than one factor affects the variable. Probably the most important examples of such forecasts would be those concerning electricity demand and housing.

Another type of forecasting in economics which could be of value to the CFF is "indicator analysis". As used in economics it is simply the identification of "leading", "coincident" and "lagging" series which enable economists to assess the progress of the business cycle. On first thought, Professor Catt said, one would not regard this as suitable to the time perspective of the CFF but, on further reflection, one could envisage it as a method by which cultural and other changes in New Zealand could be forecast by the examination of current trends in countries which are culturally more advanced or already enjoying the standards of living which this country might reach in, say, twenty years. He instanced demographic variations and leisure-use patterns, as non-economic aspects which might be susceptible to this type of analysis.

Concerning the more sophisticated techniques, Professor Catt said that the Seminar should distinguish between the "macro" models discussed above and "input-output" models. He emphasised that for useful long-term forecasts, both should be used. As its name suggests, a macro-model is one which is concerned with the economy "in the large", or at the aggregated level while the input-output model is concerned with the manner in which the various sectors of the economy can be integrated in order to maximise real output.

The input-output models were described as models which enable the economist to build in the resource constraints so essential for realistic forecasting. Thus they incorporate the technical requirements which state that to obtain a given output of food, say, there must be a, b, c, d ... etc. of inputs of land, labour, capital, imported components, and so forth. And at the same time they will show that the appropriate levels of production of food, shelter, services, etc. would be a', b', c', d' ... etc. The data for such coefficients in practice tend to be those which existed at a past point in time but if knowledge is available which suggested that there would be changes in the coefficients in the future, such amended coefficients could be inserted.

If all the requisite information is fed in, one should finish up with forecasts of possible inputs and outputs, relative prices, and other data from which the optimum mix of production could be derived.

Alternatively, such a model would provide the clues as to the direction in which policy action should follow.

Economics has tended traditionally to be concerned with the satisfaction of material wants in the form of goods and services. But there is no reason why non-material aspects of welfare (e.g., the reduction or prevention of pollution, the extension of leisure hours) should not be introduced into such models.

Provided one is clear as to what is being maximized, and provided there are data relating to the costs and the strength of the demand for or benefits from such forms of welfare, the techniques can be used. Professor Catt said that a point which must be made was that the actual forecasts resulting from techniques used in economics are subject to extremely large degrees of error - especially when used for long-range forecasting. The principal reasons are that human behaviour is highly unpredictable, and that data relating to the future are usually little more than guesswork. When these sources of error were combined with the extreme power of exponential change one had a situation in which very minor differences in assumptions could produce widely differing forecasts, and in which errors in assumptions could produce results which would be disastrous for policy making. In addition, the mathematical techniques used, complex as they are, nevertheless are really inadequate for our purposes. What economists had found, however, was that the models are useful for comparing the likely results of different proposed policies. Even in short-run forecasting, the most useful aspect of the forecasting models is to make decisions on the relative desirability of, say, a tariff change or an exchange rate change. It is probably in the area of comparison between, say, different growth strategies that the Commission for the Future would get most benefit from economists' experience.

Professor Catt said that, to be quite frank, he could not imagine how the Commission could make useful progress without the use of models such as those he had mentioned, despite their inevitable limitations.

Professor van Moeseke did not present a paper to the Seminar but spoke from notes of a paper he was in the process of preparing.

The economic problem, Professor van Moeseke said, is one of choice under conditions of material scarcity. The planning process involves, firstly, variables determined from the outside: these are the exogenous data such as resources, technology, population, and constraints in general. Secondly, the planning process involves variables which have been determined by the policy maker: these are the endogenous variables, in other words, the objectives in terms of decision variables (instruments). Examples of objectives included NNP per capita, employment, areas of green space and final demands in an input-output model. Examples of instruments were given as taxes, government expenditure and production levels in an input-output model.

Given the exogenous constraints, the instruments are directly, and the objectives indirectly, determined by the policy-maker. Accordingly forecasting is in its strictest sense limited to exogenous variables.

From a technical point of view, Professor van Moeseke said, a national plan could be formulated as a standard mathematical programme, i.e., the maximization of an objective under a number of constraints. However, to consider that one could search for a single national welfare function somehow weighing different objectives as different individual preferences is a dangerous illusion going back at least to Rousseau and is one which leads logically to dictatorship. It was stressed that the Condorcet voting paradox and the Arrow-Black impossibility theorem showed that, other than under dictatorship, no such single welfare function exists.

Accordingly the search is not for the maximization of one special objective, but for an efficient mix of several objectives. For a decision to be efficient it must be the case that no objective can, within the constraints of resources and technology, be further increased except by decreasing some other objective.

Concerning the outlook for New Zealand, Professor van Moeseke said that the sudden necessity of charting its own long-run course should bring New Zealand to a heightened awareness of the need to formulate fundamental objectives and to delineate basic alternatives. Being uncrowded, relatively unspoiled and geographically isolated, New Zealand is fortunate in finding its options still open.

New Zealand's population growth is high compared to most OECD countries. Whatever happened to the reproduction index, the labour force would continue to expand and it was hard to see how so narrow an economic base could provide the required extra approximately 25,000 jobs per annum for the next ten years without serious social and inflationary stress.

Professor van Moeseke noted that the presentation of efficient mixes of a number of objectives did not require any prior agreement on the priorities or the relative weights of the objectives being considered.

The roles of economic planner and economic policy-maker were distinguished. The planner presents the alternative efficient mixes of objectives, consistent with the constraints, but the policy-maker chooses among these alternatives. Nevertheless, Professor van Moeseke argued that it was important

that there should be some direct popular participation in deciding what mix should be chosen. This is the case in the Dutch Social and Economic Council and the point has been made in the final chapter of the Holmes Report.

Apart from the demographic problem, perhaps no more basic issue confronted New Zealand today than the necessity to make a clear decision for, or against, large scale industrialization. The choice was essentially between the development pattern of industrialized nations such as Germany, the Benelux countries and Britain; or the development pattern of the "peripheral nations" like the Scandinavian states, Austria, and Switzerland. The experience, high average performance and many similarities between New Zealand and the latter countries suggested, said Professor van Moeseke, that New Zealand should seriously consider the second alternative. Further, it seems that there will be a consistent high demand for such basics as agricultural, pastoral, forestry and paper products by a world population currently increasing at a rate approaching 100million per annum.

The major drawback concerning primary exports - low elasticity of world demand (and hence sharp fluctuations in the exporting countries' terms of trade) - could be mitigated by stockpiling, anticyclical foreign reserve management, and international agreements.

Discussing energy Professor van Moeseke mentioned inter alia that industrialization would inevitably increase New Zealand's dependence on imported fuels - even on a per capita basis - and this would aggravate its balance of payments problems. Nuclear power and its associated problems could well generate more strife than energy. Economically, nuclear power stations would mean increased dependence on foreign sources for capital, equipment, and uranium.

General equilibrium theory demonstrates, Professor van Moeseke said, that free market policy, determined by supply and demand, is efficient under a number of conditions including absence of externalities (congestion, pollution, public goods) and individual agents small enough to be price takers. These conditions are no longer even remotely satisfied. Worse, supply and demand emanate exclusively from the present, at the expense of future generations - a position hard to justify in a world where population now nears and soon will exceed the planet's carrying capacity.

The unavoidable alternative is long-term economic planning, at least of the indicative sort. Only a serious commitment to economic planning could counter the criticism most frequently levelled at Governments, the truncation of their policy horizon by the electoral term.

Professor van Moeseke concluded by saying that general activity analysis (e.g., input-output analysis) makes it possible to cope with the intersectoral, interregional, and intertemporal links between alternative objectives - and simultaneously to determine the resource prices, or shadow prices, consistent with the plan, as well as the trade-offs between different constraints.

SESSION III: RESOURCES (INCLUDING LAND USE)

CHAIRMAN: Mr P. Rankin

PANELISTS: Professor B.J. Ross
Dr A.D. Meister

DISCUSSANT: Professor J.F. Duncan

Speaking to his paper - "Forecasting Techniques for Resources (including land use)" - Professor Ross first stressed the impossibility of making meaningful forecasts for any single variable, for a significant period into the future, without making forecasts for the other major variables. He then noted that if the Commission was only to look a short distance into the future the simple extrapolation of existing trends would be an appropriate technique. But the Commission was tasked with looking much further into the future, for periods well beyond the applicability of trend projection techniques and, in this realm, one of the most useful techniques is one of the many varieties of modelling. However, any model which provides projections of a large number of variables is necessarily complex and this conflicts with the need for the model to be

understood by people other than the specialists involved in its construction.

In this context the particular modelling technique he wished to discuss, said Professor Ross, was input-output modelling. The essentials of this technique were then outlined. The technique is readily adapted to resource forecasting. The three requirements for the estimation of resource use by input-output analysis were described as (a) the expected levels of demand, (b) the state of technology, and (c) sufficiently detailed input-output tables. When an input-output model of the economy is being used for predictive purposes, the key element of the system is the inverse matrix by which estimates of the final demands of consuming sectors for the products of the productive sectors are used to derive estimates of the total output required from each sector.

It is possible to relate sectors' use of resources directly to output if one is given the expected levels of final demand on a sufficiently detailed input-output table. But the estimation of levels of final demand and of the technology that it is thought that productive sectors will be using, require substantial inter-disciplinary forecasting exercises in their own right. Nevertheless, once the total output of all sectors has been estimated for some point in the future, it is relatively simple to derive estimates of the use of each type of resource. Energy seemed to be the ultimate limiting resource.

Because of the problems associated with forecasting all of the variables required in the input-output model,

Professor Ross said he would hestitate to advocate input--output analysis as the ideal forecasting tool. Nevertheless it does have, he considered, a very constructive role to play in demonstrating to the public at large (and not merely the planning/policy-making elite) the possible implications of forecasts of some of the key variables, and differing assumptions about them.

Professor Ross said that he regretted not being able to present the Seminar with a set of alternative projections for New Zealand's future. This was because the Lincoln College input-output model as had been used for the NDC would require some minor modifications to show specifically the resource-use implications of different assumptions concerning population and incomes, and also because the data base needs to be brought up to date. It was an incredible but sad fact that it is not known in detail how New Zealand's land resources are being used today. Further, there seemed an absence of any integrated policy concerning future land use.

Finally, Professor Ross stressed that while input-output analysis is a valuable forecasting tool, economists required the assistance of specialists from other fields to sort out the alternatives which deserve the greatest attention from New Zealand's planners.

Dr Meister opened the introduction to his paper-"Forecasting or Planning Resource Use" - by noting the conflict that could arise between the use of resources to develop New Zealand's material standard of living, and the possible negative effect on the quality of life desired. Even if on balance high rates of resource use appeared beneficial in the short term, there could be adverse effects on the quality of life of future generations. It is this conflict which created a need for resource use planning and the determination of a point of equilibrium between material standards of living and the quality of life.

Distinguishing between forecasting and planning, Dr Meister defined forecasting as "the attempt to predict certain events or outcomes" while planning involved setting a "course of action which (would) be carried into effect by people who (had) the economic and legislative power to do so".

While the future could not be predicted, it could be explored. In planning it is necessary to make forecasts to consider what people are likely to do. In his paper Dr Meister said he had concentrated attention not on forecasting techniques, but rather on techniques which could be used for exploratory or feasibility studies and the results of which could be used in the formulation of resource use plans. He noted that the word "land" could often be substituted for "resources in general" and that economic and planning principles apply to all resources.

Although it is difficult to obtain a clear idea of the specific objectives of society, it is these which should be used as the criteria for judging the effectiveness of social and economic systems in allocating resources. Current concern over many matters relating to resource use indicated that present systems did not allocate resources in accordance with societal

objectives. These objectives should be most clearly defined and relative priorities stated.

Turning to planning Dr Meister said that this should necessarily involve full citizen participation. The planning process was described as a series of steps, all interdependent. They are:

1. Identification of issues and problems.
2. Identification of goals and objectives.
3. Evaluation of resources and determination of future needs.
4. Formulation of plans.
5. Implementation.
6. Review.

Dr Meister then further explored the 'Formulation of Plans', their 'Implementation' and 'Review'. Under the 'Formulation of Plans' he described the main approaches: inventory and descriptive analysis; predictive (positive) models; and normative, optimising models.

The inventory and descriptive analysis approach deals mainly with the resource supply side, and within it several methods of planning can be recognised representing a continuum of decreasing flexibility. The methods involve:

(a) "No Plan" incrementalism,
(b) the definition of resource standards,
(c) the identification of specific constraints,
(d) the specification of land systems,
(e) the identification of composite land capability.

Examples of predictive models mentioned were econometric and simulation models. Tools used in normative analysis include mathematical programming and input-output techniques. All these

various models and techniques were discussed and analysed and their advantages and disadvantages brought out.

The 'Implementation' stage was described as being the most difficult because at that point the conflicts between individual rights and resource use plans would be most apparent. Various overseas examples were then described.

Under the rubric 'Review', Dr Meister said that, whatever plan is instituted, regular reviews should be mandatory. Preferences and the needs of people change over time, as do socio-economic conditions.

Turning to the outlook for New Zealand, Dr Meister said that land is one of the country's major resources. Because the Commission for the Future would be looking at a period 5-25 years ahead, the Commission would have to consider the options concerning land use together with the objectives of society and the priorities placed on them. Particular attention should be paid to finding out how much prime agricultural land there is and how best it and all other land should be used.

Dr Meister concluded by saying that planning for the "best" use of New Zealand's resources does not depend merely on the application of a simple economic technique; nor, in fact, is there any "best" technique. Dr Meister stressed that before any planning should be undertaken, the values and preferences of New Zealanders must be identified.

SESSION IV : PEOPLE AND POPULATION

CHAIRMAN: Dr R.O.H. Irvine

PANELISTS: Professor D.C. Pitt

Mr C.J. O'Neill

DISCUSSANT: Mrs Silvia Cartwright

Professor Pitt began his introduction to his paper - "Population and Society in New Zealand's Future" - with a discussion of the three major schools involved in the population aspect of future studies.

These were described as

(a) the "doomsday" theorists who, generally speaking, argue that unless the population explosion can be stopped the world will exhaust its food and resources:

(b) the "post-industrial society" group which usually envisages a strict control on population growth; and

(c) the Marxist school whose theory and practice have generally emphasised restricted population growth.

Professor Pitt argued that there are grave faults in all three schools in so far as their approaches may be applied to New Zealand. He criticized these schools because of their deterministic basis, their reliance on strong centralised controls and elite dominance, their lack of recognition of the continuity of social life, and their general avoidance of the possible effects of human creativity.

New Zealand is fortunate to have become involved only recently in future studies. We could learn from the experience of other countries more advanced in the field and possibly as a result develop a new and innovative futurology - in the population as well as in others.

The Commission for the Future should be wary, Professor Pitt considered, of computerised societal modelling, simulation and gaming techniques and overly imaginative Delphi forecasting. Scenario development is more valuable. It is difficult to go past J.S. Mill's logic and correlation techniques and the Schutzians' and phenomenologists' common sense approach to the social sciences. Further, the new qualitative mathematics could well be useful.

For New Zealand, in contrast to overseas models of post-industrial societies, population growth rather than zero population growth should be emphasised. While careful observation of the experiences of comparable countries is necessary if the potentially valuable techniques involving precursive analysis are to be utilised, we should keep in mind that New Zealand is now much more an underdeveloped country than a candidate for "post-industrial" status.

In examining societal change in New Zealand the primary focus should be the population groups that comprise our society. Much more research - especially by participant observation techniques - is needed to enable us to understand how our various communal groupings function as well as interact in the total society. Generally it seemed that the social dynamics of many communities in New Zealand would result in a strong continued population increase in the foreseeable future - even if migration was kept to a minimum level. Both Maori and Polynesian growth rates appeared to be rising. Polynesian families would remain larger than those of the general population. With much evidence that the Welfare State is running down, the wide range of social and psychological functions served by the extended family is of increasing importance.

Noting the sensitivity and symbolic importance of population issues, Professor Pitt observed that there could be advantages for New Zealand society in the present population growth and even in reverting to a situation of migration inflow. Experience overseas indicates that local groups and communities want less rather than more centralised government control in all areas, including population. Any concerted attempt to control population either directly or indirectly could well lead to increased conflict among the pluralist groups in our society, and at the present time ethnic conflict in New Zealand was not far below the surface.

A number of reasons were advanced for a population growth policy in New Zealand. These included a correlation between static population and economic depression, and the requirement

for labour in the manufacturing and agricultural sectors of the economy. If labour was scarce then the necessity for increased capitalisation could adversely affect the balance of payments and this scarcity could, through the wage push factor, contribute to inflation. An underdeveloped country, if it is to avoid a crippling and demeaning dependency on outside capital, needs a large labour force.

The arguments against population growth and migration to New Zealand needed careful consideration. The unvarnished assertion that the more people there are, the less goods and services there are per capita, does not take into account the effects of the different resource and energy behaviour of the various social groups. Further, it is not necessarily true that greater numbers of people require more services from official agencies.

While acknowledging that the community in general had experienced some problems from the effects of immigration, Professor Pitt said that stopping immigration would not necessarily result in the cessation of these problems. In any case, the effects of "floating migration" (whether external or internal) need to be distinguished from the "chain migration" apparent within existing kinship or religious institutions. Much more needed to be known about the causes of our floating migration.

Generally speaking, far more important than population numbers or immigration is the kind of society that we have. Our plural society is valuable for a number of reasons, and in it the need is for a reversal of New Zealand's

historical pattern of cultural transfer from Pakeha to Polynesian, particularly concerning the value of the extended family. The anomic society is a most disadvantageous alternative to the plural structure we now possess.

Concluding, Professor Pitt stressed that futurology and planning are arts, not sciences. In both, participation must be a central element. A French Commissariat General du Plan Report had suggested that there should be committees of wise men at all levels of society. The need is for "barefoot futurologists".

Mr O'Neill introduced his paper - "Population Projections and New Zealand: The Certainty of Uncertainty" - by noting that over the last four years New Zealand's crude birth rate had been dropping very rapidly. The concern expressed during the last decade about the possible dangers associated with a rapidly increasing population and diminishing resources had now lessened, being replaced by concern about the problems of a declining population. Similar demographic changes had been occurring in certain European countries.

The aims of population projection are, Mr O'Neill said, to attempt to provide the essential numerical basis for social and economic planning. He stressed that not only did the reliability of the projection decrease the further the desired end-point, but also that there are hazards in shorter term projections. A projection was defined as "the calculation of future population size (total or components) which results from fully defined assumptions about the course of the relevant measures (fertility, mortality and migration)".

Discussing methods of projection, Mr O'Neill described the "continuity principle" and the present standard method of projection by components. Each of the three major components were then discussed in the light of past projection experience in New Zealand.

Mr O'Neill began by considering mortality projection. He criticized the Department of Statistics model as being inter alia overly conservative, and he suggested some methodological improvements.

Turning to projections of net migration, Mr O'Neill mentioned the special difficulties involved in making assumptions about the rate of net migration. The high variability in these rates

and lack of control over a substantial proportion of total movement introduces a large chance element into net migration projections.

The three basic methods of fertility projection - period and short fertility measures, and measures based on marriage parity progression ratios, were described and the particular values and uses of these methods were examined. Mention was also made of the influence of exogenous factors in the analysis of fertility data and the disadvantages that result from the largely inferential or intuitive approach to such factors in New Zealand.

Mr O'Neill then critically examined the Department of Statistics projections for the growth of the New Zealand population over both the last and the next twenty years. They showed, he said, how uncertain New Zealand's demographic future is and a plea was made for urgent research to reduce as far as possible the margin of error.

In considering New Zealand's demographic future, Mr O'Neill said that there are major difficulties involving not only marked fluctuations in period fertility (over relatively short time spans) but also the circumstances under which these occur - which are in several important respects historically unique. He suggested that the best, though still unsatisfactory, "predictor" of future population trends could lie in a close examination of present trends, associated with sufficient research to provide insights into current social behaviour, and hence, clues about the likely degree of continuity.

From a close examination of present trends both in New Zealand and in comparable countries elsewhere, the following could be suggested:

(a) that there would be a continued downward trend in generation fertility.

(b) that ex-nuptial pregnancy and ex-nuptial births would maintain a highly influential role in overall fertility patterns. Major implications would include a subsequent change in social attitutes and the likelihood that better contraceptive use and/or improved abortion facilities would significantly affect total fertility levels. Sterilization is an important issue but much more research is required on its likely demographic effects.

(c) that many of our policy options in the demographic field are already conditioned by the present population age structure (modified by migration and mortality). Thus it would appear that after 2000 the proportion of aged persons in the community will rapidly increase. Until then the age structure seemed, on balance, very favourable.

Mr O'Neill said that he believed the recent changes in fertility accorded with what people wanted and were therefore worthy of the greatest respect. Accordingly, the Government should ensure that its policies were in harmony with existing demographic trends. The need remains though for more research to reduce the certainty of an uncertain demographic future.

SESSION V : ENERGY

CHAIRMAN: Miss B.A. Wakem

PANELISTS: Dr G.S. Harris
Mr P.D. Lucas

DISCUSSANT: Mr M.M. Latham

Dr Harris said in introducing his paper - "Energy Scenarios for New Zealand" (prepared by him and others) - that it had been written as a result of concern about the energy aspects of New Zealand's future. Energy is typical of many growth-related problems and is one whose solution is most urgent.

The research methodology adopted was to pose the questions: if society were to adopt a particular set of values and live according to them, what might be some of the consequences of this type and level of activity on the energy system? The authors attempted to trace over a 50-year period the implications of the major policy option or dominant theme of the scenario. The three themes emphasised material wealth, pollution and resources respectively and the corresponding scenarios are known as "Continuation", "Low New Zealand Pollution" and "Limited Growth".

Dr Harris then described each of the three scenarios in turn, explaining their assumptions and the implications

of these assumptions for future energy use. The key features of each scenario were summarized in the table below.

The scenario research showed, Dr Harris said, that the most important of the issues facing New Zealand's future energy position was that of the scarcity of liquid fuel supply during the next 50 years. This was seen as having greater importance than the nuclear power issue.

The scenario research indicated that there was no simple solution to the liquid fuel supply problems and, further, that if economic growth continued at anything like past rates, then New Zealand's fossil fuels would be virtually exhausted by 2030.

Concerning nuclear power, Dr Harris said that if New Zealand's per capita economic growth rate were to be slightly lower than past levels nuclear power would not be required for at least another fifty years.

Dr Harris concluded his presentation by noting that scenario research had demonstrated that there are viable alternatives to the policies which had been followed in New Zealand over the last few years. What was now necessary was informed debate among all sections of society to find out what type of future the country wanted.

TABLE 1 KEY FEATURES IN THE THREE SCENARIOS

			CONTINUATION		LOW NEW ZEALAND POLLUTION		LIMITED GROWTH	
		1975	2000	2025	2000	2025	2000	2025
Population	Millions	3.1	4.2	5.0	4.2	5.0	3.6	3.7
GNP Per capita (1973) prices	dollars	2591	4840	8060	4490	6620	3782	4111
Primary energy per capita	GJ	134	285	498	179	184	130	151
Total consumer energy	PJ	302	816	1621	594	813	368	332
Domestic energy per capita	GJ	11	19	27	17	20	13	13
Commercial energy per employee	GJ	43	75	128	63	93	58	60
Industrial consumer energy	PJ	103	361	849	238	311	122	112
Steel production	kt	110	1000	1500	850	1000	110	110
Pulp production	kt	946	4300	12000	2400	2400	1300	1300
Aluminium production	kt	96	220	220	110	110	10	10
Fuel use in Cement, Glass etc.	PJ	15	40	79	31	45	15	10
Fuel use in Food Processing	PJ	23	44	66	26	22	21	18
Car kilometres	10^9 km	13	30	36	23	27	13	8
Aviation fuel	PJ	12	56	109	33	51	21	20
Total transport energy	PJ	126	232	460	217	310	136	104
Total primary energy	PJ	415	1195	2512	747	924	471	556
Electricity generation	PJ	71	211	550	134	180	81	86
Nuclear	PJ	0	9	363	0	0	0	0
Other thermal (including geothermal and in-plant)	PJ	15	100	48	29	36	6	5
Non thermal	PJ	56	102	139	105	144	75	81
Solid fuel	PJ	65	312	446	112	179	68	95
% Coal remaining	%	100	77	36	90	71	92	86
Gas (incl. wood gas)	PJ	12	235	103	172	161	62	35
% Natural gas remaining	%	100	60	20	71	29	86	80
Liquid fuel	PJ	213	375	631	275	370	173	102
Geothermal heat extracted	PJ	56	105	180	52	7	61	61
Energy imports	PJ	205	314	1597	221	320	154	0
% Imported primary energy	%	49	26	64	30	35	33	0

In introducing the paper from which he was to speak, "The Development of a New Zealand Energy Model", Mr Lucas said it should be noted that the paper was not his alone. He was a co-author with Messrs B. R. Smith and B. A. Murtagh of Victoria University's Department of Information Science, and had also received assistance in the preparation of the paper from his colleagues in the Ministry of Energy Resources.

One of modern society's major problems, Mr Lucas said, concerns the allocation of energy resources. The need for planning in this area is obvious and essential. In the past ad hoc policy analyses concerning individual sectors of the energy industry had been adequate, but this was no longer so. The energy industry was now so complex that policy decisions concerning one area could affect all the others.

The computer based model, which was described in the paper, was intended by the authors to provide a quantitative description of the entire energy industry in order to enable energy planners to make consistent evaluations of alternative policy decisions.

The problem being examined is that of determining the capacities and operating characteristics of process plants (e.g., power stations, oil and gas refinery plants) as well as the levels of energy supply in various forms to the end-use consumers.

A mathematical programming model was prepared where cost is minimised subject to various technical and environmental constraints. The model is sufficiently flexible to allow 'cost' to reflect a number of different attributes including, for example, overseas balance of payments

and total imported energy. Temporally and spatially, the model describes steady-state operation of the energy system at a given period of time.

Mr Lucas then described the details of the model. He outlined the flowcharts of the system and the target year approach utilised. Sub-models were specified for each logical group of processes, including the generation of electricity, the extraction and processing of natural gas, oil refining and coal mining.

Mr Lucas went on to describe the electricity generation and oil refinery submodels and outlined the procedure used to integrate the submodels into the overall model of the energy system. He explained that a high level matrix generator language was used to transform the data tables which describe the activities of the various supply and conversion processes into the format required for the linear programming computer code used.

Concluding, Mr Lucas said that the total model had proved useful in the analysis of various issues of energy policy. He stressed that the model was not intended to provide an unalterable master plan. Rather he saw the model as a tool which makes it possible to quantify the implications of energy policy options under a wide range of assumptions about the future. In this way a model can assist in the identification of policy options which would yield substantial benefits under a wide variety of future conditions.

SUGGESTED AREAS OF INTEREST

AND

POSSIBLE PROJECTS

I : SYSTEMS ANALYSIS

A. Major subjects/areas in which the Commission should be interested:

Systems analysis and macro-modelling.

B. Research and other projects which it was suggested that the Commission might wish to consider:

The development of a normative model based on the 'Continuation' scenario (as defined by the NZERDC).

II: ECONOMICS:

A. Major subjects/areas in which the Commission should be interested:

(1) Differing growth strategies

(2) Resource constraints

(3) Economic modelling

(4) Indicator analysis

(5) Leisure -use patterns

B. Research and other projects which it was suggested that the Commission might wish to consider:

(1) Research into New Zealand's economic goals and the likelihood of these being achieved.

(2) Further research towards the development of a comprehensive 'input-output' model of the economy.

(3) Studies to assist with the development of long term models of the economy.

(4) The application of indicator analysis to assist in the identification of New Zealand's possible economic futures.

(5) Contingency plan preparation including an examination of the likely effects of the discovery of oil in commercial quantities in or around New Zealand; and research into the implications of any significant substitution of other products for our major agricultural exports in our overseas markets.

(6) A study should be made of the likely effects on the New Zealand agricultural industry's comparative advantage of the rising costs of energy.

(7) A study should be prepared to suggest the likely size, shape, skills possessed, and training likely to be required by the work force up to 2000.

III : RESOURCES

A. Major subjects/areas in which the Commission should be interested:

(1) Public participation in resource allocation decision-making

(2) Resource allocation modelling

(3) Land ownership patterns

(4) Forestry

B. Research and other projects which it was suggested that the Commission might wish to consider:

(1) The development of normative, optimizing models for resource allocation.

(2) The modification of the input-output model (as used for the NDC) to adapt it both to bring its base up to date, and to show specifically the implications for resource use of different assumptions concerning population projections and differing income levels.

(3) Regular reviews of all plans for resource development.

(4) Encouragement of the centralisation of decision making concerning land use.

(5) An examination of present patterns of land ownership to help determine optimal land use.

(6) Research concerning the implications of any 'irreversible' effects of resource allocation.

(7) A study of the future of forestry.

(8) Encouragement of efforts to improve the timeliness and to widen the span of statistics in the resources area.

IV : PEOPLE AND POPULATION

A. Major subjects/areas in which the Commission should be interested:

(1) Marriage, fertility and reproduction

(2) Race relations

(3) Migration

(4) Regional development

(5) Women

(6) Manpower policies

(7) Social indicators

(8) Precursive analysis

B. Research and other projects which it was suggested the Commission might wish to consider:

(1) A study of the factors affecting, and of the motives for, childbirth and marriage.

(2) The psychology involved in the non-use of contraceptives.

(3) Research into the causes of changes in fertility patterns, including the effects of the increasing participation of women in the labour force.

(4) Research into the factors affecting the survival of the extended family.

(5) Research into the causes and implications for New Zealand of both present and probable patterns of migration both to and from New Zealand.

(6) An examination of the causes and implications of internal migration in New Zealand.

(7) A study of present and probable population patterns in the South Pacific.

(8) Research (especially involving participant observation techniques) concerning the functioning and interactions of New Zealand's major racial groupings.

(9) Research into the present value structures of the major racial groupings, including analyses of the effects of changes in these values and their implications.

(10) Analysis of the present and potential contributions to New Zealand of its major racial groupings.

(11) An examination of the developing resistance by ethnic groups to further research on their communities and of ways to co-operate with them in furthering significant research likely to be of benefit to them and nationally.

(12) The application of precursive analysis techniques to New Zealand's social, demographic and cultural futures.

(13) A study of the major decisions taken to date on people and population matters (e.g., by the NDC) and an analysis of the effects of the implementation of these decisions.

(14) Further research into societal groupings - especially women.

(15) The co-ordination of the various groups working on subjects in the people and population fields.

(16) An examination of manpower policies and forecasting in New Zealand with particular attention to unemployment and young people.

(17) An examination of the effects on New Zealand society of both inflation and likely economic developments.

(18) Research into social and demographic aspects of regional development.

(19) An examination of the current state of research concerning social indicators and their relevance to future studies.

(20) The production of an annotated bibliography of all social research conducted in New Zealand with appropriate attention to the methodologies utilised therein.

(21) The standardization of key demographic and sociological classifications, e.g., who is Maori?

(22) A study should be undertaken to ascertain the goals and aspirations of

(a) society as a whole;

(b) major communal and social groupings; and

(c) individuals.

An effort should be made to identify those areas in which frustration is likely and to suggest how this might be avoided.

(23) The possibility of modelling social development should be examined.

V : ENERGY

A. Major subjects/areas in which the Commission should be interested:

(1) Substitutes for presently utilised sources of energy, including nuclear power.

(2) Energy conservation.

B. Research and other projects which it was suggested that the Commission might wish to consider:

(1) Research into the world shortage of liquid petroleum-based fuels and likely effects on New Zealand (see also II B (5)).

(2) Research into energy-saving techniques and technological developments relevant to New Zealand's energy demand.

VI : MISCELLANEOUS

Research and other projects which it was suggested that the Commission might wish to consider:

(1) A compilation of all presently applicable official projections and plans should be undertaken. Where possible this should includenon-governmental organisations' plans which are likely to have a significant impact on the direction of New Zealand's future. Any contradictions or major discrepancies between these various plans should be noted.

(2) A list of the information the Commission considers it requires to help it determine the options open to New Zealand should be prepared. Comment should be made on the availability and adequacy of this information.

(3) The Commission should keep in close touch with comparable organisations overseas so as to be aware of their work and, where applicable, this should be adapted to New Zealand requirements.

(f) The Commission should maintain a close watch on the forecasts and the long-term plans of other countries to see how these might affect New Zealand's own forecasts and plans.

(5) An examination should be made of the roles of central and local government in decision-making; particular emphasis should be given to ways and means of increasing public participation in the long-term planning process.

(6) Possible catastrophic developments, both at home (e.g. a major destructive earthquake) and abroad (e.g. a breakdown of the world monetary system) should be assessed in terms of their likelihood and their expected effects. Where it was considered necessary, the requirement for contingency planning should be discussed with the relevent authorities.

(7) Likely developments in science and technology should be studied to determine their probable impact on New Zealand as well as on the international environment.

ANNEXES

ANNEX A

COMMISSION FOR THE FUTURE: TERMS OF REFERENCE

1. To consult with Departments of State, the NDC planning organisation (including its Councils and Committees) and such other instruments of State, professional and amateur associations and other organisations to the long term development of New Zealand of:-

   (a) present policies and decisions;

   (b) new world developments especially in technology

   (c) the possibility of world catastrophic events.

2. To make information on the above topics publicly available by issuing reports and in other suitable ways.

3. To initiate public discussion on the reports the Commission issues by press comment and by arranging meetings for suitable members of State Departments, NDC sectors, industry, other organisations and the general public.

4. To ensure that Members of Parliament and in particular, appropriate select committees, have opportunities of informing themselves of the issues raised in the Commission's reports and other areas within the Commission's responsibility especially immediately before they are to be debated in the House.

5. In consultation with the Parliamentary Counsel Office to draft legislation for establishing the commission by Act of Parliament, to be introduced as a bill in 1977.

6. To advise Government on the administrative and financial arrangements necessary to establish the Commission on a permanent basis.

7. To report progress through the Chairman of the Commission to the Ministers of National Development, Science, and Broadcasting, as appropriate.

ANNEX B

CFF NELSON SEMINAR : ATTENDANCE LIST

COMMISSION MEMBERS

Professor J.F. Duncan (Chairman),
Head, Department of Chemistry and
Professor of Inorganic and
Theoretical Chemistry,
Victoria University of Wellington,
WELLINGTON.

Hon. H.C. Templeton M.P.
Minister of Broadcasting,
Parliament Buildings,
WELLINGTON.

Hon. R. O. Douglas M.P.
Parliament Buildings,
WELLINGTON.

Mrs S.R. Cartwright,
Barrister and Solicitor,
Harkness, Henry and Company,
HAMILTON.

Dr R.O.H. Irvine,
Vice-Chancellor,
Otago University,
DUNEDIN.

Mr M.M. Latham,
Director of Planning,
Auckland Regional Authortiy,
AUCKLAND.

Miss B.A. Wakem,
Head of Programme Services,
Radio New Zealand,
WELLINGTON.

Unable to attend Seminar

Professor A.R. Frampton,
Head, Department of
Agricultural Economics
and Farm Management,
Massey University,
PALMERSTON NORTH.

Mr N.R. Moller,
Managing Director,
Moller Holdings,
NEW PLYMOUTH.

PANELISTS AND DISCUSSANTS

Dr H. Barr,*
Applied Mathematics Division,
DSIR,
WELLINGTON.

Professor A.J.L. Catt,
Department of Economics,
Waikato University,
HAMILTON.

Dr G.S. Harris,
Executive Officer,
NZ Energy Research and
Development Committee,
Auckland University,
AUCKLAND.

Sir Frank Holmes,
Chairman,
N.Z. Planning Council,
Mayfair Chambers,
The Terrace,
WELLINGTON.

Mr P.D. Lucas,
Ministry of Energy Resources,
WELLINGTON.

Dr A.D. Meister,
Department of Agricultural
Economics and Farm Management,
Massey University,
PALMERSTON NORTH.

Mr C J. O'Neill,
Department of Sociology,
Waikato University,
HAMILTON.

Professor D.C. Pitt,
Head, Department of
Sociology,
University of Auckland,
AUCKLAND.

Professor B.J. Ross,
Professor of Agricultural Economics
and Head, Department of Agricultural
Economics and Marketing,
Lincoln College,
CANTERBURY.

Professor P. van Moeseke,
Department of Economics,
Otago University,
DUNEDIN.

Professor G.A. Vignaux,*
Head, Department of
Information Science,
Victoria University of
Wellington,
WELLINGTON.

Unable to attend Seminar

Professor G.H. Hines,
Professor of Business Studies,
Dean of the Faculty of
Business,
Massey University,
PALMERSTON NORTH.

* Also Discussant

OBSERVERS

Dr Judith Johnston,
Department of Sociology,
Waikato University,
HAMILTON.

Ms J. Morel,
The Treasury,
WELLINGTON.

Mr Peter Rankin,
Ministry of Foreign Affairs,
WELLINGTON.

Dr R. H. Thornton,
Director,
Cawthron Institute,
NELSON.

CONFERENCE SECRETARIAT

Mr R.M.D. Munro (Conference Secretary),
Prime Minister's Department,
WELLINGTON.

Mr P. Daymond-King,
Head Office,
DSIR,
WELLINGTON.

Ms S. Duignan (Executive Officer),
Commission for the Future,
C/- Head Office,
DSIR,
WELLINGTON.

Mr T. C. Logan (Rapporteur),
Head Office,
DSIR,
WELLINGTON.

Mr R. Smith (Press Liaison),
Tourist and Publicity Department,
WELLINGTON.

CFF NELSON SEMINAR : SESSION ORGANISATION

SESSION NO.	TITLE	CHAIRMAN	PANELISTS	DISCUSSANT
I	The Systems Approach	Mr Munro (PM's)	Prof Vignaux (Victoria) Dr Barr (DSIR)	Hon Mr Templeton*
II	Economics - Forecasting Techniques	Prof Ross (Lincoln)	Sir Frank Holmes Prof Catt (Waikato)	Hon Mr Douglas* Prof van Moeseke (Otago)
III	Resources (including Land use) - Forecasting Techniques	Mr Rankin (MFA)	Prof Ross (Lincoln) Dr Meister (Massey)	Prof Duncan*
IV	People and Population - Forecasting Techniques	Dr Irvine*	Prof Pitt (Auckland) Mr O'Neill (Waikato)	Mrs Cartwright*
V	Energy - Forecasting Techniques	Miss Wakem*	Dr Harris (NZERDC) Mr Lucas (MER)	Mr Latham*
VI	Summing-up and Seminar Evaluation	Prof Duncan*		Prof Vignaux (Victoria) Dr Barr (DSIR)

* Commission Members

CFF NELSON SEMINAR : BRIEFING MATERIAL

1. GENERAL

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Dror, Yehezkel; Some fundamental philosophical, psychological and intellectual assumptions of futures studies. Pp. 145-165 in The Future as an Academic Discipline. Ciba Foundation Symposium 36 (new series). Amsterdam, Excerpta Medica, 1975.

2. THE SYSTEMS APPROACH

Beer, Stafford; Managing modern complexity. Futures, 2(3), September 1970 : 245-257.

Boulding, Kenneth E.; Predictive reliability and the future : the need for uncertainty. Pp. 57-64 in Rubin, Louis (ed.). The Future of Education : Perspectives on Tomorrow's Schooling. Boston, Allyn, 1975.

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