The Post War Project in Western Australia
A discussion about two case studies into Australian engineering development during the second half of the 20th century.

Leigh Edmonds

INTRODUCTION - THE POINT OF THE DISCUSSION

In 1951 Western Australia's electricity generating capacity was around 100 megawatts. By the year 2000 it had grown to over 3000 megawatts. In 1950 Western Australia had no generating stations with a capacity over 100 megawatts, by the end of the century it had five stations exceeding that capacity and most went well beyond it. Similarly, there were no high tension transmission lines to speak of in Western Australia in 1950 but by the end of the century the interconnected system filled the south west corner of the State and stretched as far north as Geraldton and Kalbarri and as far east at Kalgoorlie (an area larger than the state of Victoria).

At the same time Western Australia's network of sealed roads has extended from a small system in 1950 with sealed black-top linking Perth with only the main cities of Albany, Bunbury and Geraldton. By the end of the century the State's sealed road system extended all the way from the border with South Australia in the south to the border with the Northern Territory in the north and included every city and most settled areas. In Perth, where there had been four bridges across the Swan and Canning Rivers in the city in 1950 there were, by the end of the century, ten.[1]

There was similar rapid expansion in other aspects of the development of Western Australia including telecommunications, housing and water supply (which remain to be studied). In retrospect these developments seem natural (whatever that means), a logic outcome of the development that had commenced in Western Australia and, to take the broader view, Australia as a whole, following the commencement of white settlement. But while it is true that all the British colonies in Australia followed broadly similar trends in the period up to Federation they did not experience the same developments at the same time. For example, in Victoria the discovery of gold in the 1850s was the major impetus for the prosperity and growth that followed until the 1890s while Western Australia had to wait until the 1890s for a similar boom, also spurred by gold. Engineering infrastructure developments in those colonies became necessary and affordable only when they had the prerequisite wealth and population. (Railways, the high technology transport system of the day, are the prime example of different timing in engineering development.)

The purpose of this paper is to use the examples of provision of electricity and roads in Western Australia after World War II as a case study for discussing the sources of the rapid development that took place. It is generally understood that similar developments took place across Australia in the post-war period but a study of those engineering infrastructure development and the causes that led to them is well beyond the scope of one small paper. Hence this paper looks at two cases in one state but suggests the possibility that the factors that influenced developments in electricity and road development in Western Australia are also applicable to understanding most engineering infrastructure development in Australia in the post war period.

The most important question arising from this case study is perhaps whether engineering infrastructure developments in Australia would have followed a similar trend had it not been for World War II and the lessons it taught Australians. This is, of course, a counter-factual argument and outside the scope of historical study. But it seems to me that the enormity of the war and the mobilization of Australian civil society that occurred to wage total war was a turning point in Australian development and that we owe the current flavour and nature of Australian society to the lessons and decisions made in the 1940s, during and immediately following the war. As an example, but also an aside, the multicultural nature of present day Australian society is the result of mass migration into this country beginning in the late 1940s which was intended to achieve two ends - boost our population as defence against future aggression and provide labour for the post war project of developing and industrializing Australia. Both these objectives became goals for Australians as a result of the experience of total war.

The lessons of war and the massive development of engineering infrastructure that commenced in the immediate post-war period, which continued into the 1980s and still dominates our daily lives (with, for example, running good quality water, reliable electricity supply and good quality roads) shaped a generation or more with ideas of development and growth and how it was to be achieved, by building things to provide these services. This happened across the whole of Australia in more or less the same fashion because the experience of war had shaped Australian decision makers no

matter where they lived in two ways. It had brought them together in common decision making processes in ways that had not been necessary or possible before and it had made the Commonwealth government the dominant government in the nation. Decisions made in Canberra became the starting point for most development across Australia.

The provision of engineering infrastructure requires several basic ingredients. It requires the stage on which to work, the tools to do the work and the will to do it. In this paper the stage is a small one - two areas of development in Western Australia - but it suggests a much larger stage, the whole of Australia. The tools include such elements as the capital to pay for works, the manpower and equipment necessary for the construction process and the engineering expertise necessary to design the infrastructure and to bring all the elements together successfully. Most important, however, is the *will* to undertake such projects. Without this *will* nothing happens even if there is the stage and all the tools are in place. (There is an increasingly interesting field of study in the history of technology which looks at failure and why it occurs, and in many occasions the lack of *will* led to a project's failure.[2])

This paper examines primarily the *will* to undertake the provision of extensive engineering infrastructure in Western Australia and suggests that this *will* was motivated by the experience and lessons of what could be achieved when the energy of a nation was focussed on achieving major objectives such as development and industrialisation. During the war this energy had been focussed on defeating the enemy, in the post war period the objectives were more diffuse but also much more grandiose because they looked to a future of prosperity and progress, not just military victory. Perhaps, by creating those ideals and a program for achieving them, the planners and engineers of the immediate post-war period did much to create the world that we now live in.

THE STAGE
WESTERN AUSTRALIA AT THE END OF WORLD WAR II.

In 1947 the population of Western Australia was 502 480, only 1/15th of Australia's total population of 7 579 358.[3] The state, with an area of almost one million square miles, occupied one third of the Australian continent but most of that area was, by the standards of the day, considered largely unproductive except for very low density pastoral activity and the residue of mining activity in the eastern goldfields. White settlement was concentrated in the south west corner of the state. More than half the population, 272 528 people, lived in Perth, 51 800 lived in other towns and the rest in rural areas.[4]

Even in the south west infrastructure provision was minimal. The depression and following war had left roads largely undeveloped and unmaintained for a decade or more. Around Perth reasonable roads did not extend outside the city area (nowadays considered the inner city) while in the wheat belt roads were generally only graded earth or gravel. (Like the rest of Australia the development of the grain industry had occurred during the age of railway development and roads were considered mainly routes of access from farm gates to railway stations and sidings, not trunk transport routes.) Outside the agricultural areas roads could barely be said to exist and in the far north the roads that had existed had been so badly damaged by military traffic that the Army agreed to make a significant contribution to their reconstruction when the war ended.

The provision of electrical services was, if anything, even more ramshackle. Where electricity was provided to communities it was on a local basis with local governments or private operators running power houses providing power in as many different forms at it was possible to imagine; AC or DC and in a variety of voltages and cycles. Perth was supplied from one power house where the most recently installed generation unit, providing 25 megawatts, had been commissioned in 1938 and run almost continually thereafter without comprehensive maintenance so it had become thoroughly unreliable by the end of the war. Blackouts had become a way of life in the city and the situation was so desperate that the electricity authorities were almost deliberately discouraging people from buying and using electrical appliances to restrict the growth in demand for power.

Like the rest of Australia, Western Australia was mainly considered a producer and exporter of raw materials and foodstuffs; wheat and flour, gold and other metals, meat, dairy products and the like. In the ten years before the war only 5 per cent of Australia's exports were manufactured. Australia's imports, on the other hand, consisted mainly of manufactured goods.[5]

THE TOOLS
TO MAKE DEVELOPMENT POSSIBLE

Before and during World War II a wide range of new technologies were developed and brought to maturity that could make large scale engineering infrastructure works feasible in Western Australia. Many of them did not appear in Western Australia during or immediately after the war but the fact that they were developed and in use elsewhere meant

that when conditions and the need arose they could be brought to Western Australia ready to be used. In addition the war had caused large scale population dislocation in Europe while the war had largely placed the control of the national economy in the hands of the Commonwealth government. A further necessary resource was the engineering graduates who had been trained in Western Australia, principally at the University of Western Australia, and who had been steeped in local engineering traditions such as the achievements of C Y O'Connor.

All these tools were available and ready when they were needed in post-war Western Australia. The history of each is a study in itself and the details of those stories can only be hinted at here.

Equipment

Before the war large equipment for earth moving or other construction work was largely missing from the Western Australian landscape. In road making motorised transport was beginning to replace horse drawn wagons and graders but most of the construction work was done by hard manual labour. This trend was, coincidentally, encouraged by the economic conditions of the depression in which public works were a major way of creating employment. Even in the immediate post war period it was very difficult to obtain halfway decent equipment and until the early 1950s the only thing that saved some road making equipment from the scrap heap was the fact that no replacements were available. However, from the early 1950s road making equipment became more freely available and began to redefine the time and cost involved in constructing roads. A simple bulldozer could clear a road alignment in a few hours whereas it would have taken a gang of men weeks to do the same work ten or twenty years earlier. In the early 1960s Main Roads began using scrapers to move soil and found it so reduced the cost of earthworks that they were soon in demand for work across the state. These technologies not only made work cheaper but also made it possible to contemplate works of greater scope, size and complexity.

Similar changes effected construction of the electricity infrastructure. When the first 66-kilovolt transmission lines were constructed around Perth in the early 1950s all the holes were dug by hand, the poles lifted in manually and the concrete was mixed using small concrete mixers, shovels and wheelbarrows. In comparison, when the 220-kilovolt transmission line was constructed to link Kalgoorlie into the interconnected system in the mid 1980s mechanisation meant it only took 12 months to construct the 655 kilometre long line.

The computer also made a significant change to the provision of engineering infrastructure. The war gave the initial impetus to development of modern computers but it was not really until the 1960s that they began to make a significant contribution to the provision of engineering infrastructure in Western Australia. Main Roads Western Australia purchased its first computer in 1962 to help compute the structures and grades in the Narrows Interchange and soon found it indispensable for other work. The State Electricity Commission also began using computers, for accounting and billing its customers but also for operating the interconnected system, operating power stations and in calculation and design work. Without this technology much of the sophistication of engineering design in Western Australia from the 1970s would have been impossible.

Manpower

One of the initial objectives of post-war planning was to provide full employment for the Australian population but it soon became obvious that the existing Australian workforce would not be sufficient to do the work that was planned. For example, despite rapid expansion by 1948 Main Roads had accumulate over £1 730 000 unspent from previous years partly because of a shortage of labour. It could have employed 800 men but only had a workforce of 532.

In 1945 the Commonwealth government decided that 70 000 migrants a year would be brought to Australia to help increase the population and, although this figure was not achieve until 1949, by the end of 1953 over 772 000 migrants had arrived in Australia. Thirty-six per cent of the migrants were European war refugees, commonly called 'displaced persons' or 'DPs' and, between 1948 and 1950, a little more than 19 000 DPs went to Western Australia, 5914 of them adult males. They signed a contract in which they agreed to work for the Government for two years and, for its part, the Government agreed to find them a job and provide them with accommodation.

Migrants became a major contributor to the workforce during the 1950s and from the 1960s the generation that had been born in Australia immediately after the war also began to enter the work force. Consequently the workforce in Western Australia grew from 206 000 men and women in 1947 to 339 000 in 1966 and 591 000 by 1981.[6]

Money

The Commonwealth government recognised the importance of roads to national development in the 1920s and

set up funding arrangements to pay the States to undertake major road works. This arrangement continued in a variety of forms until the 1990s and, although the States remained adamant that the Commonwealth never gave them enough and was too stringent in its funding conditions, it was that funding that made possible a large percentage of road works in Western Australia. In 1947 the Commonwealth provided its road funding through duty paid on customs and excise on petrol and that year it increased total payment to the States from £3.2 million to £7.2 million a year. A new Act in 1950 allocated even more money with the justification that roads helped to develop resources and made transport more efficient. Western Australia received 19.2 per cent of the allocation because the funding formula used to allocate money to the States was based partly on population and partly on land area. It was not until the 1970s that the increasing cost of road construction and the failure of the Commonwealth to meet that growth forced the Western Australian government's contribution to road funding to increase, eventually equalling that of the Commonwealth government during the 1980s and also it mostly from a levy on fuel use.

Funding for the development of electricity generation and transmission in Western Australia was entirely different. The Commonwealth had nothing to do with it and the State government avoided the issue as well. The State Electricity Commission was a government owned organisation with, by 1969, 230 000 customers. It operated, to some extent, like a privately owned company. It had to borrow to fund its expansion, raising its first public loan in 1952 and later also raising private loans. By the end of the 1950s it was raising around $4.8 million a years in loans and by the end of the 1960s that had risen to $15 million a year. By the time the Commission was converted into 'Western Power' in 1995 it had debts totalling $2 178 million, giving it the very high debt-equity ratio of 80:20. Nevertheless, this large debt had been considered acceptable by the government and its energy advisors for the development of the State.

Engineering expertise

The engineers who were responsible for Western Australia's roads and power supply at the end of the war were experienced engineers who had begun their careers in the 1920s or earlier. They were highly knowledgeable and from what might be termed the 'old school' of engineering in which experience usually counted for more than theoretical knowledge. They strongly influenced the philosophy of the small number of engineers who were employed from the 1930s and that generation continued in control into the 1960s. They infused those who worked under them with a respect for and sense of responsibility to the community for the public services they provided.

The engineers who then became the leaders in Main Roads and the State Electricity Commission were of the generation that had gained their education, most often at the Engineering School at the University of Western Australia, in the 1940s and early 1950s. The number of students enrolled at that time was relatively small and they got to know each other, forming a bond that lasted through their careers. (There is a photographs of a rowing team at UWA around the mid 1940s in which two team members were Don Aitken (later Commissioner of Main Roads) and Gilbert Marsh (later one of the best bridge builders in Australia) and a third may have been Dave Eustice (who also became a Director in Main Roads).) The State Electricity Commission also began employing young engineers from the late 1940s and many of them graduated within a few years of each other and continued to work together into the 1980s.

Before the war many people called engineers did not have the academic qualifications that would later become necessary to enter the profession. Both Main Roads and the State Electricity Commission were engineering organisations and their leaders were trained engineers, and after the war they began employing university trained engineers. Even so, there were not many and in the early 1950s Edmondson, the Commission's General Manager, fondly referred to his 'fourteen bright boys'. In Main Roads John Punch (whose term as Commissioner was cut short by his untimely death after only a year) was particularly keen on the professional development of engineering and Don Aitken, who followed him as Commissioner, made sure there were many opportunities for engineers to continue their professional development.

Even with an academic training behind them both the Commission and Main Roads believed their engineers had to be given fully rounded training. Many engineers entering the Commission were cycled through the major disciplines of power house construction and operation - civil, electrical, mechanical and operations. Bill Gillies told them that what they had learned at university was only background information and they would learn on the job. Similarly, in Main Roads is was commonly held that engineers had to learn in the field and that a good engineer was one who paid attention to the experience and advice of his foremen and gangers. In both organisations engineers were also expected to develop as managers as well as professional engineers.

All these circumstances combined to create a generation or two of engineers who were imbued with a sense of their value to the community, not through self importance (as a rule) but because they believed the work they were trained to do was vital to the development of their community. They had been told that the material progress necessary to improve society would be achieved through their application of logical principles to problems in a scientific way, leading

to the creation of reliable and usable infrastructure without which the goal of prosperity for all could not be achieved.

These engineers had grown to maturity in the shadow of the war and their belief structures were shaped by what they saw around them and the spirit of optimism of the time. The principles of organisation and *will* that had helped to win the war could now be turned to an even more worthy goal, universal and long lasting prosperity. They accepted this view as a valid description of how the future would be shaped and how they could contribute to it. And that is what they did for the next thirty or so years. When society began to change from the late 1970s those changes, which espoused other values, often left them somewhat bemused (or even confused) about what lay in the future and what their role in it was. Fortunately most of them had reached retirement age so they found other useful things to do.

THE *WILL*
THE SOURCE OF DEVELOPMENT

In 1943, when the Chifley Labor government was in power in Canberra, the Labour Party Conference passed a resolution recommending that the government should undertake planning that looked to post-war reconstruction and the attainment of five objectives. They included full employment, equality of education and occupational opportunity and reductions of social inequalities, but its first two objectives were:

The proper use of the nation's productive resources, techniques, skill, scientific discoveries and inventions, so as to attain and maintain a high, rising, standard of living, and

These resources to be used for the production and distribution, in sufficient quantities, of the goods and services required to meet the fundamental needs of the whole population for sound nutrition, adequate clothing, housing, medical care and education.[7]

The Minister for Post-war Reconstruction of the time, Ben Chifley, put the matter even more succinctly when he said that the fundamental goal of the government was full employment, that this would lead to rising living standards and that, '... only on that basis can this country develop its resources fully and build up its population.'[8]

The emphasis the Curtin government gave to full employment and equality of opportunity in the coming post-war world makes perfect sense, given the horror of the depression that Australia had just lived through and then the experience of virtual helplessness in the face of Japanese aggression. These two overwhelming threats to the nation had to be avoided in the future and that could only be done by making sure every Australian had the opportunity to make Australia a stronger, more prosperous place. It was not just a necessity to improve the lives of Australians, it was a imperative for future national survival.

These announcements were made in 1943, a time when it appeared that the tide of the war was turning, that the Axis powers had been halted in their military aggression but also at a time when final victory over them was not yet assured and was certainly a long way off. The military situation had been more precarious in December 1942 when a special portfolio of Post-war Reconstruction had been created with the Treasurer, Ben Chifley, appointed to it and Dr H C Coombs, Director of Rationing and formerly Economist in the Treasury, became its Director. The Ministry of Post-war Reconstruction (which was headed by John Dedman by 1945) consisted of the Department of Post-War Reconstruction and several Commissions and Committees directly under the Minister. This complex Ministry conducted investigations, prepared reports and plans and set the ground for what would be undertaken when the war was won and also when it became clear that victory was close at hand.[9]

The Ministry of Post-war Reconstruction operated in many, almost all, areas of civil society. They included housing, soldier settlement on the land, primary production, secondary industries, the liquidating of war stocks and industries, demobilisation and reestablishment of service personnel, social services and, most importantly here, post-war public works.

In 1944 the Commonwealth and State governments set up the National Works Council, comprising the Prime Minister and State Premiers, to prepare a program of national works in three stages designed to merge together and provide a smooth transition from war to peace-time employment and development. The first stage was to include the most urgent works which had been postponed due to the war but were vital to enable the life of the civil community to go on. The Council met in January 1944 and allocated £153 million to these projects which represented over 4 000 separate projects and which, if concentrated into two years, would give full time employment to 50 000 men. The Council did not decide on the rate at which these project would be undertaken, that would depend on the employment situation. With the list of first priorities decided the Council went on to prepare plans for a second program of less urgent works which was to be followed by more developmental work requiring intensive investigation. The programs covered local government works in addition to State and Commonwealth Works.[10]

In addition to creating these works programs the National Works Council encouraged the States in the development of regional planning which included the establishment of machinery for determining suitable regions, larger

than existing local government areas, for the planning of development.[11] Western Australia established its own committee and organisation to plan for post-war reconstruction, headed by the Director of Public Works, Russell Dumas. Its investigations and planning included all areas of the future development of Western Australia including its roads and electricity supply. The drive for these investigations and plans was explained plainly by the Western Australian Transport Board which said: 'There is no doubt that the lessons of war should be applied towards progress and development in time of peace...'[12]

In December 1944 the Western Australian government decided to take a keener interest in the north west of the state and appointed a committee to examine ways to develop the region including work on water supplies, ports, roads, mining, oil prospecting and primary production. Jim Young, the Commissioner of Main Roads at that time, was a member of the committee and convened a sub-committee to investigate and report on the condition of transport there and how it could be improved. The committee's report suggested that reasonable road facilities could be provided by constructing 3 799 miles of relatively primitive roads which would be usable in all but the worst weather and that this would be the first stage towards helping the growth of industry and pastoralism in the region. Young said that this would only be possible because modern road-making equipment made the work possible despite limited funds. The government responded by allocating £100 000 a year to be spent in the next two years, many times more than had ever been allocated to the region before and Main Roads had, at that time, neither the manpower or equipment available for such rapid development.

Other planning for the development of the State when the war ended was also under way. In 1943 and 1944 a small team of engineers and draftsmen in Perth began planning a new power station for the city and the man in charge of the project, William Taylor, flew to Britain in November 1944 with completed plans and specifications to call for tenders from British manufacturers from offices in London. This new station, to be constructed at South Fremantle, would provide a full 100 megawatts of power to the city and surrounds, more than doubling the available capacity. It was constructed and commissioned in two stages, the first unit commenced operation in May 1951 and the final unit in December 1954. The South Fremantle Power Station became the model on which all Western Australian power stations for the coming thirty years were based.

Perhaps more important in the long term was another planning project commenced in 1943 to study how order might be brought to the provision of electrical power to the south west of Western Australia. The report was completed in 1945 and said that providing relatively cheap and reliable electricity would be very important to the future development of the south west and that it should be done. The scheme should bring electricity to the maximum possible number of people while keeping costs (and consequently the prices to be charged) within practical limits that would;

enable people in the area of supply to make use of the many labour-saving devices for the farm, the factory, and the homes of the country towns, so making available the electrical amenities of the city to the man on the land, and in the country towns.

The report gave details for an electricity network that would link towns as far apart as Brookton in the north and Albany in the south, Margaret River in the west and Gnowangerup in the east. It would take many years to complete and be expensive, but it was necessary for the future development of the region and the State. The government decided that the future of electricity development in Western Australia lay in bringing the development of electricity generating and distribution in the Perth region and in the south west under the control of a new organisation and set up the State Electricity Commission which came into existence in March 1946.

Just as the State Government had adopted the Main Roads proposal for road development in the north west it accepted the proposal for electricity development in the south west and set up the South West Power Scheme. In the north west Main Roads appointed Ron Duncan as its engineer in charge and he set the model for what a Main Roads engineer should be like for the coming generation. Similarly, J B Jukes was given responsibility for the South West Power Scheme and a generation of SECWA engineers modelled themselves on what they learned from and saw in him.

Despite its pioneering work in the north west Main Roads, like the State Electricity Commission, concentrated its work in the immediate post war period to the development of the south west. Both used stage development techniques and the provision of low cost technology to provide services to as many people as possible. Main Roads constructed sealed roads 12 feet wide rather than conventional wider roads so as many miles of roads as possible count be constructed with the available resources while the State Electricity Commission provided power to farming areas using a single-line transmission system. Both also used subsidy schemes, the Contributor Extension Scheme (for power) and the Contributory Bitumen Surfacing Scheme (for roads) to harness extra funds from local areas to help provide their services to them. During the 1950s there were a succession of opening ceremonies when the new black-top roads to towns were opened and when they were linked into to the interconnected system. To everyone it seemed like a period of great progress.

(It is likely that development of the region took place in the provision of other forms of infrastructure such as

water supply, sewerage and modernisation of the railways. These developments have yet to be studied. One example from my research is the provision of radio stations in the decade from 1945 which filled in blanks in the reception area of the south west that had existed after the initial construction of radio stations in the 1930s. They were 6GN at Geraldton (1945), 6CI at Collie (1948), 6NA at Narrogin (1951), 6NM at Northam (1955) and 6VA and 6AL at Albany (1956).[13])

From the 1960s Main Roads swung its main construction effort to the north of the state in response to the need to develop that region. The Kimberley Division was created in 1960 to pay particular attention to the provision of roads to serve the cattle business and in 1971 the Pilbara Division was created to provide roads in the region that primarily served the new mining industry and the infrastructure and services it required. During this period a major effort went into construction of major trunk roads such as the Eyre Highway linking Western Australia to the eastern states and the North West Coastal and Great Northern Highways that linked the north with the south of the state.

At the same time the State Electricity Commission continued the expansion of its interconnected system and took responsibility for provision of power in the regions to the north, establishing, for example, a major power station at Port Hedland and eventually a small interconnected system serving several communities that were relatively close together and had largely developed as a response to the mining boom. In the south the interconnected system expanded so far to the north and east that it redefined the idea of what the south west region was.

The following list summarises the achievements of Main Roads and SECWA in the period from 1950 through to the 1980s:

June 1951	South Fremantle Power Station opened
August 1951	South West Power System inaugurated
1953	Great Eastern Highway (Perth-Kalgoorlie) sealed
June 1956	Transmission line linking Bunbury and Cannington (Perth) energised
August 1957	Bunbury Power Station opened
November 1959	Narrows Bridge (Perth) opened
April 1960	Transmission line linking Collie and Wagin energised
July 1962	Transmission line to Albany energised
September 1962	North West Coastal Highway (Geraldton-Carnarvon) opened
April 1966	Muja Power Station (Stages A & B) officially opened
October 1969	Eyre Highway (Western Australian section) opened
1970	Great Northern Highway (Perth Meekatharra section) opened
November 1970	Kwinana Power Station (Stages A & B) opened
November 1973	Narrows Interchange opened
December 1973	Transmission line to Geraldton energised
December 1974	North West Coastal Highway (to Port Hedland) opened
December 1978	Great Northern Highway (to Newman) opened
October 1979	Kwinana Power Station (Stage C) opened
July 1981	Muja Power Station (Stage C) began generating
August 1983	North-West Shelf gas pipeline to Perth opened
August 1984	Transmission line to Eastern Goldfields energised
November 1985	500 000th SECWA customer connected
November 1986	Great Northern Highway (final section in Kimberly region) opened
December 1989	Great Northern Highway (final section) opened

THE LOSS OF *WILL*

Sometime in the 1970s things began to change. There were probably a number of factors for this.

An important factor was the beginning of the end of the long boom that had accompanied Menzies reign as Australian Prime Minister. There was a rapid increase in the cost of oil, the rise of unemployment and economies around the world faltered so the growth and prosperity that had seemed almost endless began to wither. This led to a general questioning of the philosophies of governments and a turn from development to management as perhaps the major role of government.

Another reason was perhaps that, by the early 1970s, the post-war or baby-boom generation was reaching maturity. It had no memory of the war and what life had been like before the development and prosperity that had

commenced when they were children. So they had other interests and priorities. They took prosperity and the everyday availability of services such as power and good roads for granted, and that gave them the relative wealth and time to concern themselves with other things such as, to begin with, the war in Vietnam and then feminism, environmentalism and new (and often forbidden) ways of having a good time. Often bitter conflict developed between this generation and the previous ones, further obscuring the achievements of earlier generations.

Another reason again was that, by the 1970s, it must have seemed to the politicians and engineers leading the development that they had already achieved more than they had set out to do. Good sealed roads linking Perth to the eastern states and as far north as Port Hedland, a power transmission line as far north as Geraldton and power stations with 200 megawatt units would have been considered fantasy when they commenced their careers in the 1950s. Of course, what they had achieved led them to plan to do even more and the expectations of the community for more of what they had come to expect (endless good roads and boundless electrical power) led them to continue planning for even more development, and that continued into the 1980s.

By the early 1980s, however, things had changed radically. The governments of earlier days, with Premiers like David Brand and Charles Court, were committed to development of their state, and that meant engineering development in large part. Don Aitken, Commissioner of Main Roads for over 20 years, recalled that the Premier would drop in to visit him and discuss what needed to be done and how it would be done. Bill Gillies, Managing Director of the State Electricity Commission, recalled the Premier agreeing with him about the need for a new power station but pondering how the money for it could be raised. In 1983 Brian Bourke brought to ALP back to government in Western Australia. It wasn't a developmental government, it had different priorities and a new view of how society would be shaped which paid little attention to engineering and what it had to offer. In frustration Aitken, who was used to talking to people at the highest level of government, demanded to know 'How in the hell do you talk to anyone in this government?'

By the end of the 1980s both Main Roads and SECWA, which had been government bodies of engineering excellence, were changing rapidly. Norm White was appointed from private enterprise in 1988 to take over SECWA with the task of converting it from an engineering body into a manager of the power system. By 1995 the organisation, renamed Western Power, had lost almost all of its engineering expertise and most of that kind of work was done by consultants and contractors. Similarly, Don Aitken left Main Roads in 1987 and although Albert Tognolini and Ken Michael, both engineers, succeeded him as Commissioner, the provision in the Main Roads Act specifying that the Commissioner had to be an engineer was quietly dropped and it, like Western Power, lost most of its engineering expertise. So when two major new engineering projects were undertaken in Western Australia, the Collie Power Station opened in 1999 and the Graham Farmer Freeway opened in 2000, they were built under design-and-construct contracts with almost no engineering input from the government agencies they were built for. This does not mean they were not built to professional engineering standards or that they are not important to Western Australia, it means that they did not follow on from the engineering traditions that had seen the major development of the state from the end or the war.

CONCLUSION

There is another, and perhaps the most important, reason for the changes that took place in Western Australia from the 1980s. Forgetfulness.

Society forgot what life had been like in Western Australia before and during the war. Society took for granted the services it had been provided with as a result of planning and strategies that had commenced in the early 1940s and so did not see the point in putting the energy and resources into them that it had for three decades. Health, education and welfare had always been important to government and society but now the creation of the infrastructure that made it possible to generate the wealth that supported those public services lost priority. Even the need to maintain that infrastructure lost priority.

Organisations like SECWA and Main Roads forgot the value of engineering expertise. They had built up high levels of engineering expertise and experience over almost four decades after the war but they began divesting themselves of it, saying it could be purchased more cheaply and effectively on the open market than developed in-house.

The engineering profession forgot the reason for its long period of work at the forefront of State development and began to take for granted its place as one of the foremost professions in the State. Consequently, when things began to change it was difficult for the profession to see that the goals they strove to achieve were not now the same goals that the rest of society and the politicians saw. In an increasingly pluralist or post-modern world the voices of engineers had to compete with many other voices for a hearing.

There is also, of course, the simple fact that when power stations, transmission systems and roads and bridges were built they did not need to be built again. So, by the end of the 1980s, the post war project of developing Western

Australia had been accomplished, at least in terms of how it had been defined 40 years earlier. Engineering did not become less important, they remained necessary to maintain the infrastructure of society to fill in gaps or meet new demands (as the Collie Power Station and Graham Farmer Freeway did). What happened was that other professions, the ones that are necessary to managing society rather than developing it such as health, education, social welfare and finance, became more important.

Forgetfulness is a marker of the passage of time. We forget because the years pass and things that were once at the centre of our attention are replaced by other thoughts. In the half century since the end of the war the people of Australia and Western Australia did great things to develop their nation and their State into a modern community with infrastructure as good as anything you will find around the world. It is now taken for granted, noticed only when it doesn't work as everyone expects it to. Forgetting is not always a bad thing but it seems to me that since the infrastructure on which our society relies was constructed with so much effort and is, in reality, very fragile, we risk losing it if we do not remember the ways in which it was made and how much it cost in resources and human experience.

That is, of course, one of the objectives of engineering heritage.

CODA
WHAT THIS MEANS FOR THE FUTURE

Society, in Australia and around the world, faces a massive challenge in the coming century. That is to overcome or at least lessen the effects that people have had on the environment largely as a result of post war development around the world. It is now beginning to become clear that the long term effect of these environmental changes will probably be catastrophic.

It may be that future generations look back on the period of fifty years after World War II not as a period of development as we did but as a period during which the earth's resources were plundered and its environment devastated. That is for them to judge - they will see the world in an entirely different way from the way we do now and the way the people did half a century ago. Just as we have largely forgotten the relative poverty and the experience of living in Western Australia and Australia at the half way point of the 20th century, they will have forgotten what we knew and what it was like to live at the beginning of the 21st century.

The noted environmentalist, David Suzuki, commented that it will take a 'World War Two scale of effort' to overcome the environmental problems that the world faces. There is a certain irony in this if it was a World War Two scale effort that started the process of significantly degrading the environment in the first place. At this moment the scientists and engineers know what the problems are and are beginning to work on solutions. What is lacking, as we are seeing with the on-going debates on greenhouse gas emission controls, is the *will* to get on with the task.

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2 A good example of this appears in an article in the most recent issue of *Technology and Culture* which tells the story of the decision reached in the United States not to build a new generation telescope. W Patrick McCray, 'What Makes a Failure? Designing a New National Telescope, 1975-1984', *Technology and Culture* 42/2, April 2001, pp.265-291.

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NOTES

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