

● We are very pleased to have the privilege of publishing an article on the problem child of the Australian economy—the black coal industry,—by such an authority as Mr. K. A. Cameron. Keith Addison Cameron graduated as a Bachelor of Mining Engineering at Melbourne University. After early experience in Australia and Overseas, he served with leading metal mining corporations throughout Australia until the end of 1946, when he became Chairman of the Joint Coal Board, newly constituted by the Commonwealth and New South Wales Governments to promote improvements in the black coal mining industry of New South Wales. His wide experience in mine management and his association with the Joint Coal Board uniquely qualify Mr. Cameron to write on this contentious subject.

Mr. Cameron resigned from the Joint Coal Board in May, 1950, in order to take up his present post as Managing Director of Mt. Morgan Limited, Queensland.



# THE PROBLEM OF COAL

By K. A. CAMERON

SINCE 1945 there has been an increasing public interest in coal—an interest stimulated by the direct effects of coal shortages; but superficial, because only in rare cases has the public set out to learn the truth about the industry, and the reasons for the public inconvenience.

It is significant that no such—even superficial—interest was evinced in the similar period from 1930 onwards, and yet it was then that the groundwork was laid for the unsatisfactory results which were to be experienced after the War.

For the last five years, the public, with pious complacency, has blamed variously the colliery employees, the Government, and even acts of God—such as weather—for the recurring coal shortages; but in

fact the public has been getting from this industry, neither more nor less service than it should expect, if it faces the realities honestly.

As a broad generalisation it may be said that public opinion eventually moulds any industry of national importance. It will in fact influence the trends of the coal industry; but unfortunately the public as a body has had no opinion; largely because it has not informed itself. There have been some opportunities to do this, and even warnings in the past of the effects of public disinterest and consequent ignorance, but they have been virtually disregarded. That the shortage of coal is a severe handicap to national development has often been said, but seldom really understood.

For this state of affairs the daily press cannot escape a major share of the blame, because, generally, it has failed in its duty of informing the public properly on important matters. It has not seen the difficulties as a national problem on which the weight of informed public opinion must be brought to bear, but as a prolific source of spectacular headlines. It has consistently blamed one group for the failures of the industry, when even a passing acquaintance with the laws of probability and human behaviour would suggest that such an attitude was unlikely to be correct; and it has usually emphasised the bad points and rarely given credit for the good. The task of educating the public has been left to the more thoughtful — more responsible — bodies and publications which try dispassionately to analyse the problem as a first step to pointing its solution.

There are certain fundamental facts which cannot be repeated too frequently, because intelligent examination of them goes a long way to giving some understanding of a complex problem only too often beyond the comprehension of the casual observer.

The problem of the Australian industry varies only in degree—and its incidence—from that of the industry in other democratic countries—its character is much the same.

In the pre-1939-war years, the coal industries of United Kingdom, Holland, U.S.A. and Australia, had all reached a low state. The progress since then, towards recovery, has been strikingly different in those countries, so that now the United States and Holland lead in efficiency and buoyancy with the U.K. next, and Australia lagging badly. In one important feature the coal industry in the United States differs from its counterparts in the other countries mentioned—it is subject to the most intense competition from alternative sources of fuel and power. In Australia (as in U.K. and Hol-

land) black coal is in a position of virtual monopoly. Hydro electric power in this country has only a limited field to date, except in Tasmania, and while the development of the great brown coal measures in Victoria has provided very important supplies of fuel and power, it has barely kept pace with the expansion in demand, so that Victoria, like the other States, still depends on N.S.W. black coal. There are as yet no commercially developed resources of natural gas or petroleum in the country.

A monopoly industry may be benevolent and there are one or two in Australia, but generally the protection of the national interest demands that it be broken, or controlled to the common good. The first has been impossible until now, but further development of the Victorian brown coal measures, and of hydro electric potentialities, will help to loosen the stranglehold in a few years. The search for natural oil continues, but no easing of the situation from this source can yet be confidently assumed. In the circumstances some measure of control is essential, at least for a time, and I believe it is significant that this course, in varying degree, was adopted by the countries other than U.S.A.—first in Holland, then in England, and about the same time in Australia.

The constitutional relationships of the Commonwealth and the States presented a rather special problem in Australia, and moreover there was a desire to stop short of nationalisation of the industry. So was conceived the idea of the Joint Coal Board, with scope and authority built on the joint powers of State and Commonwealth. Its purpose was to assist—technically and financially—the industry to improve its production as rapidly as possible. Incidental to this aim were price control and distribution of supplies. Although the Commonwealth Government at the time offered the same measure of complementary legislation and financial

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assistance to all States, only one accepted, but that one (N.S.W.) was the predominant unit in black coal production in Australia.

In the post-war period, shortages have been the common story, both in the services provided by public utilities, and in general commodities. It would be foolish to attempt to minimise the effect on the general industrial activity of the shortage of the basic commodity—coal. It would be equally foolish not to recognise that in our condition of very great industrial expansion, the “bottleneck” could very easily shift from Coal to Transport, and in fact, in certain power plants has already moved to Generating Capacity.

The typical post-war condition of shortage reflects the lag in development and capital equipment, coupled with an unprecedented increase in consumer demand. But it is accentuated by the relatively high proportion of domestic production which has gone into capital goods. For example—the steel industry has been unable to satisfy the demand for its products, but that industry has itself drawn heavily on its own production, as well as on a wide range of others, in equipping itself for increased output in the steelworks, in the collieries, and in the iron ore and flux mines.

## Significant Historical Features.

Let us look at the story of the coal industry in Australia over say, the last twenty years, and for this purpose confine our attention to the bituminous (black) coal industry of New South Wales.

### Black Coal Production in N.S.W.

(Mines Department Records).

(Thousands of tons.)

1914-1919 inclusive (Av. Annual)	8,955
1920-1927 inclusive (Av. Annual)	10,854
1928 . . . . .	9,408
1929 . . . . .	7,586
1930 . . . . .	7,063
1931 . . . . .	6,405
1932 . . . . .	6,756

1933 . . . . .	7,088
1934 . . . . .	7,840
1935 . . . . .	8,662
1936 . . . . .	9,161
1937 . . . . .	10,010
1938 . . . . .	9,531
1939 . . . . .	11,149

Employment rose from 16,000-18,000 men in the period 1914-1919 to a peak of over 24,000 men in the 1920-1927 period, then fell to a “low” of 12,700 men in 1935. In 1928, 1929 and 1930 while the number employed was tapering off slowly, the position was worse than the figures suggest, because employment was only part-time. This was a feature of the “depression” years.

The implications of the tremendous variation in men employed clearly and understandably have left on the industry an effect which cannot quickly be counteracted. In the last five years employment in New South Wales has averaged about 18,000 men.

The production of coal reflected the demand over the years considered. In 1947 the demand for New South Wales coal in Australia was estimated by the Joint Coal Board at 13,000,000 tons in 1948, rising gradually to 16,000,000 in 1952. It must be remembered that long term estimates of demand are subject to considerable error if supply, in the earlier years, falls far short of requirements because the rate of expansion of consumption is thereby retarded.

About 1930 the industry was grossly over-developed in relation to demand. As a consequence mines worked only intermittently, coal prices were cut to bed-rock levels—or below—and as a result, development was restricted, and good mining practice prejudiced by short term commercial considerations.

Then commencing in 1939, and rising steeply in 1945, came an upsurge in demand under very much altered industrial circumstances, and with the mines neither developed nor equipped to meet it—par-

icularly under the new conditions. The immediate result was inevitable; but this, like any other problem of inadequate production, will be solved, given the desire on the part of colliery proprietors, and the ability on the part of management. The overtaking of the lag will of necessity take a long time, and call for heavy capital expenditure, but these are normal commitments in developing increased production in a heavy industry.

#### **Human, Financial and Technical Aspects.**

The eagerness of colliery proprietors to invest additional capital in the industry was tempered by an understandable disappointment, that the attractive profits to be derived from a commodity in short supply should be denied them, because of the imposition of price control, and as well by a natural fear of an early return to oversupply, with all its dire results.

Management has had to face two main problems—technical and industrial. The first is often overlooked, yet it is fundamental. Despite what has been done in the last five years, the mines are not yet fully equipped to produce sufficient coal to meet the demand, even if the industrial problem were solved. Nor is the general standard of plant and machinery in line with that of modern equipment designed to obtain the maximum output per unit of labour. There has been, and still is, a tendency to excuse the absence of technical progress by the industrial difficulties, but clearly the excuse will not do. There has been too, a tendency to maintain that development and equipment was adequate to support required production if labour exerted the same effort it did, say, in 1930. Not only was the premise wrong, but the point of view is completely unrealistic.

The industrial aspect of management's problem is conditioned by several things:

There has been an almost violent and apparently unexpected change in the intensity of the human side of industrial problems—a change which is gen-

eral and world-wide, but which has found management in this country, in far too many cases, inadequately equipped mentally and by experience to cope with it.

In a period of full employment, no one is compelled by economic circumstances to work at a job which he does not like. Therefore, at such a time, the relative attractiveness of different industries and individual units of the one industry is highlighted, and unless the particular industry is attractive, it is difficult to establish or maintain in it a reasonable standard of labour efficiency.

The coal mine employee has a deeply ingrained fear of a condition of ample coal supplies—first because large stocks are a potential industrial weapon, and secondly, because, in his experience, over-production eventually means under-employment. That these are not inevitable consequences cannot be demonstrated under existing conditions. Therefore, we are presented here with a public—and industrial—relations job of the first magnitude.

Contrary to often expressed lay opinion, and the lying propaganda of those who know better, underground work, under proper conditions, is not unduly arduous or unpleasant; but until recently, the conditions in some collieries, or certain sections of them, undoubtedly were bad. Similarly with living conditions—largely living conditions are what the individual makes them, with this important qualification—certain basic community facilities must be provided by the appropriate authority. In regard to this latter, some coal mining communities were badly off—local government and government authorities were reluctant to spend money in areas regarded as unstable. Thus water supply and electric power supply were lacking in some localities, and, in many, roads were in

very poor condition, while in the predominantly coal mining areas the standard of many community amenities was well below that of most rural towns of similar size.

The Communist Party is at work in the coal industry, as well as in other basic industries. It numbers within its industrial ranks, capable, shrewd men who have been quick to employ the inherent ills of the industry to further their political objectives. They appreciate the fact that the industry is still under-developed and badly equipped; they use to the full the natural fear of over-production and under-employment; they shrewdly pin-point bad conditions, over-emphasise the hazardous nature of the work, and do everything to keep alive the traditional class hatreds of the industry; and they are never at a loss to make capital, industrially, out of management's gross mistakes and errors of judgment—and in the coal industry, perhaps more than in any other, top management, conditioned by its very difficult and bitter experience, is prone to let its emotions colour its judgment on industrial matters.

The human aspect poses a problem of considerable magnitude, but surely not one incapable of solution. The lines of action towards solving it, are first of all directed by psychological or human considerations, and include the correction of the technical backwardness of the industry, because notably this will mean improvement in working conditions incidental to increased productive capacity. Secondly, they call for the recognition that the industrial sabotage being directed by clever tacticians, can only be met adequately by similarly well planned tactics—not by a feudal attitude now out-moded in industrial relations. Most of the causes for dissatisfaction which provide a fertile field for industrial disturbances will be removed when the technical job is completed. The remainder is

more intangible, but of paramount importance if the skilled “agent-provocateur” is to be out-manouvered, and finally discredited.

It is in this sphere that management must meet its greatest challenge. Traditionally it has been mastering technical problems, but the modern human problem in industry is a new one for which management largely is unprepared. Particularly is that emphasised in the coal industry, whose background has increased the magnitude of the adverse influences. Nevertheless, as management acquires a better understanding of the human problem, and the forces which operate under modern industrial conditions, and employs the new tool of industrial relations the problem will be solved, even in the face of the activities of the saboteurs.

It may come as a surprise to some to learn that in a number of collieries work is regular, and man shift performance is high. Other well-equipped collieries have a poor record, and some observers are inclined to argue therefore, that technical modernisation is not the answer. Clearly, with a number of problems of wide variety, there can be no simple panacea for all the ills—the solution will be reached only by simultaneous improvement in a number of features.

The rehabilitation of inadequately developed and equipped mines calls for the installation of the most modern equipment for boring, cutting and loading coal, for efficient haulage and hoisting, and for ancillary activities such as workshops, changehouses, man transport, etc. In many cases it calls, too, for non-productive development work which makes heavy demands on labour and equipment. All these involve the expenditure of much capital, and require considerable time for their completion, particularly in circumstances of extreme world shortage such as existed in the immediate post-war years.

As to capital cost, if Free Enterprise is not prepared to take the risk, Governments have expressed themselves as willing to assist through the Joint Coal Board.

The time factor for development is markedly reduced when the deposit is amenable to the open cut method of mining, and in the last eight or ten years, exploration has located several areas where open cut methods can be applied. Production by this method has increased from 45,000 tons in 1940 to 1,602,000 tons in 1950.

The development of highly efficient excavating and rock moving equipment is gradually extending the scope of this mining method, by increasing the depth to which the coal seam may be so extracted. However, overall planning is necessary to ensure that open cut mining does not prejudice subsequent underground mining at greater depth.

It is perhaps significant that with one or two notable exceptions, the colliery proprietors in New South Wales did not take advantage of the availability of modern equipment to introduce this new (to New South Wales) method of attack, and it was left to the Commonwealth Coal Commissioner, and afterwards to the Joint Coal Board, directly to engage in mining operations so as to obtain relatively quickly, an important contribution to the additional coal production so urgently needed. It seems ironic now, after the practicability and economies, in suitable circumstances, have been demonstrated beyond question, that certain people have, almost overnight, acquired a tremendous enthusiasm for this method of mining, while some are severely critical of the Joint Coal Board for having entered the field of free enterprise. "Open-cut" coal has become a catch-cry, as though a new type of coal were discovered—in fact, because of the development of highly efficient machines, we have a new method with application only to certain sections of certain

seams, and under certain conditions. The selection of the best mining method for any mineral deposit is a technical consideration of many factors—not just a matter of personal preference.

### Types of Coal and the Vexed Question of Quality.

It seems desirable to say something about the classes of coal, since obviously there is a great deal of misconception on this point:—

In New South Wales there are three main types which may be classified according to their particular use, i.e., GAS, COKING, STEAM. All three may be utilised for heating and steam raising. Gas coal is characterised by high content of volatile hydro-carbons, and yields a high make of industrial and domestic gas. Coking coal has physical and chemical properties which result in production of a physically strong metallurgical coke. The coke produced in the retorting of gas coal is known as gas coke and is used for a variety of heating purposes, but has not the essential physical properties of metallurgical coke.

Typically the South Maitland field produces gas coal; the Newcastle and Southern fields, predominantly coking coal; and the Western field, steaming coal. All can be used for steam raising in plants appropriately designed for the particular properties of each coal.

It is of the greatest importance nationally that, so far as practicable, the use of each different coal type is restricted to the purpose for which it is specially suited. This does not automatically apply, and in fact considerable tonnages of gas coal and coking coal have been, and still are, being used for steam raising.

Some consumers object to a change of type of coal, and are reluctant to accept the fact that the use of coal must be rationalised in regard to type. Some plants, too, have been critically designed, and conversion takes time and money. Moreover, while shortage exists in total,

it is impossible to achieve the ideally balanced consumption in types. However, the overall planning for increased production is concerned not only with total production, but with the necessary production of each type of coal. Broadly—if the consumption of gas coal and coking coal were restricted to those special purposes, the necessary additional total coal requirements should come from increased production of steaming coal.

Quality is a term frequently used loosely. It can be measured only in relation to the particular purpose and plant under consideration, e.g., many first class steaming coals are useless as coking coals, while one coal excellent for use in one steam boiler plant may be useless for another. A high grade gas-making coal may be completely unsuitable for a particular boiler plant, e.g., about 90% of the production of best Maitland coal from the Greta measures cannot be used at the Bunnerong power plant of the Sydney County Council, because the ash fusion temperature is below the furnace operating temperature of the boiler plant.

One factor common in all questions of quality is ash content, i.e., the proportion of incombustible material. Coal seams contain carbonaceous and non-carbonaceous material as an extremely intimate mixture—the incombustible material here is known as inherent ash. Most seams, in addition, show bands of "stone" to varying degrees, and also stone from roof or floor may contaminate the coal as mined. This is known as extraneous ash.

Although the absence of competition in the market tends to destroy the incentive to market coal as clean as possible, the aim of the producer usually is to minimise the amount of extraneous ash. However, several factors operate in the reverse direction:—

In machine mining, included bands must be taken with the coal, and at times roof and/or floor material is unavoidably extracted with the coal—in

hand mining, where formerly the custom was to sort out the stone underground, it is increasingly difficult to insist on effective separation. Screening and hand picking of the run-of-mine product is conducted at the surface of many mines, but this is at best only partially effective, and under moderate labour conditions, hardly effective at all.

The cleaner seams naturally exploited first are becoming depleted, and seams of higher ash content must be utilised. This fact is often overlooked by the consumer, who cannot grasp all the implications of the wasting asset nature of mining.

This general tendency towards higher ash content is common to the coal industry in other parts of the world, and overseas is being dealt with in one of two ways, depending on the technical requirements of the consumer and the relative economics of the alternative. Where the consumer demands, and is prepared to pay a premium for a coal of relatively low ash content, it may be produced by the use of mechanical cleaning devices frequently known as washeries. Where new coal consuming plant is being planned, it is designed to use coals of higher ash content, which can be produced at cheaper cost.

In Australia the producing industry has been slow to accept the need for mechanical cleaning plants; firstly, because of the absence of competition, and secondly, because the consumer generally is not yet prepared to face up to the higher cost of cleaned coal. A noteworthy exception is the steel industry which, producing the bulk of the coal it uses, operates a washery at each of its two steel-making plants.

### Production Statistics.

Some interesting deductions are possible from a study of available statistics of the industry.

The average output per man shift—men employed directly in coal winning at the face in underground mines, i.e., breaking and loading the coal) is about 10.25 tons. There has been an important improvement in this figure since 1947 when the average output was about 9.5 tons per man shift.

So far as is ascertainable, the figures for the pre-war and “depression” periods were about the same as the latter figure, and in the interim the available hours of work have been reduced by statutory changes, as well as by increased time of travelling to working places as mines become deeper and more extensive. The comparison therefore, is not unfavourable to the post-war period and improvement in the last three or four years is most encouraging.

On the other hand the average output per man shift for all men employed in underground mines has remained practically steady at between 2.9 and 3.1 tons for the post-war years, and is lower than for the depression period. Unit production in open cut mines being substantially higher than for underground mines, and applying only in the more recent period, has been eliminated from the comparison.

These comparisons reflect the increasing depths and distances involved in the handling of coal, materials and men as mines become older and more extensive. In the absence of improved handling equipment and technique, the increase in the proportion of indirect or “offhand” labour would appear inevitable to anyone acquainted with production problems.

The output per man shift will continue to improve as facework equipment of the most modern type is installed, and the detail organisation of the multiple operations forming the whole is brought to the highest possible pitch. This, after all, is just “methods” engineering.

Coal haulage must be of the type and capacity to handle the very high output

rates of modern face equipment. Man transport must be the most rapid possible so that the available working time in the face is a maximum. Too often, good face equipment gives disappointing results because of a “bottleneck” further along the production line, while in many New South Wales collieries, the working faces are two to four miles from the mine entrance, at which point the working shift commences and finishes. Good engineering applied to these two features will result in an increased output per man for all men employed.

Summarising the position arrived at today, there is in one respect cause for satisfaction, and in the other, while results have been generally disappointing, there is no reason for pessimism.

On the technical side there is improved man shift facework performance in the underground mines. Also in underground mines the overall man shift performance has ceased to decline, and there is some evidence of improvement which will become more marked as plans for modernised haulage, etc., and man transport come to fruition. Production by open-cut methods has raised the overall unit output of all men in the industry.

The result of these three factors is that the “capacity” of the industry has increased from about 265,000 tons per week in 1947 to 305,000 tons per week in 1950. (“Capacity” here, is the production that would be achieved if all mines worked every day.) The increase in capacity is a measure of the technical improvement which has occurred in the period.

The actual annual production since 1947 has been:—

	Tons
1947 .. .. .	11,683,000
1948 .. .. .	11,721,000
1949 .. .. .	10,736,000
1950 .. .. .	12,798,000*

\*Record production.

In comparing actual annual productions it must be remembered that for several years up to and including 1948, “back”

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Saturdays were worked in the last three or four months of the year. Since 1948 they have not been worked. Also about 1948, industrial awards increased annual holidays and sick leave with pay, reducing the available working days in the year.

The difference between "capacity" and actual production clearly is accounted for by losses of which the greatest are those caused by strikes. It is in respect of this feature that the figures show little improvement. On the other hand individual absenteeism is relatively low. Considering losses of man shifts from all causes, an analysis of twelve months from August, 1949, to August, 1950, gives the following round figures. The period was selected to exclude major strikes such as the Kemeira dispute of 1948 and the general strike of 1949.

<b>Loss of available man shifts due to:</b>	
Industrial stoppages . . . . .	5.0%
Mechanical breakdowns, weather, etc. . . . .	0.5%
Compensatable accidents . . . . .	2.5%
Sick leave . . . . .	4.0%
Voluntary absenteeism . . . . .	3.0%
<b>Total loss of available man shifts</b>	<b>15.0%</b>

For comparison, the total loss of available man shifts from all causes (including major strikes) was:—

	All Causes %	Industrial Disputes %
1948		
Underground . . . . .	20.09	9.93
Open Cut . . . . .	9.19	4.15
1949		
Underground . . . . .	25.49	16.45
Open Cut . . . . .	18.36	14.57

## Conclusion.

There still remains room for improvement in the proportion of available working time, and this will come as management sees the problem in its right perspective, and learns to apply to it the modern twin techniques of industrial and public relations. These must be directed to convince both employer and employee that their interests are identical, and to demonstrate beyond any doubt that this common interest is not advanced by what is called communism. To a great extent this has been done in U.K. and U.S.A.—therefore it can be done in this country, and, if management is to retain its initiative, it must be done.

The technical side of the problem is in a fair way to being solved. Results on the industrial side are still unsatisfactory, but they will be improved as the influence of informed public opinion swings into line with the efforts of enlightened management.

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