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Haulage rope passing underneath the gripper car and through the gripper on a Wellington cable car. An account of the old and the new cable car systems is given in the paper on p. 83.

Directions for the future

THE future may once have been the domain of the soothsayer and the clairvoyant, but, with growing concern about where the future is taking us, futurology has become an increasingly respectable subject. Future study institutes and courses are being set up round the world, and science, which has been largely responsible for the technological developments that have produced such vast social change, is taking a hand in looking at that future.

Evidence of this concern was the choice of "Directions for the Future" as the main theme of the recent ANZAAS conference in Auckland with the aim of looking at the place of science in our own future. Important addresses were given by Professor James Duncan, chairman of the recently set up New Zealand Commission for the Future, and by Professor Lars Ingelstam, director of the Secretariat for the Future Studies in Sweden. Several sessions were given to aspects of economic and social planning, and the theme was closely linked with another main topic of the conference, the social responsibility of the scientist. As one speaker pointed out, scientists as the great "manipulators of nature" also have the responsibility of being aware of what they are doing, how it fits in with the needs of society, and where their work is likely to lead.

Engineers as the practitioners of science, bringing to reality the potentials of science, must recognise and accept this same social responsibility.

How far, however, can science help us to examine this future? The methods of future studies include scenarios, strategies, paradigms, much use of the computer to discover where this or that proposed plan of action might lead us. But as one of those early exercises, the Club of Rome's study *The Limits to Growth*, showed, what comes out of the computer is always dependent on what is fed in and how it is programmed.

Analysis of history can give us some clues about where we might be heading, if we are clever enough to identify the relevant variables and combinations of variables. But cause and effect are rarely a straight line, and have become an increasing tangle of loops and feedbacks. We know the future will not be a continuation of the past, and that there is always the unsuspected round the corner to surprise us.

The crystal ball is notoriously cloudy. Even population predictors who like to hedge their bets by offering high, medium and low options can be taken unawares. Did the population predictors of the 1950s know that the birth control pill was waiting round the next corner or what its effects would be? Or, more recently, who in the 1960s could have predicted the sudden rise in oil prices in the next decade and the effects on the world economy?

So, although scientists may be doing their best, they are only too well aware of their limitations in this field. The rationalistic scientific method which has dominated western thought for the last few hundred years — and, let us admit it, has been responsible for tremendous benefits to mankind — may be losing its prime position, may not have all the answers. As the scientist knows, and as the recent *Encyclopaedia of Ignorance Book* (R. Duncan and Weston M. Smith (eds), Pergamon, 1977) amply shows, the areas of nature that have not yet yielded up their secrets are still huge. And even the scientific method needs some of those unpredictable and unmeasurable ingredients, insight and intuition and imagination.

So it is not difficult to accept that investigation of the future may be more than a scientific exercise, an exercise as well in philosophy, in morals, in ideology and faith. And back of it always is faith, and the confidence it brings in the nature and destiny of man. Yet faith is not an easy thing to put under the microscope. ▽

* Unless specifically indicated, statements or opinions in *New Zealand Engineering* do not necessarily reflect the views of the Institution or the publishers. Correspondence on material published is welcomed.

A half-century of progress in electricity supply

P. W. BLAKELEY
C. ENG., F.I.E.E. (FELLOW)

1. INTRODUCTION

THE complete freedom given to presidents of the Institution in the choice of subject for their address to the annual conference, although convenient, can also be embarrassing to the person concerned as he debates with himself what he should say on that unique and important occasion.

Presidential addresses over the past few years have covered the subjects of communication, engineering education, and safety. The two most recent addresses, those of Mr Ingram and Mr Scoular, with the intriguing titles of "Appropriate tautology" and "... fascinated by their own technology", dealt thoughtfully and analytically with the state of the engineering profession and the Institution.

I think these subjects have been adequately covered for the time being, and intend to concentrate mainly on the particular field of engineering in which I have been engaged for almost half a century — electricity supply.

Looking back over the list of Past Presidents for those who have worked in the same field, we find the names of J. C. Forsyth 1957-8, R. S. Maunder 1954-5, L. B. Hutton 1947-8, then three in successive years, A. O. Glasse, M. C. Henderson, and E. Hitchcock in 1942-3, 1941-2, and 1940-1.

All these gentlemen spent their careers primarily on the distribution side of the electricity supply industry. I joined the same side of the industry myself, as an eager but nervous youth, away back at the beginning of 1931, but transferred in 1939 to that dealing with generation, transmission and bulk supply. One has to go back to 1932-3 to find a President engaged solely in these aspects of electricity supply, in the person of F. T. M. Kissel. He held, at that time, the position of Chief Electrical Engineer of the Hydro-electric Branch of the Public Works Department. Later, in 1946, he became the first General Manager of the newly formed State Hydro-electric Department, subsequently renamed the New Zealand Electricity Department, and now the Electricity Division of the Ministry of Energy, the identical position to that which I have held since 1972. It is interesting to note that, despite his title, he described himself, in introducing his Presidential address, as a civil engineer, and quoted Thomas Tredgold's famous definition of civil engineering, "the art of directing the great sources of power in nature for the use and convenience of man". Mr Kissel did, in fact, make a name for himself as a civil engineer in the State's first venture into electricity generation in the Lake Coleridge hydro-electric scheme. I would point out also that when the address was given our Institution was still called the New Zealand Society of Civil Engineers. The change to the present name did not occur until 1937, one of the prime movers in obtaining agreement to the change being the same F. T. M. Kissel.



The most recent address on the subject of electricity supply was that of Mr Forsyth in 1957-8, with the title "Electricity, energy and human welfare". Mr Kissel did not give his address a title, but it is recorded in *Learning, Service, Achievement* as "Economics of electricity supply". Substantially the same material was used a few months later in a paper submitted to the Institution of Electrical Engineers, headed "The organisation of electricity supply in New Zealand". It did not confine itself to generation only, but covered the whole gamut of history, legislation, organisation, and operation of electricity supply at all levels. It went into a great deal more detail than I am prepared to risk this evening. Either audiences in those days had much greater powers of concentration or higher levels of tolerance than I would judge modern audiences to have — with no disrespect to present company, of course — or Mr Kissel was endowed with gifts of dynamic presentation far beyond those I would claim to possess.

I propose in this address to take up where Mr Kissel left off, and to describe the main developments which have taken place in the intervening period of nearly fifty years. This also fits in very nicely with the recognition being given to the 50th anniversary of the Wellington Branch, hosts for the conference. Also when one considers utter dependence on electricity of our main exporting industries (farm produce, forest products, and aluminium, to mention just a few), my subject seems reasonably