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Engineering Linkages with the
Coal Chain

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Carl Grundy-Warr

Doctor of Philosophy thesis submission
Department of Geography
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May 1989



25 JUN 1990

VOLUME ONE

Chapters 1 to 5 includes Abstract, Acknowledgements,
Contents, List of Tables and Figures.

Abstract

Engineering Linkages with the Coal Chain

Carl Grundy-Warr

"Industrial restructuring without parallel in recent British industrial history" is how the current Chairman of British Coal, Sir Robert Haslam, has described events in that industry. Since 1960 upwards of three quarters of a million jobs have gone in the deep coal mining industry alone. Numerous studies have analysed the underlying mechanisms behind the rapid decline of the nationalised coal industry, but hitherto little attention has been paid to the national linkage effects of that decline. This thesis is an attempt to analyse the consequences of industrial restructuring in coal mining on its UK engineering suppliers. In so doing, the thesis develops into much more than an empirical case study of industrial linkage and becomes a critical analysis of state capital-private capital relations. In particular, it focusses on the shifting boundaries of state ownership in the energy sector of the 'eighties. It considers what are the main processes involved and some of the consequences for those people and places most dependent on mining related jobs for their livelihoods.

Acknowledgements

There are many people I would like to thank for their help, encouragement and moral support during the research and writing up stages of the thesis. Not least of all is my supervisor, Alan Townsend, who has had to put up with numerous delays and excuses, and during the latter part of my thesis work, a distance of several thousand miles between us. I thank him for his help in several ways and his patience. Thanks should also go to Ray Hudson who helped put me on a more critical path during the early stages in my research. Undoubtedly I have benefitted from the critical comments, suggestions and friendly encouragement of fellow research students in Durham. They often made life more tolerable during difficult periods.

Outside Durham numerous individuals have given of their time, energy and knowledge to assist me. Special thanks are due to the following: Gary Lawson of the Engineering Industry Training Board, who made frequent visits to Watford enjoyable and worthwhile; Damian Dewhirst and Bryan Gladstone, formerly of the Coalfield Communities Campaign; and to everyone who agreed to give up some of their time to answer my questions.

Thanks are also due to Margaret Bell and Catherine Reed, who have done a great job with the typing, and they have provided friendly encouragement at all times.

Finally, I am deeply grateful for the love and practical support of my family, especially that provided by my wife, Kin Noi, who has had to live with the thesis as much as I have.

CONTENTS

	<u>Page</u>
List of Tables	vi
List of Figures	xi
List of Photographs	xiv

VOLUME ONE

INTRODUCTION	1
1.1 Background to the Research Proposal	1
1.2 Objectives	3
1.3 Methodological Strategy	7
CHAPTER TWO : COAL BARONS AND MACHINE MAKERS PRIVATE	
PROFITS AND COAL PRODUCTION	16
2.1 Pre-Nationalisation Mechanisation	18
2.2 Short Term Profits, Production and Capital Investment	22
2.3 Scientific "Progress" and Mine Safety	25
2.4 Three Shift Mining and the Problems of Mechanisation	29
2.5 Piecework and Wages	31
2.6 Mechanisation and the Machine Makers	38
2.7 Relations between Colliery Companies and Machine Makers ..	50
2.8 The First Phase of Mechanisation and Miners' Work	53
2.9 The Transition to State Ownership and Bottlenecks in Mining Machinery Supplies	55
CHAPTER THREE : THE BOUNDARIES OF STATE OWNERSHIP : THE CASE OF THE COAL BOARD	
3.1 Public or State Ownership	75
3.2 Selective State Ownership	76
3.2 Selective State Ownership	77

	<u>Page</u>
3.3 Coal Nationalisation, Compensation and Consent	79
3.4 Horizontal, not Vertical Integration	82
3.5 Ancillary Activities	86
3.6 "In House" Engineering	91
3.7 Sell Offs and Contracting Out in the Eighties	96
3.8 Public versus Private Efficiency	116
3.9 Redefining the Public-Private Sector Boundaries	120
 CHAPTER FOUR : GOVERNMENT INTERFERENCE AND EXTERNAL CONTROLS	
ON THE NATIONALISED COAL INDUSTRY	130
4.1 Fuel Policies and Financial Controls on the Coal Board ...	132
4.2 1947-56	133
4.3 1957-73	137
4.4 Post-1974	147
4.5 "Market Forces" and Energy Policy in the Eighties	150
4.6 Relations between the Coal Board and other Nationalised Industries	152
4.7 Outside "Market Forces" - Nuclear Power	159
4.8 The State and the Nuclear Establishment	162
4.9 The language of the market place and financial controls on the coal industry	167
 CHAPTER FIVE : STATE OWNERSHIP, EXTERNAL AND INTERNAL RELATIONS OF PRODUCTION, AND THE CHANGING GEOGRAPHY OF DEEP COAL MINING IN THE UK	
5.1 What about the workers? State ownership and the mining labour process	184

	<u>Page</u>
a) Mechanisation - the politics of production and the geography of change	191
b) Automation Phase - political choices and technical decisions	198
5.2 "Wooing the Collier Capitalist"	207
5.3 Public-private sector relations and the technical change process	221
5.4 The limitations and inflexibilities of the Coal Board's capital investment approach and ideas for alternative approaches	237

VOLUME TWO

CHAPTER SIX : ENGINEERING SUPPLY LINKAGES AND THE UK DEEP MINING INDUSTRY	272
PART ONE	
6.1 Linkage Multipliers	274
6.2 Industrial structure and relations with British Coal	277
6.3 Engineering jobs linked to deep mining	281
6.4 Pressures on Suppliers in the 1980s	284
6.5 Intra-sectoral linkages and local supply networks	297
PART TWO	
6.6 Mining Engineering Linkage in Yorkshire	304
6.7 Mining Engineering Linkages in the North East of England	310
6.8 Conclusion	336

	<u>Page</u>
CHAPTER SEVEN : INTERNATIONAL MARKET FORCES AND PRIVATE SECTOR MINING IN BRITAIN (Opencasting, Multinationals, engineering linkages and coalfield communities)	395
7.1 "Market Forces" and the changing role of opencast mining .	397
7.2 Partial privatisation and private mining	408
7.3 Opencast engineering linkages in the UK	423
7.4 World Mining Equipment Markets	439
7.5 The balance of trade and coal imports	447
7.6 Coalfield communities and engineering jobs	454
7.7 Conclusion	458
 CHAPTER EIGHT : MULTINATIONALS, MONOPOLIES AND THE UK ENERGY SECTOR	 490
8.1 Multinational interests and foreign investment in the UK energy sector and coal industry	494
 CONCLUSION : LINKS IN THE CHAIN	 512
9.1 Coal conservation, coalfield communities and engineering linkages	517
9.2 The short-term future of deep mining in the UK	527
9.3 Power plant decisions and the safeguarding of coalfield communities	538
9.4 "Clean coal", environmental costs and privatisation	550
9.5 Employment Trade Offs	562
9.6 Energizing Local Economies	576

APPENDICES

1. Interviewees - Company Managers and Unionists	593
2. Researchers and others consulted during research period ..	595
3. Some of the Main suppliers	596
4. Questionnaire	600
5. The Locations of Some of the Companies Visited	604
6. Copy of a Letter from Wilf Miron, Chairman of the East Midlands NCB and Board Member, to NCB Chairman Derek Ezra	605
BIBLIOGRAPHY	614

LIST OF TABLES

	<u>Page</u>
CHAPTER TWO	
2.1 Mechanical and Electrical Machinery in use in Coal Mines, 1924-1938, (including Number of Horses and Ponies)	68
2.2 Number of Coal Cutters, Conveyors, and other Facilities - England and Wales, and Scotland in 1938	69
2.3 Number and Types of Coal-cutting Machines in G.B. 1911 1923 and 1938	70
2.4 Coal Cutter Suppliers in the 1920s	71
2.5 Pneumatic (Mechanical) Picks and Drills : Number in Use 1928-1938	72
2.6 Number of conveyors and gate end loaders in use 1929 and 1938	73
2.7 Production of Mining Machinery (Monthly) And of Motor Cars	74
CHAPTER THREE	
3.1 NCB Turnover 1983	124
3.2 British Coal Subsidiaries and Ancillaries 1987/88 ...	125
3.3 British Coal Research and Development Expenditure in 1987/88	126
3.4 Central Area Workshops by Area/Region 1983	127
3.5 Reduction in BC Workshop Capacity since 1984/85	128
3.6 Workshop Product Support for Collieries 1987/88	129

	<u>Page</u>
CHAPTER FOUR	
4.1	NCB Basic Statistics, 1947-80 174
4.2	Capital Structure of the Coal Board, £million ² 175
4.3	Total Annual Number of Collieries and Colliery Employees 1979/80 - 1987/8 176
CHAPTER FIVE	
5.1	Moses' Suggestions For Improved Competitiveness 259
5.2	Northard's Suggestions For Improved Competitiveness . 260
5.3	Wheeler's "model" colliery : The 'Least Cost Option' 261
5.4	Main Elements of British Coal's "flexibility" plans . 262
5.5	Vital statistics underlying British Coal productivity increases since 1982/83 263
5.6	Capital expenditure on major capital equipment, March 31, 1984 264
5.7	Proportion of Total Output (T0) Cut and Loaded by Various Types of Machines in British Coal Mines, 1954-1972 265
5.8	Numbers of Roof Suppliers to the NCB before and after industrial reorganisation in 1969 266
CHAPTER SIX (VOLUME TWO)	
6.1	Inputs to the Coal Industry 1973 (£m) 345
6.2	Coalface and Development Equipment Suppliers 346
6.3	Important Longwall Product Markets and Suppliers in the U.K. 347

	<u>Page</u>
6.4	The UK Mining Machinery Market 349
6.5	Regional Employment in the Mining Machinery Industry 350
	Activity 3251 : 1978 and 1987 (1)
	Definition Activity 3251 351
6.6	Employment in the mining machinery industry
	1978-1987 352
6.7	Production indices for mechanical engineering and
	selected mechanical engineering industries,
	including mining machinery 353
6.8	Anderson Strathclyde employment 354
6.9	Unemployment in South Yorkshire, January 1987 355
6.10	Employment by occupation in the UK mining machinery
	industry in Yorkshire and Humberside 356
	Notes to Table 6.10 (and 6.14)
	Occupational Categories List. (Numbers as they
	appear on tables) 357
6.11	Survey of British Coal Suppliers in Yorkshire and
	Humberside, 1987 358
6.12	Survey of Supplier Firms to British Coal 361
6.13	ABMEC member companies in the Yorkshire and
	Humberside Region 362
6.14	Employment by occupation in the mining machinery
	industry in the Northern Region*, 1978 to 1987 . 364
6.15	List of North East suppliers to British Coal 365
6.16	Employment change in mining machinery suppliers in
	the North East 367
6.17	Job losses in NEI in Tyneside 1980-86 368
6.18	World power plant export leaders, 1981-1986 369

	<u>Page</u>
CHAPTER SEVEN	
7.1	British Coal Opencast Executive Coal Output 464
7.2	Opencast Performance 1957 to 1987 465
7.3	British Coal Costs of Production (England & Wales) .. 465
7.4	Output and employees, 1978-87 466
7.5	Opencast Executive - Employment, March 87 466
7.6	Opencast Executive Operating results 467
7.7	The New Coal Companies? Area operating profits (losses), year ended 31/03/86 468
7.8	Regional Opencast operating results (1987/88) 469
7.9	Opencast Contractors and Equipment Suppliers 470
7.10	Plant used on two comparable UK opencast sites 471
7.11	Equipment in use on NCB opencast coal sites (March 1985) 472
7.12	British-based Opencast Equipment Suppliers 473
7.13(a)	World Recoverable Coal Reserves 474
7.13(b)	Hard Coal Production by Country 474
7.14	Proportion of Surface Mined Output, 1985 475
7.15	Product strengths and weaknesses in export markets for mining equipment 476
7.16	Surface and underground Export Sales by ABMEC Members (£m) 477
7.17	Rate of Installation of New Longwalls in the USA 478
7.18	Production from Longwall Faces, Australia 479
7.19	British Mining Equipment Export Performance: Sales by UK to different geographical areas (£million) 480

	<u>Page</u>
7.20(a) UK Underground Mining Equipment Exports	
1983/4 (£m)	481
7.20(b) The Top Ten Countries for ABMEC Members' Export	
Sales in 1986	481
7.21 World Coal Export Trade, 1985-86	482
 CHAPTER EIGHT	
8.1 Charter Consolidated : vital statistics regarding	
mining related activities	510
8.2 Shell and BP's interests in the Australian Coal	
Industry	511
 CONCLUDING CHAPTER	
9.1 Future Scenarios for British Coal	585
9.2 Considerations for Policy-Makers : Further Costs of	
Colliery Closures	586
9.3 Markets for North East Coal	587

LIST OF FIGURES

	<u>Page</u>
CHAPTER FOUR	
4.1	Some of the external constraints operating on the coal industry 177
4.2	UK Coal Production since 1900 (million tonnes) 178
4.3	Productivity 1947-1975 Investment (£m) 179
4.4	The nuclear-industrial complex 180
4.5	CEGB Research Spending 181
CHAPTER FIVE	
5.1	Mechanisation 1947-72 : Cutterloaders and Power Supports 267
5.2	Increase in UK Output Per Manshift and the Pit Closure Programme 268
5.3	Colliery Productivity (British Coal) 269
5.4	Colliery Operating Costs (British Coal) 270
5.5	Cartoon 271
CHAPTER SIX (VOLUME TWO)	
6.1	Engineering Linkages with the Coal Chain 370
6.2	The Mechanised Longwall Mining System 371
6.3	UK power plant suppliers with mining machinery subsidiaries..... 372
6.4	Dowty Group Organisation and Mining Division Profile..... 373
6.5	Profile of Dobson Park Industries (1986) 374

	<u>Page</u>
6.6	British Coal Supply Chain 375
6.7	Production Index 1979-86, Mechanical Engineering
*	and Mining Machinery (*same page as Table 6.7) . 353
6.8	Generating Jobs - Employment dependency on the electricity supply industry (1986/7) 376
6.9	Engineering by county, 1978 and 1984 377
6.10	Employment by engineering sectors in Yorkshire & Humberside, April 1978 and April 1984 378
6.11	Company Profile of Victor Products, 1985 379
6.12	NEI in the North East of England 380
6.13	Home Orders for Turbines, 1960-86 381
6.14	CEGB Installed capacity and plant mix 382
6.15	CEGB North Eastern Region and Power Stations served by North East coal 383
PHOTOGRAPHS 384-394	
CHAPTER SEVEN	
7.1	The "Exposed" Coalfields 483
7.2	UK Opencast Coal Markets 484
7.3	Open Pit and Strip Mining Methods 485
7.4	Opencast Planning permission refusals and approvals, 1984-87 486
7.5	Room and Pillar mining equipment and methods (Continuous Miners) 487

	<u>Page</u>	
7.6	Room and Pillar Mining equipment and methods	
	(other machines)	488
7.7	Delivered cost of steam coal to ARA, 1982	
	(US \$/tonne)	489
 CONCLUDING CHAPTER		
9.1	Potential new power station sites	588
9.2	Combined Heat and Power	589
9.3	Flue-Gas Desulphurisation Emission Control Process ..	590
9.4	End-Use Energy Efficiency Energy Losses: Coal	
	Production to Delivery	591
9.5	End-Use Energy Efficiency : How energy is lost in	
	conventional coal use	592

LIST OF PHOTOGRAPHS

	<u>Page</u>
Photo 1 : A pony pulling coal tubs	385
Photo 2 : Manual sorting, breaking and grading coal - pre-automation	385
Photo 3 : Conveyor in use in a miners' solarium	386
Photo 4 : A modern roadheader in use	387
Photo 5 : A Gullick Dobson assembly line	388
Photo 6 : Durham Miners' Gala, 1987	389
Photo 7 : Miners protesting over job losses in the streets of Brussels.....	390
Photo 8 : Dowty longwall system in use in New South Wales, Australia.....	391
Photo 9 : A Waste Disposal System on an opencast site	392
Photo 10 : Hay Point, Australia's largest coal export terminal	392
Photo 11 : "The End of A Dream" : Photo showing the face of a Japanese coal miner	393
Photo 12 : British Nuclear Fuel's reprocessing plant at Sellafield	394

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To Mum and Dad

INTRODUCTION

'Far from being a wholly academic matter, the question of method is of crucial political importance in generating information that can be socially useful' (Sayer, A. and Morgan, K., 1985, in Massey, D. and Meegan, R. Politics and Method, Methuen, London, p. 167).

1.1 Background to the Research Proposal

Before describing some of the initial steps taken in the early stages of my thesis it is useful to mention an earlier research project I was involved in. Early in 1983 I was employed as a temporary research assistant at Coventry (Lanchester) Polytechnic after a frustrating period of unemployment. I worked in the Polytechnic's Department of Politics and History on a project examining the history of the city's motor vehicle industry. Although I did not realize it at the time, the problems facing Coventry were similar to those of numerous coalfield communities in a number of ways. Firstly, Coventry was over-reliant on one major industry like many mining areas. Secondly, the city had experienced rapid decline in that industry - motor vehicle manufacture - since the early 1960s. Thirdly, an employment gap had opened up due to a lack of provision of alternative sources of employment. Fourthly, the rapid decline in motor vehicle manufacture had hit supplier industries, including several components and machine tool firms. Consequently a large part of my research schedule involved interviews with numerous people who had lost their jobs in the city's engineering industries, many of whom had had long experience in motor vehicle plants and had no work experience outside



that industry. For many of the young people just entering the local job market there were few opportunities to enter the city's manufacturing sector, or indeed few opportunities at that time apart from low paid or part time service sector jobs.

My experiences in Coventry influenced my decision to examine some of the consequences of manufacturing decline in the UK on employment and jobs in selected mechanical engineering industries. My initial proposal to the Economic and Social Research Council (ESRC) was very broad and poorly defined because I had not considered carefully which industry(ies) I should study. During the first five months of my research period I considered various options ranging from motor vehicle components; metalworking machine tools; textile machinery to agricultural equipment. In fact it was not until the spring of 1985 that I eventually decided to focus on the UK mining machinery industry. Why was this?

Whilst I was engaged in my academic deliberations one of the major industrial stoppages in modern British history was unfolding - the miners' strike of 1984-5. Very often on my way into the University in the mornings I witnessed many police vans, including some from other counties, on their way to local pit villages. At the time I was deeply aware that the country was undergoing a period of fundamental industrial and political conflict which was going to have repercussions well beyond the coal industry. It was only after the miners had returned to work, in April 1985, that I considered examining the implications of the coal crisis for engineering suppliers.

Initially I considered carrying out some comparative research between the mining machinery industry and other UK mechanical engineering industries. I also considered a study of both the UK and West German mining machinery industries. Both these forms of comparison would have had their merits, but in terms of research design they would have produced a very different methodological approach. Furthermore, owing to the problems of clear industrial classification this study of the UK mining machinery industry has necessitated considerable research into other engineering industries within the UK. Whilst some form of comparison with what is happening to the mining and mining machinery industries in West Germany would be very useful, it was not a realistic proposition because I do not speak German. This is not to say I have neglected the major competitors to Britain's mining manufacturers in global markets. An important part of the thesis is an understanding of the interaction between international and national fuel and machinery markets. But the main focus of the thesis is on how the British "coal crisis" has affected employment in linked industries. The study examines the broader dimensions of the coal crisis, which has adversely affected thousands of people's livelihoods in areas within and beyond traditional coalfield communities (1).

1.2 Objectives

Initially I had not fully appreciated the implications of my choice of case study. It soon became apparent that to begin to explain changes in the mining machinery industry I would need an understanding of the underlying mechanisms and social processes that produced and shaped Britain's coal crisis. Furthermore, I would need to understand

much more than I did about the character and shape of Britain's 'mixed economy' and relations between state capital and private capital. As the thesis progressed I began to question the issue of state ownership, and particularly since the election of a third Thatcher government in 1987, the whole issue of privatisation became a dominant theme in the thesis. Indeed, the proposed privatisation of the electricity supply industry (ESI), and after that, the coal industry itself, and the retreats in the Labour Party from the concept of nationalisation, led to a complete revision of the thesis from mid-1987 onwards.

The thesis has raised many more questions than it has answered. Some of the ones I have tried to answer are:

- . How are the restructuring processes in the coal industry related to employment change in the mining machinery industry?
- . How has state intervention in the nationalised coal industry affected the mining machinery industry?
- . Why was the nationalised coal industry dependent on private firms for its capital goods requirements?
- . How and why have the capital goods supplied to the coal industry been implemented in particular ways? What part has private capital played in the changes in the mining labour process?
- . How has restructuring in the mining machinery industry affected particular localities dependent on mining and manufacturing employment for a high proportion of local jobs?

- . How will the privatisation of the ESI affect state capital-private capital relations in the coal industry?

- . Who will be the main winners and losers if the coal industry is privatised?

- . How can an understanding of engineering linkages help in the formulation of alternative coal policies, and more importantly, in the formulation of a national energy policy?

Whilst there are numerous studies of the history of coal mining in Britain; the history of capital-labour relations in the industry; the place of the miners' union in the labour movement; and of changes to the mining labour process, hitherto few other studies have focussed on the linkages between coal mining and engineering, and none have examined the coal crisis from the perspective of state capital-private capital relations. For these reasons I believe that this thesis is a necessary contribution to debates about the current and future shape of the coal industry, if not to wider debates about the character of British nationalisation and privatisation. The main aims of the thesis can be summarized as follows:

- (1) To provide an understanding of the historical development of relations between the nationalised coal industry and private suppliers of capital goods (see chapters two and three);

- (2) To examine the character of state ownership and the crucial influence of state policies on the evolution of the nationalised coal industry and upon the industrial structure and performance of mining suppliers (see chapters four to six);

- (3) To examine linkages between external and internal relations of production in both the coal mining industry and its major suppliers of capital goods (see chapters five and six);
- (4) To provide an understanding of the very different sets of monopoly buyer-supplier relations and conditions affecting the fortunes of suppliers to the deep mining and opencast mining industries (see chapters six and seven);
- (5) To supplement studies of linkage and income multiplier effects in specific localities as a result of the decline in coal mining (see Hudson, Peck and Sadler, 1984) with a study of linkage multipliers at the national level (see chapter six);
- (6) To examine the piecemeal privatisation of the coal industry in the 1980s (see chapters three to seven);
- (7) To examine some of the possible consequences of the privatisation of the electricity supply industry and of coal mining on the industrial future of mining equipment suppliers, and to consider who the major corporations are in the competition for stakes in the UK energy sector (see chapter eight);
- (8) To suggest some possible alternative courses of action and policies that would fully take into account:
 - a) the income and linkage 'knock on' effects of industrial decline for employees in the mining and mining supply

industries and on the local economies most dependent on those industries for jobs and livelihoods, and

- b) the policy linkages between energy matters, employment, regional development and a clean environment (see the concluding chapter).

1.3 Methodological Strategy

At an early stage in the development of the thesis I had decided to adopt a methodological strategy that would enable analysis of restructuring processes at three main spatial scales - international, national and regional. I have concentrated primarily on national changes as the critical level of analysis because of the special relationship that developed between the National Coal Board (NCB) and its primary suppliers. In several respects it can be argued that a monopoly buyer in the home coal market has insulated domestic producers from international competition. Nevertheless, it is not possible to understand national fuel policies in isolation from international energy markets and from international processes of change. Developments in the international mining and minerals industries have become increasingly important considerations for British mining equipment suppliers faced with a shrinking home market since the late 1950s.

At the national level I have concentrated on changes in state policies and priorities towards the nationalised coal industry and the role of the state in the national economy. This is the context within

which relations between the NCB (now British Coal Corporation) and mining machinery suppliers are analysed. It is also argued that national fuel policies, state expenditure limits, pricing policies and wider political goals have had fundamental consequences for employees and their communities in both the mining and mining supply industries.

The focus on two industries (coal mining and mining machinery makers) and the need to understand international and national processes of change has meant that it has not always been possible to carry out what one might call an intensive rather than an extensive research strategy. Some of my analysis of events in the coal industry, for instance, is at a very broad level and relies heavily upon secondary sources of information. In chapter five I briefly examine some of the consequences of technical change and new working practices within the deep coal mining industry. Most of the analysis is based on media reports, specialist articles in the financial, trade and technical press, and upon the work of other researchers. If I had chosen to study the consequences of new mining technology and Coal Board restructuring on the mining labour process as my prime concern it would have necessitated a much more intensive historical study of particular pits, and many interviews with miners, pit managers and union representatives. I did not, but I did need to understand broad level changes to the mining labour process. Indeed, capital-labour relations in coal mining have significantly influenced the direction of technical change in the industry, research and development on equipment and mining systems, and in turn, state capital-private capital relations.

Hitherto, there have been few meaningful studies of the UK mining machinery industry, and none that examine the possible implications of

privatisation upon public-private sector relations and upon industrial structure. This means that I had little documentary evidence to draw on. To analyse inter-industry linkages and production reorganisation within the mining engineering industry I adopted a pragmatic mixture of extensive and intensive research methods. To illustrate and describe broad trends and developments I was able to obtain a wealth of useful statistics on the mining machinery industry as defined by the Standard Industrial Classification, and upon other related industrial activity headings from the Engineering Industry Training Board (EITB). In fact, I have only used a tiny proportion of this quantitative material in the thesis, although I have used numerous tables and figures to aid empirical description or to highlight important trends. For more detailed statistical data on specific companies within the industries I was studying I devised a questionnaire survey (see Appendices). The questionnaire returns proved very helpful in making sense of the industry-wide, national, regional and sub-regional data supplied by the EITB.

Throughout the research I have avoided "number crunching" methods in favour of a mainly qualitative analysis. Nevertheless there is a lot to be said for combining questionnaire survey data with interviews. My own small surveys of companies in Yorkshire and the North East of England were helpful in identifying varying levels of dependency on the home coal industry market and secondary suppliers excluded from standard definitions of the mining machinery industry. It was also possible to gain an idea of the inter-relations between suppliers through sub-contracting. Questionnaire data also proved helpful in management interviews where there were often strict time constraints and questions had to be well prepared and carefully structured. During

the course of my research I interviewed several key actors, including senior executives, middle managers, unionists, and in some cases, production workers (see Appendices). Nevertheless, as the thesis progressed I became more selective in who I interviewed, partly because my research had become more concerned with broader issues - national energy policy, privatisation, and the like, and partly because, as a research student I simply could not finance all the research I wanted to.

Oral interviews proved useful in two respects. Firstly, whilst much of the evidence could be considered to be anecdotal and subjective, taken together it enabled me to develop a much clearer picture of the pressures and problems facing equipment suppliers. Secondly, the oral evidence provided me with more detail and different interpretations of events which sometimes led me to re-evaluate my own ideas, assumptions and previous interpretations. Very often I was able to gain deeper insights than I would otherwise have had. But there were problems with my research strategy. I wanted to obtain information from several companies in different parts of the country. A truly intensive research design would have necessitated a spread of interviews at each company and several return visits. I only visited four companies more than once during the whole research period. So although I assembled some very interesting and potentially important detail from several interviews I have used only a small fraction of this information in the thesis. I did not want to rely too heavily on highly selective interviews without more evidence, either gained from long observation or numerous interviews. For several firms I could have described changes in working practices and the labour process, but the evidence I had was not detailed enough to do so without over-simplification.

There were differences in approach, and sometimes, in dress, when interviewing managers and unionists. With managers I tended to wear a suit and use more formal structured interview techniques. With unionists I often turned up in casual dress and used semi-structured and interactive interview methods, or a conversational approach. In both cases I used a tape recorder except when told details "off the record". Whenever it was possible to do so, I tried to organise meetings with both management and union representatives separately on the same day. This backfired on one occasion when a senior executive I had recently had a long discussion with walked into the union convenor's room to discover me with my feet up enjoying a mug of tea with the convenor and two shop stewards! This particular director was most upset and told me so. After this incident I was much more tactful and held meetings with unionists well outside the factory gates. There was another memorable occasion when I met three company employees in a local pub. The meeting went very well, and I thought successfully. It was only when I was half way back to Durham on the inter-city 125 that I discovered I hadn't put the tape recorder on for the second half of the interview!

It is important to stress that in approaching individuals for information I did try to avoid stereotypical assumptions about "us" and "them" attitudes in industry. I think the opinion of Sayer and Morgan (1985:155) is valid:

'... stereotypes arise through a failure of the investigator to listen and a tendency to criticize behaviour without understanding the reasons behind it. However, critical evaluation cannot be dispensed with or tacked on as an optional extra under the heading of 'policy implications' for in assessing the adequacy of various explanations

offered by different groups of their activities, we inevitably have to judge which of these are more or less correct ...

... What managers and others do is very much a function of the pressures and constraints which bear upon them, and it is not the individuals but the form of social organization which we would expect to criticize!' (my emphasis).

Another important constraint on my research progress and upon the sources of data was the lack of cooperation I received from the Coal Board (British Coal) itself. During MacGregor's time at the NCB and following the national miners' strike the industry became more sensitive than usual about researchers, journalists, and most academics. Consequently I failed to obtain even the most basic details regarding the national and area purchasing of equipment, let alone colliery level information. So I had to rely on published data, plus additional but far from comprehensive information from the National Union of Mineworkers (NUM).

Even before the miners' strike, the Financial Times had described the mining machinery industry as a "tight lipped" one. The reasons for this were probably due to the great uncertainty that existed then about the future shape of the coal industry and what the effects of the increasingly profit-orientated policies of the Coal Board would be on business with UK suppliers. Whilst I encountered reluctance to answer questions concerning the specific details about equipment orders from the Coal Board, most interviewees were frank about their concern over the shrinking size of the deep mining industry, not least because in some cases there was (and is) a very real threat to their own jobs.

I was also able to gain a clearer understanding of the varying company responses to British Coal restructuring from company level interviews, which was impossible to do from media reports.

One of the problems of examining changes in two national industries - coal mining and mining machinery - is that of coverage. To prevent my analysis of events from becoming over-generalized and too superficial to have any explanatory value I focussed primarily on specific product markets, namely the heavier items of underground mechanical machinery (coal cutters, road-headers, underground transportation equipment, roof supports), and upon two main localities, namely the North East and Yorkshire. Even so, I did attempt to visit primary suppliers suppliers of longwall machinery outside those two geographical areas, such as Dowty in Worcester and Aschurch or Anderson Strathclyde in Motherwell. Furthermore, the focus on a locality such as Tyneside meant that I had to take account of other forms of linkages with the coal industry, especially the power plant industry (see chapter six, part two). Once I had decided to consider the implications of privatisation on the industry my attention turned to a broad network of engineering and corporate linkages incorporating multinational energy conglomerates, civil engineering contractors and private mining operators (see chapters seven and eight). This all required considerable secondary research and further questionnaires, rather than face-to-face interviews. (Given the constraints of time and resources I could not do all the interviews and additional research I wanted to). At the international and national level of analyses I was mostly concerned with who would benefit from current policies and

trends? Who would lose? And what would be the main consequences for people employed in the mining industry, particularly the private suppliers? (see Objectives above).

For anybody reading this thesis there will be little doubting where my sympathies lie, or indeed about my political proclivities. Nevertheless, I have tried to remain as objective as possible in my research methods. At all times I have been conscious of the fact that whenever it comes to interpretation and analysis of data or events personal prejudices and assumptions do take a part. Even so, I hope that the empirical study and accompanying analysis will be useful to other researchers and academics, and of some relevance to current debates. The whole process of researching and writing a thesis has been a learning experience for the author, and after completing it I realize only too well how incomplete it is and how much more I have to learn.

FOOTNOTES AND REFERENCES

- (1) To certain sections in British society there may not seem to be a "coal crisis" at all. For instance, the current government view its political and economic attacks on the miners as a triumph and the preparations of the industry for complete privatisation as a major policy success. For sections of private capital, the expansion of opencasting in some places has brought huge profits. Others will gain from increases in coal imports and from the expanded opportunities offered to private investors. The term coal crisis has real meaning when looked at from the perspective of those who are dependent upon the industry for jobs and incomes and in terms of national energy policy.

CHAPTER TWO

COAL BARONS AND MACHINE MAKERS; PRIVATE PROFITS AND COAL PRODUCTION

'In plain truth the coal owner is a gambler with the nation's coal resources and the life and well-being of the miner. Every effort he makes to decrease the financial cost of production tends to increase the intensity of labour performed by the miner' (extract from Industrial Democracy for Miners, 1919).

'A great pioneering task thus awaits the employer and the mining engineer, which is nothing less than the rebuilding of the industry on the most modern lines' (from the report by the Technical and Advisory Committee to the Ministry of Fuel and Power, 1945, Cmnd. 6610).

A central aim of this chapter is to examine the historical development of the British mining equipment industry in relation to the coal industry under private ownership. It focusses on the suppliers of the major items involved in the mechanisation of deep mining coal production, such as coal cutters, power loaders and conveyors (1). Some understanding of the relations between these firms and private coal companies is essential to understand changes wrought by state ownership to inter-capital relations after 1947.

From the outset it is important to raise one big distinction between the coal industry under state ownership and the industry in private hands. Prior to state takeover it was the system of production for profits that influenced both the pace and direction of technical changes in the production process. In turn, the coal owners' ability to make profits affected the development of the specialist mining engineering industry. Nationalisation did not only alter the broad

institutional and organisational parameters within which technical changes took place, it altered attitudes towards technical change. Capital investment decisions were based on long-term centralised planning about the future direction of the industry as a whole. This long-term perspective was virtually impossible in the cut-throat competitive environment that had prevailed under private ownership.

This chapter concentrates on the pre-nationalisation era, particularly the inter-war and wartime periods. Hitherto, studies of the coal industry have looked at internal capital-labour relations, the politics of production, changes in the mining labour process, the history of the miners' union and the economics of the industry (2). In all these studies little attention is devoted to the mining machinery makers, who were (are) important players in the technical transformation of mining from "pick and shovel" methods into the sophisticated "high tech" industry of today. This study should redress this imbalance. Whilst it does not aim to go into great detail about the impact of new technologies in the mining labour process, which are analysed comprehensively elsewhere (see especially, Heycock, 1986), it is important to recognise the crucial links between internal and external relations of production. In fact, changes in internal capital-labour relations and at the point of production can not be fully understood without reference to external inter-capital relations. As Nichols (1980:25) stresses, any analysis of the labour process that restricts itself to internal relations of production would

'not only miss much, but fail to see why what happens does happen'.

This alone is an important reason to study the relations between capital goods suppliers and the users of those capital goods. In this case the focus is on relations between the mining machinery makers and the coal owners. This is necessary to analyse how nationalisation changed the parameters within which important decisions about capital investment, technical and organisational changes were made.

2.1 Pre-Nationalisation Mechanisation

Table 2.1 provides a useful breakdown of vital statistics related to the level of mechanisation in the inter-war coal industry. There was an increase in the numbers of chain coal cutters and mechanical conveyors, and the percentage of coal cut by machinery increased from 19 to 59 per cent between 1924 and 1938. There was also a corresponding rise in the use of electrically driven machines and lamps underground. All this might indicate rapid technical change within the industry, but in comparison with other European, and US, coal producers Britain's advance towards mechanised mining was slow and uneven, with great variations in levels of capital investment in machinery between and within regions (see Table 2.2).

As Table 2.1 shows there were over 2,000 working mines in Britain on the eve of World War II. The small-scale of most of these mines restricted the possibilities for mechanisation and achieving economies of scale. In contrast, many mines in Europe were deliberately laid out on a large-scale from the start. Whilst many British mines were typically producing 100,000 tons of coal per year, large-scale German mines were raising almost one million tons a year and some Dutch mines

almost two million tons. Before the General Strike of 1926 Britain's national average mine productivity was as high as Poland's coal industry, the highest in Europe, and about level with the Ruhr coalfield and the Netherlands. A decade later, output per manshift (OMS) was half that in Poland and had slipped well behind German and Dutch levels of productivity. Between 1913 and 1938 OMS increased by 13 per cent in Britain, whereas over the same period, in the Ruhr it had increased 64 per cent, in Poland by 63 per cent, and in the Netherlands by 101 per cent. British mines were slower to adopt mechanised methods than many European producers. Collieries in the Ruhr won some 97 per cent of their coal from mechanised means in 1934, compared with only 2 per cent in 1913, whereas less than half the coal cut in Britain was by machine (see Table 2.1).

By the late 1930s, the British coal industry was generally in bad shape and technically backward compared to several other coal producing nations. It was during the inter-war years that Britain had slipped down the league table in terms of productivity. As Pagnamenta and Overy (1984:182) put it, the industry

'was weighed down by hundreds of worn out businesses, paying low wages to a workforce that was getting older as younger men left for the better-paid jobs elsewhere. The old, bad, coal industry was the one the public heard about, and the one that provided the case for state ownership'.

Years of neglect by private owners was reflected in the report of the Technical Advisory Committee to the Ministry of Fuel and Power, under the Chairmanship of Sir Charles Reid in 1945 (The Reid Report).

The "professional" verdict of the committee of mining engineers was that

'much of the industry is out of date ... Methods of coal getting and haulage need to be modernised. There is an acute shortage of technical ability ... We are satisfied that throughout the industry drastic technical reorganisation is not only practicable, but virally necessary'.

By exposing the industry's inefficient production methods and technical shortcomings the Reid Report provided ample ammunition for the advocates of state ownership (see Chapter Three), although Reid himself favoured voluntary integration of colliery companies without state intervention (see Shinwell, 1957).

The Reid Report went into considerable detail about the technical shortcomings of the coal industry, and it became an official planning guide for many NCB investment projects and colliery amalgamations and reorganisations during the first decade of state ownership. But the Report made no recommendations as to how to coordinate the production of mining capital goods with coal production, preparation and supply. It merely suggested the need for "greater technical assistance with the mine machinery manufacturers". The dominant Government view after the war was that the problems in the supply of vital machinery to the mines was caused by shortages in the supply of labour and raw materials to the manufacturers, rather than deficiencies in the inherent structure of the machinery industry itself. A contrary view was put by Heinemann, writing in 1948, who suggested that the engineering capacity was too small to meet the enormous national demands of the Coal Board for equipment of all types.

Several inter-related questions from the above comments require deeper analysis. Why was the coal industry so technically inefficient by World War II? Explanations require an understanding of the system of production for profits as it existed in the early 1900s, as well as the pattern of private ownership of land and coal. One underlying argument is that production for short-term profits and dividends shaped the whole innovation process, dictated the pace of technical change, and to a large extent the nature of the innovations themselves. This is a basic point to make, for, if accepted, it dispels the notion that science and technology were (and are) somehow neutral forces in a political, economic or social sense. In the coal mining industry, as in many others, scientific advances were introduced to increase profits and not directly to improve the working conditions of labour. Of course, other factors influenced decisions to invest in new machinery, such as the age of collieries, local geology, physical obstacles to machine mining, wage rates and working practices. It is necessary to consider how these factors influenced the profitability of private coal companies and coal owners' attitudes to capital investment.

In addition to the above issues there is another set of questions related to the supply of mining capital goods. Who were the machinery makers? How big was the mining machinery industry prior to state ownership? How vertically integrated was coal production with mining machinery production? Before examining these questions it is useful to analyse the relations between short-term profit and long-term capital investment decisions in the era of private coal capital.

2.2 Short Term Profits, Production and Capital Investment

Undoubtedly the British coal mining industry remained one of the most labour intensive and technically primitive of industries well into the Twentieth Century. Whilst other industries were adopting much greater mechanisation a great many mines were using pick and shovel, muscle and pony power. One of the reasons for this was the extreme difficulty involved in mechanising the labour process underground. Twisting roadways, cramped conditions, long distances from shafts to coal faces, tiny passages, poor drainage, faulted seams, danger of explosions caused by sparks or poor ventilation, were just some of the many typical problems encountered. Coal mines were unpredictable and dangerous environments, which made it both difficult to apply mechanised methods and hard for management to supervise or control the mining labour process (see Heycock, 1986). So coal mining remained a technically backward and physically exhausting occupation throughout most of the era of private ownership. As Mumford (1932:68) put it,

'Among the hard and brutal occupations of mankind, the only one that compares with old-fashioned mining is modern trench warfare'.

Coal was also the fuel that was crucial to the development of British capitalism in the 19th century and for Britain's industrial supremacy in the world. It was at once a raw material for scientific research (3), and a source of fuel to power machines. Coal was the basis of wealth and power for a large number of industrial capitalists, not least the coal barons themselves, iron and steel companies and the

railway owners. Writing in 1938, Orwell expressed the profound importance of coal for everybody.

'Our civilisation ... is founded on coal, more completely than one realizes until one stops to think about it. The machines that keep us alive, and the machines that make machines, are all directly or indirectly dependent upon coal'.

It is all the more interesting that the mining labour process was only partially mechanised at the time of nationalisation. Coal had fuelled technical changes in other industries, but the coal barons were reluctant to invest in new machinery to produce more coal. Why?

Capital investment in new machinery ultimately depended upon the colliery company or owner's willingness to invest. If an owner considered the eventual returns on capital investment to be minimal, none would be invested. Many colliery owners and directors of colliery companies were only interested in taking dividends rather than in re-investing profits into the mines (Carney, Lewis & Hudson, 1980). Implementing new plant and equipment entailed changes elsewhere in the mine, altering mine lay-outs, changing working practices and piece-rates. Returns on investment were not immediate, and planning had to be long-term. Most coal owners lived away from their pits and rarely visited them. It was exceptional if a coal owner had personal experience of working in a pit or knew very much about the production process. Furthermore, whilst labour could be cheaply exploited, there was little pecuniary incentive to increase the capital intensity of the mining labour process. In fact, some owners were against mechanised mining on the grounds that by raising productivity per miner it would also increase labour costs unless numbers employed could be cut. The

owners preferred to maintain short-term profits by suppressing the wages of miners.

The coal owners themselves strongly resisted any attempts by the state to impose controls or regulations on the industry that they did not agree with. They were able to continue to make profits from their older, inefficient collieries by wage cuts or intensifying the labour process, e.g. by lengthening working hours. Every attempt by Government to interfere in the industry, whether to improve working conditions for employees or to promote more efficient organisation of the industry met with opposition from the owners. As Heinemann (1944:129) observed, the coal barons held

'an important place among the most influential, the most vocal, and on many matters the most reactionary ... mouth pieces of a narrow class interest, so narrow that it was once described by The Times as constituting "a danger to private enterprise".'

This narrow class interest had many sympathizers in Westminster, not least among those MPs who held directorships in iron, steel, coal and engineering combines and small colliery companies (4). It is not that surprising, therefore, that the coal owners staved off state ownership for so long (see Chapter Three). Similarly, they managed to earn handsome dividends from an industry that was increasingly out-of-date from a lack of proper organisation, co-ordination and long-term capital investment. Technological development was more rapid in the mining industries of other European countries primarily because of a greater willingness in those places to sink capital in long-term schemes (Heinemann, 1948:37).

2.3 Scientific "Progress" & Mine Safety

If one is to understand the reasons why mechanisation did not proceed faster in the inter-war years it is necessary to understand something of the underlying processes of change. What forces motivated capitalists in the coal industry to introduce new devices, to apply scientific inventions and new technology in the mines? Put another way, how did private coal capital benefit from technical change? The latter question is significant because it obviously implies that technology is political and is shaped by determinate groups for particular ends. In other words, science and technology were not applied purely for the benefit of humanity, but were applied for the benefit of a narrow class interest. In an articulate essay entitled 'Present Tense Technology', Noble (1985:143) stressed how capitalism emerged

'as a system of production that was identified with progress itself ... This emergent ideology of technological progress served capitalist development well in the name of material prosperity, and diverted attention away from the exploitation entailed.'

He argues that intellectuals' theories of modernity and technological change as a good in itself and "the transformation of such theories into a generally accepted 'common sense' which, being shared by all, has greatly weakened the analyses and actions of the opponents of capital's hegemony" (pp. 139-140). Whilst Noble's perspective is a

broad one concerning societal level changes, he is careful to stress that

'No one is against "technology", despite the frequently heard charge, because technology as such does not exist. Technology exists only in the particular, as particular pieces of equipment in particular settings ...' (p. 148).

These observations have considerable relevance to the technical and scientific changes occurring in the British mining industry. It is necessary not to view improvements in the conditions of labour underground as the result of scientific and technological progress. Any improvements in the mining labour process were the result of years of struggle by miners and their political representatives, liberal Parliamentary reforms, and also the accidental by-product of technical change. This is not to argue that scientists and mining engineers ignored safety and health concerns altogether. On the contrary, safety standards did improve as a result of several inventions. Rather, the coal owners were unlikely to invest in any device or machine unless it was likely to improve both productivity and profits. This was illustrated by Albury and Schwarz (1982) who examined how the miners' "safety lamp" designed by Sir Humphry Davy was not, as is often claimed in history text books, a great scientific discovery on behalf of humanity which helped to save thousands of miners' lives.

'Davy's brief was rigidly defined. He spoke to no miners. He was told - and he believed - that the problem was not one of ventilation. His brief, in short, was the owners' brief - to build a lamp that would work in methane-rich atmospheres that existed in crept workings. It was not to investigate mine safety but to design a lamp' (Albury & Schwarz, 1982:19).

As a direct result of Davy's lamp "crept workings" (i.e. methane rich parts of coal mines) were re-opened in numerous mines of northern England, and mine explosions caused many hundreds of deaths in the following century. Whilst much of the blame for these deaths can be placed on the greed of the owners who wanted to work dangerous places to earn more profits, and upon the lack of adequate ventilation in many mines, there were also inherent design failings with the Davy lamp (5). If the miners had been fully consulted the mine owners would have had to sink new ventilation shafts and crept workings would have remained closed.

The Davy lamp is only one example of a device being used as a cheap, simple solution to a mine owner's problem but justified in terms of improving mine safety even though it increased the dangers to miners. There are other examples of mine owners being unwilling to invest in or being slow to adopt some innovations because of cost. During the 19th century there were few improvements in the technical means to get coal from the face (see later). Wooden tools were replaced by steel ones and safer explosives were introduced. But mine owners were reluctant to introduce new intrinsically-safe equipment into mines. Several electrical engineering companies introduced equipment safe for use in fiery or dusty situations. An example was the Davis Magneto Exploder which enabled shots to be fired electrically from a safe distance without the use of naked lights. Nevertheless, many mines continued to use "match and light" techniques, which were highly dangerous, rather than invest in the Magneto Exploder which was more costly.

Perhaps the most obvious example of coal owners' willingness to exploit human labour rather than improve working conditions or introduce more efficient methods is in the abuse of pit children (see Forster, 1978). The 1833 Factories Act limiting the hours of work for children to nine per day and provided a scheme of national inspection. The Act extended regulations to textile factories but not to coal mines, where only pit communities were aware of the true horrors of pit life. Young boys were employed as "trappers", minding wooden trap doors, sometimes for 18 hours a day six days a week, without seeing day light. The trap doors were crucial for pit safety, for they were located at strategic points in the mine galleries to direct "course" air into the workplaces and to allow the passage of coal tubs pushed by older boys called "putters" or pulled by ponies (see Forster, 1978). Whilst the use of female labour underground was prohibited by the 1842 Mines and Collieries Act, it took over sixty years before the use of boys under 13 years was prohibited by Parliament.

The simple fact was that the coal owners found it very profitable to employ cheap child labour. Even when Bills were passed, such as the 1842 Act and subsequent acts relating to the mines, it was difficult to enforce them or to ensure that coal owners were not flouting them (6). There were too many mines and too few inspectors. Many of the inspectors were drawn from the same class as the mine owners. And as already pointed out the mine owners were well represented in Parliament via kinship ties and directorships held by MPs (Heinemann, 1944). Any attempt to "interfere with their property" met with stiff opposition

from the colliery owners. As Kirby (1977:20) put it, the owners continued

'to fight a rearguard action against legislation which inevitably influenced the cost structure of the industry and increasingly impinged upon the day-to-day management of the colliery enterprise'.

In some senses these attitudes also applied to technical change. Coal owners saw little reason to make long-term and big outlays of capital if they could continue to prosper using existing methods.

2.4 Three Shift Mining and the Problems of Mechanisation

Most mines operated a "three shift" system of mining. Only one of the three daily shifts actually involved hewing coal, which meant that early mechanisation dedicated to improving pit productivity focussed on the coal getting shift. It was only after World War II that the technology was made available to integrate the mining production process and have coal getting on every shift, which was a major reason for productivity increases in longwall coal mines during the 1960s (see Chapter Five).

The three shift system involved "an extreme division of labour" in face operations which destroyed "the unity of colliers' work" (see Burns et.al., 1983). In each shift teams of miners performed separate but complementary tasks - "getting", "filling" and "flitting". The first shift involved drilling holes into the face into which explosives were placed and an undercut was made along the floor to control the explosion. Then props and bars were re-set up the coal face, and

shot-holes were drilled into the coal. At the end of the shift the coal was shot off the face by shot-firers. The second shift was devoted to "filling" the loosened coal either into tubs, or less common in the early 1900s, onto conveyors. On the third shift, "flitters" advanced the face props for the next coal getting shift. Setting up new rows of props and advancing tub rails or the mechanical conveyor into position close to the location of the new face was a very labour intensive exercise. In addition, roadways (main gate and tail gates) were essential as routeways for materials, men and coal, and for the movement of air to the workings, but they required "ripping" (the removal of roof material) and "dinting" (the removal of floor material) to make the passageways more even and easier to transport men and materials down.

For the coal owners the labour-intensive three shift system created bottlenecks in production. One bad shift could create delays for the subsequent two shifts. Coal mining could only be really efficient with greater integration between the different miners' tasks. Another problem for the owners was their lack of direct control over the mining labour process. Once underground, it was difficult to supervise the miners. Although overmen and deputies were employed, holding positions akin to foremen in factories. But the cramped, tiny passageways, long underground travelling distances from shaft to coal faces, and poor working conditions made supervision a problem. Furthermore, colliers would sometimes refuse to work if an overman was watching them (Goodrich, 1920).

It is important to understand why British mine owners did not make greater efforts to introduce labour-saving mechanisation during the

early 1900s and inter-war period. What advantages did the mostly "hand got" methods of mining have for the owners and colliery companies? Part of the answer lies in the method of payment to mine workers.

2.5 Piecework and Wages

In place of external supervision, the mine owners and colliery managers relied on the operation of the piecework system as a form of "internalised" supervision (Tomaney, 1988). Piecework involved the negotiation of a price for a given task or job between the overmen and the group or individuals concerned. Piece rate earnings were variable depending on rates of pay criteria, ways in which people were selected for particular jobs, mining conditions, local working practices (see Krieger, 1983). There were inter- and intra-regional variations in the piecework system. Many localised disputes were often the results of arguments about piece rates. For the mine owners the system had a number of advantages. They know it was in the interests of workers to work as productively as possible. So if miners hit a bad seam they would work harder and longer to maintain their wages. If they hit a good seam they would work hard to increase their productivity and pay, which was largely dependent upon the quality and quantity of coal from the face. The owners had a choice, under bad conditions they could either abandon a seam or intensify the work process.

In South Wales, and other areas, there was much bitterness caused by the lack of a minimum wage and by the fact that wages were affected by poor seams and miners were being forced to work in abnormal places.

The exploitative and wasteful system of mining was described in Industrial Democracy for Miners (1919)

'In order to obtain the greatest mass of profit in the shortest time, and on the lowest investment of capital, the coal owner is forced to employ the most wasteful and profligate of methods. For the human factor, the miner, this means working under price lists, based not on average working conditions, but on ideal conditions which he perhaps encounters once or twice in a life time. The result is that he is driven to a toil of hellish intensity, to disregard safety, and to practise methods which result in an enormous waste of coal. This is intensified in the South Wales coalfield, where the common practice is that the hewer receives no pay for small coal which he sends out. Thousands of tons of the nation's coal resources are "gobbed" every day owing to this fact alone. On the other hand where, owing to a difficulty occurring in a seam which makes for a considerable rise in the cost of production, and therefore a fall in the rate of profit, the management quite frequently leave behind, and thus lose to the nation, considerable tracts of coal bearing strata' (Coates, 1974:107).

Another cause of resentment for the miners but source of profits for the owners was the operation of "sliding scale" wage agreements. Colliery bosses took the selling prices of coal as a criterion for wage rate adjustments. In times of trade recession when coal prices fell, owners were able to recoup their losses by cutting wages. Thus the miners and their families had to bear the costs of recession, not the owners.

Only after considerable struggle did the miners win the principle of a minimum wage. In 1909 the Eight Hours Act was passed, which reduced working hours from "bank to bank" from 10½ - 10 to 8½. Unfortunately this added to miners' difficulties in making up their pay from so-called "abnormal places", i.e. areas in the mine that were

exceptionally hard to win coal from. It was opposition to the sliding scale and calls for a minimum wage that led to a coalfields' wide stoppage for six weeks in 1912 (Edwards, 1938). The miners did not get one national minimum wage. Rather the minimum wage was to be left to the Joint District Boards established under the Act, comprising 17 mining districts, each possessing historic differences in wage rates, different criteria for settling piece rates, and different geological and mining conditions.

During the inter-war period coal owners continued to cut wages and resist attempts by successive governments to impose controls on the industry. In the mid-1920s many coal owners began to suffer from increasing competition on overseas markets from other coal producers. By 1925 two-thirds of Britain's collieries were operating at a loss and probably a quarter of the industry's workforce was unemployed (see Cook, 1924). The exporting areas of South Wales, northern England and Scotland were hit by the return to the Gold Standard which made British coal dearer than that of overseas competitors. Coal owners called for bigger wage cuts and a longer working day. The Government appointed a Royal Commission under Sir Herbert Samuel, which was composed of "men considered to have a "safe" capitalist background and training" (Heinemann, 1944:114). Unlike the Sankey Commission, which six years earlier had considered the industry was ripe for nationalisation, the Samuel Commission virtually agreed with the coal owners' prognosis, called for immediate wage cuts to solve the crisis, i.e. of low profits and losses to the coal owners. Not only did the Samuel Commission's decision hasten the General Strike of 1926, it delayed a thorough reorganisation of the industry. As Calvocoressi (1978:49) put it,

'Having won this battle, the owners were not obliged by the economics of their situation to face the need for modernisation, although in shirking it they worsened their long-term plight and the plight of the industry'.

Even the Samuel Commission saw the need for some form of industrial rationalisation and proposed amalgamations, so that coal companies could reap economies of scale. Whilst amalgamations did take place they did not lead to a more technically efficient industry. Rather, they created bigger combines with more money and influence than the small owners. This in turn enabled the combines to create

'a series of "tied" markets for their coal in other industries where they were able to reap extra profits. They bargained (very effectively) with the Government to fix compulsory minimum prices at the level that protected their most backward and inefficient units. Many of the combines had been built up by purchasing pits at inflated prices, were over-capitalised and burdened with bank debt, and more money than the economies brought in was paid out in fixed interest to the debenture-holders instead of being invested in the industry ...'
(Heinemann, 1944)

by

The creation of large coal combines, either voluntary or state induced mergers, was and could not be an answer to the industry's problems. The industry required systematic long-term planning and investment on a coalfields wide scale. But the state side-stepped outright nationalisation between the wars and tried to generate some form of reorganisation in the industry. Private capital cleverly selected which state measures suited them most. The coal owners resisted state proposals for compulsory amalgamations (under three Acts relating to the coal mines), whilst they used state power to secure monopolies to sell their coal.

The Coal Mines Act, 1930, helped establish cartels, i.e. price fixing and output fixing rings. Part One of the Act set up a Central Council comprising representative coal owners from each district, whose main function was to allot output quotas to each of the mining districts, with separate quotas for inland and export sales. Distinct quota allocations were distributed among all mines in accordance with the size of their respective standard tonnages. Each district Executive Board had the responsibility to set minimum price schedules for all classes of coal. The major consequences of Part One of the Act dealing with output quotas, and Part Two, concerning coal mines reorganisation, were:

- (1) Price competition was controlled within districts, but increased between them due to the adoption of deliberately low price schedules by certain Executive Boards;
- (2) Prices for most districts stabilised during the depression and rose thereafter;
- (3) The more successful district marketing schemes were the less need there was to alter the existing industrial structure (see Kirby, 1977:166).
- (4) Colliery companies were given a new lease of life by stabilised coal prices and low wages. In particular, the Act improved the profit margins after 1931 of the big coal, iron and steel combines;

(5) According to Heinemann (1948:118-119) "the consumer was made to pay to keep the coal-owners in the saddle and to stave off reorganisation". Whilst small domestic consumers were buying dear coal, heavy industry, particularly steel (a business closely related to coal), bought relatively cheap coal.

The various Coal Acts in the inter-war years were inadequate measures and failed to pin-point the fundamental problems afflicting the coal industry. District price schemes enabled many marginal loss-making operations to survive and their owners to make profits without re-investment into the pits. Mergers did create some large coal combines but few large, modern coal mines. Far from being synonymous with technological progress, the system of private ownership in the coal industry was a definite block on technical advances and capital investment. It is true that the late 1920s and 1930s were times of over production and under-employment in the coal industry, and greater capital investment in mechanised mining would either raise output and/or reduce employment, but it was the coal owners' ability to continue to cream off any profits from inefficient pits that was the real block on mechanisation. The large combines had financial interests in several industries and owned pits in different coalfields, and they were able to subsidize loss-making pits without major investment in them. In fact, it was expensive to close down mines due to the fixed capital already in them. Smaller coal companies, often owning two or three pits, simply lacked the necessary capital resources to modernise their operations.

In addition to the problems created by the short-term profit-mindedness of colliery owners were those created by Britain's

"early start" in coal mining, and by fragmented patterns of land and coal ownership. Before nationalisation there were hundreds of marginal workings and collieries with limited capital resources. Furthermore,

'more than half and possibly as much as two-thirds of the coal produced in 1914 came from collieries which had been projected before 1875' (Taylor, 1968:67).

Another impediment to technical change was the chaotic pattern of land ownership. Arbitrary boundaries between properties on the surface dictated where companies mined coal underground.

'This was often due to the bizarre illogicality of the mineral rights laws. Engineers developing mines had to observe underground boundaries that followed streams and hedges dividing property on the surface. One coal mine might have three or four land owners with the mineral rights to the coal beneath, entitled to a royalty' (Pagnamenta & Overy, 1984:179).

Coal got from under such a property could cost over a penny a ton extra, so roadways were often bent to avoid expensive properties. This led to complex, narrow, twisting passages unsuitable for locomotive haulage or long-distance conveyor belt systems.

There was nothing rational in the way coal seams were extracted. Private companies bought the rights to extract whatever coal existed beneath a particular acreage of land. Indeed, one of the arguments advanced for public ownership was that it would lead to a more logical, coherent and less wasteful system of mining coal, and one that was not

restricted by the complex divisions between surface properties and colliery companies (see WERU, 1985:10-12). As many miners realized,

'The division of a coalfield into numerous undertakings, each with a barrier of forty yards of unworked coal as a boundary, may be instanced as a specimen of the wasteful methods entailed by private ownership' (Coates, 1974:108).

2.6 Mechanisation and the Machine Makers

The system of private ownership, fragmented land and colliery holdings and the preference of owners and shareholders for short-term profits and dividends are all reasons for the relatively slow pace of mechanisation prior to World War II. They are also reasons for the slow and uneven development of a domestic mining machinery industry. In the absence of any degree of centralised planning at regional or national level or of coordinated equipment purchasing programmes, the general tendency was for many companies to try to supply particular collieries with a complete range of goods, rather than specialise in one or two items.

In the nineteenth century, many of the early mining suppliers produced a range of items for pick and shovel mining, including hand tools, explosives, hand or pony pulled tubs, tracks, miners' lamps, winding gear, rescue and safety apparatus. One of the early commercial pioneers of miners' lamps and electric devices was John Davis & Son (Derby) Limited, which in 1887 produced a catalogue containing no less than sixteen different types of miners' lamps, such as 'the Davy', 'the Clanny', 'the Upton', and 'the Bonneted Muesler'. This variety

reflects a lack of standardisation and fragmented market demand in that period. Whilst John Davis (later Davis Derby) became one of the major suppliers of electrical equipment to British mines, it was a supplier of many non-mining items to all parts of the globe. By the close of the 19th century the company had

'an agent in Barbados who was selling hygrometers and other equipment in the sugar plantations. A Spanish railway company bought lightning conductors. Goods occasionally went to China and Japan, and there was a fair stock turnover in Brussels. Time saving calculators were being shipped to Yokohama!' (extract printed in The Colliery Guardian, April 1983).

Pick and shovel makers were common. One of the most successful was Holman Brothers Limited, which was founded in 1801 by Nicholas Holman and remained a family business into the Twentieth Century. Based in Cornwall, Holmans started out as a boiler making concern but quickly developed into a general engineering company supplying boilers, hoists and various mining capital goods. It became a major supplier to the Cornish tin industry and copper mines. A company catalogue issued in 1879 listed the equipment made by Holmans :

'Steam engines, air compressors, pulverisers, hoisting crabs, lifting jacks, screw Jim Crows, chains, cooking apparatus, mining machinery of every description.'

The discovery of tin and copper deposits in other parts of the world ended the virtual monopoly Cornwall had enjoyed for centuries. Holmans had started supplying British coal mines, but with the declining Cornish mining industry it started to develop markets abroad. Sales of Holman Brothers equipment overseas may have been aided by the

diaspora of Cornish miners to the metalliferous mines of the Americas, Africa, Australia and Malaya, for they took with them tools upon which they could rely. By the 1920s Holmans were making a range of pneumatic riveters, hammers and drills, in addition to conventional hand tools, for the home coal industry.

Whilst hand tools predominated until the 1930s, the first experience in mechanised coal getting were in the Victorian era. In the 1860s a compressed air coal cutter was given a trial. It was reported that the machine discharged "a stream of pure atmosphere at every stroke adding to mine ventilation whilst coal cutting" (Journal of the Coal & Iron Trades, 21 September, 1862). At this time Gillot and Copley of Barnsley were producing a disc cutter, which undercut coal by means of a horizontal disc with picks set around the circumference cutting as the disc spun against the coal face. By 1873, there was another machine utilizing a projecting horizontal jib around the edge of which ran an endless chain containing cutter picks at intervals. A third type of coal cutter used a bar cutter, which was a tapered round steel bar as a cutting arm with picks along its length in a spiral formation. It was not until 1893 that the first electrically driven coal cutter was implemented down a British pit.

Table 2.3 shows the adoption of different types of coal cutters at different times in the early 1900s. The rate of adoption was slow for reasons already advanced, but there were other advantages to "hand got" over machine mining. In the first place miners had a wealth of knowledge about underground environment. They knew when it was dangerous to mine. They could work bending and subsiding roofs to get more coal. Machines were only able to operate well under relatively

good, unfaulted mining conditions. In areas where coal seams were soft it was more economic to use "hand got" methods. Where steep inclines existed it was far easier to employ men with picks than machinery (see Peel, 1908:157). The tacit knowledge of mineworkers could not be incorporated into mechanical devices. As an article in The Journal of Coal & Iron Trades put it in 1862, none of the attempts to produce steam-driven cutting machines had

'superseded the old plan of "curving" and "nicking" or "holing" and "shearing" by the pick in hand ...'
(26 April, 1862).

Some 84 years later mining engineers were still doubtful about the machine's advantages over conventional hand got methods. As one put it,

'The major fault in mining practice in the past generation has been the neglect to control the natural forces involved and to rely upon powerful machines to get the coal, with disastrous results to many working faces and roadways' (Transactions of the Institution of Mining Engineers, 1946-47, Vol. 106:562-566).

Another disadvantage with machines was that they could not discriminate between qualities of coal and waste, which meant that more energy was required to transport greater outputs and to sort it out on the surface. As long as miners were only paid for larger coal they would sort it out before sending much of it to the surface. Mechanical coal cutting did not necessarily reduce total labour costs. Whilst the numbers of miners needed to hew coal was reduced, more people were often required elsewhere below ground to maintain roadways, coalfaces

and the machinery. It was also very costly to introduce new machinery into a pit. Not only had piece rates and working practices to be changed but mine lay-outs had to be altered to accommodate machines. As Howse and Harley (1960:110) pointed out with reference to the early experiments with the Meco-Moore cutter-loader.

'The introduction of a revolutionary machine demanded changes in accepted practice of a minor revolutionary nature. It needed lengthy trials, skilled and sympathetic operators, and patient managements, and it is small wonder that the early years of the Meco-Moore were fraught with difficulty, disappointment, and sometimes despair.'

In an era when Fordist mass production techniques were being applied in motor vehicle factories and mechanisation was proceeding apace in many industries, the coal industry of the early 1900s was still very dependent on labour intensive methods of production. Quite simply coal mines could hardly be compared with factory environments, nor could the process of producing coal be compared with that of producing consumer or capital goods. Capital investment in coal mines has always demanded longer-term time horizons than similar investments in factories (see Schumacher, 1957). Nevertheless, this does not explain why overseas coal producers were faster to adopt mechanised methods of mining than Britain.

The main competition for British mining equipment companies came from across the Atlantic from machines such as Jeffreys, Sullivans and Harrisons. US machine makers had a number of home advantages over their British counterparts. Firstly, they had a vast internal market being opened up as their machines were coming onto the market. In contrast most British mines were developed at an earlier stage before

cutters and conveyors and other devices were commercially available. Thus, mine lay-outs and organisation in Britain were often inappropriate for the introduction of mechanical devices. Secondly, different mining conditions to Britain prevailed in many parts of the US. Many more US deep mines were much shallower and with thicker seams than British ones. Whilst there were mines using room and pillar methods in northern England, virtually all US deep mines used these methods, and owing to greater reserve they could afford to be more wasteful. They could also afford to use machinery.

Room and pillar mining involves cutting a series of cross-hatch roadways around and through coal seams leaving a chess board pattern of pillars of rock and coal from 40 to 80 feet on a side left standing to support the mine roof. The deeper the mine the larger the pillars are. In the final stage of mining coal pillars can then be extracted allowing the roof to fall in. The coal cutters initially designed for this system were similar (or the same) designs of machines used in British mines, mostly for longwall production methods (see Chapter 5). Many machines were exported to Britain from the United States. In the US itself, by the early 1900s, power equipment for drilling blast holes and undercutting the coal face ready for blasting were common place, and by the end of World War II some 90 per cent of US coal was undercut by machine (Marovelli & Karhnak, 1982).

A major rival to US producers was Anderson Boyes, founded in 1899. One of the co-founders of the company (AB), was Alexander Anderson, an electrical engineer with mining knowledge, who

'saw that a revolution was overtaking the industry, that the slow method of the hand pick must give way before the advance of the coal-getting machine and that the shovel must lead to the mechanical conveyor and loader' (Carvel, 1949:21).

Anderson Boyes produced its AB coal-cutter in 1906 to counter the Jeffrey cutters from America, which at that time were being sold by John Davis (Derby). By World War I the company produced the AB 17 inch chain coal-cutter and the AB 14½ inch cutter for thinner seams, but the company's most popular machines were then disc-cutters (see Table 2:3). Another Scotland-based company, later to merge with Anderson Boyes, was Mavor & Coulson, Bridgeton, Glasgow, which produced electrically-driven coal cutters. Mavor & Coulson had grown out of an earlier partnership between two electrical engineers, Muir and Mavor, founded in 1885, whose dynamos were widely used in the mining industry for lighting, pumping and haulage.

By the early 1920s several British firms were making coal-cutting equipment, although most were producing conventional or powered hand tools (see Table 2:4). The exceptions were Anderson Boyes, Mavor & Coulson, Cowlshaw, Walker & Co., and the Diamond Coal Company, who produced heavier cutting machines. Another company established in 1920 "to undertake mining work by contract, to manufacture and act as agents for the sale and installation of machinery and equipment at the coal face" was Gullick Brothers (later Gullick Dobson). The two Gullick brothers, Charles and Geoffrey, had formed the partnership to exploit their experience of machine mining gained before the First World War. Initially they carried out coal-cutting contracts; first of all at the Pemberton Colliery Co. Ltd., Wigan, and later with the Holmside and South Moor Collieries Ltd. in Durham, and Maltby Main and Rossington

Collieries in Yorkshire. Later Gullick Brothers turned their attention to the growing market for longwall coalcutters, and in 1923 they reformed into a private limited company, Machine Mining Services Limited, to provide accessories for those machines, including hoses, ropes, cutter picks, steel props and lifting jacks. The company also pioneered and were later sole selling agents for a continental pneumatic pick, the 'Titan'. Sales were low, due in part to resistance to change in the pits, fierce competition, and the disruption caused by the General Strike (Purdy, 1982).

In spite of the number of suppliers selling small pneumatic picks and drills there were still only 5,679 of these in use by 1928. Heavier coal-cutters, particularly disc or chain cutters, accounted for the greater part of the 28 per cent of coal mined mechanically in the late 1920s (see Tables 2:3 and 2:5). In the larger coalfields of France and Belgium as much as 50-70 per cent of total coal was cut by pneumatic picks or drills, and in the Ruhr it was as much as 75 per cent. Percussive machines were widely used in the Westphalia coal mines, and some ninety per cent of coal was won mechanically in Germany (see Redmayne, 1932:133).

Dominant foreign competition in mining equipment came from the US, France, Germany, and to a lesser extent, South Africa (e.g. the Rand Drill Company), although a number of South African mining suppliers were of British origin. Import penetration into Britain was helped by several British firms acting as selling agents to overseas manufacturers. Dollery & Palmer of Sheffield sold props and bars made by Gutehoffnungshutte AG of Oberhausen (GHH); compressed air picks made by Rudolf Hausherr & Sons; and products of Gewerkschaft

Eisenhuette Westfalia (GEW) of Lünen near Dortmund, which in the 1940s produced the first armoured face conveyors to be tried by the National Coal Board. Indeed, GEW and Dollery & Palmer formed Underground Mining Machinery (UMM) in County Durham in the late 1940s to manufacture conveyors and a range of other mining machines for the NCB. German companies also sold equipment through Hugh Wood & Company (Limited in 1914) a small Newcastle firm, which acted as agents for Eickhoff, Bochum, making shaker conveyors and cutting equipment, and Schwarz for roof props.

Hugh Wood was largely responsible for establishing a US owned subsidiary, British Jeffrey Diamond (BJD), in Britain prior to World War II. During the First World War, Nicholas Hugh Wood, the company's Managing Director, sought to take over the sole British selling rights for Jeffrey mining machines made in Columbus, Ohio. At the time Hugh Wood was a sales agency not a manufacturer of machinery. But as a result of losses of Jeffrey machines due to submarine torpedos during the trans-Atlantic crossing, Hugh Wood arranged for the manufacture of the first "British" Jeffrey machines under licence. It was not until 1927 that Hugh Wood persuaded Jeffrey Machine Company to begin competitive production in Britain. Whilst this was partly a move to avoid criticism from people who feared rising unemployment due to foreign imports, it was primarily a shrewd business venture by Nicholas Wood, whose company retained full responsibility for sales of Jeffrey machines in Britain (Huwood Limited, business archives).

Jeffrey bought a well-established coal mining machinery firm, the Diamond Coal Company in Wakefield. British Jeffrey Diamond, as it came to be known, was left under the co-leadership of the former Managing

Director of the Diamond Company and Mr. N.H. Wood himself. Thus BJD was to be one of a small group of foreign owned companies in Britain that was going to benefit from the huge expansion in home demand for mining machinery following coal nationalisation (see Chapters Five and Six). After eleven years the agreement between Jeffrey and Hugh Wood was broken. In 1938, Hugh Wood parted company with BJD to build their own mining equipment factory on the Team Valley Trading estate in Gateshead, which was the start of Huwood Mining Machinery Limited.

Before World War II the two dominant British-based coal cutter suppliers were BJD with its 'ACE' chain cutters and Anderson Boyes. Between 1900 and 1938 the percentage of machine cut coal had increased from one per cent to 56 per cent of the total coal output in England and Wales and 80 per cent in Scotland (see Table 2:2). Coal cutters increased coal output in the coal getting shift but had not eliminated the three shift system. Inefficient methods of loading and carrying coal back from the faces to the shaft and haulage out of the mine caused bottlenecks in production.

Up to the end of the 19th century the most common system of transporting coal underground was to load coal into tubs at the coal face. The tubs would either be pushed by men or boys (7) or pulled by ponies to a rope haulage system used to convey coal to the pit bottom. There were many variations to this theme, although most haulage systems required manual and pony power. From about 1841, small steam-driven engines were introduced underground, replacing ponies where the distance, mine lay-out and conditions justified it. Haulage engines were later powered by compressed air and electricity, but as Preece and Ellis (1980:53) point out,

'whatever power was used, establishing a haulage system was one of the largest outlays of capital for the colliery.'

Many British mines stuck to ponies, which was reflected in many mine lay-outs including underground stables, cleaning and feeding area food storages, water troughs, and harness repair facilities (see Bright, 1986). By World War II, Britain still had 30,000 working horses at the mines (see Table 2:1). A massive reorganisation of the haulage and underground transport systems was called for by the Reid Committee (1945), which compared Britain to other countries. In the US one haulage worker was needed for every 50 tons of coal produced; in the Netherlands the ratio was one for every 20-25 tons; but in Britain it was one to five.

The first mechanical conveyors appeared in mines in the early 1900s. These were made of a series of connecting troughs running along the length of coal faces through which ran an endless scraper chain. A second type of conveyor was originated in Germany and consisted of a series of steel pans which produced a shaking motion as coal ran along the pans. Whilst conveyor systems were not quickly adopted by British mines there were cost advantages once they were installed (see Table 2:6). Redmayne (1932:158) noted that conveyors eliminated numbers of tubs, ponies and miners required, led to savings in down-time, cheaper filling and increased output. One report stated,

'... the use of conveyors frequently affects a saving in cost of more than one shilling per ton and thus enables seams to be worked which would otherwise be abandoned' (The Midland Institute of Mining Engineers, May 1929).

Only a small number of firms specialised in conveyor systems, including both Anderson Boyes and Mavor & Coulson. Perhaps the most important supplier to develop in the inter-war years was the Mining Equipment Company (MECO). Mecos was founded as an all-purpose engineering firm producing percussive coal-cutters, rock drills, hammer drills and a range of rescue apparatus. Its early success was as a supply of equipment to mine rescue stations. Whilst it produced conveyors, such as the 'Meco Worm Drive Belt Conveyor', before World War I, many of its early conveyors were applied in the gold mines of the Rand in South Africa.

In common with other mining suppliers Mecos found the 1920s years of fluctuating fortunes, and at times it was a struggle for the company to survive. Companies were badly affected by the miners' strike in the winter of 1920 and Mecos had to lay off workers. According to Howse and Harley, the company's historians, the early 1920s were lean business years for Mecos and its business was kept afloat by exports and by a South African subsidiary selling spares to mines there. Nonetheless there was a steady expansion in the conveyor business which led to production problems at Mecos's cramped Moorfield works in Sheffield. In 1925 the company sold the rescue apparatus side of its business to Siebe Gorman and Co. Ltd. and moved from industrial Sheffield to the Cathedral City of Worcester. At the time the Worcester City Corporation was promoting the city as a centre for light engineering, and it offered Mecos a good site for expansion, ten Corporation houses and cheap electricity supply. The Mecos site was eventually served with sidings of the Great Western Railway Company for in-coming raw materials and for out-going mining machinery (see Howse & Harley, 1960).

By the 1930s mining engineers had begun to develop ideas to integrate different operations - coal getting, loading and haulage. The man who eventually provided "the missing link" between getting coal off the face and haulage was Matthew Smith Moore, who had worked on a simultaneous cutter-loader idea for almost twenty years (8). It was Meco that developed Moore's ideas and they eventually tried out the Meco-Moore cutter-loader at Houghton Main Colliery from 1936 onwards, which produced some 250,000 tons of coal before the outbreak of war. During the war the Mechanisation Advisory Committee to the Mines Department, fore-runner to the Reid Committee, pulled together engineers from Anderson Boyes and Meco to develop a more efficient cutter-loader. An AB coal cutter was mounted on to a Meco-Moore power loader to produce a machine that could cut and load coal simultaneously and for long periods. Carvel (1949:65) described

'the ceremony of switching on the power to start the first AB Meco-Moore Cutter Loader in Ruffard Colliery (Notts.) in Easter 1943. By that simple, yet momentous act, a new epoch in mining was opened, and the dream which had been with mining engineers for many years became a concrete fact.'

2.7 Relations between Colliery Companies and Machine Makers

Under private ownership close ties developed between specific colliery companies and engineering firms, although there was relatively little vertical integration. Most engineering suppliers were independent concerns from the large coal, iron and steel combines. In fact there was much greater integration between coal production and end uses, especially steel manufacture. Even so, some coal companies did have their own "in group" manufacturing companies supplying mining

equipment. An example of this was Cowlinshaw Walker, makers of the Shelton Power Loader, which was an indirect subsidiary of the Shelton Company, which in turn was part of the United Steel Companies combine. United Steels also owned engineering companies such as the Universal Grinding Wheel Company, Davy and United Engineering, and the Yorkshire Engine Company (Heinemann, 1944:122). Other large combines had similar involvements with privately owned railway companies, electric power companies, shipping firms, and shares in private banks.

Whilst there was little direct linkage via mergers between coal companies and their engineering suppliers, there were many informal linkages. Informal ties were developed by people with mining experience and knowledge who then set up engineering firms supplying the mining industry. Many of the engineering suppliers were established by or employed qualified mining engineers who often had close connections with particular colliery companies. Mining suppliers were also established in centres with easy access to raw materials and components for production and close to or within coalfields. This was no accident. It was more profitable to locate industrial centres with good communications near to potential clients. Anderson Boyes chose Motherwell as a site for its main factory

'because it was a good engineering centre in the heart of the Lanarkshire coalfield and because much of the raw material for the company's needs could be bought locally' (Carvel, 1949:26).

Clusters of mining engineering activity developed in particular localities. The Colliery Managers' Pocket Book lists many mining machinery firms in Sheffield, Wakefield, Barnsley and Doncaster in

Yorkshire; in Manchester and Wigan, Lancashire; in Derby and in the fast developing "engineering heartland" of the West Midlands, in the 1920s (see Chapter Six). Similarly, a number of suppliers were concentrated in Newcastle-upon-Tyne, and north of the border. Glasgow had numerous mining suppliers, including Mavor & Coulson, James Hendry Ltd., the Scottish Tube Company, Mirrlees Watson and Murray McVinnie. These companies probably had close links with the large Scottish combines such as the Edinburgh-Lothian Group, the Fife Coal Company and W.M. Baird & Co. Ltd.

Mining engineering qualifications were an obvious advantage to a supply firm. One of the three co-founders of Anderson Boyes, Daniel Burns, had worked down the pit with his father whilst continuing his self-education into the technical aspects of mining. He married the eldest sister, Margaret, of his friend Alexander Anderson. Burns wanted to do something other than work at the coalface, so he learnt all about mining from books and from colliery officials, eventually becoming a colliery manager (see Carvel, 1949). Similarly the first chairman of Meco, George Blake Edwards, was trained as a mining engineer at Wharnccliffe Silkstone Colliery, where he put many of his engineering ideas to the test. In fact, Wharnccliffe became a testing centre for many of Meco's products (see Howse & Harley, 1960).

These examples show how personal ties were important in the early development of some of the major mining suppliers. For companies such as Meco and Anderson Boyes it was very important to have close ties with particular colliery companies so that they could try and test their machines in underground conditions. Such testing facilities only became formalised and available for all mining machinery suppliers

after the first decade of nationalisation. State ownership also broke up some of the cosy relations between particular suppliers and buyers. Instead of hundreds of potential small buyers there was suddenly one large monopoly buyer and many suppliers, although the new relations that developed were if anything even closer, if less informal, than had existed under private ownership (see Chapter Five, Section 5.3).

2.8 The First Phase of Mechanisation and Miners' Work

By the late 1930s about half of the collieries of Britain had experienced the first phase in the mechanisation process as it was to develop (Burns et.al., 1983). Instead of working short stretches of the coal face, the advanced longwall method was adopted whereby headings (tunnels), a tail gate and a main gate, are driven into the strata from the main roadway and coal is worked from the face between the headings. Only in Durham was the room and pillar method common (Haynes, 1953). In mines utilizing machinery it was common to have mechanised cutting, hand loading or filling of coal onto belt conveyors running along rollers and driven by pulleys from the loader gate end, with mechanised gate end loaders transferring coal into sets of pit tubs.

This mechanisation phase had not ended the division of labour associated with the separate functions of miners on the three shifts, but it had introduced machines into pits where formerly only humans and ponies had worked. The main impetus behind the engineering endeavours to mechanise mining was to raise productivity and output and to reduce mining costs, mainly by reducing labour employed. And this has often

been justified in humanitarian terms as a process whereby humans are relieved of one of the most arduous and dangerous of occupations by machines. For example, the development of the Meco-Moore cutter-loader held out the possibility of replacing the heavy, monotonous and dangerous work of hand-loading. This was very labour intensive. A 100m face typically employed between 10-20 fillers whose job was to shovel (filling) the loosened coal on to a conveyor. Many thousands of men were employed in mines merely doing shovelling work, and a high percentage of underground accidents happened at the coal face where the majority of miners were employed in loading unprotected conveyors (Howse & Harley, 1960:108).

Undoubtedly machines replaced men in some of the worst mining jobs, but they increased unemployment in mining communities and brought new hazards into the mining environment. Orwell's (1937) vivid account of a visit he made down a mine describes the use of an electrically-driven coal-cutter.

'Incidentally it makes one of the most awful noises I have ever heard, and sends forth clouds of coal dust which make it impossible to see more than two or three feet and almost impossible to breath'.

Noise pollution increased with coal cutters, conveyors, electric drills and more powerful pneumatic picks. Dust levels also increased, and are still a problem in the late 1980s with new heavy duty machinery. There were also the physical hazards of using unguarded machines in confined spaces, and the speed up of work (see Burns et.al., 1983 and Heycock, 1986, unpublished thesis).

Mechanisation did not only affect the underground labour process, it extended to surface work as well. In the inter-war period surface washeries at pit heads were one of the most labour-intensive of jobs, employing women, boys too young to work below ground, and men who were unfit to work underground owing to age, injury or ill-health. In the 1980s coal preparation is one of the most automated parts of the mining industry, but it was not until nationalisation that mechanisation was systematically applied to surface works. After World War II the jobs at the washeries and preparation plants went to men, when previously they were the main source of employment at mines for women (see Campbell, 1984).

2.9 The Transition to State Ownership and Bottlenecks in Mining Machinery Supplies

The Reid Report (1945) had recommended better cooperation between the coal industry and machinery suppliers, but in fact there were serious problems with the structure and capacity of the mining machinery industry itself. Fragmented coal ownership, divisions between coal companies, and decision-making based on considerations of short-term profit and loss and dividends for share-holders, had not been conducive to the formation of a mass home market for standardized mining capital goods. According to Heinemann (1948:42) the typical mining machinery maker would have

'a multiplicity of jobs within a single, medium-sized factory, with no long runs, and consequently none of the advantages of mass production.'

The inter-war mining machinery industry was characterized by:

- (1) Too many small and medium sized companies producing too many varieties of similar products;
- (2) Unnecessary duplication of products and a lack of standardization;
- (3) No coordination or direction of the most technically efficient and appropriate equipment to those mines where they were most needed;
- (4) A total mining machinery capacity that was too small for a rapid expansion in coal production. There were some larger producers but no use of mass production methods.

The existence of hundreds of coal companies, each one with different needs and purchasing abilities tended to militate against national or even regional equipment markets. Although there was in fact regional differences in levels of mechanisation (see Table 2:2). Nevertheless, the general tendency was for machine manufacturers to produce a large range of different items rather than to specialise on particular ones.

During the war years mining machinery was in short supply. Imports of American machines such as Joy and Jeffrey conveyors, Goodman Shortwall and Sullivan coal-cutters, shuttle cars, battery locomotives and numerous pneumatic drills, made up for some of the shortfall of British machines. Some 207 cutters, 284 conveyors and 117 power loaders arrived from the States between 1943 and 1946 to inaugurate room and pillar mechanisation schemes in Britain, plus large quantities

of opencast machines (The Colliery Guardian, December 6, 1946:745). Part of the problem was that mining engineering companies were ordered into production of equipment for the Armed Forces between 1939-42. It was only in 1942 that mining machinery supplies were considered essential for the war effort by helping to raise home coal output. In 1940 only 40 per cent of pre-war mining machinery capacity was available to produce mining equipment, but by 1943 it was almost 100 per cent (Howse & Harley, 1960:61). The firms themselves were hampered by the shortage of skilled labour for many workers had joined the Armed Forces, unlike the coal mines themselves which received drafted labour under the Essential Work Order. Although they did lose many skilled miners to the war effort.

The coal industry itself suffered from both a shortage of miners and materials, as well as poor management. The Government became increasingly involved in day-to-day direction of the whole industry via a wartime National Coal Board, which was running the industry "on the basis of National Service" and took responsibility for labour relations, production and re-equipment (Pagnamenta & Overy, 1984:183).

Even though coal production was made a priority industry, output of coal had actually fallen from 240 million tons in 1937 to 183 m.t., which included 8 m.t. opencast, by 1945. The labour force in 1945, above and below ground, was 73,000 people fewer than in 1938 (9). Costs of production had risen from 17 shillings a ton to 36 shillings a ton over the same period. Output per manshift declined and overall productivity was down ten per cent on the pre-war level. There was some increase in mechanisation. Approximately 72 per cent of coal output was cut by machine and 71 per cent of output conveyed

mechanically in 1938. Power loading was still in its infancy accounting for little more than one per cent of total coal output. The industry was, according to Harold Wilson (1945:1), "almost the only black spot on the home front".

Faced with an out-moded, worn out industry, the Reid Committee (1945) called for a massive reorganisation of the industry that involved increasing supplies of just about every type of mining equipment from the face to surface washeries. Whilst many recommendations were given as to how to improve mines and coal output, there was very little thought to the problem of how to raise the supply of equipment to mines. More coal-cutters, drills, conveyors, engines, electric lighting, locomotives, winding equipment, tunnelling and road-heading machines were required, but the same number of mining machinery suppliers as had existed before the war had to supply them.

Throughout the history of mining a popular scapegoat for low coal output or a failure to meet targets has been the miners themselves. This was no less true after the war when low coal output was blamed on absenteeism and localised disputes over pay (see Hall, 1981). In fact, a far more serious problem was the shortage of equipment. The production of specialist items of mine plant and machinery was dominated by the 17 member companies of the Council for Underground Machinery Manufacturers (CUMM), although around this "core" of firms were numerous suppliers of general engineering items, components and surface plant (see Chapter Six) (10).

Pre-war mining machinery output represented some £3 to £4 million a year, part of which went on exports. This should be compared with

the annual average expansion programme envisaged by the 1946 Coal Bill for some £25 million to be invested, half of which on mechanisation (Coal Age, April 1946:146). Even larger estimates of the expenditure required on mining machinery was provided in the report of the European Cooperation Committee in September 1947. This suggested that the British Government intended to raise coal production from 199 million tons in 1947 to 249 m.t. by 1951, which would require approximately \$1,042 (US dollars) or some £250 million of mining equipment. Using these figures Heinemann (1948:42) drew the obvious conclusion that this would require a major expansion of the mining engineering industry.

'The output of mining machinery before the war (1935) was only £3,000,000 (out of a total of some £560,000,000 in the engineering industries as a whole); and over two-thirds of this was exported. This represented a labour force of only 13,000 or so. Even supposing that prices have trebled since 1935, it is clear that an enormous expansion of capacity would be needed to provide £52 million worth of machinery (a year) for the home market alone, without taking into account the need for exports.'

At nationalisation the mining machinery industry was much as it had been prior to the war with only a few new companies entering the industry. Heinemann (1948) argued that the existing industrial structure of the machinery suppliers was "obviously absurd" with the creation of a single, national buyer. She argued for more specialisation, standardisation of goods, and recommended the use of Royal Ordnance factories and sections of the motor vehicle industry to be mobilised to make large quantities of standardised mining machines. Her logic was simple. The nation was short of coal, so it was a gross misallocation of resources to have some 560,000 people engaged in the

production of motor vehicles, cycles and aircraft and only 12,000 people engaged in the production of underground mining machinery.

It is true that the majority of home-based suppliers were hard pressed to satisfy the growing demands of the coal industry and they failed to meet delivery deadlines. Many factories were working flat out. In 1947 Huwoods announced it was breaking new production records monthly. They were producing three machines a day, conveyors mostly, plus the odd power loader (Coal & Colliery News, 8 May 1947:209). By the end of 1947 the total monthly production of coal cutters was 105, together with ten power loaders of all types, and 280 conveyors. Heinemann (1948:41) compared this with the monthly production of some 25,000 private motor cars (see Table 2:7). Meco-Moore cutter-loaders were being installed at the "very leisurely pace" of "one a fortnight", and this was when Meco's entire output was for the home market. Owing to the great home demand it was not possible for Meco to recommence conveyor exports until 1948. Meco and other engineering companies were hindered by materials and fuel shortages themselves.

'... the (Meco) Works had to operate on a completely unbalanced production, assembling complete machines for which raw materials and components were available, without regard to any particular order or delivery promise' (Howse & Harley, 1960:67).

Whilst the Labour Government publicly placed the onus of raising productivity and output in the coal industry on the miners' shoulders, it soon realized that the highest priority should be placed on mining equipment production. In April 1947 the Government announced that they were adopting a wartime system for raising the output of machinery

needed for the mines, for generating plant and for coal-oil conversion equipment (see Coal & Colliery News, 10 April 1947:165). The Ministry of Supply (MOS), which had originally controlled supplies to the Armed Forces, took over control of supplies of heavy electrical plant and mine machinery in the battle for coal. Coalface machinery and conveyors were classified as "programmed equipment". The newly formed NCB notified the MOS of its requirements for programmed items, which were then translated into a production programme for specific manufacturers. Work was sub-contracted if orders could not be met. All "non-programmed" orders were placed directly by the NCB with manufacturers, although the MOS progressed the supply of labour, raw materials and components to major suppliers (see Colliery Guardian, 6 June, 1947).

The Government also approved factory extensions and new buildings for mining equipment production in the North East, West Cumberland, South Lancashire and Scottish Development Areas (Colliery Guardian, 30 May 1947:695). Projects were underway for the manufacture and repair of opencast machinery at factories in Cardiff and Aderdare, South Wales.

Furthermore, the Trade Union Congress (TUC) had urged a stop to exports when mining machinery was needed in British Mines (11)

'... everything possible in the way of hastening the manufacture of mining machinery and equipment must be done' (Colliery Guardian, 23 May, 1947).

Both the NUM and the engineers' unions had met to negotiate ways in which the supply of equipment to the mines could be increased.

Thus there was a serious shortage of equipment as the coal industry was handed over to state ownership. The problem was structural in nature in the sense that the mining machinery industry was too small and individual suppliers were unable to meet the large increase in demand after the war. The heterogeneous demands and fragmented market of the industry under hundreds of private coal companies had left an inadequate home supply industry. As Heinemann (1948:37) had argued,

'Private enterprise for a hundred and fifty years has been getting rich by extracting the easiest seams of coal at a minimum of capital expense.'

State ownership was to increase the level of investment in machinery and plant, and provide a more planned and cohesive domestic market for suppliers. The following chapter focusses in some detail on the in-house engineering facilities of the National Coal Board, and on why the NCB did not become more involved in the manufacture of its own capital goods. Chapter Five then considers how relations between the NCB and its suppliers have evolved and have affected "the technical transformation" of the industry. It also considers the role of the State in public-private sector relations in the UK mining sector.

FOOTNOTES AND REFERENCES

(1) There are literally thousands of products, materials and services used by the coal industry. Mining machinery covers both underground and surface plant and equipment. It includes machinery involved in the pre-production phases of mine development, e.g. machinery to sink shafts, build tunnels, etc.; coal getting and transportation; coal preparation and processing. The narrow focus on the production process, on the mechanisation of the coal face and underground transport, is deliberate. It enables a more detailed understanding of inter-capital relations, and analysis of changes in inter-capital relations due to nationalisation.

(2) There are numerous detailed histories of the coal industry and of the mining union. For example, Ness Edwards, (1938) History of the South Wales Miners' Federation, Lawrence & Wishart.

R. Page-Arnot (1953) The Miners : Years of Struggle, George Allen & Unwin.

For a full list of references see Bibliography.

(3) Coal was an important raw material for a whole range of scientific discoveries, including Hardock's experiments on the applications of coal gas for economic purposes in the early 19th century; Faraday's discovery of benzene; Mansfield's research on coal-tar; and Kidd's examination of naphthalene. Coal was an important raw material for

synthetic dyestuffs. Coal tar led to the discovery of saccharine, a new sweetening agent. In 1809 the Committee on the Gas Light and Coke Company's Bill incorporated certain persons for procuring coke, oil, tar, pitch ammoniacal liquor, essential oil and inflammable air, from coal.

- (4) Heinemann (1944) refers to a detailed study of directorships held by MPs which showed that in 1938, 51 MPs held 109 directorships of iron, steel, coal and engineering companies. Former Conservative Prime Ministers came from families with long associations in heavy industry - Mr. Baldwin's with Baldwins Limited, South Wales coal and steel combine; Mr. Chamberlain's with Guest, Keen and Nettlefolds, coal, steel and engineering combine.

- (5) A mining inspector at the time put it like this

'the (Davy) lamp is liable to accident by falling pieces of coal, by dusty atmosphere clogging the gauze making it red hot, by coal particles igniting on the hot wire mesh' (Holmes, J.H.J. (1816) quoted in Albury & Schwarz, 1982:17)'.

Furthermore, the methane could explode by entering the gauze too quickly as a result of "blowers" or sudden currents of air. The wire gauze itself could be damaged and detached from the lamp body, permitting the flame to escape and explode in the surrounding atmosphere.

- (6) Subsequent Acts included a Bill passed in August 1950, which enforced the registration of plans, the notification of fatalities, and appointed inspectors with the power to enforce the Act by legal proceedings. In 1860 the age limit for the employment of boys was raised to 12, with the bizarre exception of those who could read and write. By 1872 the hours worked by boys was restricted to ten hours with the provision that they were to attend school for not less than twenty hours per fortnight. The Mines (Prohibition of Child Labour Underground) Act was not passed until 1900, and raised the age limit of boys to 13 years.
- (7) Women and girls were also employed pushing or pulling tubs. Reacting against a Bill to prohibit the use of female workers underground, Lord Fitzwilliam of Yorkshire, assured the House of Lords, that it was misleading to talk of women "working in chains" since the chains were merely used to draw the carriages or tubs they pulled (quoted in Hammond, J.L. & B., 1969:77).
- (8) Matthew Smith Moore was trained as an engineer at the Royal Technical College, Glasgow, and had joined Mavor & Coulson before working for Cowlshaw, Walker & Company, which made chain and bar coal-cutters. Then he moved to Anderson Boyes, before transferring to a Belgium firm, Habeuses Ajax of Brussels. It was whilst in Belgium he began trials of a coal cutter-loader before returning to England and Mecro to capitalise on the idea.

- (9) Of the workforce in the coal industry in 1945, some 100,000 were over 55 years of age, and approximately 40,000 were "Bevin Boys" who had been drafted into the mines to raise wartime output when many miners had joined the Armed Forces. Many miners left the industry after the war. Several thousand men were literally trapped in the industry by the Essential Work Order, unable to join the Armed Forces or to work in munitions factories with better pay. Ex-miners demobilised after the war went to join other trades. As Wilson (1945:137-138) put it:

'... five years spent in other parts of Britain, and overseas, will have given them a wider horizon than they possessed before : it is doubtful whether many will wish to return to the mines, of which they have such unhappy and bitter memories.'

- (10) The Council for Underground Machinery Manufacturers was the first mining trade association, which developed out of the Coal Face Machinery Exhibitors Association established by just twelve manufacturers in 1935.
- (11) British mining machinery exports in 1945-46 were influenced by the world coal shortage. Machinery was directed to European countries capable of producing large quantities of coal. The United Nations Relief and Rehabilitation Administration (UNRRA) requested some \$3.6 million (US) of machinery from the UK (Coal Age, September 1945:137). The Ministry of Supply controlled exports and issued licences to the approximate value of £2.4 million of mining equipment to

the Dominions and the Colonies. Some British manufacturers complained about export controls and argued that the United States was taking advantage of the world hunger for mining machinery in markets Britain would soon need (Howse & Harley, 1960:62).

TABLE 2.1

Mechanical and Electrical Machinery in use in Coal Mines, 1924-1938. (Including Number of Horses and Ponies)

Year	No. of mines at work	Coal Cutting Machines							Mechanical conveyors and loaders			Safety lamps in use		Electrical Equipment			Number of horses and ponies employed below-ground
		Number and kind of machines in use					Coal cut by machinery		Number in use		Tonnage of coal conveyed (1,000)	No. of Flame Lamps	No. of Electric Lamps	No. of motors in use	Aggregate horse-power installed		
		Disc	Bar	Chain	Percussive and other machines	Totals	Quantity 1,000 tons	Percentage of total output	Conveyors on coalface and elsewhere below ground	Loaders					Below-ground	Above-ground	
1924	2,855	1,213	921	2,281	2,812	6,830	49,911	19	1,373*	-	-	576,318	356,817	-	810,896	671,036	65,210
1925	2,840	978	767	2,645	2,122	6,512	27,778+	22	1,667*	-	-	493,325	370,123	34,257	852,045	768,100	56,762
1928	2,539	793	635	3,391	2,312	7,131	61,388	26	2,856	-	27,976	416,018	375,186	36,695	897,660	824,672	50,405
1930	2,328	572	566	4,131	2,367	7,637	75,756	31	3,747	453	62,495	379,551	389,238	39,979	954,789	861,680	49,243
1932	2,158	300	412	4,442	1,983	7,137	80,286	38	4,120	526	52,666	295,521	391,142	41,358	970,131	885,131	41,756
1934	2,123	257	325	5,006	1,818	7,406	103,701	47	5,369	637	81,493	242,901	394,820	45,342	1,022,104	927,082	37,751
1936	2,080	206	251	5,516	1,627	7,600	125,670	55	6,727	716	109,318	209,539	407,318	50,081	1,134,318	974,284	33,136
1938	2,125	140	186	6,005	1,398	7,729	134,958	59	7,826	766	122,915	175,462	474,913	55,809	1,198,261	1,045,726	32,524

Source : Based on the Annual Reports of the Secretary for Mines

Notes + 1926 Miners' Strike led to low production figures

* Mechanical conveyors used at the coalface only. Figures for elsewhere below ground are not recorded prior to 1928

- Not recorded

TABLE 2.2

Number of Coal Cutters, Conveyors, and other Facilities - England and Wales, and Scotland in 1938

District	No. of mines at work	Coal Cutting Machines							Mechanical conveyors and loaders			Safety lamps in use		No. of electric motors in use	Number of horses and ponies employed below-ground
		Number and kind of machines in use				Coal cut by machinery			Number in use		No. of Flame lamps	No. of Electric lamps			
		Disc	Bar	Chain		Totals for all types	Quantity 1,000 tons	Percentage of total output	Conveyors coal face & elsewhere	Loaders			Tonnage of coal conveyed (1,000)		
DURHAM	247	-	19	711	364	1,094	13,183	42	601	72	7,822	40,663	44,793	7,193	10,406
YORKSHIRE, SOUTH & WEST	237	36	2	811	248	1,097	23,696	56	1,236	145	22,910	28,760	108,405	8,103	4,515
LANCASHIRE & CHESHIRE	155	2	19	371	369	761	9,661	68	725	45	10,250	19,877	32,055	2,963	142
DERBYSHIRE, NORTH	103	-	-	427	57	484	11,419	88	504	73	9,639	11,512	30,517	3,178	1,554
STAFFORDSHIRE, SOUTH AND WORCESTERSHIRE	64	-	4	9	1	14	88	6	6	3	21	926	2,383	275	447
SOUTH WALES & MONMOUTHSHIRE	424	-	12	453	70	535	9,183	26	1,306	36	15,845	23,692	105,195	6,327	7,423
TOTAL FOR ALL ENGLAND & WALES	1,699	48	94	4,692	1,354	6,188	110,665	56	6,697	596	105,343	165,694	437,721	44,057	31,755
LANARKSHIRE, LINLITHGOW, STIRLING, RENFREW & DUMBARTON	284	75	41	656	24	769	10,958	84	446	87	6,053	5,434	20,284	5,461	668
TOTAL FOR SCOTLAND	426	92	92	1,313	44	1,541	24,292	80	1,129	170	17,572	9,768	37,192	11,752	769

(Based upon the Annual Reports of the Secretary for Mines)

TABLE 2.3
Number and Types of Coal-cutting Machines in G.B.
1911, 1923 and 1938

Date	Total no. mines	Mines using coal-cutters	disc	bar	chain	Total All types of coal-cutters*
1911	3,100	471	1,020	390	148	2,146
1923	2,902	857	1,240	882	1,841	6,155
1938	2,125	-	140	186	6,005	7,729

* Includes percussive coal cutters

Source: Annual Reports to the Secretary for Mines.

TABLE 2:4

Coal Cutter Suppliers in the 1920s

- .. Anderson Boyes, Motherwell
- .. Climax Rock Drill & Engineering Works Limited, London
- .. Cowlinshaw, Walker & Co. Ltd., Biddulph, Stoke-on-Trent
- .. The Diamond Coal Company, Wakefield
- George Cohen, Sons & Co. Ltd., Stanningley, near Leeds
- .. The Hardy Patent Pick Company (hand held drills and percussive machines)
- Padley & Venables Limited (pneumatic chisels, picks and special "all steel" rock drillings bits), Sheffield
- .. Mavor & Coulson, Bridgeton, Glasgow
- Messrs. Reavell & Company (producing the 'Eloy' hammer pick) and its subsidiary, the Reavell-Mossay Pneumatic Tool Company, Ipswich

Source : The Colliery Managers Pocket Book, 1923 and 1925.

TABLE 2.5
Pneumatic (Mechanical) Picks and Drills:
Number in Use 1928-1938

Year	No. of mines where used	Coal-getting		Ripping	Drills for boring shot-holes
		with cutting machines	independently		
1928	281		934 *	1,318	5,504
1929	284		1,383 *	1,622	5,876
1930	318		2,214 *	1,953	6,057
1931	327		2,557 *	2,173	6,112
1932	316	302	2,363	2,243	6,069
1933	347	596	2,980	2,367	6,392
1934	387	713	3,752	2,709	6,615
1935	414	967	4,557	3,088	6,857
1936	441	1,191	5,273	3,450	-
1937	457	1,281	6,340	3,824	7,747
1938	485	1,685	7,250	4,202	8,377

* Only Total in use for coal getting recorded prior to 1932

Based on the Annual Reports of the Secretary for Mines

TABLE 2:6

Number of conveyors and gate end loaders in
use 1929 and 1938

Date	conveyors	gate end loaders	tons of coal conveyed
			mechanically
1929	3,218	355	37,150,000
1938	7,826	766	122,915,000

From : Preece, G. & Ellis, P. (1980)

A Handbook of the History of

Coalmining Gallery, Salford

Mining Museum : Manchester

Free Press.

TABLE 2:7

Production of Mining Machinery (Monthly)
And of Motor Cars

		Coalcutters	Power Loaders	Conveyors	Private Cars
1946	1st qr.	53	10	164	
	2nd qr.	70	9	169	18,200
	3rd qr.	61	9	160	
	4th qr.	81	9	189	
1947	1st qr.	67	6	149	18,600
	2nd qr.	84	10	196	26,900
	3rd qr.	80	9	231	24,700
	4th qr.	105	10	280	24,900

Taken from : Heinemann, 1948:41

CHAPTER THREE

THE BOUNDARIES OF STATE OWNERSHIP:

THE CASE OF THE COAL BOARD

'... to the British, a publicly owned industry usually means a nationalised, centrally owned and controlled state enterprise embracing an entire sector of the economy, and operating within carefully prescribed limits which prevent it from venturing into new fields' (Holland, 1972:45).

Nationalisation led to a redistribution of private capital, with some sections of private capital being taken over by the state whilst others had to readjust to the mixed economy. The suppliers of mining plant and equipment were suddenly faced with one big national customer, the National Coal Board (NCB) in place of hundreds of colliery companies. The NCB was the only major purchaser of mining equipment in the UK. Its investment and purchasing policies had a direct impact on the industrial structure of the supply industry and upon the economic fortunes of mining machinery makers.

This chapter examines the evolution of public-private sector boundaries in the coal industry. It considers why state ownership was confined mainly to the working and getting of coal, and why there was so little diversification from the outset into related activities. Why was nationalisation in Britain not used to coordinate vertically integrated production processes? Whilst the chapter examines the NCB's attempts at diversification and greater integration, it focusses on the production of mining capital goods and the Board's in house engineering facilities. Why did the NCB adopt a tacit policy of non-competition in

the private sector and leave the supply of vital capital goods almost entirely in the hands of external manufacturers? In attempting to provide explanations this chapter concentrates on the state sector. Following chapters examine the development of public-private sector relations and the effects of NCB policies and restructuring on private suppliers in some detail.

3.1 Public or State Ownership

It is useful to clarify what is meant by the terms public and state ownership. Nationalised industries in Britain are organised as public corporations, but the terms are not necessarily synonymous (Sloman, 1978). In 1976 the National Economic Development Office (NEDO) defined nationalised industries as public corporations whose assets are in public ownership; whose board members are appointed by a Secretary of State but are not civil servants; which are primarily involved in industrial or other trading activities; and whose revenue is derived from customers. This definition is useful but raises the concept of public ownership, which has misleading connotations if used loosely, as it implies a level of common or collective ownership that has never existed in Britain, except in the most narrow of senses. As McEachern (1980:176-177) puts it,

'The community only owns the industry to the extent it controls the government. At best that control is formal and so is the ownership. The community's other stake in the industry is through taxation and the national debt, which are used to buy the industry and to provide it with needed additional funds. More accurately, nationalisation makes an industry state-owned'.

3.2 Selective State Ownership

Selective nationalisation increased the direct role of the state in industrial and economic planning. It also enlarged the state owned element in Britain's mixed capitalist economy, but contrary to the socialist aspirations and promises of Labour's 1945 manifesto, Let Us Face The Future, it was not a first step towards "a new social order". The industries and institutions nationalised in 1945-51 included the Bank of England, coal, gas, electricity, the railways, a part of inland transport, cable and wireless, and eventually steel. All in all about 80 per cent of the economy was left untouched, and once compensation was set at generous terms, only steel's nationalisation was vigorously opposed by its private interests (see McEachern, 1980; Miliband, 1972).

Very few industries were seriously considered for complete state takeover. The industries that were nationalised were central to the nation's economic performance, but they could hardly be described as its "commanding heights" (Hudson, 1986:181). They were in need of some sort of national reorganisation and coordinated long-term planning. Even Winston Churchill endorsed the Coal Industry Nationalisation Bill,

'noting that some major state commitment, through systematic reorganisation or outright nationalisation, provided the only hope for reconstruction of the (coal) industry and for provision of the large amount of capital necessary for technological innovation' (Krieger, 1984:36).

Labour's chief architects of nationalisation hoped that state monopolies would improve resource allocation and planning and produce economies of scale, raise technical efficiency and lead to lower costs for industry and consumers. In turn, greater productive efficiency

would help to secure more welfare benefits and better working conditions for producers.

Left wing critics of Labour's nationalisation programme of 1945-51 argued that it did not go far enough, particularly when the Attlee Government had inherited "a system of war-time controls and disciplines which would not have been realised in normal conditions without something approaching a revolution" (Bevan, 1952:10). No attempt was made to challenge private ownership in the more profitable and growing sectors of the economy, such as commercial banking and the newer industries of chemicals, food processing, motor vehicle manufacture, consumer durables, and light engineering.

By removing sections of private capital from the older base industries, the state was rationalising the infrastructural base of the national economy by ridding it of many worn out private businesses. It was believed by Labour's leaders that the nationalised industries would provide cheaper power, a more efficient transport system and essential raw materials, such as coal and steel, for the export industries, most of which were privately owned. The state owned industries effectively became tools for achieving a range of economic objectives, from improving the competitiveness of British industry and raising national growth rates to improving taxation yields and the country's balance of payments. The fact that successive governments, both Labour and Conservative, used the nationalised industries to improve national output and growth, and it was not until the Thatcher years that there was any full-scale attempt to dismantle the mixed economy, says much about its political character. For Labour's nationalisation programme had helped create

'a system of "welfare capitalism" in which the concentration of capital and economic privilege remained and in which the old power structure was undeniably intact. This was a system which the Conservative Party proved capable of running with ease ...' (Coates, 1975:74).

Some observers have even suggested that far from advancing socialism the Labour Party are "the progressive voice of capitalist development", although perhaps not intentionally so.

'Even though it pursued these policies (such as nationalisation) for other reasons, and they were conceived with other purposes in mind, its actions had the effect of creating a mixed economy which could provide for the profitable expansion of private capital' (McEachern, 1980:178).

3.3 Coal Nationalisation, Compensation and Consent

The first Parliamentary step towards nationalisation was the Coal Act of July 1938, which established a Coal Commission to act as a "landlord" to promote the better organisation of the industry and put an end to private ownership of coal royalties, but mining operations other than boring or searching for coal were left in private hands. During World War II the state took control of the coal industry as in World War I, only this time the extent of the industry's accumulated problems after two more turbulent decades of private ownership were starkly exposed (see Chapter Two). In 1945, the Technical Advisory Committee to the Ministry of Fuel and Power unwittingly sounded the death knell for private mine ownership by producing a report detailing the industry's technical problems. As Page-Arnot (1979:93-94) put it,

'... the mining engineers had done their share of the work only too well. The Reid Report was an example of overkill. The intention was to prove the need for a complete overhaul and reorganisation of the coal trade. In the early summer of 1945 they found that they had proved much more, that they had convinced the general public that private enterprise in coal must be swept out of existence. They had done no more as technological experts than complete what Sir Reginald Redmayne, HM Chief Inspector of Mines, had done in 1919 in his evidence to the Sankey Commission. He had shown that the coal trade was ripe, rotten-ripe, for unification. Twenty five years afterwards, the Reid Report disclosed to the public a coal trade in an advanced state of putrefaction.'

For the Labour Government, nationalisation of the mines was "an overwhelming political necessity" (Beynon, 1985). For the coal owners, represented by the Mining Association and with strong connections in Westminster, the political tide had finally turned against them. But, as predicted by Hutt (1928:134), they made sure "that they got their pound of flesh, with a few odd ounces in as make-weight". The state took over the coal industry on terms that were considered "fair and just" to the owners, partly in recognition of existing property rights, and partly to achieve a peaceful transition to state ownership.

Compensation ensured that the general consciousness of consent upon which nationalisation was to be based applied even to those private capitalists it displaced. For as Krieger phrased it,

'... capitalists have been quite content to offload moribund industries onto the state under extremely favourable terms' (1984:4-5).

The actual compensation amount equalled £164 million, whilst the figure given to former royalty owners was fixed at £78,457,000. The principle of a global sum to represent the value of the coal industry was

adopted. It gave some colliery owners the advantage, in the calculation of values, of the greater stability which the industry as a whole possessed compared with any particular colliery. The process of compensating hundreds of colliery owners and companies and dividing equitably among them the global sum was a slow, painstaking, complex task. Every pit was visited by a local District Valuation Board, whose responsibility was to examine the pit's history, its prospects and estimated life span. Factors included in the assessments were the condition of items of plant, the state of underground road haulages, accessibility of and quantity of coal still to work, as well as past dividend records to shareholders. As Conner (1962:22) points out from the perspective of Scottish experience,

'Each separate company's position had to be considered in relation to its own special circumstances. Pre-nationalisation dividend record is of special interest. It shows that in spite of the belief widely encouraged by the Owners when wage claims were submitted that coal was a profitless enterprise, the opposite was the case in respect of many of the companies in the Scottish coalfield'.

Eventually the Valuation Boards made their assessments based on "what a willing buyer would pay a willing seller". The total sum was then scaled down to match the global amount made available for compensation. Valuation of individual collieries was made even more complex by the existence of large combines owning many pits in more than one district and by the multiple directorships some owners had in companies with coal stakes. For individual companies there was one overriding consideration - to get the best possible price for their businesses as they were bound to demand in the interests of their shareholders.

The Nationalisation Act provided for interest payments, at rates to be fixed by the Treasury, on compensation from the primary vesting date until the date when compensation was satisfied. The liability of these payments plus the interest on capital borrowed since vesting day, helped to turn coal industry profits into losses in five years out of the first ten of the National Coal Board. From the late 1950s onwards the operating profit margin narrowed and the liability of compensation became a heavy drag on an industry that had long been neglected by many of the coal owners.

The NCB not only had to pay the owners during the first decade of nationalisation, it had to invest enormous sums into the industry to integrate it under single ownership, to modernise its collieries, to raise output, and to undertake research and development. In this context, compensation payments were like "sending good money after bad" (see Hutt, 1928:134). They saddled the industry

'with a burden of debt which materially contributed to difficulties that were later ascribed to the imminent character of public ownership' (Miliband, 1972:288).

3.4 Horizontal, not Vertical Integration

Before nationalisation, the coal industry comprised hundreds of companies, including a few large iron, steel and coal-combines owning collieries in various coalfields each (see Heinemann, 1944). One of the initial problems facing legislators was where to draw the

boundaries of state ownership. This was a problem recognised by the Samuel Commission over twenty years earlier.

"... if mining were nationalised and other associated industries remained in private hands, a new frontier would be drawn across the domain. Integrations that have already been effected would have, in fact, to be broken up. Probably not less than one-fifth of the coal production, other than for export, is already carried out by companies which conduct at the same time blast furnaces, or coking enterprises in other localities, or other associated industries. It is proposed to sever into its component parts all this organisation' (The Samuel Commission, 1925).

In practice, it proved to be a complicated business separating coal production from steel making, for many companies had interests in both. Although the Coal Board did take over some coke reduction plants, which were significant manufacturing employers in some areas, it became, first and foremost, an industry devoted to the working and getting of coal. The NCB was constituted under the Coal Nationalisation Act of 1946. Its duties were defined in the opening section of the Act. Briefly these were as follows:

- (1) to work and get coal in Great Britain;
- (2) to secure the efficient development of the coal mining industry;
- (3) to supply without "undue preference" to any one and to regulate qualities and sizes, quantities and prices so as best to further the public interest in all respects.

In addition to coke ovens, the NCB inherited other useful ancillaries such as brick-making facilities dependent on the use of shale, but it also inherited a mixed assortment of non-coal related assets, including agricultural land, farms, houses, hotels, swimming

pools, milk rounds, a holiday camp and a cycle track (Berkovitch, 1977:56). In areas where some vertical integration was both logical and profitable the NCB had at most only a partial involvement. From the start, the NCB's primary functions were to mine coal, raise coal output and lower coal production costs. In 1947, the NCB had 958 collieries under its control. It was virtually a coal monopoly. Whilst very small private mines employing less than 30 men underground were allowed to continue operations, provided they paid royalties to and received an operating licence from the Coal Board, their combined annual output has rarely climbed over 2.2 million tonnes (see Chapter Seven).

It is surprising that there was very little debate within the labour movement or indeed within Parliament about the most appropriate boundaries, functions and objectives of the nationalised coal industry. Undoubtedly, nationalisation of the mines was high on Labour's list of priorities, but other than taking over the many private collieries, plus a few useful ancillaries, little action was taken to create a more vertically integrated national monopoly. More attention was given to the structure of the management hierarchy and the complex task of administering hundreds of collieries in the far flung coalfields. The Labour leadership followed the Morrisonian model of a publicly owned, semi-independent Public Service Board, with a top-down management structure extending from central headquarters, through areas and divisions, to pit level management (1).

Diversification was not entirely ruled out by the Coal Nationalisation Act. But the Act concentrated on the handing over of private collieries to the state and gave few operational guidelines

outside of the primary work of producing coal (Ezra, 1987). The industry was nationalised as a horizontally integrated monolith with set primary functions to perform, and a management structure designed to administer coal working and getting. Once the nationalised industry's boundaries were settled and the bureaucratic structure in place, they were unable to diversify without Parliamentary approval. Whilst the Act itself allowed some diversifications, the development of profitable ancillaries was low on the NCB's priority list and was not given prominence in the Act. This strongly suggests that the state did not want to encourage the coal industry to venture into new spheres of production or into competition with the private sector. Indeed, it was not until the 1960s that the NCB had its own Coal Products Division, separately managed, and concentrating on the development of the industry's by-products.

Compared to state owned industries in Europe, where often the divisions between public and private sector activities were less rigidly drawn, in Britain, there was little provision or encouragement given to expand into other activities. Countries such as Austria, Sweden and Italy used a holding company model, which enabled state-owned companies the freedom to diversify and to expand into new fields (Saville & Kerevan, 1987:33). There were few enterprising departures from the primary functions outlined for the Coal Board. According to Allen (1981:108),

'It was isolated from other processes, a single product concern, fully exposed as a basic cost factor with no value in itself except as a source of domestic heating. In the conditions of post second world war Britain no reasonably intelligent capitalist would have wanted to own or control the coal industry on the terms entrusted to the NCB

namely to be confined to 'the working and getting of coal'. But a reasonably intelligent capitalist faced with the inevitability of nationalisation, would have wanted coal to be so isolated, to be exploited as a subsidizing factor as it was until the late 1950s and to be castigated for its cost raising qualities, as it was afterwards.'

3.5 Ancillary Activities

In 1963 the NCB set up a Coal Products Division in charge of its coke ovens and chemical plants previously managed by its coal production divisions. The fact that it took 17 years to set up a distinct administrative division devoted to coal products is an indication of the extent to which the NCB treated its non-mining activities as side line operations. During the sixties, the NCB was losing its coal markets to oil, and it received government approval to engage in various activities allied to coal production in order to improve the industry's overall financial position. The logic behind this move was explained by Lord Robens, NCB chairman during the 1960s:

'What we did was to utilise our own resources, physical and human, our own particular expertise, which a shrinking mining industry had made available. The aim was to produce profits which we could use to stabilise the price of coal and thereby improve the financial position of our primary business' (Robens, 1972:320).

The Coal Products Division introduced new products, handled North Sea gas activities, and took over smokeless fuel plants. The NCB's coke ovens produced benzole as a by-product, which for many years was used as a motor spirit. Eventually the NCB built a modern benzole

distillation plant in association with a big steel company. Another by-products joint venture was with Dutch State Mines, which established a plant to make caprolactam, the raw material for Nylon 6.

It was in the 1960s that the NCB extended its expertise in continental shelf exploration. It already had experience in off-shore drilling for coal off the Durham coast and in the Firth of Forth. On the basis of this, Roben's began discussions with Gulf Oil about the possibility of forming a partnership in North Sea exploration. Eventually the Coal Board was granted statutory powers to drill for gas, and Roben's was permitted to enter an agreement with the Continental Oil Company to explore for gas in the Viking field of the North Sea, which had huge profit potential.

The NCB also owned solid fuel appliance showrooms, but it could not sell the appliances. So the NCB became the majority shareholder in a builders' merchants business, J H Sankey & Son Ltd. The NCB owned 77 per cent, and British Sisalkraft Limited, an American subsidiary company, owned the rest. Sankey became the third largest builders merchants in the UK, and the Board's nationwide showrooms provided clients with both purchase and installation services, especially for domestic coal burning grates.

Ancillaries were profitable. During Roben's decade they made profits every year. From 1965/66 to 1969/70 their profits (after-tax) increased from £9.3 million to £20.6 m. This followed a Labour Government White Paper, The Finances of the Coal Industry (November 1965), which gave the NCB the go-ahead to diversify into non-mining activities by investing up to £75 million, at 1964 prices, in the five

years to March 1971. Whilst this sum was only a fraction of the NCB's total expenditure, particularly on the mechanisation of mining, it was recognition that the NCB could generate at least some internal finance by diversifying. Even so, diversification was a piecemeal process and ancillaries remained peripheral concerns to the main business of mining coal.

In fact the NCB failed to capitalise on some crucial market opportunities. Whilst the NCB had the facilities and expertise available to develop oil and gas from coal, it made no serious attempt during its first two decades to enter these markets. As early as the 1930s the Maclaurin Scheme was put before the Scottish National Development Council as a positive and practical response to check the economic depression. The Scheme offered a grid using oil supplies distilled from coal by low temperature carbonisation. The aim was to make Scotland at least partially independent of foreign oil supplies. At the time oil imports into the UK were seven million tonnes per annum, of which four m.t. was motor spirit. By 1961, oil imports had reached 50 m.t. and were increasing.

The Maclaurin report had optimistically stated that all the filling stations of the future would be at collieries and gas works, which would supply petrol, diesel oil, bottled gas and compressed gas for all purposes (Conner, 1962:86). To implement such an ambitious scheme on a nationwide scale would have meant very large additional tonnages of coal for carbonisation. Although it was beyond the coal industry's capability to displace oil imports entirely, a share of the oil market could have rejuvenated mining. More than this, some such scheme would have helped to create a more diversified national energy

market based on indigenous non-renewable resources, reducing the nation's oil import bill, and strengthening the long term security of energy supply.

During the early 1960s, the Gas Boards were importing natural gas from North Africa and establishing a grid. Instead of cooperating with each other, the gas and the coal industries were "at each other's throats". Greater coordination between the national energy industries under the framework of a national energy policy would certainly have helped create a more diversified energy base without the massive run-down of the nation's coal industry due to fuel imports (see Schumacher, 1960). As Conner (1962:88) put it,

'A fuel policy, in one sentence, means making sensible use of our native and natural resources. If gas had not decided to go its own way it would have been cooperating in means to obtain cheap supplies from coal rather than the oil fields of the Sahara'.

State monopolies in the energy sector have tended to move along divergent paths due to conflicting objectives and a lack of strong central direction by the state. When coal was nationalised it was almost the only fuel source for the whole nation. Very little thought was given to integrated energy sector planning and cross subsidisation between state owned industries. It is ironic that a loss-making Coal Board should be subsidizing an electricity supply industry making big profits when both industries are state owned, and to cut costs more collieries are closed, adding substantially to unemployment bills and the social costs of coalfield communities (see Chapters Four and Five). Similarly, a lack of long-term coordination between the state owned

coal and steel industries resulted in a run-down of Britain's coking coal capacity at a time of increasing coking coal imports (see Beynon, Hudson & Sadler, 1986).

The Coal Board's control over prices was limited by its lack of control over retail and wholesale distribution networks. The National Board for Prices and Incomes had in 1966 recommended amalgamations into larger coal distribution organisations, rationalisation of ordering, collection and delivery services, and an expansion of NCB retailing activity. Although the NCB acquired some retail interests, including Amalgamated Anthracite Holdings Limited covering the west of England, and the Lancashire Fuel Company, it was still highly dependent upon the activities of private middlemen. In 1976, the NCB was dealing with no less than 280 wholesalers and 7,800 retailers involved in distribution to domestic users. This led to NUM allegations that private distributors were charging over double the pit head prices for coal.

An investigation by the Price Commission in 1976 revealed large disparities between different types and quantities of coal, between and within regions, and between different retailers. Often there was a large mark up in retail outlets over the pit head coal prices. As Allen (1981:109-110) points out, the situation in the nationalised coal industry contrasted sharply with that of the oil industry, which was mainly controlled by multinationals. These corporations tightly controlled their own retail outlets for oil products and "infiltrated coal distribution by persuading coal distributors to handle competitive heating oil".

One novel idea to cut out the middleman proved to be a marketing flop. This was the idea of "slot machine coal". The first demonstration machine was tried in 1961 by Lord Robens in London. He inserted four shillings into the machine and received 28 lbs of washed nuts. But as Conner (1962:84) observed,

'Only London's West End could afford to buy coal at that price even if they preferred it to oil or gas or electricity as a heating medium of which there is no great evidence'.

3.6 'In House' Engineering

The NCB did not take over any mining machinery facilities from the old private companies, although some coal combines did own engineering subsidiaries (see Chapter Two). It did inherit the Cowdenbeath engineering repair workshop from the Fife Coal Company. And after nationalisation new central workshops were built. Nevertheless, with the singular exception of a small factory in South Wales, Tredomen Engineering at Hengold, acquired in the 1960s, the NCB did not manufacture mining plant and equipment. This is in spite of being at the forefront of developing the mechanised longwall system of mining in the 1950s and 1960s, and automated mining systems in the 1970s and 1980s, at its central research and development facilities. In practice, the Coal Board passed on many of its innovations at nil cost to private manufacturers who then profited by them (see Townsend, 1980).

In theory, there was nothing preventing the NCB from diversifying into the production of machinery. The 1946 Nationalisation Act, Chapter 59, Section One, Part Two, left this possibility open. It states,

'The function of the NCB shall include the carrying on of all such activities as it may appear to the Board to be requisite, advantageous or convenient for them to carry out in connection with the discharge of their duties ... and in particular:

(d) producing or manufacturing any goods or utilities which are of a kind required by the Board for or in connection with the working and getting of coal or any other of their activities or which can be advantageously produced or manufactured by the Board by reason of their having interests or facilities for the production or manufacture thereof in connection with the working and getting of coal or any of their activities, and supplying and selling goods or utilities so produced or manufactured.

(e) any activities which can be advantageously carried on by the Board with a view to making the best use of the assets vested in them by this Act'.

Why did the NCB rely on private suppliers for its capital goods needs when it had its own network of engineering workshops, Research & Development facilities and in house mining engineering expertise?

After nationalisation the NCB's demands for all kinds of plant and machinery increased. The mining machinery industry was unable to meet deadlines and there were serious bottlenecks in the supply of underground equipment. Whilst the problems of supply were aggravated by a chronic shortage of spares, raw materials and skilled labour immediately after the War, there were also inadequacies in the size and structure of the machinery industry itself (see Chapter Two). But the government made no moves to encourage equipment manufacture within the

Coal Board. Rather, the recommendations of the Technical Advisory Committee (1945) were followed and the NCB sought close technical cooperation with its suppliers.

Private manufacturers benefitted from what Townsend (1976) described as a "complimentary interactive process" of technical collaboration with the NCB. They benefitted from the Coal Board's superior technical resources and its centralised Research & Development facilities, as well as from various technical innovations made by NCB personnel outside the formal Research and Development system. Most of the initial innovations to the Anderton Shearer Loader originated from the NCB and were passed on to the three major cutter-loader suppliers for further design and development (D & D). The same applied to later work on microprocessor based mining technology and the Coal Board's preferred automation system, the Mine Operating System (MINOS), which was developed by specialised staff in the Mining Research and Development Establishment (MRDE) at Bretby (see Burns, et al., 1983). Suppliers also benefitted from the NCB's laboratory and underground mine equipment testing facilities, which proved to be an invaluable "shop window" to them by promoting their products to potential overseas customers (ABMEC, 1986). Such services have effectively been a big public subsidy for private industry.

An important study of Scotland's engineering workshops has highlighted their potential manufacturing functions. Saville and Kerevan's (1987) study stresses the fact that the coal industry's central workshops are far more than mere "engineering hospitals" for overhaul, repair and maintenance work. They have also been involved in the design and development of cost cutting technology and in making

incremental innovations to a whole variety of machines worth £ millions. The Scottish workshops were also adept at manufacturing "one offs" and small batch items, such as shearer drums, cowls, underframes, girder clamps, conveyor structures, AFC line pans, rail crossings, mine cars and other standard items. The opportunity was always there to extend their manufacturing range or to specialise on particular specialist items if given the go-ahead by senior NCB management. But as Allen (1981:115) observed,

'The NCB had, it seems, an innate preference for encouraging the private exploitation of its activities.'

During the 1950s and 1960s, there was plenty of scope for more internal contracts to be given to workshops at a time when the NCB was spending millions of pounds by awarding hundreds of contracts to private companies, including simple replacement, repair and small batch manufacturing jobs. In the 1960s when it was threatened with closure, the Cowdenbeath workshop management and unions put forward positive proposals for the manufacture of small batch standard items. More ambitious proposals were also suggested, including the manufacture of larger, more sophisticated mining machines in competition against existing outside suppliers, and outside tendering for general engineering work. It was argued that such schemes would help the NCB financially by reducing the flow of money from the Coal Board to private suppliers, including overheads and profit margins.

The ideas to increase outside tendering and the manufacturing activities of central workshops met with "in built resistance within the NCB". Hobart House and Divisional headquarters preferred to embark

on a long term strategy of tight budgetary control of workshop expenditure, centralisation of Research & Development engineering resources, and increasing "contracting out" (see below).

Saville and Kerevan (1987) offer a number of reasons why proposals for greater in house manufacturing met with "in built resistance within the NCB". They argue that the almost military lines of command within the bureaucratic administrative structure of the NCB and its rigid rules and regulations stifled imaginative initiatives in the workshops. Furthermore, the productionist mentality of senior NCB mining engineers meant that the workshops became viewed as "a troublesome subordinate element in the real business of digging coal" and their commercial and technological potential was missed. The centralisation of R & D at Bretby concentrated resources there, and Bretby attracted and accumulated the innovative ideas of staff and workers from all parts of the mining industry, including the workshops. Many workshop innovations and improvements to machines were tested and proved at Bretby and their manufacture was passed to the private sector. Saville and Kerevan (1987:57) cite the examples of "the Alloa Heading Machine", flameproof equipment, electrical panels, hydraulic props, and a range of other equipment, which had workshop innovations.

'Instead of developing these within the NCB, Headquarters merely amalgamated improvements and handed over details to private industry, representing a colossal public subsidy to the private sector.'

The case of the coal industry's engineering workshops highlights a certain lack of flexibility and entrepreneurial ability, which many right-wing critics have ascribed as an inherent weakness of

nationalised industries (see Clarke, 1987). Some left-wing critics have argued that nationalisation should have encompassed mining machinery manufacture, otherwise it left the Coal Board open to private exploitation (Allen, 1981). Indeed there is some evidence of over-charging and excess profits made by important suppliers during the late 1960s - early 1970s (see The Select Committee on Nationalised Industries, 1974-75).

In order to develop effective in-house manufacturing the Coal Board would have had to invest in high density production lines in specialist workshops, and would have had to let workshops stray into competition against private sector firms, even if it was only for Coal Board contracts. Successive governments have always been reluctant to allow this. Consequently, over the years the central workshops suffered from a lack of capital investment and under-utilized resources. According to Saville and Kerevan (1987), the Coal Board has missed commercial engineering opportunities by misallocating its resources. More recently massive capacity cuts in both coal production and workshops have increased unemployment, making human skills redundant, which represents a failure in both commercial and social terms. Thus the issue of in-house manufacturing raises basic questions about the form, character and purpose of the nationalised coal industry.

3.7 Sell Offs and Contracting Out in the Eighties

Whilst privatisation programmes of one kind or another have been adopted in many countries, and even to a limited extent in China and

the USSR, they have had a special political significance in Britain as a central tenet of Thatcherism. Successive Conservative governments from 1979 have sought to effect a sweeping and irreversible shift in the structure of the national economy in favour of free enterprise capitalism. Government policies are aimed at opening doors for the expansion of private capital, reducing the state's direct involvement in industry and in public service provision, reducing burdens on taxpayers, encouraging wider share-ownership, reducing the scope for collective industrial action, and ultimately killing off socialism in Britain. As one of Thatcher's disciplines enthuses, by

'freeing institutions and people from the cobwebs of the state ... privatisation will be the technique finally to neutralise all socialist ideas' (Clarke, 1987:67).

In fact, nationalisation is in practice a Labourist concept and has little to do with the fulfillment of socialist objectives (Miliband, 1972). But this has not deflected the Government's ideological commitment to the privatisation programme.

Various measures are included under the umbrella term of "privatisation". Four broad areas of privatisation policy are most commonly identified, although there are many subtle variations on the same theme (see Kay, Mayer & Thompson, editors, 1986; Heald & Morris, 1985). These are :

- (1) Denationalisation. In its most literal sense privatisation refers to both the selling off of nationalised industries to the private sector and the gradual withdrawal from comprehensive public

provision in areas like education, health, and the social services. It also includes the partial sell off of state owned assets.

- (2) Customer Fees. Increases in service charges in place of tax finance.
- (3) Liberalisation and deregulation. Refers mainly to the abolition or relocation of the monopoly powers of nationalised industries, e.g. the "liberalisation" of coach and bus services in the UK.
- (4) "Contracting out", franchising or competitive tendering. A common case of "contracting out" is where a local public authority continues to bear direct responsibility both for the provision arrangements and for service quality, although the work is actually carried out by private firms. Another common case is where a state owned industry buys end products and services from private contractors which it would otherwise provide "in house".

Competitive tendering can involve "in house" employees competing against external firms and individuals for public sector contracts.

It is important to be specific about the form of privatisation one is talking about and what precisely is being privatised. For as one of its advocates puts it, privatisation

'is a complex and subtle process. It is not a panacea or a formula ... Overwhelmingly, the impression emerges that each case is unique and requires a different remedy' (Pirie, 1985:6)

The Government has made it clear that it does not intend to privatise the whole of the coal industry until after 1992, if it is re-elected. Nevertheless, during three Thatcher terms of office since 1979, the NCB, renamed the British Coal Corporation (BC), has been encouraged and coerced to embark on a number of privatisation measures. Privatisation of BC's primary activity, coal mining, will be considered later (Chapters Five and Six). The central focus here is on the selling off (partial renationalisation) of ancillary activities and the contracting out of repair and maintenance work. Neither of these forms of privatisation is new to the coal industry, but they have had an added political significance and momentum in the eighties.

a) Sell Offs

During the 1970s there was a change in direction in the NCB's policy towards ancillaries, whereas the sixties had seen greater diversification into non-mining activities, the election of the Heath Government of 1970-74 saw a measure of retrenchment. Sir John Eden became the Minister of State with responsibility over the nationalised industries. He held discussions with Lord Robens about the possibility of hiving off some of the NCB's ancillaries. A Coal Industry Bill was introduced (and later defeated) that would have reduced the NCB's activities below the statutory authority of the 1946 Act. In 1971, the Coal Industry Act was passed, which required the NCB to report to government on its ancillary activities and on those companies in which it had a share or interest. It was obvious that the Government wanted to sell off to the private sector profitable NCB activities outside its main business of mining. In fact, Lord Robens gave his reluctance to

become "the instrument for 'hiving off'" as a primary reason for his decision to resign from the chairmanship of the NCB (Robens, 1972:323).

The period 1974-79 was one of expansion in capital investment in new productive capacity and mining technology in coal mining, but there was no great change in attitude towards NCB ancillaries. The election of the Conservatives in 1979 sparked off a major offensive against the public sector, and the mining industry in particular. The Government placed tight financial limits on the industry and encouraged the Coal Board to introduce measures to reduce its operating costs and overheads (see the Monopolies and Mergers Commission, 1983). As part of this process the coal industry shed several non-mining activities in addition to its big colliery closure programme.

The Coal Board's subsidiary companies and shareholdings in other firms were controlled by two holding companies - Coal Products Limited and NCB Ancillaries Limited. In 1983/4 the combined book value of subsidiaries equalled £118 million, and Coal Board shareholdings in other firms were valued at £58.7 million, "mining related" turnover was £633 million, or 13.6 per cent of total turnover (see Table 3:1).

Since 1983, the Coal Board has sold off several subsidiaries and shareholdings. J.H. Sankey Limited, the heating equipment and building material supplier, was sold in 1984. The Board also sold its 30 per cent stake in Associated Heat Services (AHS), which designs, installs, and operates boiler and air-conditioning plant. AHS was partly owned by the NCB since 1966. In 1983, AHS had pre-tax profits of some £3.3 million on a turnover of £35 million, but it was sold for £7.5 m. (Whitfield, 1985). The company is now a fully fledged energy

management contractor involved in several schemes for inner city combined heat and power (CHP) stations, which sell hot water as well as electricity. It is now a fully owned French concern (Compagnie Generale de Chauffe of Lille), but its UK chairman is Lord Roben's NCB successor, Lord Ezra. As the Financial Times (16-03-88:7) put it,

'it is ironic ... that one of the foremost hunters for openings in the private gas and electricity markets should be Lord Ezra, who worked for the state-run National Coal Board from 1947 until 1982...'

This is a reflection of the times. New private groups are queuing up to take advantage of the potentially profitable openings which are offered by the impending electricity privatisation. Meanwhile the Coal Board has continued to reduce its non-mining roles. It has discontinued as a separate management division its Ancillaries Group by "integrating some of the remaining activities into the core business" (BC Corporation Annual Report, 1986/7:11). For example, its computer company, Compower Limited, was "reintegrated" into the Corporation's main organisation through the creation of an Information Technology Department.

Simultaneously, the NCB rationalised capacity in the Coal Products Group, which employed nearly 3,000 people in 1985/6 and some 1,732 people in 1986/7. Part of this process was the closure of National Smokeless Fuel's coke ovens at Fishburn, Smithywood, and Nantgarw, and British Benzol's coking plant at Bedwas (BC., 1986/7:7). According to British Coal such capacity cuts were necessary "to return the works to full throughput and so minimize unit costs". But it was also designed to



'leave the Coal Products Group as a viable business in its own right and removes any need for financial support from the Corporation' (BC, 1986/7:11).

In other words, the Products Group has become a financially attractive concern ready for complete sell off to the private sector (see Table 3:2).

The coal industry has also divested itself of much property, land, and housing stock. The sale of Coal Board housing has been controversial ever since the NCB adopted its disposal policy in 1976. In just over a decade the NCB had sold nearly 50,000 houses, a reduction from a total of 66,000 houses in 1976 to 16,700 NCB houses in 1987 (BC, 1986/7:11). Councils, private companies and individual tenants have bought houses, but there are many victims to speculators who have gained control of some former NCB homes (Yorkshire Post, 30-02-88). According to British Coal's 1987/8 Annual Report, by March 1988 it owned some 8,950 houses. Since 1976, sales to sitting tenants totalled nearly 47,000, and some 27,300 houses were sold to local authorities, Housing Associations, Investment Companies and with vacant possession.

Coal Research and New Coal-Use Technologies

The Coal Board has a Coal Research Establishment at Stoke Orchard, near Cheltenham. The CRE has devoted its time and resources to researching efficient, cost effective and environmentally acceptable uses of coal in collaboration with private manufacturers and other public sector bodies such as the Central Electricity Generating Board

(CEGB). As with British Coal's Technical Headquarters at Bretby (formerly the MRDE) the private sector has commercially benefitted from CRE's activities (2).

In the markets for coal-fired industrial heating the CRE has won some big orders, including one with ICI Wilton in 1988 which involves an associated coal burn of 460,000 tonnes per annum (BC., 1987/88:8). The CRE has introduced fluidised bed boilers designed to reduce nitrogen and sulphur oxide emissions. Fluidised bed furnaces producing flue gas at 850°C were developed for use for drying stone, clay, grass, etc., and units with ceramic heat exchanges producing air temperatures up to 1,000°C for applications where hot clean air is needed, such as drying in the food industry (Colliery Guardian Supplement, January 1987:64). For smaller markets, such as domestic combustion, the CRE produced a range of "Coalflow" appliances with low-cost automatic coal and ash handling equipment.

It is in the power generation market that the Conservative Government's clamp-down on public expenditure has most affected the CRE's activities. British Coal is at the forefront of developing ways of burning coal for electricity in ways that minimise sulphur and nitrogen oxide emissions. Britain's main experimental plant is at Grimethorpe, South Yorkshire, which is an 80 MW power station utilising pressurized fluidised bed combustion (PFBC) technology. PFBC can be used in combined cycles with the use of limestone to retain sulphur, which enables power stations to generate power at higher efficiency than conventional power stations fitted with expensive flue gas desulphurisation (FGD) technology (Dainton, 1988).

In 1988 the Grimethorpe plant has been threatened with closure due to lack of funds. Initially the project started life as an International Energy Agency scheme, but more recently it was jointly financed by British Coal and the CEGB. The CEGB decided not to renew a three-year agreement with BC to share Grimethorpe's research costs, and BC can only contribute a part of the £38 millions required to continue the project, which is £14 m more than the CRE's total annual expenditure (see Table 3:3).

Part of the problem is that PFBC plant developed at Grimethorpe would only work well in relatively small power stations up to 300 Megawatts. The CEGB have tended to develop large-scale conventional plants with 900 MW turbine generators, although many of these will require FGD plants attached to reduce sulphur dioxide emissions. Furthermore, US research on a rival technology, known as integrated gasification combined-cycle (IGCC), has shown that emission figures for both sulphur dioxide and nitrogen oxides are lower than for other technology or plants less than 200 MW (New Scientist, 7 May 1987:21). In spite of these difficulties British Coal has an important pollution control coal combustion technology under its wing, and one that has much commercial potential. The only commercial orders until July 1988 for PFBCs were won outside Britain by Sweden. The first and largest is a combined heat and power plant due to open in Stockholm in 1989, which will generate 135 MW of electricity and 220 MW of heat for the city's district heating system, meeting strict emission control requirements. Two more PFBC orders won by ABB, the giant Swedish-Swiss engineering group were in Spain and in the USA in partnership with Babcock & Wilcox (FI, 15-06-88:35).

The British Government's official response for more money to be injected into PFBC research has been negative. Their argument is that future funding should come from those who intend to benefit from PFBC technology, particularly the private sector. This is part of the process of creeping privatisation that has led to BC reducing its other ancillary activities and cutting research and development in other areas, including mechanical equipment (see below). But it is also a policy that may have serious implications for the UK's energy supply in the 1990s. It is ironic that the Government has proved to be so reluctant to invest in public sector R & D into ways to reduce sulphur dioxide and nitrogen oxide pollution at a time when the European Community have called for stricter limits on coal-burning pollution. This is particularly so when PFCB technology is a cheaper alternative to FGD, which costs around £200 million per power station to fit, and it is more appropriate for smaller power stations, private companies are likely to opt for smaller generating stations. It is also the case that whilst the Government argues that British Coal continues to be too large a burden for the public purse, it actually spends less than other Western coal producing nations on coal R & D. This represents only five pence per tonne of coal used for power generation in the UK, compared with the US government's 31p per tonne and Japan's 105p per tonne for 1987/88 (FT, 15-06-88:35).

The Government have also scrapped coal-related research outside of British Coal. The Lothian waste heat plan was a CHP scheme to use waste heat from the Cockenzie coal-fired power station in East Lothian. The estimated cost of converting Cockenzie was approximately £34 million, and it would have provided heat via pipes to factories, offices and homes in Edinburgh. The public consortium managing the

proposed venture included the Edinburgh District and Lothian Regional Councils, the Scottish Development Agency, the South of Scotland Electricity Board and four public companies set up to advance the project. The government's decision not to give financial support was based on the argument that CHP/District Heating schemes should be advanced by the private sector. The decision was not based on notions of energy efficiency or on the projected energy savings and long term benefits of the scheme. The decision added to doubts about the future of the Cockenzie power station and the remaining deep coal industry in Scotland at a time when there was a public row over coal prices between British Coal and the SSEB, and nearby Torness Advanced Gas-cooled Reactor (AGR) nuclear power station was coming on stream (FI, 16-03-88:8) (see Chapter Four). Above all, the decision reflects the political objective of curtailing public sector initiatives regardless of costs or benefits whilst encouraging private sector investment and expansion in the energy sector, with the notable exception of the nuclear industry, which still receives considerable government support.

b) Contracting Out Engineering Work

As part of the privatisation process British Coal have rationalised workshop capacity in the 1980s and increased 'contracting out' of repair and maintenance work to private firms. In 1983, the NCB had 26 central workshops (see Table 3:4), with an annual turnover of £215 million, employing nearly 10,000 engineers and managers. The Monopolies and Mergers Commission (1983, para. 15.34) recommended closures.

'We consider that 26 workshops is too large a number to service the needs of the industry efficiently and economically. They are not located to the best effect and there is duplication of facilities'.

Following the 1984-85 miners' strike, workshops were closed and their workforce was cut by over 3,500 (see Table 3:5). The number of workshops was cut from 26 to 11 by 13 closures, the transfer of three to Area control as jobbing shops, and the inclusion of repair work into Tredomen Engineering Limited, the wholly owned manufacturing subsidiary of BC. Tredomen was then closed in March 1988 with the loss of 270 jobs (Western Mail, 31-03-88:5). By March 1988, total workshop expenditure was reduced by £66.4 million, from £222.4 million in 1983/4 to £156.0 million in 1987/8, a decrease of some 30 per cent.

Reorganisation of central workshops was in line with MMC (1983) recommendations and changes in the total business operations of British Coal, which was seeking to become more competitive within the tighter external financial limits (EFLS) imposed on it by central government. British Coal's reasons for cutting workshop capacity are connected with its pit closure programme and financial limits, technological and organisational changes, and the political pressures to increase contracting out throughout the state sector.

The Effect of Pit Closures and Financial Constraints on 'In House' Engineering

Between 1978/9 and 1987/8 some 129 collieries were closed, and the total number of "men on colliery books" declined by almost 130,000 (BC, 1987/8:18-19). Overcapacity in world coal markets, the loss of

traditional coal markets, Britain's PWR nuclear programme and the threat of cheap coal imports, low oil prices, are current and potential future constraints on British coal demand. Setting output targets in line with static demand, with an emphasis on lowering operating costs, translates productivity increases into more pit closures.

Workshops located in areas of numerous pit closures are liable to closure themselves. Without the patients why have the engineering hospitals? This was the logic of the 'vicious circle' behind the rationalisation of Scotland's central workshops. Bogside, Polkemmet, Frances, Comrie, and Killoch pits were closed, quickly followed by Lugar and Newbottle workshops. In 1979, three workshops employed 1,000 workers in Scotland, but by 1987 there was only the Cowdenbeath "jobbing shop" left with 114 employees (Saville and Kerevan, 1987). These closures were designed to reduce costs, especially labour costs, and improve short-term financial viability of BC's total business at a time of reductions in government finance to nationalised industries (for further details see following Chapters).

Technological and Organisational Changes and their relevance to BC Engineering

The combination of a "free market" government philosophy, tighter financial controls and depressed coal markets have influenced BC's whole corporate strategy in the 1980s. BC has continued to concentrate coal production in larger "super pits" and on the most productive seams in the "central coalfields". These measures are designed to reduce costs so that coal is mined at "the right price". But the tendency to compare British Coal with international spot market prices for coal,

including cheaply mined opencast coal and coal dumped at below cost, means that the right price is very low (see Chapter Four).

In addition to pit closures, BC have introduced heavy-duty machinery and electronically controlled and integrated mining systems to raise productivity (see Chapter five). These technical changes have reduced the amount of equipment leaving pits for major overhaul in surface workshops. Remote control monitoring techniques enable colliery management to monitor machine health and performance, mine environments and the production process from surface control stations. More powerful, robust machinery has been designed to spend all its working life underground, and its manufacturers are increasingly responsible for the operational efficiency of their machines after installation. To win contracts, suppliers have had to design long life equipment. There is also more stress on modular designs for rapid machine dismantling and removal of plant to new faces without it being brought to the surface.

All these technical changes were introduced to move the industry closer to continuous production and to reduce non-productive refurbishment costs. The "refurbishment cycle" is costly in both time and capital expenditure. It comprises six main phases - installation of equipment, production, salvage from the mine, "dirty plant pool", workshop overhaul, return to "clean plant pool" for eventual installation at another or the same mine. A typical example is the life cycle of power loaders. One power loader may spend 50 weeks at a colliery, ten to 12 weeks in the dirty pool, another 12 weeks in the workshops, followed by 20 weeks awaiting re-use in the clean pool.

After the MMC's (1983, para. 15.9) recommendation for "stringent targets" on refurbishment costs, BC have increased in situ maintenance and monitoring at most mines.

To carry out these changes workshop functions and spatial operations were reorganised. Since September 1985, they have acted as specialist product repair shops operating on a national basis as opposed to general jobbing shops taking in work from collieries within their local division or area (also see Chapter Five, Section 5.4). Each workshop deals with two or three major items in volume rather than a great variety of products in small batches or one off jobs as they used to. Remaining workshops have also increased direct technical assistance to collieries. Seven workshops have liaison engineers to coordinate technical assistance to all BC pits, and mobile teams are available to carry out fault diagnosis, on-site repairs, install and commission new coal faces, and supply sub-assemblies when necessary (see Table 3:6). Colliery jobs have also been rearranged to accommodate new technology. BC has replaced many craftsmen with fewer multi-skilled maintenance workers, and machine operators are trained to do minor repairs.

A Commercial Challenge - Contracting Out and the Case for Competitive Tendering

Arguments for increased contracting out to private companies were advanced by NEDO's Economic Development Committee on the mining machinery industry.

'The NCB spends roughly £215 million annually at its central workshops and a further £500 million on maintenance etc. at the mines; economies made in these areas could feed through into additional equipment demands' (NEDO, 1984:5).

The Coal Board have not, however, always been wholly in favour of contracting out to the private sector. As the MMC (1983, para. 15.44) found, the Coal Board claimed that external contracts

'would adversely affect the ability of specialist workshops to provide the type, extent and flexibility of service required for their colliery customers.'

They added that work should be sub-contracted only outside during peak-load periods or when specialist needs can only be met by the original manufacturers. Significantly the NCB claimed that repair charges were in excess of those charged by central workshops. Whilst the MMC (1983) "did not challenge this evidence", which was contrary to the government's wish to extend private sector involvement, they stressed,

'we consider it too limited for an equitable judgement to be made.'

Although private suppliers have won more after-sales service contracts since 1984/5, central workshops still carry out the bulk of repair and maintenance work for BC in 1988. As Bishop, BC's Head of Workshop Operations, stressed, the initial purchase price of equipment is only a small part of the total cost of ownership. Apart from maintenance costs at pits, the corporation spent some £210 million on major overhauls of underground machinery, of which some £150 m was

spent in its own workshops, £60 million was spent by original manufacturers and other outside contractors (The Mining Engineer, May 1988:493).

British Coal's workshop network is a feature of the nationalised industry which is not found in other coal producing nations. Certainly the coal companies of the predominantly private western coal industries are unable or unwilling to support in-house engineering workshops on anything like the same scale as the Coal Board. The coal industry has been able

'to buy, operate and maintain equipment in a way that most overseas mining companies find uneconomic' (NEDO, 1985:45).

In the United States some large organisations like Baker Mine Services, Penn Machine or Joy have fairly big repair facilities on offer for coal companies, but nothing compared with British Coal. One of the major coal concerns, Peabody, has no in-house repair facilities and everything goes out to competitive tender to small contractors. Jim Walter Resources has set up a number of collieries with central engineering workshops, but the majority of producers use engineering contractors. In the USA there is an extensive secondhand market in mining machinery, and a number of companies specialise in buying up surplus machinery, overhaul it and offer it for re-sale.

Historically, the Coal Board has not allowed its engineering workshops to tender for outside business, and has allowed only the odd small batches or one off items to be manufactured in house. Saville and Kerevan's (1987) analysis shows in-built rigidities in the

nationalised industry framework which prevented a full utilisation of local engineering skills and resources. The top-down bureaucratic structure stifled local initiatives, and increasing centralisation of purchasing and stores and management control, from the 1960s onwards, gave little freedom for workshop personnel to run their operations as they saw fit. Tight budgetary constraints and a flawed accounting system meant that workshops were considered to be areas for economising, rather than increased capital investment, by Coal Board accountants and senior management.

Whilst outside tendering by the state sector has not been openly encouraged by a government preferring private sector expansion, limited tendering has been permitted, which may be a prelude to workshop privatisation. In 1987/88, workshops did jobs on contract for Boulby potash mines in north east England, and have repaired mining machinery for manufacturers who have sub-contracted to BC's workshops. Workshops are also able to provide some services unavailable elsewhere, such as load testing of power loader gearheads, AFC and belt conveyor gearboxes.

British Rail Engineering

The case of British Rail Engineering Limited (BREL) makes interesting comparison with BC's own engineering workshops. BREL, formerly a wholly owned subsidiary of British Rail, has, like the central workshops, undergone a complete business reorganisation in the eighties. In common with BC this has been characterized by plant closures and a workforce reduction from 31,000 to 7,500 people in just seven years. BR's Board decided to split BREL's operations into new

construction (contracts at home and abroad) and repair work (British Rail). Eventually BR announced the sale of BREL to the highest private bidders, although BR would keep the company's routine maintenance and repair activities as a separate business.

In preparation for market flotation, BREL started slimming for profits. Redundancies of around 2,600 workers were made at both the Sildon and Swindon BREL factories. There were further redundancies elsewhere. In Doncaster, BREL employment fell from 3,200 employees to only 1,400 between 1986 and 1988. Its operations were split up into three companies, the Doncaster Wagon Works (employing 680), was taken over by a management consortium, British Rail Maintenance Limited (630 people) and the National Stores Depot (100 people) both remained part of British Rail. The town lost BREL's apprentices' training school, which was taking in 120 students in 1980.

In preparation for BREL's privatisation, the BR Board introduced a competitive tendering policy in 1985/6. By then it was operating a "leaner" in-house engineering capability from premises in Doncaster, Wolverton (near Milton Keynes), Eastleigh (near Southampton) and Glasgow (FT, 17-05-86:22). The new policy enabled private firms to compete for contracts against BREL. All contracts were awarded on the lowest bidder criterion, whether to in-house plants or outside firms, although it still managed to win around 70 per cent of the total orders placed by British Rail between 1985 and December 1987. During 1987 some £14 million in contracts were lost to external private suppliers, and in spite of some success overseas BREL was operating at only 75 per cent capacity (FT, 30-11-87:11).

BREL is preparing for complete privatisation. A management-employee buy-out team led by Peter Holdstock, the chief executive, has financial backing from Trafalgar House and Asea Brown Boveri, the Swiss-Swedish electrical engineering group. FKI Babcock already has an established presence in the manufacture of railway equipment and have stressed interest in BREL's railway works at Derby, Crewe and York. Large foreign-owned corporations, including General Motors (US), and Mitsubishi and Kawasaki (Japan), are interested in establishing European manufacturing bases in preparation for the relaxation of intra-European trade restrictions in 1992 and the Eurotunnel project underway (The Sunday Times, 04-09-88:D2).

Privatisation of BREL is opening new avenues for international capital with no firm guarantee that headquarters' control will remain in the UK. BREL, like BC Workshops, has provided 'in house' services on a non-profit basis for years. The introduction of competitive tendering has led to a rapid reorganisation and rationalisation of existing capacity. In both the case of BREL and British Coal Workshops this has meant substantial redundancies and several plant closures with the consequent loss of apprenticeships. Internal enterprise schemes with limited resources and scope have proved unable to cope with the scale of job losses. Instead of being cross-subsidized as essential in house operations for the success of total business efficiency in the overall operations of the nationalised industries, they are now being treated as separate businesses and ones ripe for rationalisation.

3.8 Public versus Private Efficiency

The examples of nationalised industry engineering workshops raise many questions concerning the role of state ownership. Undoubtedly, the cut backs in the eighties are part of a political attack on the very notion of nationalisation. The government's view of "efficiency" is based purely on commercial profit and loss criteria. It is also short term profit or loss, based on end of financial year results. It is important to clarify what criteria are used for determining efficiency, for different criteria can change the whole direction of public policy. As Huby and Hartley (1985) point out, efficiency could mean producing the same output with fewer resources, including people (i.e. labour saving and cost reducing), or it could mean more output by employing the same or more resources. Alternatively, it could mean improvements in service quality.

Whilst the government may cite the profitability of the Doncaster Wagon Works as a triumph of private sector efficiency, it is important to point out that the Wagon Works were profitable as an in house facility providing rolling stock for British Rail (Interview : Day, AEU District Secretary, June 1986). It is true that competitive tendering and the sale of in house public facilities have created wider market opportunities for private capital investment and profits. But there is nothing axiomatic in the argument that private means profits, public means losses.

More to the point, should private sector profits, shareholders' dividends and lower consumer prices be the only measures of efficiency after privatisation? In the case of British Rail, long term research

is required to find out the effects of sell offs and competitive tendering on BR's total business performance and its passenger service. Many would also argue that the immediate net loss of jobs, the loss of public sector apprenticeship training, and the reduction in the number of skilled employees in local labour markets, in times of high unemployment, represent substantial social and hidden costs that should be "part of any sensible definition of efficiency" (see Rentoul, 1987:17).

Political arguments have crystallized and polarized into promoting the virtues of private enterprise per se versus the vices of state owned monopolies or public sector provision, and vice versa. This has diverted attention away from consideration of proposals to change the structure and organisation of existing public sector services which includes a better utilisation of existing in house skills, expertise and resources. State owned industries were from the very beginning constrained by their own nationalisation act, ambiguous commercial functions and by the financial and product pricing constraints of successive governments. Allen (1981:117) argues that state owned industries have suffered from their ambivalent "hybrid" status, which has led to bad entrepreneurship.

'Through ambivalence towards its purpose, through the advice given by governments and the controls they imposed, through its own incompetence, the National Coal Board was a bad entrepreneur. While successive successful capitalists were diversifying, integrating, ensuring control of supplies and outlets, the NCB was moving in an entirely opposite direction. This did not occur because the coal industry was not and is not a capitalist undertaking but is a nationalised industry for if the coal industry had not been simply publicly-owned but organised to serve society then the Government would have allowed none of the options which the NCB took.'

Proposals advocating outside tendering to make nationalised industries more self-financing have been pushed aside or ignored by both governments and top level management within those industries. It is a sign of the times that British Coal workshops are becoming more commercially adventurous in the run up to what the Conservative Government hopes will be the complete privatisation of the industry if it is re-elected in the 1990s. As Bishop (1988) noted, outside tendering

'has always been a politically sensitive area. People in Westminster do not like British Coal getting involved in things other than mining coal, but we have now started to put our toe in the water, particularly in the field of mining machinery.'

A positive set of proposals for improving the financial viability of workshops, and providing employment and training were set out in Saville and Kerevan's (1987) "action plan" for Cowdenbeath workshop. They argue that the workshop could be organised to produce a range of mining machinery, particularly equipment designed for faulted and steep seam mining conditions similar to those found in parts of the Scottish coalfield, and exported to coal producing countries like the USSR and Yugoslavia where similar conditions prevail (see Chapter Five, Section 5.4). In addition, the workshop could produce items such as cheaper underframes, skips and mine cars for British Coal as well as general engineering items for outside customers. They further proposed that four year engineering apprenticeships could be provided as part of an integrated scheme involving the Scottish Development Agency, regional and local authorities, public sector training bodies, local technical colleges, private firms, unions, and BC.

In the 1980s British Coal has chosen to sell off some of its non-mining assets and it has restricted its sights to short term financial fitness at the expense of thousands of jobs. In its main business of coal mining it has adopted policies based on fewer and fewer collieries, and an increasing concentration of productive capacity in the central coalfields of Yorkshire and the Midlands. Saville and Kerevan's (1987) "action plan" is interesting because it offers an alternative approach to the utilisation of nationalised resources based on diversification, a measure of competition against private sector firms, and maintaining employment and training. It also raises the possibility of using workshops for producing technology specifically designed for local mining conditions. As Chapter Five shows, British Coal has tended to adopt a highly centralised, unilinear technological path since the late 1950s. Such a strategy has enabled a rapid rundown of productive capacity in the so-called peripheral coalfields, adding to the enormous social costs of those communities.

Efficiency criteria based on short term financial performance have produced policies destructive of mining communities. They have also meant that some valuable assets and functions of non-mining elements in the coal industry have not been fully appreciated. An important aspect of the workshops' work is that it has been done on a non-profit basis. This is precisely because they have been providing an in house service and it is of no value over-charging different parts of the same organisation. No accounting system could reflect the economies secured by workshop personnel's efforts to make machine repairs last over a long continuous period of use. Private manufacturers would have had much less incentive to work to such stringent cost parameters, and would be more inclined to charge for replacements rather than repair machinery.

3.9 Redefining the Public-Private Sector Boundaries

Labour's nationalisation programme of 1945-51 was not the foundation for further expansion of state ownership. In fact, the Labour leaderships following the Attlee government became stubborn opponents of any significant extension of state ownership. Even when they re-nationalised steel in their second spell as government (1964-70) after World War II, they were anxious not to appear a doctrinaire party bent on nationalisation on principle. Successive governments, both Labour and Conservative, did not attempt a wholesale redefinition of the boundaries of the mixed economy established under the Attlee government. Even though the Conservative Party stands as the party for private enterprise, it was not until the Thatcher government after 1979 that attempts were made to roll back the boundaries of state ownership throughout the public sector.

It is no longer any secret that the Thatcher government intends to privatise the coal industry following the completion of electricity privatisation. Many observers and people connected with the industry have long suspected that coal privatisation was high on the government's political agenda. John Moore, when he was Financial Secretary to the Treasury, declared in autumn 1983, "No state monopoly is sacrosanct", and he listed coal as one of several likely candidates for privatisation to a gathering of City stockbrokers. Whitfield (1985) stressed how significant victory over the National Union of Mineworkers (NUM) in 1984/5 was to the government's privatisation plans for the industry. At the time Ian MacGregor was NCB Chairman. He had built up his business reputation in the USA as chief executive and shareholder of Amax, a multinational mining conglomerate, and there is

no doubting his preferences for private ownership. In December 1984, MacGregor claimed it would be "wonderful" to sell off "uneconomic" pits to miners. In The Enemies Within (1986:67) he argued that:

'Nationalised industries were created by well-meaning people, but are, in the main, inefficient, overmanned and heavily dependent on public funds. Mrs. Thatcher has been right to seek to make them more responsive and efficient and to keep them that way by privatising them ... Far from being the 'family silver', as one articulate but perhaps ingenuous politician described them, most of them are - or were until recently - family millstones, dragging down not only themselves but also the whole economy.'

MacGregor's successor as head of British Coal, Sir Robert Haslam, has proved to be more ambiguous in his references to privatisation, but has never ruled it out. Shortly after taking office he stated,

'Privatisation on an individual colliery basis would be a mistake, but I am not against privatisation" (The Guardian, 12-11-86:36).

There are several strands to the preparation of the coal industry for privatisation. Firstly, there is the sale of ancillary mining related businesses and increased contracting out to the private sector, as discussed above. Secondly, there is the whole business of improving the productivity, short term cost competitiveness, and financial fitness of the whole organisation, particularly deep mining (see Chapter Five). Thirdly, there is 'the liberalisation' of the UK coal market and expansion of private investment into BC's primary business of working and getting coal. The latter includes relaxing British Coal's monopoly and regulations on existing private operators, such as the large engineering contractors on BC's Opencast Executive sites and

the numerous small licensed mine companies (see Chapter Seven). As shall be discussed with reference to public-private sector relations in the deep mining industry, privatisation can be a double-edged sword, benefitting some sections of private capital but weakening others dependent on the monopolistic home market (Chapter Six). Before examining the public-private sector interface in the coal industry in more detail it is necessary to examine other external relations and pressures acting upon the nationalised industry, in particular the role of the state, and the fluctuations in energy demand and supply. This is the purpose of the following chapter.

FOOTNOTES AND REFERENCES

- (1) Herbert Morrison was the Labour Leader of the London City Council at the time of the setting up of the London Passenger Transport Board which ended the free-for-all chaos of the former system. The basis of the new system with a Public Service Board at its head was outlined in Morrison's 1933 book "Socialisation and Transport", which influenced Labour plans for the nationalised industries.

- (2) The Coal Research Establishment is involved in other projects with promising commercial prospects. It has successfully demonstrated the Liquid Solvent Extractions (LSE) process. A 2.5 tonne/day pilot plant at Point of Ayre in North Wales has been established to manufacture transport fuels from coal. The £30 million project is being carried out in collaboration with Ruhrkohle. Other CRE work includes research into gasification and carbonisation. CRE are also involved in scientific studies of environmental problems of coal use in collaboration with Scandinavian scientists and the CEGB (BC., 1987/8:15-16).

TABLE 3:1
NCB Turnover 1984

	£ m
Mining activities	4,551
Mining related activities	
Manufacturing coke and smokeless fuels	239
Chemicals and secondary by products	30
Distribution of solid fuel	209
Distribution of heating applicances	113
Estates and Land	2
Engineering	12
Computer Services	<u>28</u>
Total of mining related activities	<u>633</u>

Source : NCB Annual Report 1983/84

TABLE 3:2
British Coal Subsidiaries and Ancillaries 1987/88

<u>Principle Subsidiaries</u>	<u>Main Activity</u>
Coal Products Limited*	Holding Company
National Smokeless Fuels Ltd.	Manufacture of smokeless fuels
Thomas Ness Ltd.	Manufacture of chemicals, by-products, etc.
National Fuel Distributors Ltd.	Solid Fuel distribution
British Coal Enterprise Ltd.	Investment financing

Other Subsidiaries

CIN Management Ltd. and subsidiaries	Pension Fund
Coal Developments ⁺ (Queensland) Ltd. (89%)	Coking coal joint venture in Australia
Compower Ltd.	Computer services
EMS Thermplant Ltd.	Boiler design and installation
SFAS (Services) Ltd. (51%)	Trade promotion

*Interests held by Coal Products Ltd.

	Percentage Interest	<u>Main Activity</u>
Staveley Chemicals Ltd.	45%	Manufacture of chemicals
Pitch Polymer Products Ltd.	50%	Leasing of factory premises and plant to Thomas Ness Ltd
Hyload Inc. (registered USA)	50%	Manufacture and sale of 'Hyload'
Aveley Methane Ltd.	50%)	Exploitation of gas from landfill sites
Bidston Methane Ltd.	50%)	

⁺Interest held by Coal Developments (Queensland) Ltd.

Capricorn Coal Development Joint Venture	12%
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Interests held by British Coal Corporation

British Fuels Ltd.	20%	Solid fuel distribution
British Mining Consultants Ltd.	50%	Mining and engineering consultancy services
Gwent Coal Distribution Centre	20%	Solid fuel distribution

TABLE 3:3

British Coal Research and Development Expenditure in 1987/88

	£ million	£ million
	1987/8	1986/7
Mining research, development and demonstration	19	16
Coal utilisation research	24	29
Medical research	2	2
Other	-	1
Total	45	48
EEC and ECSC grants	9	10
Net Total	36	38

TABLE 3:4
Central Area Workshops by Area/Region 1983

WORKSHOP	AREA	WORKSHOPS' REGION
Cowdenbeath	Scottish	Scotland
Newbattle		
Lugar		
Ashington	North East	North East
Whitburn		
Philadelphia		
Tursdale		
Allerton Bywater	North Yorkshire	Yorkshire
Carcroft	Doncaster	
Shafton	Barnsley	
Birdwell		
Elsecar		
Fence	South Yorkshire	
Duckmanton	North Derbyshire	East Midlands
Blackwell	North Nottinghamshire	
Moorgreen	South Nottinghamshire	
Bestwood	South Midlands	Lancashire and the West Midlands
Swadlincote		
Ansley		
Trentham	Western	
Cannock		
Kirkless		Wales
Walkden		
Tredegar	South Wales	
Mountain Ash		
Tondu	Kent	

Source : The Mining Engineer, May 1988

TABLE 3:5
Reduction in BC Workshop Capacity since 1984/5

YEAR	£ M	INDUSTRIAL MANPOWER	NUMBER OF WORKSHOPS
1984/85	222.4	7,106	26 Central Workshops
1985/86	162.4	4,758	13 National Workshops
1986/87	155.0	4,358	13 National Workshops
1987/88	156.0	3,515	11 National Workshops

Source : The Mining Engineer, May 1988

TABLE 3:6

Workshop Product Support for Collieries 1987/88

WORKSHOPS	LIAISON ENGINEER	TEAM PERSONNEL	ACTIVITY
ASHINGTON	YES	8	Power loaders Roadheaders
ALLERTON BYWATER	YES	22	Roadheaders
SHAFTON	YES	7	Power loaders
FENCE	NO	23	Coal and Stone Loaders
DUCKMANTON	YES	20	Powered Roof Supports
MOORGREEN	YES	38	Roadheaders
BESTWOOD	YES	5	Power loaders
TRENTHAM	YES	10	Roadheaders Power loaders

Source : The Mining Engineer, May 1988

CHAPTER FOUR

GOVERNMENT INTERFERENCE AND EXTERNAL CONTROLS ON THE NATIONALISED COAL INDUSTRY

'Energy industries within the public sector have been encouraged, and will be encouraged, to act commercially and efficiently within a strong framework of disciplines. The aim is to settle the financial framework of the nationalised energy industries to reflect the conditions of an open market as closely as possible' (memorandum submitted by DoE and NCB to Energy Committee, 1985/86).

This chapter represents a slight departure from the previous two and subsequent chapters for it is mainly concerned with events outside the coal industry but of major importance to it. In fact no adequate explanation of changes within the UK mining industry can be made without consideration of the wider economic and political parameters within which the industry operates. Put simply, it is necessary to develop "a proper conceptualization of government-industry relations" (O'Donnell, 1987). Or as Beynon et.al. (1986:28) put it, it is necessary to analyse

'relations between the NCB's internal management decisions and the wider environment within which it operates, the connections between these decisions and government economic policies, and the operating constraints imposed upon nationalised industries as deliberate choices by governments'.

As pointed out in Chapter Three, state ownership increased the role of the state in the running of important national industries. It was also stressed that the community only owns the nationalised industries to the extent it controls the government. At this point, a

further distinction should be made between "state ownership" and "government control". The government is only one part of the state, and is itself influenced by a great variety of powerful institutions, including the various branches of the civil service, The Treasury and big financial institutions, as well as powerful outside vested interests, especially business interests. In fact, the state as such does not exist. According to Miliband (1973:46),

'What "the state" stands for is a number of particular institutions which, together, constitute its reality, and which interact as part of what may be called the state system'.

Thus, the nationalised industries are very much a part of "the state system", and they are influenced by the interaction of the various bodies and institutions within the system and by powerful vested interests acting upon the system. Government policies affecting each nationalised industry and relations between them are formulated within this framework. Government power is constrained by a whole range of external constraints and vested interests influencing and informing government policies.

The significance of this view of the state system in a study of the British coal industry and its relations with outside supplies is that internal policies and external relations are heavily influenced by a whole range of relationships and constraints outside the mining industry. Furthermore, whilst there are limits on government power, the central government is able to impose direct constraints on the operation of the nationalised industries via its controls on prices charged and financial resources (public sector borrowing). Governments have also tried to use nationalised industries to secure other economic

and political goals, such as improving the balance of trade, anti-inflation policy through controls such as prices and wages, etc., which have had both intended and unintended effects on nationalised industries' performance. In the energy sector, the government is able to influence fuel policies without having any long-term national energy plans. Governments can do this through import controls (or the lack of them), through the regulation of relations between nationalised industries, through a range of macro-economic policies affecting energy demand and supply, through regulatory controls and taxation on private sector operations, and through more direct controls and "political influence" on the public sector enterprises. Figure 4:1 is an attempt to simplify some of the major relations and constraints affecting Coal Board planning, policies, and relations with suppliers (for more on the latter see Chapters Five and Six). The following sections provide more details about the way in which coal industry restructuring can only really be understood within this broader conceptual framework. The period of most interest is since 1979, for it is in this time that consecutive Conservative Governments have sought to redefine public-private sector boundaries and relations, with profound consequences on the energy sector, particularly on the performance and future viability of the deep coal mining industry.

4.1 Fuel Policies and Financial Controls on the Coal Board

Two of the major constraints acting upon the Coal Board since nationalisation have been beyond its control. These are the fuel policies adopted by successive governments, and the financial and pricing controls successive governments have imposed upon the coal

industry. Another consistent feature of the post-war period is that there has never been a coherent national energy policy. Within this context successive governments have allowed the deep coal mining industry to decline (Table 4:1 and Figure 4:2). A proper understanding of the long-term contraction in British coal production can only come from an analysis of the wider market constraints operating as the industry and of government-industry relations in the energy sector.

To simplify matters, the post-war history of the coal industry is divided into four main periods relating to the major phases in coal output, employment, investment, etc. Briefly, 1947-56 was a period of massive coal investment and expansion, followed by 1957-73, an era of rapid contraction in deep mining capacity, then came the 1974 Plan for Coal and an upturn in coal investment and output, followed by another sharp period of contraction in the 1980s. The purpose of the following account is to examine some important external constraints upon the coal industry, and not to give a comprehensive historical account of changes in the industry since nationalisation (see Ashworth, 1987).

4.2 1947-56

For the Attlee Government the coal industry's performance was at the centre of their whole economic programme, and it was, as the first industry to be nationalised after the war, a test-case for their nationalisation programme. Thus there was no shortage of funds for the industry in the first three years of state ownership. In 1950, the NCB introduced its first Plan for Coal, which was supposed to act as a production guide and capital expenditure outline for the industry until

1965. As coal was the dominant fuel source accounting for approximately 90 per cent of the nation's fuel needs, the Plan was of considerable importance to the energy future of Britain. In fact, by the late 1950s the Plan was becoming a massive irrelevance. Why? What were the implications of this sudden change for the NCB?

The 1950 Plan estimated that some £635 million would need to be spent on the industry. The emphasis was on capital expenditure at the collieries, including 250 reconstruction and amalgamation schemes, 22 new deep mines and 53 new drift mines. During the first six years of the Plan, capital was readily available to the coal industry for its ambitious modernisation programme. In fact, according to one observer capital was "too readily available".

'... the industry has tended to look on the signing of blank cheques as the one and only solution to its problems in the knowledge that there was plenty more where that came from' (see Conner, 1962).

In just five years the NCB invested £353 million, an average of nearly £60 million a year. By 1955, annual capital expenditure was approaching £100 million (see Figure 4:3). Expenditure on major colliery schemes amounted to £40 million a year, that was 15 times the annual amount prior to 1950. Although the NCB was progressing slowly with its "major projects", it continued to plan ahead on the basis of its belief that coal output would continue to increase. In 1956, the NCB's Investing in Coal, envisaged that some 230 million tonnes of coal would be produced annually between 1961 and 1965. It outlined further capital investment of some £1,000 million to be spent by 1965. This included some £550 million on major colliery schemes to create about 50 m.t. "new capacity". In fact, large amounts of capital expenditure is

needed in any extractive industry, particularly deep mining. New capacity is needed to maintain output as older collieries became more difficult to work and other pits were closed due to exhaustion. According to Schumacher (1957), who was then the NCB's economist, the Coal Board was having to replace about four to five million tonnes a year just to stand still. He compared the task facing the industry to "running up a downward escalator".

Even though large amounts of capital expenditure were necessary simply to maintain output levels, the NCB were investing capital to expand capacity. To do this they had to invest on the basis of long lead times between the start of a major capital investment commitment and the start of actual coal production. For instance, it could take anything between eight to fifteen years between sinking a new pit shaft and production at new coalfaces. This partly explains why, out of 167 major schemes started by the NCB since 1947, only 20 were complete by 1955, that is all but £11.5 million of £128 million spent were still not completed capital investment projects. The fact that the Coal Board were having to plan, invest, and operate to such long lead times meant that a sudden change in energy demand leading to a drop in coal sales could literally wipe out £millions of capital expenditure on projects started many years previously. This is precisely what happened in the late 1950s.

What is of interest here is the lack of coordination between the state's fuel policies and the long term plans presented by the Coal Board. In 1955, the Conservative Government announced its intention to supplement coal supplies with other kinds of energy, including atomic energy and oil (Reid, Allen & Harris, 1973:16). Yet the NCB was

allowed to pursue its expansionist policy, and to borrow capital at high rates of interest from the government when it was already saddled with paying back compensation to the old private owners. Furthermore, the NCB was unable to charge the prices it wanted to for its coal. From the time the NCB was established the government interfered in its pricing arrangements, which made it impossible for the Board to operate independently at arm's length from government. As Lord Ezra, the former NCB Chairman (1971-82) noted,

'Right from the start, the underlying Morrisonian principle was breached. In spite of the explicit intention of leaving it to the management themselves to fix the prices for their products, having regard to the public interest, the Government persuaded the Coal Board to continue the "gentlemen's agreement" reached with the former coal owners during the war to peg prices at their 1939 level. Thus coal prices in Britain were kept well below the world market level throughout the Attlee Government, and indeed until 1957 when the market situation fundamentally changed through the influx of large quantities of oil from the Middle East' (Ezra, 1987:39).

Coal price pegging meant that the world market price was well over the price of domestic coal, up to £2 a ton higher. This meant that the NCB was unable to reap full benefits from coal sales when there was a shortage of coal in Britain and on world markets. Between 1946 and 1956, the NCB produced some two billion tons of coal, which as Ezra (1987) pointed out, would have built up a substantial financial reserve for the coal industry at a time when it was beginning to face severe price competition from cheap oil and gas imports. Ezra estimated that the industry lost at least £2,000 million of justifiable revenue in the first decade of state ownership, and £500 million in the period up to 1975 (Investor's Chronicle, 12-12-76). In common with other nationalised industries, the NCB did not receive any compensation from

price restraint, and its capital investment programme was undoubtedly limited by lack of internal resources in the late 1950s and throughout the sixties.

Another problem for Britain's nationalised industries was that they were restrained from borrowing from the private capital market, which meant that they had to borrow from the government and often at higher rates of interest than could have been obtained in private sector financial markets. This made the achievement of its commercial objectives more difficult, particularly during times of increasing competition from alternative fuels. Its financial targets were outlined in Clause 1 (4)(C) of the Coal Industry Nationalisation Act of 1946, which stated that its revenues should

'not be less than sufficient for meeting all their outgoings properly chargeable to revenue account on an average of good and bad years'.

In the second decade of nationalisation this modest target became increasingly difficult to achieve.

4.3 1957-73

Inland coal consumption reached a post-war peak of 221 m.t. in 1956. In the three years to 1959, total coal consumption (including exports) declined by 33 mt. More ominously, seven power stations had converted to oil. Nevertheless, 1956-59 was another peak capital investment period for the NCB (see Figure 4:2). This included some new major schemes and a large investment in plant and machinery (see Chapter Five).

By 1960 the NCB's view of the prospects for the coal industry had changed from over-optimism into despondency. Schumacher (1960) began to warn against the closure of collieries with substantial reserves left in them and against fuel policies over-reliant on what he termed the "fleeting convenience" of cheap imported oil and natural gas from North Africa and the Middle East. Suddenly the NCB was abandoning projects in which it had sunk £millions such as Rothes and Glenochil in Scotland. As Conner (1962:63) put it,

'It may be that the artificial market conditions which prevailed throughout the world in the immediate post-war years lulled those responsible for formulating and directing broad coal policy into a false sense of "demand security" and, in consequence, influenced developments in the obvious and orthodox direction almost to the exclusion of the new'.

Having allowed the Coal Board to continue its massive investment projects, including some costly holes in the ground that were abandoned before completion, the government was unwilling to restrict fuel imports. This led Will Paynter, the NUM Secretary, to warn at the 1960 Miners' Conference, that the Conservative Government was attempting to break up the nationalised coal industry, first by competition with foreign oil, then by making the Commons annually responsible for how much money should be made available to the NCB, and finally by making individual pits competitive against each other for their very survival. The NUM called for restrictions on oil imports and use, a halt to power station conversions from coal to oil, and for a merger of coal distribution into the nationalised industry framework (see Hall, 1981:78-82).

In spite of limited government measures to slow down the rate of the NCB's rationalisation, including a tax on fuel oil adding 2 pence to every gallon in the 1961 budget and measures to prevent steel companies importing cheaper coking coal from overseas, the early 1960s witnessed a big increase in pit closures. Between 1959 and 1963 there were 126 closures, and between 1963 and 1967 there were a further 173 closures. Whilst there were some 174 pit closures in the first decade of state ownership, there was a qualitative difference between many of those and the later closure programme. Earlier closures concentrated on pits nearing the end of their working life or where local geology was especially difficult, and on low productivity pits where labour could easily be transferred to higher output pits in the same localities. From 1956 onwards the pattern changed, more and more pits were closed deliberately to lower NCB operating costs and cut capacity, and this included many pits that had received substantial investment in the first decade and that had plenty of estimated working years left in them.

During the sixties the NCB's capital investment programme became more highly selective. Shortly after taking up his position as NCB Chairman, Lord Robens told miners that,

'no one owed them a living, and that the only route to a better life was by concentrating output on the best pits in the most productive coalfields'.

Two years and 50,000 fewer mining jobs later, he told the 1962 Miners' Conference,

'This is not an era of coal at any price - that ended in 1957 - we are in the era of hard selling based on price, quality and service ...' (quoted in Hall, 1981:110).

Young men who were enticed into the industry in the mid-1950s by Coal Board slogans such as "coal mining gives you a job for good" suddenly discovered how transient such promises were.

Unfortunately the NCB had no freedom to reduce coal prices for it was limited in its ability to borrow from the government. In contrast, the multinational oil companies were able to transport oil in huge tankers and they had the flexibility to offer discounted prices in order to get a share of the European energy markets. Coal also lost traditional markets due to technical changes in the rail and steel industries. In the sixties, British Rail demand for coal fell from almost ten million tons in 1960 to only 140,000 tons per annum by 1970 as a result of the switch from steam to diesel. Natural gas began to displace coal, and the state's commitment to an expensive civil nuclear power programme meant that by 1970, nuclear stations produced 22.8 million kilowatt hours of electricity, which was enough to displace 9.4 m.t. of coal per year or nearly 18,000 mining jobs (Robens, 1972:179).

Most accounts of the post-war coal industry concentrate on an analysis of the changes in energy demand and supply, particularly as a result of oil's price advantages over coal (see Robinson, 1988). It is important to point out, however, that market conditions can to a large extent be influenced by government policies. In particular, through adjustments to external controls on and relations between nationalised fuel suppliers and fuel buyers the government could have attempted some

measure of long term fuel planning. What is obvious is that neither the Conservative nor the Labour governments of the sixties were interested in doing this. Official thinking in government, relevant government departments, in the Treasury and among non-coal industry "energy experts", was that oil was plentiful, prices would remain lower than coal well into the future and oil supplies were secure. Incidentally, this was also the thinking in decision-making circles of other European coal producing nations, all of whom reduced coal's share of domestic energy consumption to below 50 per cent by 1965 (Schumacher, 1974).

It was a Labour Government that presided over the peak period of colliery closures in the late 1960s. In opposition, Labour's National Executive under Harold Wilson had argued strongly in favour of integrating fuel policies and for a strong national coal industry. This was when they needed the miners' support to get into office. Once in power, they did very little to reduce Britain's growing dependency on imported fuels. Whilst one of Labour's first acts in 1964 was to write off a £415 million debt to the Exchequer, a number of other policies made matters worse for the NCB. Most revealing was the Wilson government's determined adherence to the Advanced Gas-cooled Reactor (AGR) construction programme. One of the most damaging and symbolic blows to the coal industry was the decision to go ahead with the construction of Hartlepool nuclear power station right in the middle of the North East coalfield. At a time of rapid colliery closures, a coal-fired power station would have helped maintain existing pits and jobs (TUISU, 1985). The NCB estimated that the Hartlepool AGR cost the Durham coalfield upwards of 5,000 jobs.

The Fuel Policy White Paper of November 1967 projected that by 1975 there would be only 159,000 employees in the industry, and that was some 221,000 people fewer than in 1967. It also projected that employment in the industry would be down to 65,000 people by 1980 if production was to be reduced to 80 mt. The White Paper also envisaged an expansion in nuclear power which was relatively greater than that of any other energy contribution. It anticipated only a slight growth in gas consumption, and gave oil the major quantitative role. By the mid-seventies all the Paper's assumptions and estimates had been proved wrong. Nevertheless, it continued to be influential amongst decision-makers in Government and Whitehall until oil prices rose during the early 1970s (see Robens, 1972). There was, partly as a result of the government's view of Britain's future energy mix, no attempt to intervene in the fuel market to prevent widespread pit closures. Between 1965/6 and 1968/9, the NCB closed over 200 collieries, that is almost one pit every week for four years.

Successive governments were lured by cheap and abundant oil supplies at the expense of a long-term national energy policy. The dominant argument was that security of energy supply should be sought through flexibility via diversification rather than dependence on a high cost indigenous fuel. The result was that coal was treated as "the residual legatee" after other fuels, which put pressure on the NCB to cut capacity in order to reduce supply to the level of demand. The way in which the Coal Board went about this task was heavily influenced by the tight financial parameters within which it had to operate.

As noted above, during the era of peak coal consumption the price of coal was pegged artificially low as a matter of government policy up

to 1957. Applications made by the NCB for price rises were either delayed, ignored or only partially fulfilled. Lord Ezra (1987:40) also noted that the Coal Board was required to import dearer American coal and pay the price difference itself.

'This was an example of the Government imposing a social obligation on the coal industry much to the detriment of its commercial well-being'.

Another problem for the Coal Board was its dependence on the government for finance and the Treasury's method of allocating resources to nationalised industries in the context of overall macro-economic policies, and not on an appraisal of each industry's needs. The fact that the NCB had committed £millions of taxpayers' money on several major projects that would never be completed without further finances made little difference to the Treasury's approach. In turn, the financial resources allocated to the Coal Board was an important consideration for senior NCB managers when determining their rationalisation strategy. Through the application of wider economic and financial constraints the state is central in the production targets, financial plans and to the overall profitability of the nationalised industries (O'Donnell, 1985).

It is in this light that the NCB's (1959) closure target of between 430 and 500 pits should be viewed. The problem for the Board was how to order their capital expenditure programme. This was partly resolved by the method of categorizing pits into three main groups. 'Class A' collieries were new mines and completed reconstructions, and were considered to be long life pits with a profitable future. 'Class B' pits had sizeable reserves, but their future prospects were

uncertain. They could either be promoted to the upper group if it was thought advisable to invest more in them, or they could be relegated to the lower group, which usually signalled imminent closure. 'Class C' pits were the "no hopers". Many were near exhaustion, but others were categorised as "uneconomic" or "loss making" or had limited "realistic" reserves.

The point about all the definitions used to select pits for either one category or another is that they are very elastic and open to various interpretations. The other crucial point is that definitions such as "economic" or "realistic" are partially determined by external financial and economic constraints that had little, if anything, to do with the long term viability of production or management of strategic non-renewable resources. An industry in better financial shape than the Coal Board was in the 1960s would have sought to push more 'C' and 'B' class collieries up the hierarchy by investing in them. And as O'Donnell (1987:71) has argued, capital investment was itself an important determinant of future pit productivity and profitability.

'Whilst geological considerations play an important role in determining the NCB's hierarchy of pits it is also the case that once established it tends to be self-reproducing. That is to say, once a colliery is designated as a high performer and it is allocated capital expenditure then a virtuous cycle is created since investment leads to improved performance and yet more investment in the future'.

In the sixties, the NCB was faced with over-production problems. As the market position for coal deteriorated more and more pits were deemed to be "loss making" or "uneconomic" and were relegated down the investment hierarchy. In practice, many of the pits that were closed

down were ones that had received substantial resources in earlier rounds of NCB investment when the fuel market position of coal was brighter. In other words, pits were closed for short-term profitability reasons when a slight increase in oil prices would have made them very profitable. Occasionally pits in the Class 'C' group were given a stay of execution by the NCB. Local miners would be told that they have six months to raise productivity to a certain level to avoid closure. But very often such announcements seemed to be an NCB bluff in order to win time, for eventually the pits were closed down after local miners had made substantial productivity improvements (Hall, 1981:112):

Another important dimension of the NCB's whole policy is where pits were closed. It was during the sixties that closures were concentrated in the so-called "peripheral coalfields" of Scotland, the north east of England, the North West and South Wales. Pit closures meant that miners had little choice but to transfer to neighbouring pits or move to the "central coalfields" under the NCB's pit transfer schemes, or to leave the industry altogether. This led to the break up of numerous mining communities, social dislocation, and pockets of unemployment in areas where closures were concentrated and few job alternatives were available (see House and Knight, 1967).

The scale and pattern of pit closures, and indeed plant closures in other nationalised industries, reveals an important aspect of state ownership in practice. Not only were governments unwilling to intervene in fuel markets to slow down the contraction of the deep mining industry, there was no effort to use the big nationalised employers as instruments of regional policy. There was little attempt

by successive governments to influence the NCB's rationalisation plans in a way that would reduce the intensity of cut-backs in particular localities. Rather, there seemed to be a tacit acceptance in Parliament, except amongst a few MPs from mining constituencies, that pit closures were the price to pay for cheaper fuel to serve the national economy, and that contraction in older traditional industries like coal was somehow a necessary and inevitable part of a wider process of structural change in the national economy. In other words, coal mining's demise was necessary to raise national competitiveness and to create a modernized and more diversified industrial base. Even the national executive of the NUM seemed to accept the sad inevitability of it all. Instead of opposing and questioning the logic of the pit closure programme, the NUM leaders sought to negotiate the pace and timing of closures (Hudson, 1986:169-214).

The impact of the NCB's closure programme is evident if one considers specific coalfields. One of the areas most hard hit by closures was the Durham and Northumberland coalfield. Between 1956-74 it lost two-thirds of its manpower, three-quarters of its pits and half its output. 73,000 mining jobs were shed and the number of working collieries was reduced from 109 to 34. Miners were transferred from closed pits in the west of County Durham to the east of the county and others moved to Yorkshire and Nottinghamshire. In Northumberland there was an attempt to regroup mining populations in the council New Towns of Cramlington and Killingworth (House, 1969:111).

From the late 1950s onwards the NCB was one of the major contributors to the deindustrialisation of the region and to the structure of employment within the north east's economy. As Hudson and

Sadler (1986) have noted, the decline in coal mining, iron and steel (since 1967), and shipbuilding (since 1977), accounted for no less than 80 per cent of the total net employment decline in mining and manufacture - i.e. over 200,000 jobs lost. Many of the new jobs created by branch plants attracted to the region were not for displaced males, but were mainly low paid, non-unionised jobs for women. The very scale of losses of predominantly male jobs created a local economic imbalance within the north east that proved to be a long-term problem. The problem was further compounded in the 1970s and 1980s as governments continued to allow massive capacity cuts in the nationalised industries as a means of achieving competitiveness. There was a definite conflict of interests between the macro-economic policies of the state and the national plans of state owned corporations, and the interests of many coalfield communities. As Beynon et.al. (1986:28) observed,

'Conceived at one time as a way of furthering working-class interests, nationalisation has in practice become a mechanism to destroy jobs and communities'.

4.4 Post-1974

1974 marked another "switch back" for the coal industry due mainly to the 1973/4 oil price rises (Berkovitch, 1977). The Plan for Coal in 1974 was a tripartite arrangement between the NCB, NUM and government. It set a target of 135 mt for 1985, of which 120 mt was to come from deep mined output. It was estimated that 40 mt additional capacity would be created at a cost of some £600 million. This would be on top

of an annual expenditure of some £70 to 80 million, which meant a total investment of £1,400 million over the decade to 1985 at 1974 prices. Of the new capacity to be created, some nine million tonnes was to come from extending the life of existing pits, another 13 mt from major improvement schemes, whilst an additional 20 mt was scheduled from new mine developments, including the Selby "super pit" complex (NCB, 1974).

Following the 1974 Plan, coal production increased steadily with modest increases in productivity between 1973/4 and 1980/1. It is important to stress that the Plan's predictions of coal output growth would only be feasible if the state was prepared to actively intervene in energy markets to ensure that the long-term proposals outlined in the Plan would be successfully carried out. The Plan was a plan "in name only" unless there was a measure of coordination between it and the other fuel industries.

During the 1970s, the NCB found itself in a position whereby it was able to invest in new productivity increasing capacity. The problem was that the productivity increases and new capacity would not show through until the eighties. The Plan's capital expenditure programme also added substantially to the NCB's cumulative debt burden. The programme was financed mostly by long-term fixed interest loans from the government. Interest payments amounted to ten per cent of the industry's capital liabilities and seven per cent of its turnover (O'Donnell, 1987:72) (see Table 4:2).

In the energy sector as a whole the Labour Governments of 1974-9 continued to commit £billions to the nuclear programme. Permission was granted to build two new AGR stations and for a new reprocessing plant

at Windscale (see Hall, 1986). Coal was facing increasing competition from natural gas, which had increased its share of the energy market from five per cent in 1960 to 27 per cent in 1980. Labour also sought to expand North Sea oil production under "public control". It embarked on policies designed both to increase state participation in industry, and to collect a higher proportion of oil revenues as tax. A new national oil company - British National Oil Company (BNOC) - was set up in 1976 which would by 1981 have had a controlling stake in more than half the oil production in the UK fields. According to Porter et.al. (1986:65), this measure not only increased state control over the production of valuable non-renewable resources, it also opened the door for a sensible long-term depletion policy and for better use of the profits from oil. It is ironic that the main benefits of the substantial investment in the North Sea, both public and private, came after the defeat of the Labour Government in 1979.

Coal demand was also hit by two more changes in the wider economy beyond the NCB's control. As Robinson (1988) observed, the trend towards greater energy conservation and the introduction of energy-saving technologies increased following the OPEC oil price rises of 1973/4. More significantly in Britain, the rapid decline in Britain's heavy industries and manufacturing base at the end of the seventies and early eighties led to a considerable decline in coal demand. But the second major period of coal closures in the NCB's history was only partially due to changes in energy demand. Of more importance in the post-1979 context were the political and financial constraints imposed on the coal industry and within the energy sector by the Thatcher governments.

4.5 "Market Forces" and Energy Policy in the Eighties

The purpose of this section is not to elaborate on the dynamics of the changing UK energy market, as important as these are. Rather, it is to illustrate the importance of understanding how external government policies and direct interference in the nationalised industries have influenced coal industry restructuring in the 1980s. Never before has a government's broader political and economic priorities impinged so much on the running of a nationalised industry or on inter-public sector relations. Although successive Thatcher governments have been dogmatic in their adherence to a "free market" non-interventionist philosophy, they have interfered more in the organisation, control and performance of the coal industry than any previous government.

The Thatcher governments have almost prided themselves on having no stated national energy policy (FT, 16-11-84:6). They have preferred supply oriented approaches based on a preoccupation with short term costs and end-of-year financial results. With the exception of a high degree of state protection for the nuclear programme all the non-renewable energy industries have had some degree of privatisation. In the late 1980s, only the electricity supply industry and the Coal Board remain in the public domain. And indeed, many of the government measures affecting the British energy sector in the eighties have been the result of preparation for or actual privatisation, or concerned with public sector borrowing and Treasury finance.

Whilst the government has no stated national energy its whole economic programme was based on indigenous North Sea oil revenues. The

liberalisation of the oil tax regime in 1983 was a deliberate attempt to encourage oil companies to exploit new oil fields in the North Sea and hence to step up production levels (and government dividends) (1). The government was fortunate that the main phase in capital expenditure on exploration and new oil platforms took place immediately after the OPEC oil price rises of 1973/4 before it came to office. In the period 1980-85 there was a dramatic increase in oil production from UK's continental shelf of some 60 per cent. By March 1985 the UK had overtaken Saudi Arabia as the fourth largest oil producer in the world behind the USA, the USSR and Mexico. Unlike the OPEC producers, whose policies are based on notions of long-term profit maximization through conservation of their non-renewable reserves, Britain adopted a policy of maximum economic exploitation in the short-term to provide the Treasury with funds for macro-economic policies (Friends of the Earth, 1985:13-14). Oil and gas receipts provided between 6-8 per cent of total government revenues between 1984-88. Nevertheless, the extraction rates encouraged by the government have restricted the period the UK will be self-sufficient in oil and gas by running down reserves today at the expense of tomorrow.

The government has also privatised large parts of the oil and gas industry. In November 1982, the BNOG was split into two parts, the production arm (BRITTOIL), and a 51 per cent holding was floated on the stock exchange, complete with its North Sea reserves. In June 1984, the British Gas Corporation's North Sea holdings were converted into a private company, Enterprise Oil, and sold off, with Rio Tinto Zinc (RTZ) buying up a large share. In 1985, BNOG's remaining 49 per cent stake in BRITTOIL was privatised. In 1987, the government insisted on going ahead with the planned sale of its remaining 31.5 per cent stake

in British Petroleum (BP) despite the collapse of the share price in the wake of the stock market crash. As a result the government was embarrassed by the fact that the Kuwait Investment Office (KIO) acquired a major shareholding of 21.68 per cent in BP (see Chapter Eight).

It is useful at this stage to raise fundamental problems with Conservative government policy in the energy sector. In the first place, the government's belief in the superiority of private enterprise has led to privatisation policies that have increased the role of multinational companies (both UK-based and foreign owned) and overseas governments in national energy affairs. This ultimately restricts the ability of the British government to dictate national energy policy in future or indeed to ensure security of long term supply. Secondly, by allowing private companies to pursue their own interests, regardless of how short term or sectional they are, the long-term development of the national energy sector may be hindered (see Chapter Eight). As the Coalfield Communities Campaign (CCC) (1986:349) put it,

'This (government) policy has overlooked the fact that within the energy sector different companies have different interests and that in pursuing these interests the overall interests of the UK may not be served. The UK will rapidly run out of oil and gas and will sterilise its reserves of coal, on its current course, leaving it dependent on nuclear power stations and imports of fossil fuels'.

4.6 Relations between the Coal Board and other Nationalised Industries

"Market forces" and price competition between fuels in the UK energy market have always been important determinants of both economic

performance in the UK energy sector and of relations between public sector energy industries. But the Conservative governments since 1979 have sought to instill the language of the market place more and more into the business priorities of the nationalised industries. This has been part of their financial objective of reducing public sector borrowing (and spending), and its more ideological one of extending private enterprise, including private business management methods, into the state sector.

As a direct consequence of government policies, the NCB (British Coal since 1986), has found its major public sector customers, the British Steel Corporation (BSC) and the electricity boards, to be very tough in price negotiations. The policies of these customers have been contrary and very damaging to those pursued by the coal industry.

Relations between the BSC and NCB in the north east of England were analysed by Beynon et.al. (1986) and Sadler (1986). Following the Plan for Coal (1974) the NCB began a capital expenditure programme for Durham's coastal pits producing high grade coking coal. The Coal Board's long-term thinking was in line with BSC's expansion plans, particularly for its Redcar Works. But in October 1979 BSC suddenly changed its purchasing policy and it started to import foreign coking coal in preference to locally produced supplies. This reversal in purchasing policy is only logical if seen in the light of the government's instructions to the BSC Board that the industry should break even financially by the Spring of 1980. This led BSC to seek ways to reduce its variable costs and to close down plants. In 1979 the BSC management claimed the corporation was losing £135 million a year by buying coking coal from the NCB instead of importing it. As a

result of British Steel's coal importation policy several coking coal collieries were closed in the UK, and it was an important reason behind the decline in deep coal output in the north east from 14.1 million tonnes in 1980 to 11.9 mt in 1984, and 10.2 mt in 1987.

Undoubtedly the biggest worry for British Coal's management in the late 1980s has been the future of its power station market for steam coal, which accounts for almost 80 per cent of total output. This was highlighted in the first half of 1988 by the public row between the British Coal Corporation and the South of Scotland Electricity Board (SSEB). As with BSC in the early eighties, the SSEB argued that it could buy coal from foreign sources up to 40 per cent cheaper than coal supplied locally by BC. The SSEB argued that it would tender outside the UK for its coal needs unless BC could match international spot prices for coal. The decision put the future viability of three of the four working deep mines left in Scotland and provoked an angry response from unions who claimed the SSEB were using "macho management" techniques to force BC to lower its prices to increase SSEB revenues in the run up to privatisation (2). This was subsequently denied by the Secretary of State for Energy, Cecil Parkinson, who argued that it was perfectly legitimate for the SSEB to seek the most competitive sources for its coal (The Independent, 8-3-88:5).

In order to put the BC-SSEB arguments in perspective it is useful to consider how the relations between the two nationalised bodies has changed over the years. In the early sixties the SSEB took only one fifth of all Scottish coal output. This proportion increased as steelworks, shipyards and other heavy industries closed operations in Scotland, and more people moved away from using coal fires to gas and

electricity. In the late seventies the SSEB took three out of every four tonnes of Scottish coal produced. In 1977, the Labour Government formalised the relationship in a five year coal burn agreement, under which the state subsidised the SSEB for taking seven million tonnes of coal annually from local pits and agreeing on no imports. The Conservative Government sought to break up this cosy relationship between two state owned corporations. In 1982 it inspired an efficiency audit of the SSEB by Coopers & Lybrand, an accountancy firm, which concluded that the SSEB's relations were "potentially unhealthy" from a competitive perspective. The SSEB was advised to diversify its fuel sources. Since then the SSEB have won similar tiered priced structures for BC coal to those won by the Central Electricity Generating Board (CEGB).

The new aggressive style of the SSEB's management is a result of government policies. Firstly, the government has deliberately allowed major fuel using public sector industries to import coal or to use the threat of imported coal as a way of "disciplining" British Coal to become more competitive. Through the use of the international coal market the government has been able to keep a discreet political distance in the dispute between BC and the SSEB. The matter was treated as a purely commercial concern between two competitive corporations, and not as a concern affecting the future of the Scottish mining industry, its economy and long term energy security.

Secondly, the nationalised industries involved were given conflicting goals by the government, which makes any lasting agreement over coal prices an uncertain prospect. On one side, the electricity boards want the lowest possible fuel prices to boost their profits in

advance of market flotation. On the other side, the Coal Board has a financial break even target and can not afford to charge coal prices too far below cost. In the longer term, BC's management are preparing for privatisation which means they want long-term contracts to plan their capital expenditure programme into the 1990s with confidence. But the electricity utilities are unlikely to enter long-term commitments with BC until they have secured their own supply contracts with the 12 area boards that will distribute electricity to customers.

Thirdly, the SSEB's hard line position in 1988 is partly due to its own cost structure, which like British Coal's, has been greatly affected by the nuclear programme. In 1986/7 the SSEB made £286 million, but £240 million was gobbled up by interest charges. It made a bottom line profit on turnover of only 2.5 per cent. Furthermore, the SSEB spent over £2 billion on the construction of the Torness Advanced Gas-cooled Reactor (AGR), and its big capital debts have added to its change in commercial policy.

British Coal's biggest problem in the early 1990s will be the price of foreign coal if the government continues to favour a completely "liberated" coal market. At the moment BC's contract with the CEGB is the world's biggest energy deal worth over £3 billion a year. But the CEGB is on record as saying that British port handling facilities could handle as much as 30 million tonnes of imported coal per annum by 1992/3 (FT, 22-02-88:8). New deep handling facilities on the major British estuaries, particularly the Thames and the Humber, would threaten the existence of the most profitable deep mines in the central coalfields. According to one study, by 1992 BC will produce between 73.5 mt and 80 mt of deep mined coal from no more than 48

collieries, that is just over half the number of working collieries in mid-1988. Some 36 collieries and 51,500 mining jobs could be lost as a direct result of electricity privatisation and around ten million tonnes of coal imports mainly through the Thames, Southampton and South Wales (Dewhurst and Gladstone, 1988:46). Much would depend on international coal prices, BC productivity and prices, and the import handling capability of prices, as well as handling and inland costs. As Feickert (1987, para. 8.20:20) notes:

'To try to compete with dumped coal prices is like chasing a mirage. Recently ... South African steam coal has been selling in Europe at \$28/tonne or around £0.69 a gigajoule. To allow highly unstable exchange rates to determine a production strategy is nonsensical'.

Prior and McCloskey (1988) estimated that up to 40 pits could be closed by the early 1990s that would otherwise become internationally competitive if protected from foreign coal imports. This would result from the realisation of anticipated productivity improvements in BC pits and the expected rise in world coal prices as European demand increases. As early as 1990, international spot coal prices may have risen to between \$42 and \$52 a tonne compared with \$33.50 to \$36.50 paid by the CEGB on its spot tender in the summer of 1987.

In the analysis of government-nationalised industry relations it is necessary to raise some fundamental issues affecting both the cost structure and competitiveness of the state owned industries, and to question the short term market forces approach. One obvious flaw with the use of international spot prices as a measure of British Coal's competitiveness is that the international steam coal market accounts

for only about seven per cent of world consumption and it is not freely competitive (Labour Research, 1984; BC Press Release, 07-03-88). Much of the global coal trade is controlled by big raw material conglomerates such as RTZ and by energy corporations like Shell, BP and Exxon, whose coal fortunes are obscured by the overall business interests of the groups. Any expansion in imports increases the control of these MNCs over Britain's energy supplies. It is also true, that for a variety of political and economic motives some countries, particularly South Africa, are willing to dump their coal at below the capital costs of production on the Amsterdam-Rotterdam-Antwerp (ARA) spot market (see Chapters Seven and Eight).

As regards coal investment and production, there are long lead times before adequate financial and productivity returns are reaped on capital investments. The nature of deep mining means that it is extremely costly and technically difficult to reopen old mines. This has led McCloskey (1986:384) to argue that there is a need to take a long-term view when considering the profitability of BC pits. It may be much less expensive in the long run to subsidize pits to avoid closure now so that they will still be producing when world coal demand and coal prices increase, and when supplies of North Sea oil begin to fall off. There is nothing new in this argument. Schumacher said much the same in 1960, but no government has ever taken action on such advice. Even though the Thatcher government does not believe in long-term, coordinated planning within the energy sector, it could save the life of numerous BC deep mines simply by restricting imports to coals for proven specialist needs, which would give BC time to improve productivity.

The disagreements over coal prices raises another important issue. Coal is the major raw material "cost" to the electricity boards and the prices paid by the boards is a source of "revenue" for BC. In turn the electricity boards get their revenues by generating electricity for consumers. The public sector enterprises are extremely interdependent, but their cost structures and financial accounts are treated separately. This simple fact led Berry et.al. (1986:140) to raise the following point,

'The accounts of enterprises in the energy sector can only be properly understood by taking account of their inter-dependencies (through a coherent energy policy). Thus, reported accounting profit or losses do not reflect the economic performance of individual enterprises'.

This has considerable implications for the coal industry where even interdependencies between pits are currently being ignored and each pit's future depends increasingly upon short-term profitability criteria. On a macro-scale it casts at least some doubt on the way the Treasury has allocated resources between state sector energy industries and their economic performance has been measured since their nationalisation.

4.7 Outside "Market Forces" - Nuclear Power

It is ironic that the government's own privatisation plans for the electricity supply industry (ESI) have exposed some basic flaws in its "free market" philosophy. The most obvious of these is the proposed imposition of a statutory obligation on the privatised area distribution boards to maintain at least a fifth of their total

electricity fuel sources from nuclear power stations. Thus the British coal industry faces a double market squeeze from state protected nuclear power, and from cheap fuel imports, including oil, possibly gas from Norway, foreign coal, and surplus electricity from the French nuclear power stations via the Cross Channel Link.

One reason for "the necessity" of state protection for the nuclear industry is that it looks an uneconomic prospect if left to the free market. The capital costs of the nuclear programme from construction to de-commissioning, reprocessing fuel, waste disposal, and insurance costs, are too high for private operators to bear without substantial state subsidies. In the sixties, the enormous costs and losses sustained by the British Advanced Gas-cooled Reactor (AGR) programme were absorbed because of the existence of monopoly buyers and sellers within the state sector. In the United States the private sector would have been unable to cover the losses of the AGR programme either out of their equity capital or by loans. The debt would have had to be rescheduled and projects almost certainly abandoned (Sweet, 1983:26).

The UK government have praised the virtues of the system of private power supply in the USA and have said that US capital would be welcome to invest in a privatised electricity industry in the UK, including private nuclear power stations. This position is in itself contradictory, for investor-owned electric utilities in the US have cancelled or abandoned 64 nuclear projects since the Three Mile Island reactor incident in March 1979. In fact, no new nuclear power plant has been ordered since 1978. Between 1980 and 1984, 53 nuclear power stations at 31 different sites were cancelled. The existing 125 reactors - either operating, being tested, or being constructed - are

well below the 236 projected by utility companies in 1975 (OMNI, May 1988:42, New Scientist, 7-4-88:24).

Following the accident at the Chernobyl nuclear power station in 1986 the costs from construction to decommissioning have risen sharply. The "Chernobyl factor" has heightened perceptions of economic risk and has also pushed up safety and insurance costs (FT, 26-04-88:36). In November 1987, Coopers & Lybrand argued that concerns about financial risk and returns on capital would impede the growth of Britain's nuclear capacity (FT, 18-11-87). The government would have to indemnify owners of nuclear power plant against any unfortunate eventuality. Furthermore, City of London advisers have informed senior cabinet ministers that the private sector would require at least ^aten per cent rate of return on capital from new nuclear projects because of the perceived risks involved. In early 1988 a nationalised industry was required to make only ^afive per cent real rate of return on capital on new projects after inflation. The CEGB's own internal estimates for a proposed Pressurized Water Reactor (PWR) at Hinkley would no more than break even (FT, 18-04-88:11).

The Sizewell 'B' Public Inquiry took evidence before Chernobyl and the supposed economic benefits of a new PWR were based on assumptions about future energy demand based on rising oil and coal prices. These assumptions were wrong, and since then the International Coal Development Institute (1988) has argued that coal will be a more economic proposition for electricity generation than nuclear power for as long as coal costs are \$65 per tonne or less at 1986 prices. Whilst the ICDI's evidence, like that of the nuclear lobby, is bias in favour of the fuel the organisation's members supply, it does not undermine a

basic truth Schumacher (1974:103) made about all future cost and energy demand predictions. To make guesses about the unknown, called assumptions, then "to derive estimates from them by subtle calculation as if they are the result of scientific reasoning can only lead to the most colossal planning errors".

It is revealing to note that the proposed privatisation of the ESI has not only led the government's financial gurus to cast doubts about the nuclear industry's market fitness, but raised alarm within the industry itself. One view from within the labour movement was expressed by Jack Dromley, the national general-secretary of the Transport and General Workers Union (T & GWU), one of the assortment of unions with members within the nuclear industry.

'Investment in the nuclear industry requires enormous up-front costs and long pay back times. An increasing reliance on the private sector and a decreasing strategic commitment on the part of government threatens the industry with disaster' (quoted in The Times, 06-04-88).

John Collier, chairman of the UK Atomic Energy Association (UKAEA) was reported to be desperately anxious that a privatised electricity industry would greatly reduce investment in the nuclear industry and sacrifice it "on the altar of short term profit" (New Scientist, 25-02-88:43).

4.8 The State and the Nuclear Establishment

Ever since Britain's civil nuclear power programme was launched after World War II it has been surrounded in secrecy and has

represented a powerful influence on British state affairs and on public policy (see Hall, 1986). It is not the place here to discuss in detail the state's motives for maintaining an extremely costly nuclear programme, except to point out that consideration of possible political motives is at least as important as the economic ones (Valentine, 1985). Furthermore, some understanding of the relations between the British state and the nuclear industry is necessary to explain the reasons for exposing one public sector industry, British Coal, to competitive forces whilst protecting another, the nuclear component of the electricity supply industry, from them.

It is useful to reiterate that the British state is not a neutral instrument, placing itself willingly at the service of whichever party is in power. In fact, it is a nebulous entity comprising a complex of institutions, political processes and relations, reflecting and legitimizing vested interests (see Miliband, 1973). The "nuclear establishment" is not synonymous with the state, but it is a powerful political-technical-commercial complex, which involves many institutions and actors within the state system, including the government, the Treasury, state departments, large public sector industries and powerful private sector corporations (see Figure 4:4). And as Sweet (1983:24) pointed out,

'The power of the nuclear-industrial complex in our society is not exerted through the formal organs of decision-making. But it is nonetheless powerful, more powerful than the government in most circumstances because it not only advises the government but it creates conditions where the government may have very little choice but to accede to that advice'.

Governments are only one part of "the state system". The fact that they are formally invested with state power does not mean that they control that power (Miliband, 1973:47). Nevertheless, the Conservative governments since 1979 have been strongly in favour of expanding Britain's nuclear commitment and they have actively sought to strengthen the pro-PWR camp within the various relevant institutions of the state. Whilst this policy has met with stiff opposition from those members of the British nuclear establishment committed to the alternative "British designed" AGR option, the government's pro-nuclear stance has the tacit support of numerous influential components of and decision-makers within the state system.

The governments pro-nuclear programme is very relevant to any debate about the future of the British coal industry. Not only does nuclear power take some of the electricity market away from British Coal, it also takes a disproportionate share of public money devoted to energy research and development (R & D) away from fossil fuels and renewable energy sources. In 1986/7 the CEGB spent £162 million on R & D. Nuclear research took 68 per cent of that money while environmental work and the scrutiny of new sources of energy accounted for 16 per cent. The remainder supported research on conventional generation methods, and the technologies of transmission and control (see Figure 4:5). In the same year, British Coal's net total R & D expenditure was £38 million. Perhaps the best illustration of the enormous costs of nuclear R & D is provided by the prototype fast reactor "experiment" at Dounreay in Scotland. Expenditure on the fast reactor programme has accumulated to around £2.5 billion, but in spite of a long gestation period for the technology, Dounreay is reported to be at least 15 years from being a commercial proposition (New Scientist, 07-04-88:25).

In spite of the £billions needed to support a new generation of PWR plants and the government's publicly stated commitment to reducing public expenditure, there is little doubting the Thatcher government's enthusiasm for a "nuclear future". In December 1979, the Secretary of State for Energy announced that PWRs were essential for the country's future prosperity and security. As Armstrong (1987:86-87) points out,

'No one reading the Secretary of State's speech could be unsure of the strength of the commitment to nuclear power in general and, subject to licensing, the PWR in particular. Furthermore, both the scale of the programme announced ('at least one new nuclear power station a year in the decade from 1982') and the absence of any mention of how it might relate to other means of generating electricity strongly suggested that nuclear power had become synonymous with energy policy. No connections were made with the 1974 Plan for Coal, the then current feasibility studies on the Severn tidal barrage or, indeed, the British-designed ... AGR'.

The Department of Energy has consistently failed to explain the government's view on the future role of the coal industry and coal's position in the total energy mix. This reflects the lack of coherent long term planning in the energy sector, which is now worsened by the uncertainty over the future complexion of the ESI.

The government's preference for nuclear power instead of coal is a part of its strategy to reduce the NUM's political leverage over the country's power supplies, which was demonstrated in the 1972 and 1974 miners' strikes against the Heath government (see Beynon, 1985). The leaked Ridley Report of 1978 contained an outline of contingency measures in preparation for any future confrontation with the miners, including the building up of coal stocks, introducing dual oil-and-coal firing at power stations, and establishing a large, mobile police squad

to deal with pickets (Porter et.al., 1986:83-84). Leaked cabinet minutes shortly after the government took office in 1979 stated that,

'a nuclear programme would have an advantage of removing a substantial portion of electricity production from the dangers of industrial action by coal miners or transport workers' (TUISU, 1985:9).

Another advantage of the nuclear industry from the government's perspective is that it is highly capital intensive, employing comparatively few workers for the £billions invested in it, particularly compared to the deep mining industry (see Fothergill, 1986). The workforce is highly differentiated and fragmented and comprises mostly skilled white collar or technical workers represented by more compliant unions, such as the electricians' union (EETPU) and the engineers' union (AEU). In particular, the EETPU is recognised as the crusader for "new realism" within the labour movement, based on an explicit rejection of class-based industrial conflict in favour of what the Financial Times describes as "mutually beneficial cooperation" and "enlightened productivity deals" (16-02-87:13).

In any case, the very nature of nuclear technology and the way its plants are operated, plus the application of the Official Secrets Act, limits the scope for any worker dissention. Strict codes of conduct and disciplined working practices are followed ostensibly for safety reasons, but "ensure that dissenting opinions are kept within the organisation" (Sweet, 1985:212). Such secrecy at all levels of the nuclear establishment may have much to do with the links between nuclear power and nuclear weapons, although a major problem for researchers is "showing the extent of the marriage" (Blowers and Pepper, 1987:33).

4.9 The language of the market place and financial controls on the coal industry

The brief discussion above concerned the government's paradoxical application of market forces in the energy sector except for nuclear power, and the way in which other economic policies and ideological commitments that have little to do with energy planning, such as privatisation, have in fact greatly altered the parameters within which energy decisions are made. It is important to be aware of these wider political and economic constraints for they have directly affected internal decisions within each of the nationalised energy and energy-using industries. Simultaneously, the government has deliberately imposed tighter financial disciplines on the coal industry.

The government's objectives for the NCB were explicitly stated in the 1983 Coal Industry Act. The main ones were as follows:

- (1) Although coal is one of the UK's major natural resources, in the Government's view the justification for coal production, like that for any other business (author's emphasis), lies in the ability of those engaged in it to earn a satisfactory return on capital while competing in the market place. The basic objective for the NCB, therefore, must be to earn a satisfactory return on its assets in real terms, after payments of social grants.
- (2) The NCB should aim to maximise its long-term profitability by securing those sales which are profitable on a continuing basis, in competition with other fuels. It should plan its marketing,

production and capital investment accordingly and bring productive capacity into line with its continuing share of the market.

- (3) The Board's objective should be to ensure that over the following five years its operating costs, including depreciation and capital charges, but excluding interest, per tonne of deep-mined coal produced, are reduced in real terms for deep mined and open cast production separately.

The purpose in outlining these objectives is to highlight a fundamental change in the role of nationalisation with regard to coal production. The government emphasized the fact that the industry should behave like any private business. Whilst the need to maximise long-term profitability was mentioned, the government expected the industry to reduce its operating costs. Following the 1984/5 coal dispute, the government introduced a financial break even target for the whole of the corporation's business operations. It also imposed tighter external financial limits (EFLs) on the NCB. Through direct intervention in Coal Board finances the government was attempting to impose "business discipline" on the corporation's thinking. It was also making an arbitrary financial break even deadline the top priority for management. To a large extent it succeeded, as the corporation's Financial Director, Michael Butler, stated

'British Coal consider that in the longer term (i.e. after 1989), it is essential to improve on break even and to achieve a progressive ability to finance capital expenditure from their own internal resources (Colliery Guardian Supplement, January 1987:14).

In an effort to meet the financial targets set by the government and based not on the massive capital expenditure programme initiated in 1974 by the Plan for Coal, the Coal Board have been forced to close many pits purely on the basis of short term cost criteria. Short-term financial goals and accounting methods have affected decision-making parameters and have provided a "vocabulary of motive" for further capacity cuts (see Cooper et.al., 1986). The externally determined financial controls on the industry have influenced management definitions of what is "economic" and what is "uneconomic" capacity within the industry. As O'Donnell (1987:62) argued, it is logical to view pit closures as British Coal management's

'best way of reconciling the often conflicting external constraints placed on the industry by government'.

Precisely how financial controls have resulted in pit closures can only be understood in relation to the accounting practices of the Coal Board (BC) and its criteria for determining pit level performance (see Berry et.al., 1985 and 1986). Pits have increasingly been judged on their individual merit and treated as business centres rather than production units. This sort of decentralisation may make it easier to ultimately privatise parts of the industry, but in the short-term it has led to many pit closures on the basis of pit level performance criteria. As Berry et.al. (1986) suggests, this may be a misguided practice, for pits (like the energy sector as a whole) are interdependent and it can be

'seriously misleading to use the "bottom line" (whether it be cost per tonne or net profit or loss) to explain or otherwise justify a decision taken either to invest in (or close) a pit'.

The creation of multi-colliery complexes around single coal preparation plants has increased pit interdependencies rather than decreased them. The closure of one pit in a particular area affects the cost structure and viability of all the other pits and of the preparation plant itself. Furthermore, taking a short-term view, say end-of-financial-year results, can be highly misleading owing to the long lead times involved in colliery development and complex geological and technical problems.

Nevertheless, British Coal have adopted short term cost per tonne measures as a basis for deciding how much and where to invest. Some of their aims and performance measures were outlined in a five year Business Plan introduced shortly after the 1984/5 coal dispute without consultation with the NUM. These were,

- (1) Concentration of production at low cost collieries and from coal reserves with the potential for low cost output. Pit performance was to be judged against the operating cost measure of £1.65 per Gigajoule (Gj - the measure of the energy content of coal). Only at pits producing at less than £1.65 per Gj would investment in them be considered viable. In the longer term, £1.50 per Gj (i.e. about £35.50 per tonne) became a standard measure of efficiency.
- (2) Concentration of operations at the "best reserves", i.e. seams that are relatively unfaulted and offer the best prospects of high productivity utilizing the latest heavy-duty mining technology.
- (3) Continued investment in "super pit" developments, such as Selby, and Asfordby in Leicestershire.

The following chapter will discuss the implications of short term performance criteria and tight financial controls on the technological decisions made by BC, and on changes in the labour process. The important point is that the internal relations of production and reorganisation at the point of production can not be understood without constant reference to external constraints, whether they be changes in market conditions or deliberate measures of the government.

Finally, it is necessary to point out "the productivity trap" British Coal has got itself into mainly as a result of the financial constraints on it. In 1981/2, 141 collieries out of a total of 198 made a financial loss, although around 90 per cent of the NCB's total loss were accounted for by only 30 pits. Since 1981/2 some 106 collieries have closed (see Table 4:3). As Sir Robert Haslam, BC's Chairman has described it, this is a degree of restructuring "without parallel in recent times in any other British industry" (BC, 1987/88:1). Both the government and senior British Coal managers have described many of the pit closures as necessary in order to improve "the market fitness" of the industry through the elimination of uneconomic capacity. The problem is that the pressures of attempting financial break even with no equity capital and huge interest charges at high rates of interest, plus the demands "more competitive prices" from the electricity boards, mean that no matter how many pits are closed for "economic" reasons BC's "high cost tail" will remain.

An important aspect of the cost structure of the industry has so far been ignored, and this is the cost to coalfield communities of pit closures. There have been a number of very important studies of the social costs of colliery closures in specific localities (see WERU,

1985; Hudson, Peck and Sadler, 1984). As Rees (1986:333) points out, unless the state "intervenes to preserve existing employment in the coal industry or to ensure the creation of alternative jobs" further closures would only serve to increase unemployment in coalfields with all the adverse "secondary effects" that entails. Certainly there is a need for the state and British Coal to bear greater responsibility for the wider social costs associated with pit closures, and for some allowance of these to be included in public accounting procedures which form the basis of management decisions (Hudson & Sadler, 1987).

The purpose of this chapter has been to highlight the role, and indeed the responsibility, of the state in the long run contraction of the coal industry since nationalisation. In the context of this thesis, the analysis is necessary to understand both changes in the mining labour process (and internal relations of production) and changes in the industry's relations with its engineering suppliers. These are the issues concerning the following chapters.

FOOTNOTES AND REFERENCES

- (1) North Sea production is, of course, carried out by private oil companies, but within the legal and fiscal framework laid down by the British state. The government controls the issue of licences, decides on the allocation of areas for exploration and production, lays down the tax regime, and influences the marketing arrangements.

- (2) BC has spent approximately £70 million on the Longannet complex which is served by a 4,000 tonne capacity exchange bunker to the local power station. Before the arguments over prices BC had reckoned on supplying some 3.9 million tonnes from all the Scottish pits to the SSEB, including 1.5 mt a year to Cockenzie power station until 1992, and 2 mt to Longannet until 1995, with the rest going to the small Kincardine power station on the Firth of Forth. The SSEB started to import small shipments of 25,000 tonnes for Kincardine, and has subsequently invited big energy groups to tender for a maximum of 500,000 tonnes each of import contracts.

TABLE 4:1

NCB Basic Statistics, 1947-80

	Collieries Open (1)	Output million tons (2)	Deep mined output	Inland consumption million tons	Export million tons	Stocks million tons	Employment '000 men (3)	Output per manshift (cwt.)
1947	958	197	186	185	5	18	704	21.5
1951	896	222	209	208	11	18	693	24.5
1955	850	222	211	215	14	20	699	24.7
1959	737	206	193	189	4	50	658	26.9
1963	611	198	189	193	5	32	544	31.7
1967	438	173	165	170	3	35	419	36.6
1971	292	142	133	148	3	20	287	44.1
1974 (4)	259	105	97	129		18	252	42.3
1975	246	125	115	N.A.	N.A.	N.A.	246	45.0
1980	219	123	109	128	5	38	230	47.0

1. Year end (Dec. or March)

2. Inc. open cast AV 1947-59 p.a. 11 m tons 1960-74 8 m tons

3. Average through year

4. Output, consumption and productivity depressed by coal strike and overtime ban

N.A. Not available

Source : NCB Annual Report's

TABLE 4:2

Capital Structure of the Coal Board, £ million^a

	1974-76	1977-79	1980-82	1983-86
Loans outstanding ^b	547	1,233	2,674	4,033
Interest payments ^b	39	101	320	475

Notes: a 1987 prices
b annual average

Source : NCB Reports and Accounts, 1974-86

Taken from : O'Donnell (1987)

TABLE 4:3

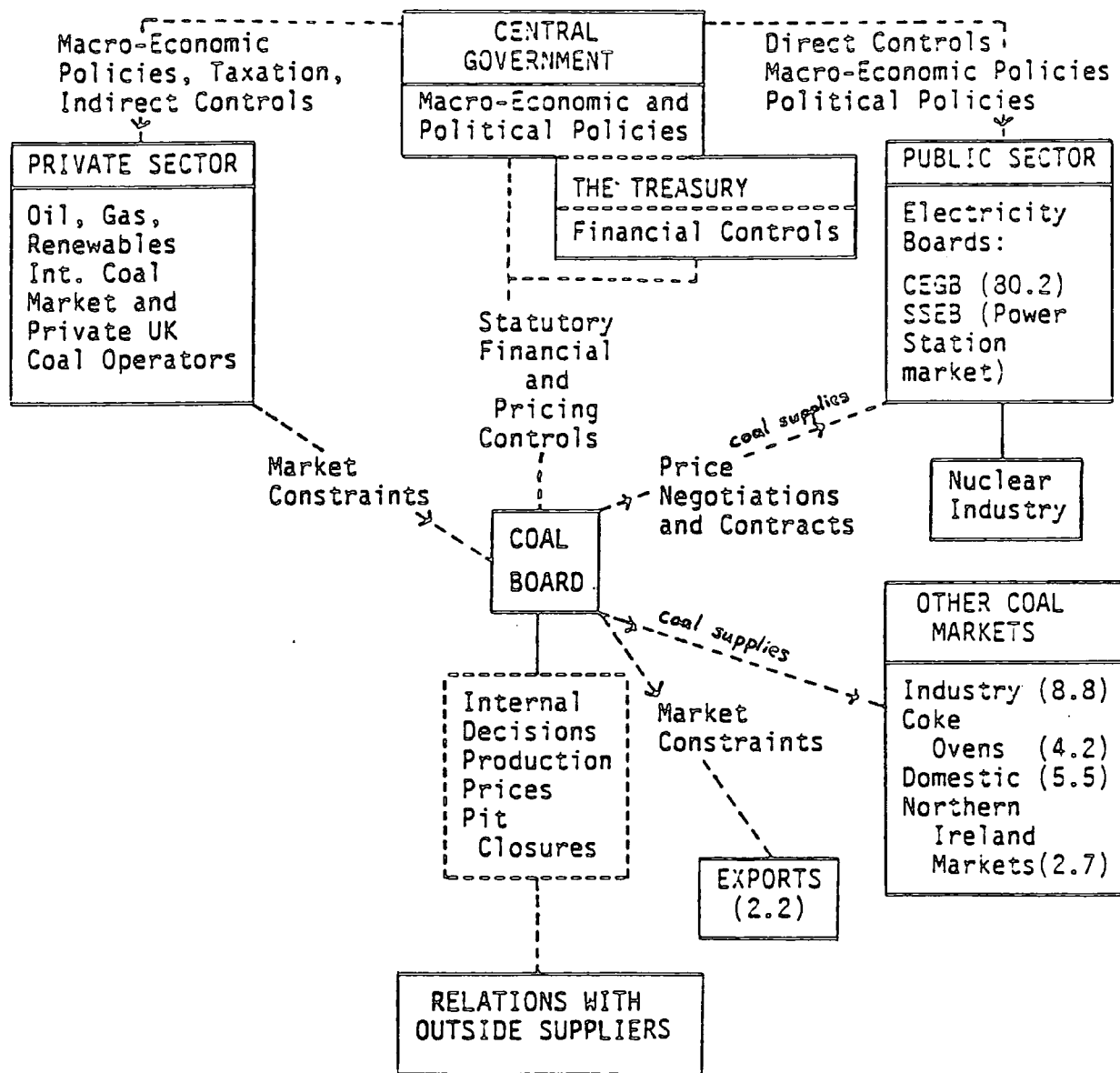
Total Annual Number of Collieries and Colliery Employees,
1979/80 - 1987/8

	1979/80	1980/1	1981/2	1982/3	1983/4	1984/5	1985/6	1986/7	1987/8
Number of Collieries at year end	219	211	200	191	170	169	133	110	94
Employees on Colliery books ('000)	232.5	229.8	218.5	207.6	191.5	175.4	154.6	125.4	104.4

Source : British Coal
Report and Accounts 1987/8

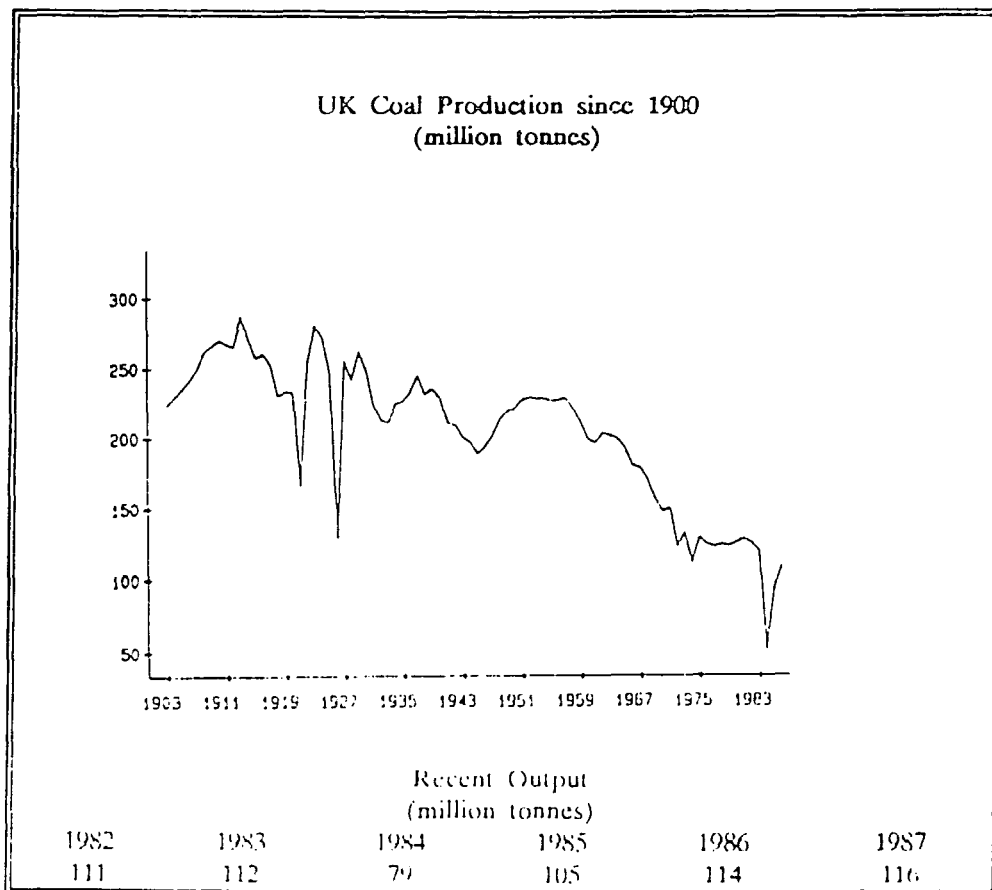
FIGURE 4:1

Some of the external constraints operating on the coal industry



Note : Figures in brackets British Coal sales
(million tonnes) 1987/8

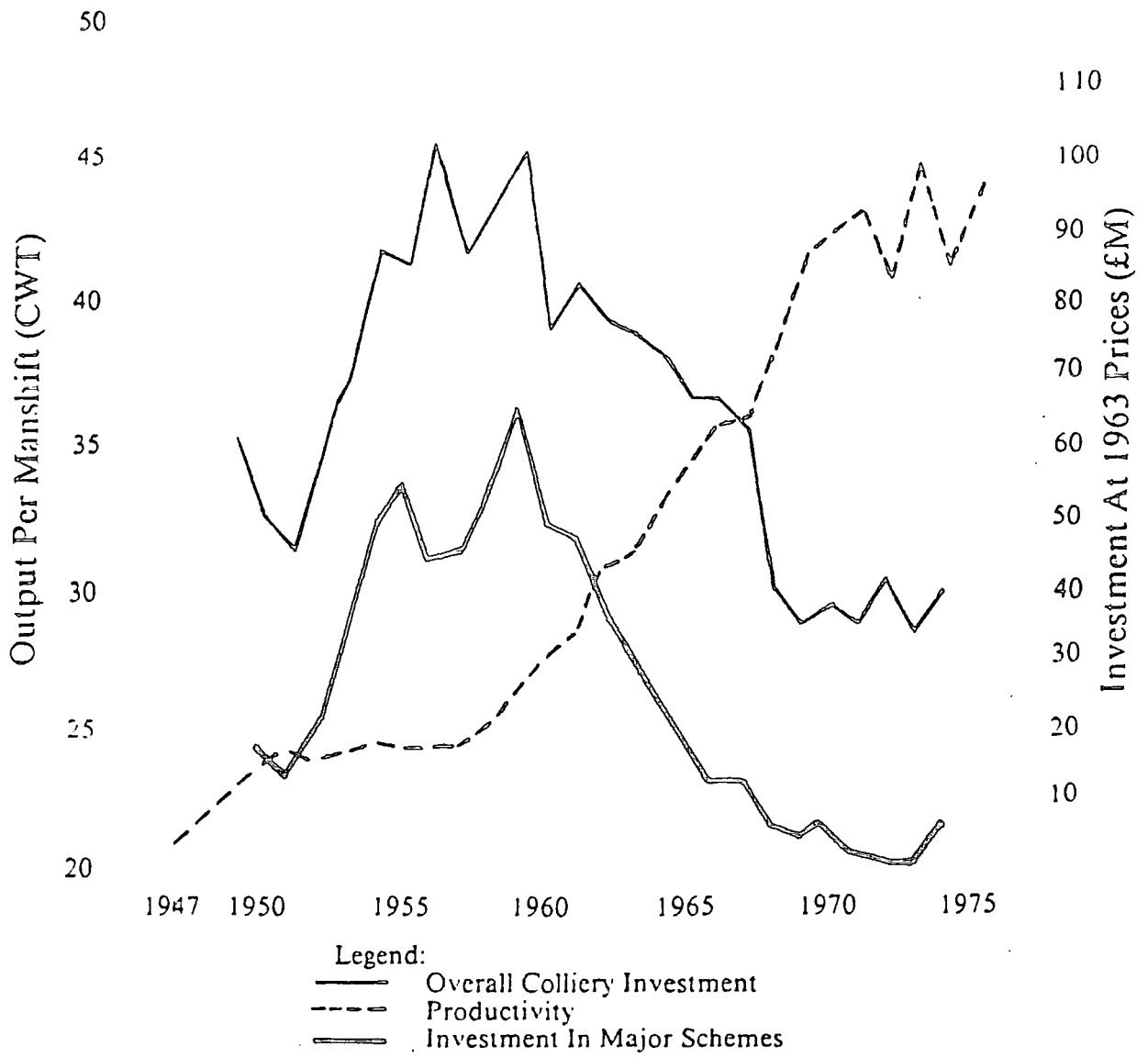
FIGURE 4:2



Source : The Institute for Fiscal Studies (1988)

Note : Sharp downturns are for miners' strikes, 1921, 1926,
1972, 1974 + 1983/4

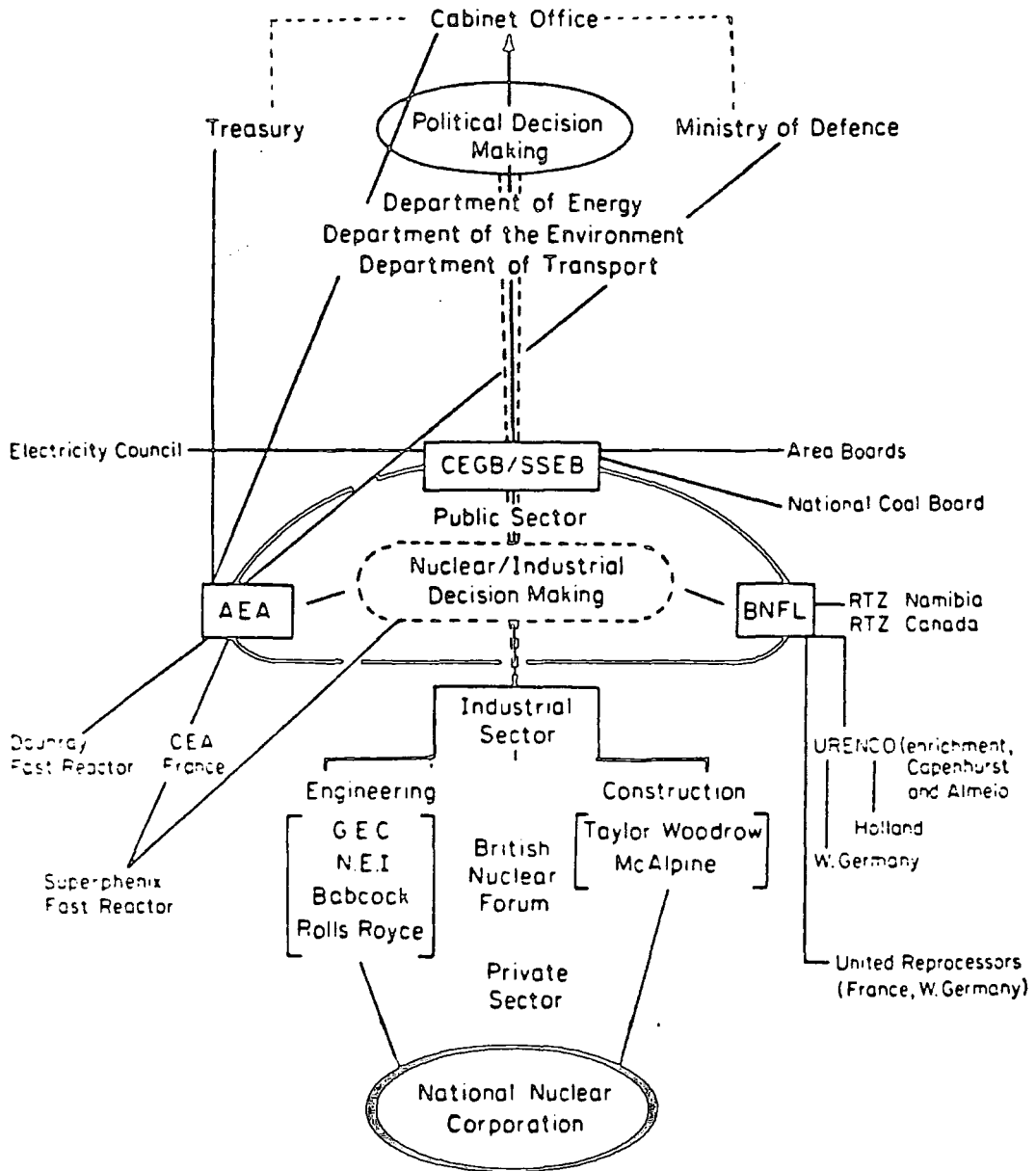
FIGURE 4:3
Productivity 1947-1975 Investment (£ M)



Sources: National Institute Economic Review, 1960, 64, 72 & 75
NCB Annual Report 1974/75

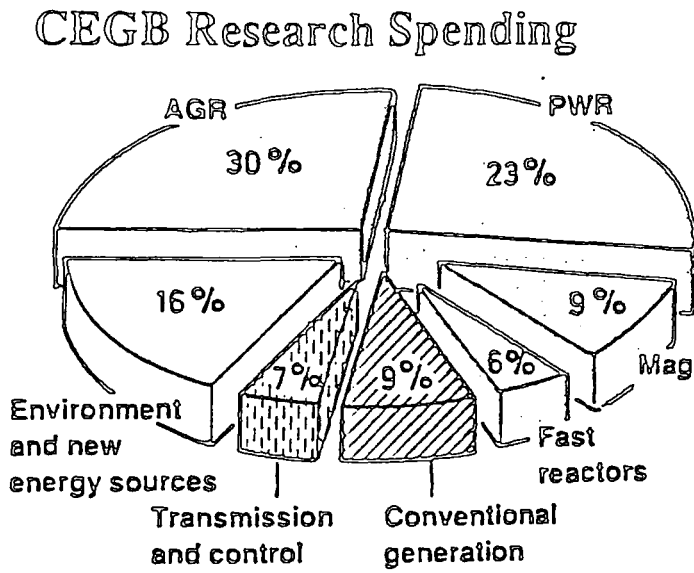
FIGURE 4:4

The nuclear-industrial complex



Source : Sweet (1983:27)

FIGURE 4:5



Source : CEGB Annual Report 1986/7 and
New Scientist 3 March 1988

CHAPTER FIVE

STATE OWNERSHIP, EXTERNAL AND INTERNAL RELATIONS OF PRODUCTION, AND THE CHANGING GEOGRAPHY OF DEEP COAL MINING IN THE UK

'Old MacGregor had a plan
Hee I, hee I, ho.
Under this plan pits would go
Hee I, hee I, ho.
With a boo, boo here
And a boo, boo there
Here boo, there boo, everywhere a boo, boo?'

A different version of "Old MacGregor..." by Dean Selway, 11, of Wales, written at the time of the 1984/5 miners' strike. This version is a protest against the Corporation's plans for pit closures under Ian MacGregor, who was then Coal Board Chairman. Published in Striking Miners' Children, 1985, More Valuable than Gold Blackrose Press: London.

This chapter has several aims. In the first place it seeks to examine how nationalisation altered both external and internal relations of production. Did it bring about radical changes in the capitalist mode of production? Did state ownership alter the way in which capital investment and expenditure decisions were made within the industry? What role has the state played in influencing restructuring processes, particularly technical change, within the industry? In turn, such questions require a basic understanding of power relations in the coal industry. Who makes the important capital investment decisions and why?

Section 5.1 examines some of the major changes in capital and labour relations in the mining industry brought about by state ownership. It does so mostly through a broad analysis of technical

change since 1947. The analysis concentrates on the major periods of nationalisation in the industry since the late 1950s. It examines the role of technical change in employment change, job losses and pit closures, and in turn, upon the changing geography of coal production. An important argument throughout is that there can be no understanding of the economic, social and spatial restructuring within the coal industry without reference to wider social and political relations and mechanisms. The analysis points to a number of similarities between the organisation of and objectives underlying the production process in a state capitalist enterprise and private enterprises. The main difference is that the state exerts more direct control over the finances and pricing structures of the former, which in turn influences the technological choices, decision-making criteria and direction of change taken by the nationalised industry.

Section 5.2 briefly examines how the process of preparing for privatisation has influenced management attitudes and decisions, and is affecting the structure of ownership and control within the deep mining industry. In particular it examines the significance of changing working practices, the introduction of US mining methods into British Coal mines, and the growth of sub-contracting for mine work.

Section 5.3 then turns to the changing relations between state capital and private capital in the mining industry. Mining suppliers have played a crucial role in the whole technical change process by making the capital goods for the mining production process. Hitherto, most analyses of the mining labour process have ignored the suppliers completely. The transformation of British Coal mining from a labour-intensive into a capital-intensive industry has been one of the

major influences upon the development of the UK mining engineering industry. But the story is not simply one of growth and harmonious relations. The major periods of nationalisation and technical change in the coal industry have produced numerous changes in the industrial structure of the supply industry. The Coal Board has played a central role in shaping the size and product market structure of its UK engineering suppliers. This section focusses on the main historical phases in public-private sector relations since nationalisation, and Chapter Six examines developments in the 'eighties.

Finally, section 5.4 is a speculative examination of possible alternative concepts of and attitudes towards ^{the} technical-cum-organisational changes in the UK mining industry. It reassesses some of the primary objectives underlying the production reorganisations and capacity cuts in the UK coal industry. In so doing, further questions are raised about the need for privatisation and about the nature of nationalisation in Britain.

5.1 What about the workers? State ownership and the mining labour process

The state has played a pivotal role in changes that have and are taking place within the British mining industry. The policies and constraints imposed by the state on the coal industry have fundamentally affected relations between the nationalised industry and private capital (see Section 5.3). But before analysing how and why relations between public and private capital have changed it is useful to consider how state ownership altered capital-labour relations within

the industry, ie internal relations of production. An understanding of underlying social processes is necessary for an analysis of the reasons for and the ways in which major production and investment decisions have been made and implemented in the mining industry.

The whole edifice of nationalisation was based upon notions of cooperation between capital and labour in the economy as a whole for the ambiguous purpose of raising national competitiveness. State ownership was an essential element of post war consensus politics. Consensus between the state, management and labour organisations was to be the formula for both raising productivity and for maintaining harmonious industrial relations and the wider economy. The coal industry was a central testing ground for the new consensus as the first industry to be nationalised by the Attlee government and one with a history of bitter industrial strife.

Whilst it is true that the Labour Party could claim to have formally acceded to working class demands for public ownership, in actuality the substance of those demands were never fulfilled. It is true that there were material benefits of nationalisation that would not have come so quickly, if at all, had the coal industry been left under private ownership. Mine workers won improved wages, longer holidays, better welfare and pension schemes, pit head baths, canteens on site. Against these gains is the fact that state ownership did not result in any fundamental shift in power relations between "the managers" and "the managed". Any form of genuine workers' control was never seriously on Labour's political agenda. Rather than transform the capitalist mode of production by handing over control to the workers, the architects of British nationalisation sought to adopt

existing capitalist control mechanisms to raise productive efficiency within the industries concerned. Although the nationalised industries were distinct from private firms by "the absence of profitability as a direct mechanism of control", other "quasi-competitive" restraints were placed on the industry, such as the need to earn a satisfactory return on capital over a period of years, and more recently to achieve financial break even by a set date.

Herbert Morrison clearly intended the public corporations to,

'make possible organisation of a more efficient industry, rendering more public service, and because of its efficiency and increased productivity enabled to do progressively better for its workers' (quoted in Dahl, 1947:899).

Nationalisation transferred the locus of responsibility away from the coal barons to the state, but it did not lead to any great changes in the way work was organised and managed. There was no radical restructuring of the organisation of work to allow producers a say in the day-to-day decision making processes, let alone in the long term planning of the industry. In fact, the National Coal Board adopted a top-down hierarchical administrative structure incorporating many of the traditional distinctions between managerial responsibilities and prerogatives on the one hand, and trade union functions and workers' tasks on the other.

Many of the state appointed bosses at colliery level were precisely the same "old faces" who had been in command under private ownership. People were appointed in managerial positions on the basis of 'proven leadership qualities', and they included numerous mining

engineers and people with previous business or administrative experience, particularly at area and colliery levels. The NUM continued to negotiate with the employers on wages, hours, conditions, health and safety, but was remote from the key decisions shaping the direction and future of the industry. Capital investment, production planning, where to invest, which pits to close, resource allocation, sales and marketing, were all management functions just as in private businesses.

In place of workers' control the workers got conciliation and consultation. At area and pit levels local management-union committees became "wrangling grounds about reasons for lost output" (Hall, 1981:104). These committees became preoccupied with production targets, output per manshift (OMS), absenteeism and labour turnover. They acted as a channel of communication from the managers to the pit, but rarely were miners consulted before an important decision was made. As one South Yorkshire Area Director put it, the problem with consultation from the management perspective was that

'many members of the committees did not fully realise that they had no executive powers' (The Mining Engineer, December 1986:388).

The elaborate consultative network set up by the NCB, with its plethora of committees, became a one-sided communication channel. Management received information which helped in formulating decisions, but the local union representatives on the committees had no real power.

Technical change and control over the labour process

The concept of control is important when examining the technical transformation of the British deep mining industry from its 'pick and shovel' days into one of the most highly mechanised and automated mining industries in the world. It is very easy to view the technical changes in the mines of Britain as a unilinear technological progression that has been necessary for the industry's economic survival. Many of the senior decision-makers in British Coal would probably support this uncritical view of technical change. Viewed at from the perspective of the majority of miners, their families and communities, and the places where they live, there is much to criticize in the way technology has been used and the industry restructured since the late 1950s.

Before examining some of the ways in which technology was and is being used it is useful to consider some of the basic features of technical change in the nationalised coal industry. Firstly, the parameters within which the capital investment decisions take place are set by macroeconomic and market constraints; energy policies; and the operational, financial and pricing controls imposed upon the industry by the state (see Chapter Four, Section 4.9). Any change in the objectives governing the design, development and application of mining technologies can only be effective if they are sanctioned by the state, and if appropriate national policies are applied by the government.

Secondly, technical change is a complex, interactive process involving numerous vested interests, groups and individuals. In the UK coal mining industry these include senior Board personnel, management,

scientists, engineers, designers, craftspeople, various trade unions and mineworkers. Mining machinery manufacturers should also be included, for they have played a considerable role in the technical changes affecting the industry. It is necessary to reiterate the fact that fundamental to the understanding of technical change in the nationalised industry is the fundamental division between capital and labour. State owned industries did little to alter the capitalist mode of production, rather they adopted it for the purposes of raising output and productivity. In this respect the nationalised industries differ little from their private counterparts. As Allen (1981:103) observed, the Coal Board became preoccupied with the variable costs of production, particularly labour and in ways to increase productivity, output per manshift (OMS), and reduce production costs, especially labour costs. In other words, the NCB sought to extract a greater surplus value from the workers in "the public interest". In addition, state owned industries also took on the limitations of large rule-bound, bureaucratic structures, which as Krieger (1984:26) suggests, involves:

'a relationship of domination and chronic struggle, ... a "dialectic of control", a fluid struggle for control between administration and the administered'.

However, within the Coal Board management hierarchy there were certainly divisions between different levels of management, as well as between central, district, area and colliery managers. Similarly divisions existed between moderates and militants within unions, between different coalfield communities, and between unions. As Krieger (1984:26) noted, power relations are complicated by intra- as

well as inter-class struggles, and in the coal industry by the "regionally specific, locally differentiated and experienced fragments" which militate against a "unified national enterprise".

Thirdly, as with private capital one of the principal motivating forces for new innovations and the adoption of new technology was to increase productivity. Nevertheless, state ownership did alter attitudes towards capital investments. Under private ownership the coal barons and coal combines based their investments and production policies on short-term profits and dividends from shareholders. Under state ownership the NCB was able to take a longer term view than the private owners provided state support was given, although quasi-competitive constraints were placed upon the industry. The major constraints acting upon the NCB's capital investment plans and forecasts were the wider macroeconomic, market and fuel policies of the state. Changes in international fuel prices, particularly of oil, gas and coal, could literally reverse the Coal Board's entire investment strategy. So too could political and financial pressure on the industry from the government of the day.

Fourthly, for any nationalised industry the politics of the state are inextricably linked with the politics of production. If anything this is especially so in the 1980s as the public sector industries are being prepared for privatisation. In the coal industry this has meant a deepening of inter- and intra-class rivalries and tensions, and a direct use of financial and economic controls upon the industry for ideological purposes (see Section 5.2). Technology has been a means to political ends in the coal industry, although the technical change process is often explained in terms of economic rationality, for

instance, as a means to raise productivity and efficiency. It is important to be clear about definitions and perspectives when discussing technical change, for as Wilkinson (1983) observed:

'Economic rationales can serve to conceal the political processes and social choices that lie behind innovative efforts and the manner in which new technology is introduced'.

British Coal (formerly the NCB) has justified many of its actions as necessary elements in the drive to improve competitiveness and economic efficiency. As noted in Chapter three, the term "efficiency" is open to many interpretations which are often coloured by the political perspectives of the interpreter. Higher productivity is often used as a measure of efficiency. Time and time again new technology is said to be necessary in order to raise productivity levels, to compete and to survive in a competitive industrial environment or market, but as in the coal industry, the same technology may also be used to centralise and strengthen managerial control over production processes and/or to wrest control from the shop floor or pit.

'In sum, arguments about "efficiency" can be used as a legitimating device for politically informed decisions on the technical and social organisation of work' (Wilkinson, 1985:448).

a. Mechanisation - the politics of production and the geography of change

Technical change in the coal industry has had fundamental consequences both for the internal organisation of production and the

mining labour process, and for the spatial organisation of production. But technical change should not be viewed as an isolated process for it is one of several restructuring processes affecting the organisation of work and employment. In their analysis of the geography of job loss, Massey and Meegan (1982) identified three distinct forms of production reorganisation - work intensification; rationalization; and investment and technical change. Job loss is only inevitable with rationalization, i.e. disinvestment and cutbacks in capacity. As they stress:

'Neither intensification nor technical change in themselves involve closure of capacity or cutbacks in production. Both of them, by lowering costs, by increasing labour productivity and, for technical change, by changing the product are simply means of increasing or maintaining competitiveness, of carrying on accumulating' (Massey and Meegan, 1985:124).

In the coal mining industry all three forms of production reorganisation have led to job losses. The aim here is to concentrate on technical change, although it should be stressed that within any industry, particularly within a big multi-site operation like the nationalised coal industry, there will be two or more restructuring processes occurring simultaneously. The crucial point to remember is that a nationalised industry is no different from a private capitalist one in that "the geography of ... job loss is related to the requirements of production for profit" (Massey and Meegan, 1985:125). In a state capitalist enterprise like the NCB the process of production for profit is obscured by wider economic and political goals and the financial controls of the state. Even so, it is clear from a study of the coal industry that the basic objectives underlying the organisation

of production were related to the need to increase industrial competitiveness in the market place by reducing costs and increasing productivity as in private industries, and due to political concerns (see below).

Nationalisation did not lead to new ways of organising production so that employment in disadvantaged regions or localities would be maintained. In practice, the Coal Board has introduced many measures that have proved economically and socially destructive to many localities, and they have contributed to socio-economic inequalities between different parts of the UK. This is well illustrated by the uneven capital investment strategies of the Board since the late 1950s. As Burns et al (1985:104) notes:

'The first major structural change in the nationalised industry came with the competition from cheap oil after Suez. Slum clearance, the 1956 Clean Air Act, the move to diesel and electric rail traction, the contraction of the steel industry, and the increased thermal efficiency of steam raising plant all contributed to the collapse of coal demand between 1958 and 1970. The shearer loader and longwall working were developed in order to reduce the price of coal relative to oil. The technical choice of the shearer loader as the main piece of coal-getting machinery meant that even at that stage the coalfields of Wales and Scotland were put at risk, because the shearer is best suited to the conditions of the Nottinghamshire and Yorkshire'.

The Coal Board attempted to make mines as much like factories as their often unpredictable environments would allow. A number of innovations - armoured face conveyors in the early 1950s; the Anderton Shearer Loader during the 1950s; and powered roof supports during the late 1950s-early 1960s, plus the introduction of better tunnelling

machines; tracked roadheaders; and electro-rail haulage, meant that rapid strides in the mechanisation of collieries could be made. These innovations also meant that previously separate functions - cutting, ripping, and filling - were integrated (see Chapter Two). The shearer incorporated a drum with cutting bits which rotated along the longwall face shearing coal from the seam. Coal hewn from the seam fell into the armoured conveyor belt and was transported away from the face. The introduction of "self advancing" roof supports cut the hard physical effort involved in the manual haulage of conventional wooden or steel props.

Figure 5.1 indicates the rapid adoption of mechanised mining methods from the mid-1950s, which reached a peak at the end of the 'sixties. By the mid-1960s production on mechanised faces was some 76 per cent higher than on non-mechanised faces (see Kelly, 1969). In 1969, some 92 per cent of all output was produced by power-loaders and 74 per cent of coal faces were using powered roof supports (see Townsend, 1980). The results in terms of productivity increases at the coal face and output per manshift (OMS) were impressive, although elsewhere below ground productivity rises were less (see Townsend, 1976). Figure 5.2 shows some of the major changes reflecting the triple impact of closures of uneconomic pits, increasing mechanisation, and concentration on high-producing faces (Townsend, 1980:145). The average number of mechanised faces per colliery dropped from 5.2 in 1960 to 3.4 in 1971, while OMS increased from 28.9 cwt in 1960/1 to 46.0 cwt in 1974/5.

The displacement of manual and partially mechanised methods came in a piecemeal fashion. The enormous diversity of coal face

conditions, seam thicknesses, geology, the friability of coal, faulting, presence of water, all made mechanisation easier in some places than others. The crucial point is that for the NCB's mechanisation strategy, combined with its pit closures, meant that capital investment in mines was very selective. The Coal Board could have adopted a different investment approach based on technology designed for a variety of pit conditions (see Section 5.4). Mining suppliers were capable of producing equipment for different mine conditions. But the NCB centralised its research and development facilities and developed longwall machinery best suited to collieries in the central coalfields. Townsend (1976:21) summed up the NCB's economic objectives behind this investment strategy:

'... the full range of machinery to those faces on which potential output, geological conditions and pit organisation indicated that a high level of machine output per manshift could be obtained with the minimum interference from natural or unexpected causes'.

The concentration of capital investment and output condemned many pits excluded from the NCB's mechanisation plans to an early death in the absence of markets for their coal. From 1963 onwards the NCB designated certain collieries and "spearhead faces" to use for practical demonstrations of what was technically feasible using modern machine mining methods. Many pits in Scotland, northern England and South Wales were closed in spite of being in receipt of considerable investment during the 1950s. Some of the "losing" pits were in the West Durham coalfield, which was all but destroyed in the 'sixties. According to the NCB's own estimates only 127 million tons of the available 592 m.t. under that part of the county was extracted by 1962.

The closure of West Durham pits meant that some 400 m.t. of coal were sterilized by the NCB (Durham NUM, 1987).

In 1967 the "50 pit scheme" was launched.

'The plan was to increase their combined output from 35 million to 60 million tons a year. The pits were chosen because of their potential, which meant not only their physical reserves, but also the quality and cooperativeness of the manpower. This was essential because we would need to pour a lot of capital into them' (author's emphasis) (Robens, 1972:103).

This quotation is revealing because it shows that economic and technical criteria were not the only ones influencing the capital investment decisions of the Board. There was a clear "political" content, for some pits were chosen for investment if they were considered to have "moderate" or "cooperative" workers and local union representatives. Nonetheless, it was not until after the national miners' strikes of 1972 and 1974 that politics became a major element in the technical choices of the NCB.

The major consequences of new technology for miners who were either transferred to or worked within mechanized pits were in pit organisation and working practices. Machines were helping to change power relations within the industry, and initially at least, not entirely in ways beneficial to the state or senior NCB managers. Mechanized mining linked together formerly separate tasks at the coal-face. Power loading reduced the extreme division of labour associated with the old three shift system, and manual hand-filling was virtually eliminated. According to Burns et al (1983:12):

'Guiding a shearer along the face, keeping it out of the roof and floor dirt, and maintaining an even cut requires considerable skill. Powerloading changed the skills associated with face work but the machine incorporated none of the miners' knowledge. Machine skills, increased productive power, and more unified face teams increase the miners' control under power loading'.

Miners still retained a large degree of control over the production process and mastery over the new machinery which was becoming the main regulator of productivity, rather than worker effort.

'Machine running time was, year by year, replacing worker effort as the determinant of the pace of productivity. Wage drift through anarchic procedures of spot bargaining was increasingly incompatible with the technological character of the industry, destructive of EMS/OMS efficiency (the earnings to output per manshift ratio), and at odds with the centralizing mandate of management of a state-owned industry' (Krieger, 1984:79).

Mine mechanisation thus encouraged the NCB-NUM to introduce the national day wage structure with the National Power Loading Agreement (NPLA). Before the NPLA there was little chance of either national restraint or of coordinated and concerted action between NUM members in different parts of the UK and in different pits. National wage bargaining was a dominant factor in writing the union, and so in giving it greater political strength. An important strand of the NCB's investment plans after the 1974 Plan for Coal was the deliberate attempt to reduce the political unity and power of the NUM.

b. Automation Phase - Political Choices and Technical Decisions

The 1974 "Plan" marked a turning point in the post-war history of the British mining industry. As in the early 1950s the government sought to raise total coal output, only this time it was to reduce the UK's reliance on imported oil, which was largely the legacy of previous governments' efforts to produce a multi-fuel economy too quickly and to increase national competitiveness by capitalising on cheap oil supplies. Thus, the NCB was given financial resources to expand production. As one part of its corporate strategy the NCB sought to add 42 million tonnes of new capacity in a market for coal expected to be around 135 mt by 1985. The mining complex at Selby was part of the NCB's plans and by the mid-eighties the Selby complex had received around £1.4 billion of Coal Board investment. The Coal Board had also decided that it had advanced almost as far as it wanted to go with mechanical innovations, and that the next major steps could be made in machine automation. The introduction of microelectronics into industry during the 'seventies enabled the NCB to increase its research and development resources allocated to "remote control" mining. All these developments had enormous economic, social and spatial implications on the industry, especially during the 'eighties.

The main technological and organisational changes since the mid-1970s were determined by small technocratic and managerial elites headed by influential members of the Board. Burns et al (1985:94) describe the functions of a Central Planning Unit (CPU) in the NCB, which was established alongside the Board's Operational Research Executive (ORE):

'The main function of the CPU has been to determine a 20 year strategic plan for coal, based on the question "where can we invest in new capacity".'

The CPU used concepts of systems engineering and constructed models giving cost versus tonnage data for pits, regions or areas, although "political considerations" also played a part. The CPU effectively determined criteria for shaping the nature and pattern of technical change associated with the Board's preferred system of automation - the Mine Operating System (MINOS). The various subsystems of MINOS, their applications and consequences for labour are well documented elsewhere (see Burns et al, 1983 and 1985; Winterton, 1985 a and b; Feickert, 1979). The objectives underlying the implementation can be summarized as the increasing of labour and capital productivity and increasing the flow of information to management.

Three of the perceived constraints to raising productivity were: (1) the need to improve coal clearance systems and elsewhere below ground productivity; (2) the need to improve machine running time; (3) the need to break the militancy and political influence of the NUM. To some extent technology could be designed and implemented in ways to achieve all three objectives. With regard to the political objective, there is evidence to suggest that the NCB were influenced by the ideas of Wilfred Miron, Chairman of the East Midlands NCB and Board member. These ideas were expressed in a private correspondence to NCB chairman Derek Ezra, which was eventually leaked to the NUM (see Appendices). Miron had been involved in the NCB's experiments in the first remotely operated longwall faces (ROLFs) at Ormonde and Newstead collieries in the East Midlands in the 'sixties. He suggested a number of lessons had been learnt in those early trials that could be applied in the

1970s and 1980s. He recommended a whole package of measures which could be implemented in ways to neutralize the influence of militants within the NUM and the total power of the NUM itself. A number of these were and are being tried by the Coal Board, including ways of using mining technology and automation to minimize the number of miners in the industry as well as the proportion of employees in non-coal mining trade unions. Miron recommended the reintroduction of decentralized pay bargaining and productivity agreements as a way of breaking the miners' material basis for national unity enshrined in the NPLA. The Coal Board were aided by the Area Incentive Scheme of 1978, which has paved the way for a further decentralisation of pay negotiations and wider earnings differentials in the 'eighties.

During the 'eighties, particularly since the 1984/5 miners' strike, the so-called "Miron Factor" has become more prominent in the Coal Board's plans (see Feickert, 1987). It is difficult to summarize all the separate strands of the Board's plans, but some attempt at this is made in Tables 5.1 and 5.2, which are drawn from articles that have appeared in The Mining Engineer. One of the "prophets" of the Coal Board is Moses who outlined the Board's "new approach" in 1986:

'... it is clear that to survive the industry needs urgently to reduce costs by eliminating grossly uneconomic capacity, maximising low cost coal production and fully exploiting and utilising its capital assets' (The Mining Engineer, September 1986:185).

Probably the most influential proposals were put by Wheeler (1986) in his "Frontiers and Forward ..." address to the Institution of Mining Engineers. In it he outlined suggestions for a "model" colliery with

an overall OMS of six tonnes (see Table 5.3). According to the NUM this has become a standard for all collieries to follow. The essence of Wheelers' suggestions are that large productivity increases can be secured from no additional investment by making better use of existing resources. Wheeler proposed several changes in working practices, such as three nine-hour shifts per day over a six day week, which have now become part of British Coal's "flexibility" proposals (see Table 5.4). Wheeler suggested output increases of over 20% per week are possible simply by increasing the number of days worked by one a week. But as Prior and McCloskey (1988:28) observed:

'Wheeler's proposals have something of a flavour of a conjuring trick; to achieve so much extra output without any individual investment is surely a little more difficult. Buried in his appraisal are a lot of unproven assumptions about the ability of existing plant to function continuously for longer at the drop of a hat....'

In spite of some doubts about the potential for productivity increases from the introduction of the Coal Board's concept of "flexible working", Wheeler's ideas were taken a step further by Northard (1987 a and b) (see Table 5.2). According to Northard no new technology was required by British Coal, only the more widespread application of that which is available within a more effective organisational framework. Northard stresses the commercial logic of getting more output over longer periods of working time from the capital already invested at collieries. Among the suggestions he put forward were: (1) utilising the installed capital more intensively; (2) extending the working week of the plant to 18 production shifts; (3) reorganising colliery shutdown periods so that more days in the year are worked by the plant. The emphasis is increasingly on

improving capital productivity owing to the capital intensity of modern mining methods. Actual average wage costs are approximately 30% of total costs in the late-1980s compared with over 65% in the 1950s.

All the Board's plans for the mining industry and the restructuring of the 1980s should be viewed within the broader political and economic constraints on the industry, and in the context of much lower demand for coal than was predicted in 1974. The effects of ideology and government pressures shall be considered more fully in the following section. Here it is necessary to reiterate some of the main consequences of the Coal Board's investment strategy over the past fifteen or so years.

In virtually all the articles to appear in The Mining Engineer in recent years there has been little mention of the human costs of British Coal policies. Productivity indices are discussed without mentioning the scale of the industry's contraction in terms of the numbers of jobs lost; coal reserves lost; premature colliery closures; direct and indirect social costs; the redundancy payments burden; and written off fixed costs. When the labour reducing consequences of pit closures, colliery mergers, and automation are mentioned they are treated as "impressive achievements". Figures 5.3 and 5.4 show the productivity increases and reductions in operating costs achieved by the corporation since 1985. Table 5.5 lists some of the relevant statistics underlying this 'business transformation'. As Massey and Meegan (1982) point out, job loss and capacity cuts are sometimes good for capital, but always bad for labour.

According to the NUM (1987), productivity increases were almost entirely due to the application of new technology since the miners' strike, although this is disputed elsewhere (see Prior and McCloskey, 1988; Northard, 1987b). What is certain is that the differential capital investment strategy of the Board has increased the rate of closures in the peripheral coalfields. This was stressed in Winterton's (1985) study of the NCB's applications of MINOS in the coalfields. In 1985, Scotland, Durham, South Wales and Kent comprised 35% of NCB collieries but only 12% of MINOS applications. Overall capital investment figures reveal similar geographical disparities (see Table 5.6). In March 1984, investments in the North Yorkshire pits were over £ one billion, which included the Selby complex. There had also been massive capital expenditures on pits in the Doncaster, Barnsley and South Yorkshire areas, whereas capital investment in South Wales was only £20 million distributed between 28 pits, producing about seven million tonnes a year. In the Barnsley area £327 million was spent on 16 pits producing eight million tonnes a year (Computing The Magazine, 11-04-85:9).

To a certain extent the question of where to invest is determined by the initial design and development of the technology itself. The specific technical choice of the Coal Board have their own technical limits. Certain machines only work well under specific conditions. As with the ASL in the 'sixties, retreat mining methods, heavy-duty machinery and shield supports cannot be uniformly applied to all seams and pits. But the technology has not determined the direction the industry has gone in. In fact, it has always been possible for the coal industry to develop a more regionally-balanced capital investment strategy and to design different technology or to apply the same

technology in different ways (see section 5.4). But as Winterton (1985) explained, the NCB chose a restructuring strategy based on massive job losses derived from three main processes:

- (1) New capacity being introduced from the development and reorganisation of existing pits. This includes the linking of collieries into colliery complexes, usually around single main shafts and preparation plants on the surface;
- (2) The elimination of human activity through automation;
- (3) As a result of increased productivity more pits then become classified as "surplus capacity", or if they have not reached the tonnage-cost expectations of the corporation, as "uneconomic capacity".

Additional "uneconomic capacity" was created by the continued development of Selby in the eighties at a time when coal demand in the UK was falling. Extra capacity at other developments, such as Asfordby, and arising from the introduction of more "flexible" working practices in the 1990s are likely to increase pressures to close down more pits. The number of working collieries in peripheral coalfields is now very small, and so it is likely that more pits from the central coalfields will join the "high cost tail". At the start of 1989, there were 17 working pits in Nottinghamshire compared with 36 in the late 1960s. Eight pits had closed since the miners' strike in spite of its being the heartland of the breakaway Union of Democratic Mineworkers (UDM). British Coal's plans to continue capacity reductions into the 1990s may result in a further six or seven Notts' pits closing down.

Even more pits in the central coalfields will be threatened if oil and coal importing facilities are expanded on the River Humber. Some 40 per cent of the output of the Nottinghamshire pits goes to the four power stations nearest the Immingham terminal site. Together with the other proposed port, at North Killingholme, Immingham could import ten million tonnes of coal a year (FT, 10-02-89:7).

British Coal have tended to concentrate investment in new collieries and on major reconstruction schemes within the central coalfields of the Midlands and Yorkshire, but as O'Donnell (1988) observed from her study of the North Yorkshire coalfield, there are big intra-regional variations in capital investment. A turning point in corporate strategy toward pits in the North Yorkshire coalfield came after the 1984/5 miners' strike. Prior to the dispute closures in the coalfield were averaging one a year, but in the first fifteen months after the end of the dispute six collieries were closed and a further five were closed up to the Spring of 1988. In Yorkshire, as elsewhere, short-term financial returns have taken precedence over other considerations, such as the extent and accessibility of coal reserves; past performance; future pit viability and market conditions (see concluding Chapter). The North Yorkshire Area was praised by British Coal management for breaking output and productivity records. The Area reduced operating costs from £1.86 per Gigajoule to £1.59 per GJ by early 1988. To achieve this target, the Area management had to close down marginal capacity which was operating above the targets set for the industry as a whole, and to switch production to the lowest cost pits (O'Donnell, 1988:15). In so doing decisions were made which may actually increase the operating costs of surviving pits. This is particularly so where a group of pits share the capital and running

costs of single preparation plants and coal despatch facilities. Closure or contraction of one pit in the group will increase the financial pressures on the rest. Furthermore, the transfer of some of the miners from closed pits to surviving ones in the coalfield leads to rises in operating costs which places them in danger of exceeding the performance targets set by British Coal. As O'Donnell (1988:16) put it, there exists

'an in-built dynamic to the process of restructuring ... where the economic and financial fortunes of a number of collieries are closely intertwined'.

By basing its restructuring on end-of-year financial targets and stringent accountancy measures to please the government, potential investors and financial institutions in the City, possible adverse long-term consequences are being ignored. As O'Donnell implies, there are possible long-term diseconomies as a result of ignoring some of the economic interdependencies between pits sharing resources within individual coalfields. It is worth noting that not all colliery managers have favoured British Coal's closure policies since the strike. In 1986, the British Association of Colliery Management criticised the Board's market-based operating philosophy in evidence to the House of Commons Select Committee on Energy. Referring to the Board's plans for further closures, they pointed out that:

'We are concerned that if this new strategy is implemented too literally the effect will be to increase unjustifiably the rate of closure' (FT, 06-03-86:8).

They argued that methods other than pit closure should be implemented to remove surplus capacity in the longer term interests of both the industry and the United Kingdom. In spite of their objections, British Coal has continued to push through its pit closure strategy. The following section examines some of the political and ideological motives underlying the corporate restructuring processes, and the changes in business philosophy during the period since the 1984/5 strike.

5.2 "Wooing the Collier Capitalist"

The title of this section is taken from a headline in The Daily Telegraph (25-01-1989) and it is indicative of current attempts by British Coal to persuade miners to become shareowners in the industry. Underpinning virtually every part of British Coal's restructuring in the 'eighties, particularly since the end of the 1984/5 miners' strike, is the preparation of a nationalised industry for its eventual privatisation. As Whitfield (1985:14) explained during the strike:

'... the current struggle in the mines is not just about pit closure, its about the future of the National Union of Mineworkers, the future of the mining industry, and ultimately about whether the labour movement is able to defend public ownership against the ideological and economic attacks of current Tory policy'.

After the strike the Coal Board were able to implement a range of policies which have, in the words of a Monopolies and Mergers Commission (1989) report, helped to transform the industry "from an institution into a business".

A crucial element of the transformation of the coal industry into a business was the application of tight public expenditure limits on it by the state. As Cooper et al (1986:136) argued, financial management and accounting statements are mechanisms by which the state can unobtrusively manage the activities of its enterprises. Through such mechanisms the state is able to influence the nationalised industries opportunities for investment and the possibilities for capital accumulation (see Chapter Four). In turn, the state's use of financial controls, together with the ideological commitment of successive Thatcher governments to roll back the boundaries of state ownership, have actively moulded the language and the objectives of the management of state-owned enterprises. Virtually all the changes have been heavily loaded in favour of capital. Cooper et al (1986) examined how financial and accounting practices were used alongside technical and bureaucratic controls to reduce or remove the gains made by labour in its control of the labour process since nationalisation.

The Thatcher governments have sought to "restore management's right to manage" in all sectors of the economy via a range of policies including trade union reforms. Massive state resources were used against the miners, their communities and supporters during the 1984/5 strike. Nevertheless, it is misleading to view the process of change purely in terms of a dichotomy between capital and labour. Whilst the miners' strike did polarise relations between the Coal Board and the majority of mineworkers, it also exposed divisions within capital and within labour. Indeed it took an "outsider", Ian MacGregor to "shake up" the Board, and the hard line subsequently taken by the NCB against miners was not supported whole heartedly by many managers who had spent most of their working lives in the industry (see Beynon, 1985).

During the MacGregor years as chairman the attitudes of senior managers hardened. The miners' strike had changed many previously taken for granted views of the world amongst managers and mineworkers. The return to work in the Spring of 1985 marked the beginning of another round of pit closures. The reduction in the number of miners and the introduction of labour-saving technology in working pits was one way of reducing the numerical strength of the NUM (see Section 5.1). Since the strike the government set arbitrary financial break even targets, and stringent accountancy controls were applied by British Coal. Management attitudes were influenced so much so that Cooper et al (1986:126) were able to report that:

'All the managers we talked to in the NCB believed that the "bottom line" of the industry was profit; not safety, contribution to society, employment, satisfying work or any other measure of performance. As one manager saw it: "I don't want to work in a bloody charity". Although miners and most mining engineers and general managers in the NCB tended to avoid using financial information, they had internalised the logic that profit and loss were the absolute measures of performance, the bottom line'.

The implications for the deep mining industry of the change in commercial attitude and organisational approach were outlined by Northard, British Coal's Operations Director, in 1987. He argued that the Corporation's policies had

'opened the minds of management and men to break with their traditional outlook whereby hopeless collieries and difficult coalfaces had become a professional challenge and a formula for working with more capacity than necessary, employing correspondingly more resources and consequently operating at a higher cost of production' (Colliery Guardian, Commerative Supplement, January 1987:38).

As part of the process of "opening up the minds" of NCB personnel, MacGregor sent senior managers and mining engineers on study trips to the USA as part of a deliberate move towards a more "business-minded approach" to running a state-owned industry (FT, 06-03-86:8). The attempts to fuse British mining technology and American working practices have continued since MacGregor's departure. In spite of the fact that geological and mining conditions are very different from those in most UK underground mines, and the opinions of some senior mining engineers who visited the US that "much of the American scene is not transferable", the Corporation has adopted numerous US ideas to raise productivity levels (see Feickert, 1987). Indeed many elements of 'the Wheeler Plan' incorporate changes in shift patterns and working practices similar to what is already established in the US coal mining industry.

During 1987 and 1988 several guest speakers of the Institute of Mining Engineers presented papers comparing and contrasting "free enterprise" mining in the USA with "state monolith" mining in the UK. Probably the most illuminating address as far as current British Coal policies are concerned was by Bill Carr, the President of Jim Walter Resources Incorporated (Mining Division). In his early career Carr was a pit lad employed by the NCB. In his address Carr stated five areas of operations which have produced higher productivity in the US compared to British mines. These were:

1. Surface Labour Density

In the US all jobs are cost-justified. Workers are trained to do several jobs and develop multi-skills. The elimination of jobs through automation "is a real goal unhindered by union resistance".

2. Working Time at the Production Point

Fast Systems of transport are used to get people from the surface to their workplace. Longer working shifts ensure that the productive time spent at the coalface is greater.

3. Roof Bolting Systems

Costs of materials such as steel arches and pit props can be reduced by the mechanical insertion of roof bolts, which are also used as auxilliary supports in longwall moves.

4. Heavy Duty Equipment

Great emphasis is placed on machine reliability and repeatability of performance. All the main items of longwall equipment used by Jim Walter Resources have their origin in the UK.

5. Worker Flexibility

In the USA, employment levels at mines can be varied as the demand for coal changes. In times of hard competition, costs can also be cut by laying off personnel and eliminating jobs in less essential areas. Management can reduce or increase the number of days worked in any particular week, dependent upon inventory levels and market considerations (The Mining Engineer, February 1987:539-548).

In his concluding remarks, Carr denounced nationalisation

'The coal business, like any other business, should acquire its capital at least cost, on prevailing risk/reward terms, and must employ this capital in the most productive, innovative and responsible way it can devise. The discipline which is exerted to see that this happens is through the marketplace.

If the capital is used wisely, the industry will prosper; if unwisely, the industry will go out of business. The very real accountability through the operation of the marketplace does not apply in a nationalised, state-owned enterprise, where there is always the virtual certainty that government, for all kinds of reasons, will bailout the commercially bankrupt entity.

The protection offered by government in this instance does not solve the problem, and in fact creates a climate counterproductive to good management ...

...

Corporations are the economic agents of the people, just as governments are their political agents. The failure to preserve this distinction between the proper roles of economic agents and political authorities, threatens to politicise all economic decision-making. To the extent that this occurs - and the British coal industry is a classic example - it will impair fundamentally the ability of the business system to provide jobs, raise productivity and create wealth ...

...

The experiment with nationalisation has failed; it must be replaced with an industrial management philosophy that recognises the fundamentals of the laws of supply and demand and invigorates the initiatives and entrepreneurial spirit of risk-taking managers.'

The reason for quoting Carr at length here is that his speech reflects "the business philosophy" being promoted by state policies. One of the tenets of Thatcherism is that true business efficiency can only occur in the private sector. The fact that none of the mining engineers present at the meeting questioned Carr's free enterprise rhetoric is perhaps indicative of the extent to which Thatcherism has pervaded through the Coal Board and organisation as a whole. Private ownership is seen as the only solution to the industry's problems, which are interpreted entirely in terms of short term profits, costs and financial criteria. As Moses observed with regard to new investment,

'Perhaps the most important thing to be achieved is a revolution on thinking - that is, despite all the pressures, new mines must pay'.

Many of the technical-cum-organisational ideas suggested by Carr to raise productivity in British Mines have in fact been put into action in many working collieries. Whilst the NUM continues to resist the Corporation's notions of "worker flexibility", British Coal has successfully exploited the new industrial order since the strike in 1984/5 to its advantage. British Coal has used the threat of pit closures or the cancellation of capital investment proposals as bargaining levers (some would say blackmail) to persuade local NUM officials into new working practice agreements. For instance, the proposed £80 million Margam project in South Wales was postponed because it is being made conditional upon the South Wales NUM signing a flexible working agreement, which would involve six-day working and longer shifts. Margam would create at least 850 local jobs and the South Wales NUM argue that if they miss the deal the work may go either to contracted labour or the UDM, or alternatively Margam may never be developed.

British Coal has been able to introduce piecemeal privatisation into areas controlled by the UDM, particularly Nottinghamshire and South Derbyshire. The UDM has already experimented with its own "mining company" to compete for contract work in the coal industry. British Coal has increasingly turned to private contractors to develop coalfaces, build tunnels and other projects outside the normal production process. The Corporation's use of sub-contractors is being introduced outside the NUM's negotiating procedures and the practice

has spread to more and more mining functions, especially work traditionally undertaken by craftsmen. As the NUM (1987) noted, there are

'instances reported of craftsmen being made redundant on the Friday and returning to work the following Monday at the same colliery in the employment of a contractor.'

Such instances have become commonplace even in NUM strongholds such as South Yorkshire. Nevertheless, it is the UDM which has taken most advantage of the offer of ad hoc contracts.

Shortly after taking up the post of Board Chairman, Haslam recognized the value of the UDM to the Board's plans.

'The UDM is younger, it is ready to embrace new ideas. It moves more quickly to support our objectives, and appears more progressive' (FT, 7-10-86).

By mid-1988 the UDM had won almost 2,000 contracts, some of which were worth £80,000. In Nottinghamshire, teams of miners worked three shifts a day for seven days a week to win big bonuses for colliery development work. At one pit weekend workers were paid bonuses of £1,500 for developing a new coalface in only 16 weeks, compared with the six months management had expected.

The real significance of sub-contracting and the formation of teams of miners to compete against outside contractors for development work at pits was noted by Kim Howells, Labour MP and former research

officer for the South Wales NUM. Howells pointed out that if the sub-contracting system continues to spread,

'the Coal Board will simply become a leasing operation and the whole thing will be privatised through the back door' (quoted in FI, 13-05-88:8).

Numerous bureaucratic reorganisations recently implemented by the Board are designed to ease the privatisation of the industry, if not as a whole then in parts. The reintroduction of decentralised pay bargaining and local incentive schemes increase the possibility of introducing share-ownership and contract mining arrangements because there is no longer any degree of national solidarity over wages. The encouragement of competition between miners and pits through the use of differential benefits and losses has undermined the unity of the NUM. Furthermore, the corporation has introduced fundamental changes to its administrative structure. It has sold off the separate area headquarters of South Wales, Scotland, the Western Area and the North East, and grouped them together as "peripheral" groups under central control. The Head of Group Operations is none other than Albert Wheeler, author of "the Wheeler Plan" and champion of six day working. The changes in the geography of administrative control and the distinction between the central blocks - the Yorkshire and Midlands coalfields - and peripheral groups makes it easier for parts of the industry to be "packaged" and divided for eventual privatisation.

The forms that privatisation can take are manifold. Robinson and Sykes (1987) suggested that the corporation be sold off firstly on an area-by-area basis, but then further structural changes could take place by:

- (1) management/worker buy-outs;
- (2) private sector mining and engineering firms in the UK buying into the industry (see chapter seven);
- (3) groups of miners wishing to work in mining cooperatives;
- (4) big multinational companies and mining houses buying up shares of the industry (see chapter seven).

Like former Coal Board boss MacGregor, they argue that groups of workers, acting as companies or cooperatives, ought to be given the opportunity to mine coal at those pits British Coal is considering closing down, that is the so-called "uneconomic" pits.

Another strand of privatisation is the introduction of share-ownership schemes. This is clearly on the government's agenda. In a speech made by Cecil Parkinson, the Secretary of State for Energy, in October 1988, the notion of collier capitalists was enthusiastically spelled out:

'Just think, miners will be shareholders with a stake in their own industry. Mr. Scargill - if he's not in Cuba - will be sitting down to negotiate with the managers of private companies...

From the day when the miners' leaders thought they owned the Government ... to the day when every miner owns part of his own mine' (quoted in The Daily Telegraph, 13-10-88:1).

Miners at Kellingley colliery, near Wakefield in West Yorkshire, one of the most productive pits in Britain, have already been approached by a

London-based market research company seeking their views about the possibility of share-holding if the industry was floated as a public company (Yorkshire Post, 24-01-1989). The research was commissioned by British Coal and clearly indicates the Board's intentions. Furthermore, the Corporation has already laid down plans for a series of small pithead power stations jointly owned by British Coal, private contractors and local electricity distribution companies. Bilsthorpe and Rufford collieries in Nottinghamshire have been offered as possible sites for the first prototype power station capable of supplying up to 200 MW of power to the East Midlands Electricity Board (EMEB). The scheme would involve share ownership for miners in the consortium that would run the plant. Crucially the scheme would need the equivalent of a no-strike agreement to guarantee a regular supply of fuel to the EMEB. If the UDM agrees to these proposals the door will be opened for similar joint ventures and share ownership schemes between other collieries and the electricity supply industry.

The issue of share ownership raises the question of who will actually own and control the coal industry in the future if it is not to be a nationalised industry? Share ownership does not mean power sharing. Undoubtedly the major beneficiaries of any privatisation of the coal industry are likely to be the senior managers, private sector institutions and companies involved (see Chapters Seven and Eight). The notion of there being a very diversified coal industry largely owned and operated by small worker cooperatives is extremely unlikely. The rationalisation of the industry, the concentration of resources in a few colliery complexes, and the administrative reorganisation of British Coal all suggest the preparation of an industry for division into three, four or five major private sector groupings. Large

institutional shareholders and big private investors are likely to have most say in the running of the industry. Share ownership for miners under such an industrial structure is a very long way from "the mines for the mineworkers" ideal fought for by the syndicalists and militant miners in the early 1900s (see Coates, 1974).

It is also argued by the government that a diversified, competitive and private coal industry will produce greater opportunities for increased pay and for profit sharing as the industry takes advantage of market opportunities. A centre for Policy Studies report argued:

'The result should be greater job security, which would be both genuine and deserved because it would be based upon improved efficiency rather than the illusion of security created by taxpayer subsidies and union militancy' (see Robinson and Sykes, 1987:9).

Nevertheless, the gains will almost certainly be shared between fewer workers. It is also necessary to examine precisely what advantages the remaining workers will get under a system of private ownership.

In the United States coal mining industry the major source of "flexibility" in response to market changes is the ability of companies to hire and fire at will. As Carr (1987:547) put it:

'The flexibility in managing the business that varying the manpower level gives to management better ensures survivability in hard times and the ability to rehire as the difficulties of the business cycle recede. This is the norm rather than the exception in the majority of businesses. It is only in the nationalised system that manning levels are resistant to variations of this nature.'

Mining companies also operate "core" and "periphery" employment practices, whereby a hard core of very skilled workers are kept on even during lean business periods, but other workers are laid off during those times. Carr described the practice with Jim Walter Resources.

'In our case the protection offered to the worker who is temporarily dismissed because of the requirements of the business is that he or she is on recall on a seniority basis, and during the layoff period the workperson involved retains medical and health insurance coverage for up to one year.'

The fact is that an industry driven by money rather than tonnes of coal produced is likely to have many people employed on a temporary or short-term basis, particularly if the British energy market is also to be opened up to unrestricted fuel imports (see Chapter Seven and the concluding Chapter). Flexibility may mean that more workers have to accept lower wages or spells of unemployment during times of low profitability for their employers (see CAITS, 1986). This form of "numerical flexibility" creates a fear of unemployment amongst managers and workers in the US mining companies. Since 1979, over 60,000 jobs have been lost in American mines, despite the rise in coal production levels.

The NUM have opposed British Coal's flexibility proposals on grounds of safety and employment security. Virtually all the proposals are designed to cut costs and improve productivity, and many require revisions to existing mines' health and safety legislation. Incentive bonus schemes, longer production shifts, contract development work are all ways of increasing the intensity and productivity of the mining labour process. The NUM argue that they reduce attention to safety

procedures and may increase the potential for accidents or injuries at work. In addition, the introduction of heavy-duty machines and diesel powered vehicles underground has increased dust and fume levels. There is also debate about the support reliability of cheaper roof bolts compared with steel arches and pit props.

Crucially the main area of contention with the Corporation's flexibility plans are the effects of more continuous production and six or seven day working weeks on employment levels. A 20 per cent increase in total output from existing collieries would result in more pit closures. According to the NUM's Research and Industrial Relations Department (1987:35):

'a six day week arrangement would result in a minimum of 31 pit closures and full implementation of British Coal's proposals would axe 55 pits with a loss of jobs of over 40,000'.

If state ownership is to be defended there is a need to develop alternative objectives and ways of organising production that will defend jobs in the industry. Hitherto, the Labour Party and the right wing factions in the trade union movement have tried to water down existing public ownership policies. They have developed a broad concept of "social ownership" encompassing a wide variety of ideas, including share ownership, worker cooperatives, joint public-private ventures, and greater state regulation in the free market. Some left-wing trade unions want the Labour Party to promise to re-nationalise all the industries that have been privatised by the Thatcher governments. As this study has suggested there is a need to reevaluate the form that the nationalisation of the coal industry has

taken. Section 5.4 looks at possible directions the coal industry could go in, which would help to secure employment, without taking the industry out of the public sector.

5.3 Public-private sector relations and the technical change process

Any account of the restructuring processes affecting the British coal industry should take into account the inter-dependencies and relations between the state monopoly buyer and private suppliers of capital goods. Private manufacturers have played a leading part in the technical transformation of the nationalised coal industry. Equally, the National Coal Board has greatly influenced the whole technical innovation process in what was described as a close "complimentary, interactive" technical relationship with major suppliers (see Townsend, 1976). As a result, the fortunes of the mining machinery makers are tied to the ups and downs of the UK coal mining industry (see Chapter Six).

The rapid contraction of coal output, particularly of the numbers of collieries, has produced tensions in relations between the Coal Board and its suppliers in the 'eighties. Furthermore, the encouragement of a more business-minded approach by the nationalised industry has led to a greater emphasis on short-term lowest cost criteria as a basis for purchasing materials, machines and components. Formerly cosy relations between state monopoly and private manufacturers have been broken by the decline in overall business and by new state management philosophies geared much more towards profits

rather than production. The consequences of these changes on the UK mining machinery industry are discussed in Chapter Six. The following details trace the evolution of public-private sector relations with reference to particular product markets.

In the early years the NCB had to import many of its equipment needs (see Chapter Two). The Coal Board continued its technical liaison with mining machinery firms started with the formation of the Technical Advisory Committee during wartime. The coal industry purchased a wide variety of equipment of all kinds. For example, amongst the various coal-cutters it purchased were Mavor & Coulson's 'Samson Stripper', the 'Huwood Slicer', AB Meco-Moores, and Joy-Sullivan's 'Gloster Getter'. It also purchased the 'Dosco Miner', a longwall version of the Joy Continuous Miner, and several room and pillar machines from the United States. UK producers turned out an average of 850 standard coal cutters a year between 1946-51 (see Lansdown and Wood, 1957) (see Table 5.7).

From the outset the NCB realized that general progress in mechanisation could come only through machinery either designed for or specially adapted to British mining conditions. The NCB's efforts centred on the longwall method of mining. The Reid Report (1945) had recognised that the major impediment to raising productivity at the coalface was the three shift system of mining. It envisaged a new generation of face technology that would integrate the various functions into a mining system with coal getting on every shift (see references to Meco-Moore machines in Chapter Two). The system included flexible power loaders to be mounted onto special face conveyors which could be moved bodily sideways by mechanical means several times during

the course of a shift without dismantling. In turn, this would mean "prop free faces" with no need for props between the conveyor and the new line of the face.

In the late 1940s the Coal Board imported armoured face conveyors (AFCs) from West Germany, and eventually licences were obtained by several UK manufacturers to produce them. The major breakthrough in power loading came with the development of the Anderton Shearer Loader (ASL) by a small NCB team in the early 1950s, which quickly became

'the backbone of the NCB's drive to improve output per manshift' (see Townsend, 1976).

The 'fifties were record years for colliery investment and they were also prosperous years for the UK mining machinery suppliers, especially those primary suppliers (and their sub-contractors) which developed close technical relations with the NCB, especially for suppliers of longwall items. Other types of equipment were needed, such as coal haulage and handling machinery, flameproof items, surface washery machinery, coal crushers and preparation plant. By the mid-1950s there was negligible import penetration and the UK mining suppliers were able to meet most NCB demands. Some overseas manufacturers had been encouraged to set up production plants in the UK, such as UMM and EIMCO in the North East of England.

By the mid-fifties the Coal Board had established its own central engineering establishments and developed very close working relations with suppliers. Townsend (1976; 1980) studies the relations between the NCB's formal research and development facility at Bretby, near

Burton-on-Trent and the main private manufacturers with licences to make the ASL - Anderson Boyes, British Jeffrey Diamond (BJD), and Eickhoff of West Germany. Most of the technical representatives or service engineers employed by the manufacturers were former employees of the NCB. Townsend (1980:154) pointed out that the boards, including the chairman and managing directors, of the two principal UK-based coal cutter makers, were ex-NCB, as were "75 per cent of upper and middle management". Ties between state monopoly buyer and private suppliers were further strengthened by the fact that many NCB staff members, including some Board members, held shareholdings in several mining machinery firms (1). The close, often personal ties between private and public sector have continued into the 1980s. Several managers in the mining machinery industry were employed either as mining engineers or other staff within the NCB.

The influence of the NCB's monopoly purchasing power on the structure, development and industrial restructuring of the supply industry can best be seen with reference to specific product markets. Of these, the powered roof support market is a useful example, if only because it involves a relatively small group of primary suppliers. The earliest achievements in the research, design and development of hydraulic powered roof supports were dominated by three important manufacturers - Dowty, Gullick Limited and W.E. & F. Dobson.

Dowty had entered into the mining markets after the second world war as an engineering group with experience in manufacturing hydraulics in the aircraft industry. After a member of the Dowty board had visited an underground mine and saw "a forest of creaking wooden pit props doing a most indifferent job". Dowty investigated the possibility

of supporting mine roofs by hydraulic support (Rolt, 1972:Vol. 1). The first advancing roof support in the form of a chock was produced at Aschurch in 1949 but this was temporarily shelved in favour of the "Dowty Roofmaster", the world's first semi-automatic system of roof support. Initially most of the corporation's production for the NCB was carried out by Dowty Auto Units. But owing to the profitable potential of the mine roof support business and the expansionary plans of the Coal Board, it was decided in 1954 to make Dowty Mining Equipment an autonomous unit responsible for its own production. At the end of August 1954, Dowty Auto Units was renamed Dowty Hydraulic Units and a large new factory was built at Aschurch, near Tewkesbury in Gloucestershire, close to the corporate headquarters in Cheltenham. Dowty Mining Equipment was left in full possession of a former Ministry of Supply building, which was redesigned in the interior for the mass production of pit props.

'This was the first Dowty effort in this field, but with its automatic multi-welding machines and other ingenious devices it was a most impressive example of modern flow production technique. The production line was started in December 1956 and thereafter the facts speak for themselves. The plant consumes fifteen miles of steel tube each week, the millionth Dowty pit prop came off the line in April 1957 ...' (Rolt, 1972:Vol 1, 63).

The rapid growth in business experienced by Dowty Mining Equipment Limited in the 1950s was echoed elsewhere in various product markets. The NCB was planning to expand output and to mechanise its operating collieries, which meant full order books and forward contracts well in advance for most primary suppliers. Another roof support manufacturer to benefit was Gullick Limited, which was a small company with no mass production facilities. Unlike Dowty, Gullicks had supplied private

coal companies with equipment before the second world war (see Chapter Two). Gullick sub-contracted much work to other firms. It relied for most of its fabrication work on other companies - A.J. Muschamp & Co. Ltd., Butterley and Cotterill, which later became part of the Park Web Group. To capitalize on the rapid growth in demand for roof supports, both at home and abroad, it was necessary for Gullick Limited to acquire better manufacturing facilities. This was achieved in 1957 by a merger in which William Park & Co. Forgemasters Limited purchased the whole of the capital of Gullick.

One other company held NCB powered roof support approved certificates prior to 1960 - WE & F Dobson (a Dobson Hardwick Group company). The company supplied the NCB with frame supports. The first of these were installed at Newstead Colliery in the East Midlands Division in 1958. In the mid-sixties, Dobson introduced rigid based supports with the addition of a safety fixture called "the deadman's handle". These were introduced at several collieries but they never reached the popularity enjoyed by Gullick's 'Seaman' articulated supports (Purdy, 1982:527).

Through the innovative efforts of both the suppliers and the NCB the British companies were able to secure a market niche in longwall technology, which included a wide range of products such as roof supports, shearers, conveyors, tunnelling machines, through to complimentary flameproof and intrinsically-safe items for underground use. In the roof support markets of the world, British firms developed a market lead in hydraulic props. Continental manufacturers and mining engineers during the same period concentrated on mechanical, friction type props, unsuitable for the developments in the powered supports

field. By the late 1950s both Gullick and Dowty were exporting their roof supports to mining markets in various parts of the world, although it was not until the late 1970s that mechanised longwall mining found ready markets in major coal producing countries outside of the UK and West Germany (see Chapter Seven). Dowty was particularly active overseas. In 1958 the company had formed sales subsidiaries in North America, whilst licences to make Dowty props were granted to firms in Germany, France and Japan. In West Germany Dowty teamed up with Salzgitter Maschinen AG, which had the most modern large-scale pit prop production plant outside the UK.

The success of companies like Dowty and Gullick in the roof support business encouraged other mining machinery suppliers to diversify into the business. The Coal Board actively supported these moves. The most important thing for suppliers to the NCB was that mechanisation at surviving collieries would enable them to reap profits, even though the number of working pits was being cut down very rapidly. So in the early and mid 'sixties several product markets were proving profitable and demand for new equipment actually expanded at a time of deep mining contraction. In the roof support business five more companies were granted certificates by the Coal Board to supply roof supports. In chronological order these were Wild in 1960; Underground Mining Machinery in 1964; Fletcher Stewart in 1965; Bonser and Huwood in 1966. Prior to 1964 most roof support installations were in the East Midlands Division, but after that date virtually every working colliery in the land installed roof supports, reflecting the universal acceptance of powered supports as an aid to more economic production and improved safety. Output from powered support faces increased from 22 per cent to 91 per cent in just eight

years - between 1964 and 1972. Purchases reached a peak between 1966-68. According to the NCB:

'Even during the period of peak purchases it was apparent from forward projections of production that there would be a marked reduction in requirements and that a relatively level demand for replacement, as opposed to additional, faces would ensue from about 1968' (Evidence to the Select Committee on Nationalised Industries, 1974-5, Appendix One, para. 38).

Drastic cut-backs in colliery capacity, and more significantly, the fall in overall NCB investment, which by 1968/9 was in real terms running at less than half the expenditure of the 1950s, did little to adversely affect the profits of the major suppliers. In fact, the Select Committee for Nationalised Industries had to investigate serious allegations of excess profiteering by the major roof support manufacturers in the sixties (The Select Committee, 1974/5).

Between 1966-68 there were eight roof support suppliers to the NCB. There was considerable over capacity in the market by 1968 and each supplier realized that the NCB's level of demand could not be sustained at the peaks of the previous two years. In spite of its rapid programme of mechanisation the NCB had reduced total capital expenditure since 1957. The Board had also reduced its investments on 'major schemes' from £50 million per annum in 1958/9 to £11 million in 1968/9. It would not be long before the primary suppliers of mechanized longwall equipment would be hit by a reduction in NCB demand. Furthermore, the outlook for the following decades was bleak with regard to the coal industry. The 1967 White Paper on the industry predicted large coal capacity cuts in the 'seventies as cheap oil and gas (and nuclear power) continued to undercut traditional coal markets.

No matter how false the government's official predictions proved to be, there was a widely-held view that the coal industry would continue its decline. It was this view that persuaded the government to take steps to rationalise and reorganise the mining machinery supply industry, which was part of a much broader economic strategy to encourage mergers and industrial concentration in important manufacturing industries. The Industrial Reorganisation Corporation (IRC) was established by the Labour government in 1966 to promote or assist the reorganisation or development of any industry, or of any industrial enterprise. The economic rationale behind the creation of the IRC was the emphasis on

'the need for more concentration and rationalisation to promote the greater efficiency and international competitiveness of British industry' (IRC, 1968).

In August 1968 the NCB were approached by the IRC with a suggestion that they should examine the structure of the mining machinery industry. It was agreed that the IRC should:

'undertake a review of the present structure of the mining machinery industry to ascertain what, if any, changes are needed to meet the ongoing situation at home and in markets overseas' (The Select Committee on the Nationalised Industries, 1974:5; Appendix One, para. 43).

According to the NCB, the IRC took into consideration the following set of considerations regarding the powered roof support suppliers:

- (1) That future orders would be insufficient to meet the existing production capacity of the manufacturers;

- (2) That this may lead to "a protracted period of debilitating competition" between the suppliers, which "might not necessarily leave the pattern of manufacture best suited to the Board's long-term requirements".
- (3) That some reorganisation was necessary in order "to maximise exports of mining machinery", particularly of complete face systems packages to compete with those available from other sources, such as West Germany.

As a result of the IRC/NCB negotiations with roof support manufacturers three main groups of mergers took place (see Table 5.8). As an incentive to the suppliers to merge into the new groups the NCB gave them assurances of a minimum level of orders for new supports for a transitional period ending on the 31st March, 1972, subject to the acceptability of price, quality and service (The Select Committee, 1974/5, page x, para. 9). By 1970 there were effectively three dominant suppliers of supports to the NCB. Owing to the fact that the NCB had successfully introduced full-face mechanisation at all the existing collieries and faces it was technically feasible to do so, the Board then embarked on a period of standardization of face machinery, reducing the number of machine varieties. From 1st April 1972 it was agreed with the manufacturers to place a two year freeze on the design of main face line supports, although not of supports used for other purposes. The Board also sought to buy the best design of each major sub-assembly, such as the legs, valves and rams, as an NCB standard to be purchased by competitive tender.

The roof support market was not the only one to undergo industrial concentration during this period. Other important mergers took place independently of the IRC. For instance, in April 1968, the Dowty Group acquired Higgins Boughton Industries whose main subsidiary was the Mining Engineering Company (Meco) Limited of Worcester, renowned for its conveyors and cutter-loader machines (see Chapter Two). Thus, Dowty Meco was formed as part of a strategy by the larger group to coordinate the design and integrate the production of the three elements of coal-getting. Conveying, roof supporting and coal-cutting were coordinated almost as parts of one machine, so it was logical that Dowty should attempt to become a single source for the complete package of longwall face machinery. Dowty had also taken over the mining interests of Bonser Engineering Limited, which manufactured various products, including roof supports at a factory at Hucknall, Nottinghamshire. In the process Dowty transferred Bonser's service depot from Clay Cross to Hucknall.

So having got a substantial share of the roof support business and entered the market for conveyors Dowty then sought to acquire Anderson Mavor under the aegis of the IRC (MMC, 1982, para. 4.5). Success would have made Dowty a major supplier to the NCB in the power loader and roadheader markets. Anderson Mavor refused to become a part of the Dowty Group and managed to keep its independence. Only three years earlier in 1966, Anderson Boyes, the principal supplier of the Anderton Shearer Loader, merged with Mavor and Coulson, another Glasgow-based company, to become Anderson Mavor, which later (in 1974) became Anderson Strathclyde. In the 1950s, Mavor and Coulson had acquired Austin Hoy of High Wycombe, Buckinghamshire, and its associate Hoy Carbides, to provide a source of hard metal cutting elements, cutting

chains and picks for its own mining machinery. Thus Anderson Mavor was vertically integrated with subsidiary companies making some of the main components in shearer and roadheader manufacture.

By 1970 the UK mining machinery industry had undergone its major phase of restructuring in response to the NCB's needs for fewer specialist suppliers of the main items of longwall equipment following the peak of the industry's mechanisation phase in the 1960s. An important consideration for the manufacturers at the time of merger activity and in the early years of their merged operations was the demand for British produced coal, and the NCB's consequential production and equipment purchasing policies. Forecasts in the late 'sixties were favouring the continuation of cheap oil supplies from the Middle East. These forecasts proved to be completely wrong, as did other assumptions in the Labour Government's energy strategy, such as the promise of cheap nuclear power. The dramatic twist in coal's position in the total energy mix as a result of the OPEC oil price increase of 1973:4, meant that the NCB embarked upon ambitious capital projects and suppliers received orders in excess of what had been predicted at the time of the IRC negotiations. Thus, the period from 1974 to 1979 was a prosperous one for most mining machinery makers, but there were occasional bottlenecks in supply due to under capacity.

A number of significant points about public-private sector relations arise out of an examination of the period up to 1974. Firstly, the influence of government policies is great on both the shaping of NCB strategies and private sector responses. After 1957 successive governments sought a multi-fuel economy, even if it meant high dependency on imports. The Coal Board insisted on an energy

policy that took into account the loss of money already invested into the mines; the bad effects fuel imports would have on the country's balance of payments; the permanent loss of a national asset; and the dubious wisdom of relying for fuel supplies on oil-rich countries in a politically unstable part of the world (Schumacher, 1960; Robens, 1972; Hall, 1981). Governments put pressure on the Coal Board to become cheaper by cutting capacity and becoming more mechanised. Whilst some manufacturers of items such as coal face equipment made large profits from the NCB's mechanisation measures it was not a prosperous period for all suppliers.

'Between 1957 and 1966 the industry lost over 40% of its producing collieries. This had a tremendous effect on the mining supply industry and reduced demand for equipment drastically, causing some manufacturers to disappear' (Fenton, 1987:52).

The government also played a key role in the mergers of the late 'sixties, which several companies strongly resented.

According to one analysis of the period,

'The reorganisation left the supply industry better able to supply the smaller NCB and compete abroad' (Fenton, 1987:52).

Nevertheless, the mergers failed to produce a fully integrated supplier of complete face packages, which it could be argued, put Britain at a disadvantage against some foreign manufacturers in export markets in the 'seventies, because British firms had little experience of cooperating together to form export packages of a whole range of mine machinery (NEDO, 1985).

Secondly, the Coal Board, as a monopsonistic purchasing power, played a very active part in the development of new machinery, even though it did not manufacture it, Mining machinery manufacturers geared up their production processes to producing equipment mostly for the longwall mining method. This was in part a handicap in export markets because longwalling was not widely adopted in coal producing countries, and in part, an advantage owing to the comparative advantage British manufacturers enjoyed in this specialist market niche (see Chapter Seven). To a large extent UK mining suppliers have adapted their own design and development direction to meet the wishes of the Coal Board. As Townsend (1976, col. 37) noted in the shearer market of the 1960s:

'... overall NCB requirements made all attempts to preserve 'brand loyalty' impossible and the productive capacity of the British suppliers was fully stretched to satisfy a demand well over the most optimistic of estimates'.

The manufacturers have taken advantage of the Coal Board's technical support and its research and development facilities, which were better than any a private corporation could support. As Harold Rhodes, the former director general of the Association of British Mining Equipment Companies (ABMEC) put it:

'Without question the UK is leading in the world in mining technology, because the NCB has developed the majority of UK's systems through its research and development facilities and has encouraged their use outside the NCB' (Computing The Magazine, 11-04-85:12).

The mining technology Rhodes is referring to are microprocessor controlled longwall machines, which have become a speciality of the

British mining engineering industry since the mid-1970s when the NCB began to develop MINOS. Sophisticated microprocessor control systems were applied to virtually all the main items of equipment from coal cutters, roof supports and road-headers to pumps and fans, conveyors, maintenance systems and coal preparation plants on the surface. This necessitated changes not only in the products but in the production processes of many mining manufacturers.

Most of the leading primary suppliers - Dowty, Gullick, Anderson Strathclyde, the subsidiaries of Hawker Siddeley - were able to adjust quickly to the new demands of the Coal Board for not just mechanical, hydraulic and electrical equipment, but for micro-electronics. The companies which were subsidiaries of larger engineering groups had the resources and in house electronics expertise to draw on to set up their own software and hardware facilities. Other companies relied on specialist suppliers to provide the software packages. A number of mining machinery firms also reorganised production within their manufacturing plants. Dowty and Anderson Stratclyde introduced flexible manufacturing systems (FMS) into parts of their factories in order to speed up production and response to NCB demands. This necessitated some redundancies and the re-training of some of their workers.

It is easy to exaggerate the scale and rapidity of the technical changes taking place. A large number of smaller suppliers and sub-contractors to the mining industry were unable to invest the capital resources required to modernize their plants. Part of the work of the National Economic Development Committee's (NEDO) Working Party set up to look at the development of the mining machinery industry was

to encourage the adoption of new manufacturing technology. As one convener at a traditional mechanical engineering supplier in Barnsley recalled:

'We had a chap from NEDO come round. He showed us videos on new technology. It was laughable ... I asked him, "When did you last come here?" He said, "twenty years ago. I said, "Well it hasn't changed a bit"' (Interview: Michael Allen, July 1986).

The most important force for change in the industrial structure and employment levels of the UK mining machinery industry have not been the application of new technology by the Coal Board and manufacturers, but the overall decline in mining activity (see Chapter Six). Even so, it is necessary to point out the fact that the particular technical choices made by the Coal Board and the way in which technology has been applied in the mining industry has accelerated the pace of pit closures. In one sense it can be argued that the manufacturers have supplied the technical means for reducing their home business with the coal industry.

There is nothing inevitable about the particular investment strategy the Coal Board has followed. The potential has always existed in the mining engineering industry to make equipment for different mining conditions - thick, medium, thin seams; level or inclined and uneven faces and floors; and even heavy faulting. Several manufacturers have exported such technology abroad, whilst mines in Britain have been closed as "unprofitable" or "uneconomic" partly as a result of inappropriate or insufficient capital investment. The following section develops these arguments further.

5.4 The Limitations and inflexibilities of the Coal Board's capital investment approach and ideas for alternative approaches

As noted in section 5.1, the NCB chose a technological route familiar to many industries, both public and private, guided by managerial philosophies which centred on winning control over the mining labour process and placing control increasingly in the hands of senior management and a small technological elite. During the 1950s and 1960s the NCB developed and implemented mechanised longwall technology designed to optimise output from particular coal mines and faces deemed to be the most "economic" in terms of productivity indices and returns on investment. It was in the 'sixties that the Coal Board was able to mechanise collieries and cut capacity. The pit closure programme was aided by the availability of innovations such as the Anderton Shearer Loader and "walking" roof supports which enabled big increases in production at the coal face. If a colliery was not on the list for investment in mechanised mining then it was usually put on to the list of pits due for closure. The NCB's selective capital investment strategy, made even more selective by government fuel policies and the availability of cheap oil, had important social and spatial consequences for it forced the pace of pit closures in the coalfields of Scotland, North East England, the North West, South Wales and Kent.

Broadly speaking, the early 'seventies marked a different phase in the economic, social and technical restructuring of the coal industry, although the social and spatial implications were a continuation of the trends set in the 'sixties. The availability of cheap microelectronics

by the mid-'seventies enabled the NCB to enter its 'automation phase'. From the start there were underlying political motivations influencing both the way in which technology was designed and implemented. Major capital investment decisions were made from Hobart House and small teams of researchers worked on the Mine Operating System (MINOS) at Bretby. As in private corporations, the Coal Board's preoccupations tended to be controlling the production process, raising labour productivity and output from fewer workers, and lowering production costs, especially wage labour costs. The NCB deliberately chose specific designs of engineering systems and applications of microprocessor controls and monitoring devices to maximise managerial control over the labour process. After 1979, automation became part of the Coal Board's armoury in its drive to rationalise and maximise output from surviving pits. All the coalfields were hit by some pit closures and reductions in the numbers of miners, but the proportionate changes were greatest in the peripheral coalfields. So much so, in the late 'eighties, the imminent extinction of all public sector deep coal mining in Scotland, and other coalfields by the mid-1990s, is a distinct possibility (see chapter four).

It is useful to highlight some limitations and inflexibilities of the technological strategies adopted by the Coal Board (British Coal) before discussing possible alternative courses of action. In practice, the Coal Board has chosen a narrow perception of advanced mining technology based primarily upon output-raising, labour saving applications of new innovations. In terms of increasing output per manshift (OMS) and wresting control over the labour process from the majority of workers the Board has proved successful. But there has been a very high price to pay in that "success". The very fact that

the industry has developed super pits and implemented new technology to maximise productivity during periods of stagnant or falling UK coal demand has greatly added to pit closures and the consequent direct and indirect socio-economic costs (see chapter six). Looked at from the perspective of coalfield communities, miners and workers in mining-related industries, such an investment strategy is most definitely a failure.

The choice of mechanised and automated mining systems that can only operate optimally under what mining engineers term as the best conditions available is a self-restricting exercise. As Hirschorn (1984:4) observed:

'Technology alone cannot determine work and organisational design, which are also shaped by social and political interests. But technology can set the limits within which design decisions are made.'

The Coal Board's centrally-imposed, hierarchically organised, and unilinear technological path has had numerous drawbacks in addition to creating hundreds of thousands of job losses. Firstly, the industry's capital investment priorities can be criticized for the way in which they have facilitated the sterilization of coal reserves through "economic" pit closures and for the way they have encouraged exploitation, rather than the conservation, of coal reserves in working pits. Extraction rates of coal "in seam" in modern "high-tech" pits utilising heavy-duty equipment are often lower than 40 per cent (NUM, 1987:22). The NUM has called for a strategy which seeks to raise coal out-take from workable faces based upon wider definitions of what coal is "economically recoverable" from the ones currently in use. Millions

of tonnes of existing reserves will continue to be lost unless more flexible production technologies are designed and implemented to increase extraction rates and not simply the rate of output from coal faces.

British Coal is trying to make the most use of powerful heavy duty machinery in virtually all its existing mines. Such machinery can only be applied for continuous production in unfaulted, level and stable mining conditions. Pits with very thin, faulted or disturbed seams are unsuitable for the specific types of capital goods British Coal has adopted. The highly selective capital expenditure criteria chosen by the Corporation is partly set by the limits of the technologies it has chosen. Where the machines will not work efficiently the pits are likely to be categorised as "uneconomic" propositions. This is effectively a continuation of the "spearhead faces" investment strategy started in the late 1960s (see Section 5.1).

Another criticism of the Coal Board's approach since the early 'seventies is the way in which the majority of employees in the industry were deliberately excluded from the major decisions affecting the direction of technical change and work organisation. As noted above, many technological innovations in the coal industry were applied in such a way as to greatly reduce the number of workers and working pits in the industry. Automation has merely accelerated the trend (see Winterton, 1985 and Burns et al., 1985). In addition, the various MINOS sub-systems (FIDO; MIDAS; IMPACT) have greatly enhanced managerial control by increasing the flow of information on all aspects of the production process.

Engineers working in numerous industries have developed complex engineering systems and computer-integrated production processes. The coal industry is no exception. Difficult underground environments have become "coal factories" with completely integrated coal cutting, loading, carrying and processing. MINOS installations are available at all working pits although very few have all the MINOS applications in use. The next step is artificial intelligence for existing machinery and mining robotics. British Coal has already introduced experimental two-miner coal faces, and the day can not be far away when it is possible to have unmanned coal-faces, remotely controlled from surface stations (New Technology, 04-02-83:9; Tregelles, 1986).

Advocates of automation argue that it frees human beings from soul destroying, routine and back-breaking tasks. In fact, what has happened in the coal industry is that many thousands of workers were "freed" by redundancy, partly as a result of technical changes. In the long run, redundancy can become far more demoralizing and alienating a condition than pit work ever could be. This is a strong argument for objecting to a corporate strategy that seeks to increase productivity and maintain output from a minimum number of workers, especially given the lack of alternative job opportunities in mining districts (see Hudson, Peck and Sadler, 1984).

There are also inflexibilities in the way the Coal Board has concentrated design decisions in the hands of small groups of mining engineers and scientists. As pointed out in section 5.1, technical change is a complex, interactive process. If a large proportion of the people who are going to be directly affected by new technology are excluded from the design and planning phases, many options and choices

are immediately closed. The mining systems developed by British Coal do not make the best use of miners' skills and tacit knowledge. As far as it is technically possible to do so human skills have been incorporated into the machinery. The closed loop control systems adopted by the industry set out to increase the flow of information from various parts of the mine, from the coal face to surface plant, so that managers can closely monitor the whole production process. Whilst miners have not entirely relinquished control over the labour process to surface managers, they have conceded a lot of ground, and many mining jobs have become push button operations. This is not an inevitable outcome of increased computerisation. There are ways of utilising new technology in ways that make computers into worker aids whereby the worker still retains control over his/her job and continues to make key decisions helped by the additional information provided by computers (see Wilkinson, 1983; Feickert, 1979; Burns et al., 1985).

One indication of the way in which technical change has combined with rationalisation measures to produce a net loss of skills in the industry, is the reduction in the proportion of skilled miners and the lowering of the average age of miners. This has not necessarily made the workforce more compliant, although as a rule, a smaller, less experienced workforce may be easier for management to control and manipulate. As one miner of the 'eighties observed:

'Already a large number of older miners have taken redundancy. When I started in the mines, there were some miners who had taken part in the 1926 General Strike and could remember it as if it were yesterday. They would always guide the younger workers. Now they're more than happy to take early retirement, with the best redundancy terms anywhere in the industry. It was first offered at age 60, then 55, then 50, then thrown completely open to

any miner. These men are not being replaced. The average age - and skill - has gone down accordingly. It was a political decision to get rid of the old-timers. In fact, the new people are having to learn from the older ones how to do the job' (quoted in Bohan and Wroughton, 1988:99).

It is important to reiterate the fact that deskilling and job losses are ^{not} inevitable outcomes of technical change. Braverman (1974) considered deskilling to be a manifest feature of capitalist exploitation and accumulation. Others have argued that the introduction of new technologies on the factory-floor may lead to production reorganisation and a redistribution and redefinition of skills rather than a "unilateral deskilling strategy" (see Senker, 1984; Jones, 1982) (2).

In the nationalised coal industry the major decisions in the design and planning of new technology and work organisation became increasingly centralised and the prerogatives of senior managers and engineers. Another dimension of the problem may be in the shared attitudes, assumptions and beliefs within the mining engineering profession. Rosenbrock (1981) has questioned what he has termed the dominant engineering paradigms of industrial societies (both capitalist and socialist), which place a premium on designing and using highly sophisticated systems for raising productivity that end up in dehumanising and in trivialising work.

'What is remarkable is that engineers and technologists have not produced any methodology for using to the full the abilities and skills of human beings' (Rosenbrock, 1981:3).

As he has also observed:

'When one visits the research and development laboratories in which new technology is conceived and brought forth, one finds a climate of technological endeavour in which the effect of technology upon people is ignored' (Rosenbrock, 1985:341).

Such observations are clearly applicable to the coal industry, especially since the mid-1970s. MINOS and its sub-systems were introduced into British collieries in a piecemeal fashion which obscured the overall management strategy from the National Union of Mineworkers. There was no consultation with the miners' union or work people during the planning and design phases of MINOS. Furthermore, the differential geographical impact of colliery investments and new technology combined with the reintroduction of decentralised pay bargaining to inhibit the development of an industry-wide strategy by the NUM in response to NCB decisions (Burns et al., 1985:93 and NUM, 1987 a & b).

In the 'eighties the politics of Thatcherism has filtered down into the management and organisation of the nationalised industries. The pressures of the imminent privatisation of the electricity supply industry; of an increase in coal imports; of tight financial constraints on the industry; combined with the new machismo of British Coal's management, who have successfully extended their frontier of control in spite of resistance from the NUM, mean that the changes affecting the industry are likely to be even more rapid in the early 1990s. If any case is to be made for the nationalised coal industry in such a hostile political climate there is clearly a need to develop

alternative approaches to the organisation and control of production, and to technical change, than have hitherto been tried.

It can be argued that alternatives are needed on economic and social grounds. In addition to the massive direct and indirect socio-economic costs of redundancies, plant closures, under-utilised fixed capital investments and the sterilization of millions of tonnes of coal, there are built-in inflexibilities in the modern mines. Some of these inflexibilities have been mentioned. Over reliance on capital-intensive, computer-integrated production with minimal human "interference" is vulnerable if failures occur in parts of the system. Long production delays may result if only a few highly trained people are available to rectify the problem. In mining, a delay in one part of a mine will create bottlenecks elsewhere. As British Coal engineers have argued, the increase in capital costs relative to labour costs in most collieries means that machines have to be worked continuously in order to reap adequate returns on investment (see Moses, 1988; Northard, 1987). Mining systems based upon greater human operator control and upon maximising the skills and knowledge of workers at all levels of the production process would ensure a flexibility of response to mechanical and electronic breakdowns.

Different ways of utilising existing mining technology have already been suggested. The NUM (1987) outlined proposals for using technology in ways that would benefit the maximum number of people working in the industry, rather than the lucky few who keep their jobs. Instead of adopting technology in labour-saving ways the same technology could be used to employ more people less intensively, whilst simultaneously maintaining machine running time and output. This is

partly why the NUM national executive has staunchly resisted six-day working and favoured reductions in daily working hours and the working week per employee. British Coal's proposals for flexible working and continuous six or seven day production may increase employment at some collieries, but they will also raise productivity which would create, under current political and market constraints on demand for British coal, further pit closures (see Section 5.2).

Of course, alternative ways of using technology and organising the jobs that people do require very different objectives to those currently underlying the coal industry's capital investment and production strategy. These objectives need to be incorporated into the design of engineering systems and into job design.

'... the particular design depends upon the specification of objectives : systems engineering can be used for radical economic planning and control and can incorporate objectives such as democracy into design' (Burns et al., 1985:95).

In turn, a change in direction would need a more imaginative approach to developing human skills and technology on the part of mining engineers. But as Rosenbrock (1981:4) observed:

'The engineering paradigm is not explicit, and it prevails not by a conscious choice, but by suppressing the ability to see an alternative.'

He suggested an "alternative paradigm" whereby engineers attempt to develop technology which is matched to human ability, and which fosters skill and makes it more productive.

Senior Board members, managers and mining engineers have played a greater role in the direction and shaping of changes in work organisation since the mid-1970s, but this was not always the case. Some indication of this is given by the NCB's system of offering cash incentives for innovative technical ideas during the 1960s. The Awards Scheme, as it was called, was an effort to tap the largely uncoordinated expertise connected with mining and processing coal at different levels within the industry. The scheme attracted as many innovations from non-professional NCB personnel (ie miners, fitters, electricians, deputies, overmen, machine operators) as from professional personnel (ie mechanical and mining engineers, electrical engineers, geologists, chemists, colliery managers, under-managers, etc.). The number of awards rose rapidly throughout the mechanisation phase in spite of the sharp decline in numbers employed, and the increasing contribution from the NCB's professional research and development establishments. As Townsend's (1980:153) study of innovations associated with shearer-loaders noted:

'In coal mining, as in many other industries, local non-patentable adaptations of machinery and equipment are an extremely important part of the exploitation of innovations. Taking into account the variations in seams and coalface conditions throughout the British coalfields, the awards scheme gives a fair indication of the scale and importance of this local adaptive learning process.'

The significance of local adaptations and innovations in the overall technical change process was also stressed in Saville and Kerevan's (1987) study of Scottish engineering workshops (also refer to chapter three), They argue that the Coal Board has moved in entirely the wrong direction by centralizing formal R & D within the technical

headquarters at Bretby, which literally drained all the good ideas and capital resources away from the central workshops. According to Saville and Kerevan's analysis, had the workshops been given a more autonomous managerial role, adequate capital investment and responsibility to design and manufacture some of the equipment needs of local colliers, technical solutions would probably have been found to production difficulties at so-called 'marginal' collieries. Put another way, a more decentralised technical change process involving workshop facilities in the research, design and development of technology, would have helped raise production in pits sited in the peripheral coalfields and lessened the likelihood of pit closures.

Since 1983 British Coal has followed the recommendations of the Monopolies and Mergers Commission by reducing the number of workshops and by reorganising their activities. Each workshop has become specialised in specific items of equipment such as shearers, roadheaders, conveyors or roof supports (see chapter three, table 3.6). This means that area workshops are now serving the whole industry and doing less work specifically related to their own coalfields and nearby collieries. The decline in the number of pits and faces has led to further cuts in workshop numbers.

The reorganisation of workshop functions coupled with the restructuring within the British Coal industry has renewed pressures on existing workshops, particularly those in the peripheral coalfields. An example is Ashington workshop in the North East of England. In 1988 the workshop was doing repairs on roof supports, roadheaders, underground locomotives, diesel engines, cages and skips, for local and other coalfields. During the 1988/9 financial year British Coal has

reduced the volume of repair work at some workshops, and it has decided to transfer all Ashington's roof support repair work to Duckmanton in Derbyshire. This effectively makes Duckmanton the only national repair facility for roof supports other than the private manufacturers themselves. According to British Coal, the reduction in the corporation's annual orders for new supports from some 10,000 items a few years ago to only 6,000 supports in 1988 justifies the concentration of support work at Duckmanton. The action has provoked strike action by Ashington's 470-strong workforce, of whom some 146 were involved in work on roof supports and face redundancy (Newcastle Journal, 17-01-89:5). In many ways the reorganisation of workshop production is in line with British Coal's technical changes, capital investment strategy and area reorganisation, which have concentrated productive resources in the central coalfields.

It can be argued that British Coal has adopted a minimalist approach to technical change and has not made full use of the skills, expertise, resources and infrastructure available to it. Investments have increased spatial divisions in the industry by favouring the best seams of the central coalfields. Centralising formal R & D facilities reduced the scope for decentralised innovations designed to meet the needs of collieries outside the central coalfields. Nevertheless, British Coal's approach is certainly not the only one. Efforts could still be made to adapt, modify or change existing technology for use in seams of varying thickness, including very thin seams, faulted seams, or on steep gradients. Wherever it is technically and economically prohibitive to apply heavy duty machinery, conventional equipment could be modified to meet the particular conditions of the colliery. Employers at all levels and engineering workshops could be involved

much more in the innovation process, and in the organisation of work. Of course, much would depend upon the underlying objectives and the economic criteria used to influence the technical change process. As far as the author is aware, there has never been any serious attempt in the industry to design and develop technology and organise production using concepts such as long-term non-renewable resource conservation; raising coal extraction rates from existing working collieries; upon making the best use of human skills and expertise; and upon stabilising and maintaining employment within the industry. Some guidelines for such an approach could be:

- (1) The development of the concept of pit or coalfield appropriate technologies;
- (2) A more even investment programme based on making the best use of coal reserves and human skills in each coalfield, and not just the best collieries mostly within the central coalfields;
- (3) Wider definitions of economic (and social) costs and benefits of capital investment/disinvestment decisions. These should include at least the costs of job losses and redundancy payments in mining and related industries (see Hudson, Peck and Sadler, 1984; Coalfield Communities Campaign, 1986; and chapter six on linked industries).
- (4) Productivity criteria would need to be based as much on notions of improving coal extraction rates as upon raising standard indices of productivity, such as output per manshift.

- (5) Capital investment decisions should be based on considerations of long-term coal conservation and employment, and not simply on short term financial and market criteria. Pits, unlike factories, cannot be reopened which means that decisions based upon short term criteria have major and long lasting implications for local economies (Schumacher, 1960).

- (6) The priority should be on making the best use of existing capacity without the need to close pits unless their coal reserves are exhausted. The development of the Selby super pit has created additional capacity and raised productivity thresholds, and so Selby has literally turned other pits into excess capacity (Winterton, 1985). New mines should not be developed if they are going to lead to further premature pit closures.

For any one of these guidelines to be implemented would virtually take a reversal of current state and corporate policies. It is not too late to change course, even though there are now only a few remaining pits in the peripheral areas. If there was a political commitment to base energy policy on what is available in terms of indigenous resources, employee skills and expertise, and upon the existing coal infrastructure, including engineering suppliers, there is no reason why the industry could not be maintained at current production levels without another round of pit closures and redundancies (see concluding chapter).

Conclusion - Only a Dream?

At the National Union of Mineworkers' conference on 20 December 1946, Arthur Horner, the Union's General Secretary, rounded up his speech on an optimistic note:

'... when the flags go over the pits for the National Coal Board - it does mean something different. It is a tremendous change ... It is not a change in name; it is a change that gives us the possibility of realising things we have only dared dream about for years and years and years' (NUM, December 1946).

In reality nationalisation has failed to protect employment in mining communities and it has failed to produce new ways of organising work that gives workers more say in the day-to-day running of the industry. Lack of democratic control has influenced almost every aspect of the way in which the mining industry is organised, including the design and development of technology, even though its manufacture was mostly in the private domain. Just one year after nationalisation Heinemann (1948:64) realized:

'There is a very real danger that under nationalisation much of the skill and organising ability of the men on the job will continue to be wasted because of the composition of control itself. Capitalist controls at the top are not the best recipe for producing a spirit of Socialist emulation at the bottom.'

Most of this chapter has focussed on the issue of technical change, which raises wider and more important issues. As Cooley (1980:537) argued:

'Science and technology is not neutral, and we must at all times expose its underlying assumptions. We can at the same time begin to indicate how science and technology might be applied in the interests of people as a whole rather than to maximise profits for the few.

The choices are essentially political and ideological rather than technological. As we design technological systems, we are in fact designing sets of social relationships and as we question those social relationships and attempt to design systems differently, we are then beginning to challenge, in a political way, power structures in society.'

Such considerations as those expressed by Cooley (1980) raise questions about the meaning and purpose of nationalisation in Britain. As noted in this chapter there was a deliberate centralisation and concentration of control over investment planning, economic and technical change in the industry. It has never been an objective of management to attempt new forms of work organisation based on concepts of on-the-job control and in the involvement of workers at every stage in the design and implementation of new technology.

In a conference on "Industrial Democracy" convened by the NUM in Harrogate, December 1977, Peter Heathfield, later to be NUM General Secretary, argued that the miners had limited themselves, alongside other sections of the British labour movement, "to the inept practice of an unsatisfactory concept : consultation", whereby workers were left with little say and no rights of veto over management decisions. Nationalisation should mean more than just a change of masters, it offers the opportunity to

'formulate and fashion new systems of management that will enable the socialist cause to advance'
(Workers' Control Bulletin, No. 37, 1978).

From time to time there have been various experiments with worker participation in both public and private sector enterprises, such as "quality circles", "job enrichment", "autonomous work groups", "consultative committees", and the like. The whole consultative framework set up by the National Coal Board was an attempt at increasing market participation (see Section 5.1). But the Coal Board became preoccupied with the variable costs of production especially labour, and in ways to increase productivity, and it introduced new technology in labour-saving ways. According to Nichols (1980:25):

'as a matter of plain historical fact, very little control over the labour process has been relinquished voluntarily, and what element of control has been "given" to workers has usually only been "given" when compensated for by increased or stabilised production.'

It is reasonable to argue that whilst full workers' control within Britain's nationalised industries cannot be achieved without wider social and political change, this does not excuse the development of highly centralised, top-down decision-making structures. It does not mean that social objectives have to give way always to short term commercial criteria in the running of these industries. In other words, there is nothing axiomatic in the view that nationalised industries should be market orientated to the detriment of broader social objectives and the majority of people working within those industries. As Coates (1978) observed:

'If we can't democratise the nationalised industries, they will remain authoritarian state capitalist enterprises. Why should anyone wish to swap a private capitalist boss for the state variety? If we cannot prove the superiority of nationalisation in practical democratic

experiments, how can we persuade workers to support its extension?... until workers want workers' control and industrial democracy, they won't even vote for change, leave alone rebel for it. The most powerful argument for change is to show that it works.'

This section of the thesis has raised the issue of workers' control. The importance of the concept should not be understated. It is fundamental to any understanding of the failings of nationalisation in practice. State ownership offered unique opportunities for practical democratic experiments in the organisation and control of work, which were missed. In the 'eighties there has been an expansion of private capital and of denationalisation. The government argues that workers will benefit from share ownership and greater participation in the private sector. If an alternative to private ownership of coal resources and production is to be found it is necessary to tackle the issue of industrial democracy.

This final section has examined some areas where existing forms of control and organisation can be modified or changed to increase the social responsibility of the coal industry to maintain coal production and conserve reserves for future generations; to secure employment; and to introduce a more regionally-balanced investment strategy. Social objectives of this kind would greatly benefit coalfield communities, and in the longer term should produce benefits for the wider economy.

This chapter has examined external relations of production between the state and the state-owned coal industry, and between state owned and private capital. In order to bring about fundamental changes in the way production is organised, decisions are made and jobs are

designed within the nationalised coal industry, it is necessary for the state to intervene and to encourage change. It could do so along lines suggested by Saville and Kerevan (1987) for the Cowdenbeath workshop, whereby local authorities, workshop managers and workers would have a greater role to play in developing their own production strategies and in the innovation process. Personnel at local collieries should also be allowed more say in determining their own future. Decentralisation of power would have encouraged greater investment in peripheral coalfields and lessened the emphasis placed on big capacity raising projects like Selby. British Coal could have used its monopoly purchasing power in the home market to encourage the development of a range of mining technology designed to match different conditions, as opposed to machines simply to maximise productivity on the best seams.

Many of the arguments about nationalisation have polarised into pro or anti statements without really examining the internal weaknesses of individual nationalised industries and their relations with the state and with the wider economy. Privatisation will undoubtedly create new opportunities for some sections of private capital but as it is argued here, will not produce more stable employment or more satisfying work for the majority of miners. These are issues that have to be met by the labour movement. As noted in this chapter, deliberate social and political choices have played a crucial part in determining the scale and rapidity of decline in the UK coal mining industry and in shaping the geography of that decline. The following chapters will focus much more on changes taking place in the engineering industries linked to British Coal. As shall be shown, not all sections of private industry will benefit from coal's privatisation.

FOOTNOTES AND REFERENCES

- (1) The shareholdings NCB members have had in private mining engineering companies has not been without controversy. A series of articles in Private Eye during 1971 and 1972 levelled a number of serious allegations against senior Coal Board personnel. It was alleged that NCB managers' shareholdings purchased when Bonser Engineering Limited went public in July, 1964, had an influence on NCB purchases of Bonser roof supports in the period from 1965 to 1969. During that period Bonser supplied around six per cent of the total number of supports bought by the NCB, and at the peak of sales in 1967-8 Bonser contributed nine per cent of the total purchases. This was a relatively large contribution given the fact that Bonser only entered into the production of powered roof supports in 1964. There were also some complaints from colliery managers that the Bonser supports were inadequate compared with those supplied by other manufacturers.

Among the shareholders in Bonser was Mr. Alfred Robens, son of Lord Robens, NCB Chairman. Alfred had married Patricia Bonser, the daughter of Mr. F. Bonser, Chairman of Bonser Engineering. The wife of Mr. M.V. Sheppard, then Director General of Production at the NCB, was another shareholder. In response to questions from the Select Committee on the Nationalised Industries, the Board's accountants, Thomson McLintock argued that it was "quite natural" for Board personnel on the production side to spare

an investment for firms "where they could keep an eye on how things were going". It was well known that the powered support revolution was underway and that the NCB would continue to invest heavily in coal face mechanisation.

Furthermore, such investments by individual NCB members "did not contravene any NCB staff rules" (Select Committee, 1974/5, Appendix 3, para. 10:274).

- (2) There is no doubt that the application of microelectronics has changed the nature of work in many industries and blurred traditional job boundaries at all levels, from the point of production to top management, but this does not necessarily imply deskilling is taking place even though the numbers of traditional engineering jobs has rapidly declined. Where empirical studies do find evidence of deskilling it is important not to pin the blame on the technology. There is nothing "inherent" in the hardware that would allow for the deskilling and control and surveillance of production (and workers) by management. As in the coal mining industry, it is important to analyse who designs and controls the technology and their reasons for implementing it in particular ways. It is also necessary to examine broader political, economic, organisational and social constraints and processes.

TABLE 5:1

Moses' Suggestions for Improved Competitiveness

- (1) All measures which reduce cost per tonne must be vigorously pursued;
- (2) Steps must be taken to improve the link between productivity and earnings. The aim must be to introduce more flexible working arrangements.
- (3) The priorities within the investment programme will be : 1) 'operational' capital to exploit fully the best existing capacity and reserves to improve underground infrastructure and reduce costs; 2) additional/replacement output at the existing best mines; 3) new prospects capable of earning the required rate of return.
- (4) The output at low cost collieries and opencast sites must be maximised to reduce average costs.
- (5) Collieries that do not have or appear not to have prospects of making an economic contribution will need to be examined under the Colliery Review Procedure.

Note: Moses also noted four areas of cost reduction:- Introducing "retreat" mining; shield support faces; speeding up development drivages; improving machine reliability. Moses, K. is Technical Director and member of the Board of British Coal.

Source: Moses, K. (1986) 'The Need to Cut Costs' in The Mining Engineer, July 1986:11-12.

TABLE 5:2

Northard's Suggestions for Improved Competitiveness

- (1) Concentration of production on fewer high capacity units. Heavier capacity and heavier duty equipment. Changes in technology are not foreseen.
Increase in the proportion of retreat faces.
- (2) Concentration in time by maximising production time of coalface equipment by:
 - a) Cutting out delays through better layout and organisation;
 - b) eliminating "in shift" breakdowns through better machinery design and maintenance systems;
 - c) extending production time (currently reduced by incomplete use of the time within the potential day and the week).
- (3) Ensuring continuity of coal production by having new capacity available at the required time and by speedy transfer of coalface plant.
 - greater use of roof bolts; FSVs (free steer vehicles).
- (4) More widespread use of modern roadway transport methods such as FSVs. FSVs ensure the continuity of coal production, drivage rates and transfer of face plant.
- (5) By concentration of face capacity and better utilisation of existing coal conveying and winding installations to cut out transport stoppages.
 - Total application of the MINOS systems.
 - Improved control of the underground environment through the more widespread application of proved computer monitoring and control of ventilation systems, methane dilution and drainage.
- (6) Improving organisation by reappraising needs for management and supervision. This is necessary to fit the needs of new production methods and technology, and within the requirements of existing legislation.

According to Northard, no new technology is required, only the more widespread application of that which is available within a more effective organisational framework.

Note: J.H. Northard was the Director of Operations for the British Coal Corporation. He is now Deputy Chairman of the Corporation.

Source: Northard, J.H. (1987) 'Wind of Change - Management Response' in The Mining Engineer, September 1987:107-116.

TABLE 5:3

Wheeler's "model" colliery
The "Low Cost Option"

Output	1.75 m
Manpower	1 390
Production Days	6
Shifts/Day	3 ext.
Machine Shifts/Day	9 ext.
Coalfaces	3
<hr/>	
Cost/gigajoule	£1.11

Note: ext. means extended

Wheeler argued that the lowest cost coal could be achieved at the "typical mine" by producing coal on six days per week with the men employed on a four day rosta working nine hour shifts. Further reductions could be made by reducing the working faces to three and making more effective use of the manpower augmented by outside contractors.

A. Wheeler was Director of the Nottinghamshire Area for British Coal and is now Director of Group Operations for BC's peripheral administrative coalfields.

Source: Wheeler, A. (1986) 'Frontiers and Forward - Colliery Production and Productivity' in The Mining Engineer, September 1986:152-160.

TABLE 5:4

Main elements of British Coal's "flexibility" plans

- (1) Coal production over six days per week
- (2) 4 x 9 hour shifts per day underground on a continental shift basis
- (3) Winding shafts to work for 23 hours per day as full capacity
- (4) Heavy duty face technology to become standard on all major faces and concentration of production on fewer high producing faces
- (5) Wider use of automated techniques to improve machine reliability, reduce down time and cut the number of craftsmen's jobs
- (6) To merge fitters and electricians into one multi-skilled electro-mechanic and transfer some maintenance tasks to machine operators
- (7) To cut the number of deputies and officials and change their role to that of supervisor
- (8) To revise the Mines Health and Safety Legislation to permit the use of new working practices and reduce the influence of the deputy
- (9) The introduction of a range of new incentive schemes intended to cover all groups of workers at a colliery and hasten the changes by replacing national level pay bargaining
- (10) To increase the use of roof bolts, trackless vehicles and other highly flexible production techniques used in the USA
- (11) To increase the use of outside contractors across a wide range of mining functions
- (12) To reduce jobs in every part of the mine both underground and on the surface

Source : NUM (1987).

TABLE 5:5

Vital statistics underlying British Coal
productivity increases since 1982/3

	Percentage Change + or -
Daily output per coalface	+ 94%
Output per Manshift (OMS)	+ 85%
Operating costs in £ (sterling) per gigajoule (the metric heat value of coal)	- 25%
Saleable coal output	- 21%
Number of coalfaces	- 59%
Colliery employment levels	- 58%
Number of pits	- 51%

Note: Since the end of the miners' strike in March 1985, British Coal have highlighted the following changes:

- (1) Productivity increases at collieries by 75% (see Figure 5:3);
- (2) Operating costs at collieries down 30% (see Figure 5:4);
- (3) Workforce reductions by almost 50%;
- (4) 79 collieries closed or merged (up to September 1988);
- (5) Price reductions to electricity suppliers by nearly 20% (in real terms);
- (6) Capital investment totalling £2,200 million and continuing at the rate of £2 million every working day.

Sources: FT, 14-02-89:6 and British Coal Press Release, 10-10-88.

TABLE 5:6

Capital expenditure on major capital equipment, March 31, 1984

Region	Total estimated costs (£million)	Number of operational collieries
Scotland	70	9
North East	27	16
North Yorkshire	1,183	12
Doncaster	491	10
Barnsley	327	16
South Yorkshire	185	15
North Derbyshire	30	9
North Nottinghamshire	84	14
South Nottinghamshire	11	11
South Midlands	24	14
Western	153	16
South Wales	20	28

Source: NCB Report and Accounts, 1983-4.

TABLES 5:7

Proportion of Total Output (T0) Cut and Loaded by Various Types
of Machines in British Coal Mines, 1954-1972

Year	Meco-Moore % T0	Shearers % T0	Ploughs % T0	Trepanner % T0	T.P.S.L. % T0	Others % T0	Total Tonnage 10 ⁶	Mechanised %
1954	4.0	0.5	0.9	-	-	2.9	211	8.4
1956	5.0	4.8	1.4	0.2	-	4.9	207	16.4
1958	5.0	14.1	3.1	2.3	-	6.7	199	31.2
1960	3.9	17.7	5.4	8.2	-	5.2	184	41.6
1962	1.5	24.7	6.9	15.8	1.7	7.7	188	58.4
1964	0.5	30.7	6.9	19.2	5.3	5.8	187	68.4
1966	-	41.1	6.1	20.6	8.3	4.3	174	80.4
1968	-	60.7	3.3	15.7	5.0	4.2	163	90.0
1970	-	72.5	2.9	15.4	2.6	4.4	140	92.1
1972	-	67.6	2.9	17.7	1.6	2.6	109	92.7

Source: NCB Statistics Department
Adapted from Townsend (1976)

TABLE 5:8

Numbers of Roof Support Suppliers to the NCB before and after
industrial reorganisation in 1969

1959	3 suppliers
1960	4
1964	5
1965	6
1966-8	8
1969	5 (3 account for over 95% of NCB market)

Note: In the mid-1960s the NCB was buying around 21 basic roof support designs with variations in height, weight, etc.

In the mid-1970s there were 14 basic designs from three dominant suppliers.

The IRC-sponsored mergers leading to the formation of three dominant suppliers after 1969.

First merger : Dobson Hardwick and William Park : Dobson Park
(Gullick Dobson is major company in Dobson Park Industries).

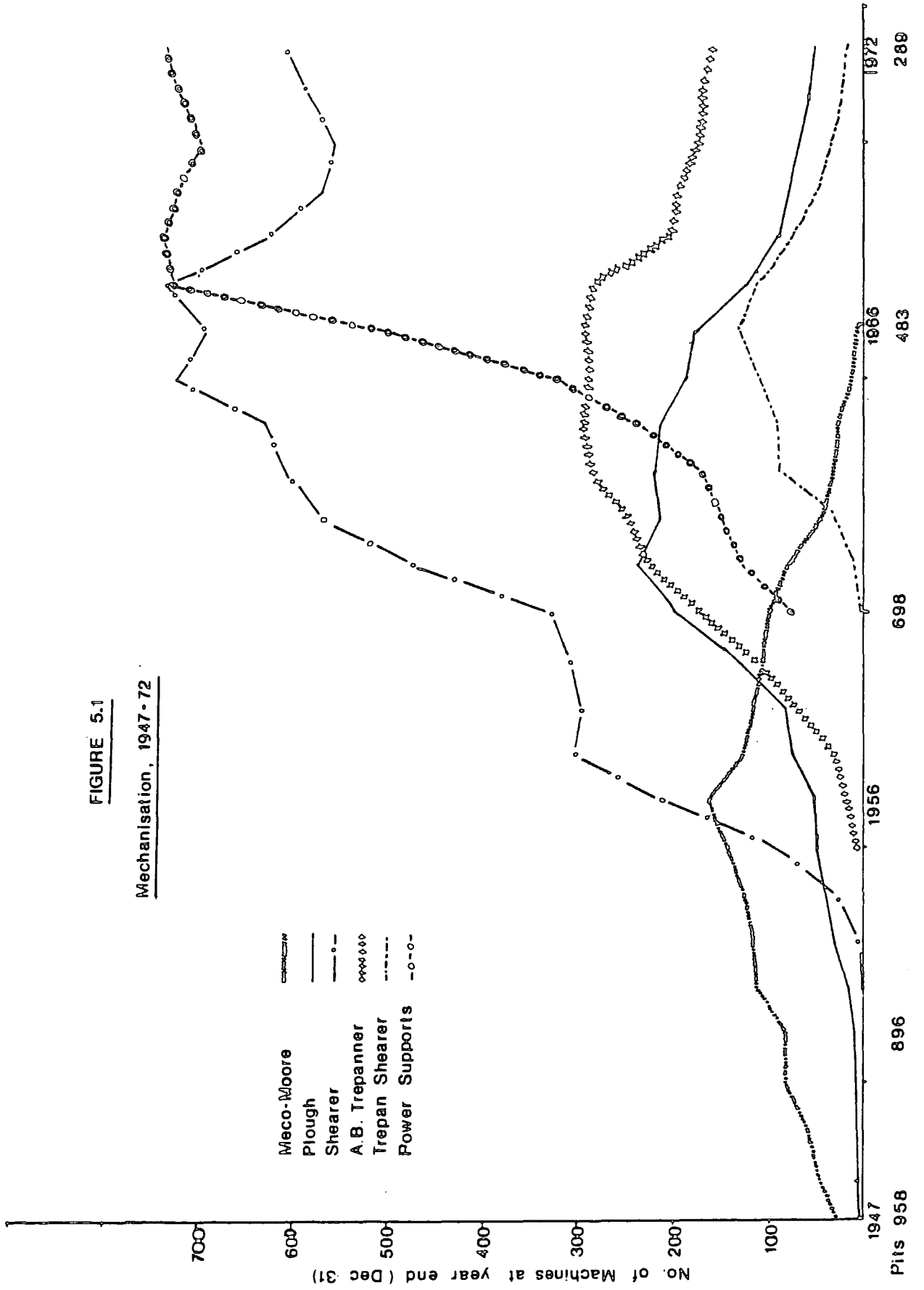
Second merger: Fletcher & Steward, Richard Sutcliffe and A.G. Wild
to form Fletcher, Sutcliffe, Wild (FSW), taken over by Dobson
Park Industries in 1981.

Third merger : Dowty Group and Bonser : Dowty.

Note: In 1989, the Dowty Group is considering the sale of its mining supply business, which could leave Gullick Dobson as the dominant, if not monopoly, supplier to British Coal (see Concluding Chapter).

Source: First Report from the Select Committee on Nationalised Industries (1974/5).

FIGURE 5.1
Mechanisation, 1947-72



1947
Pits 958

896

698

1966

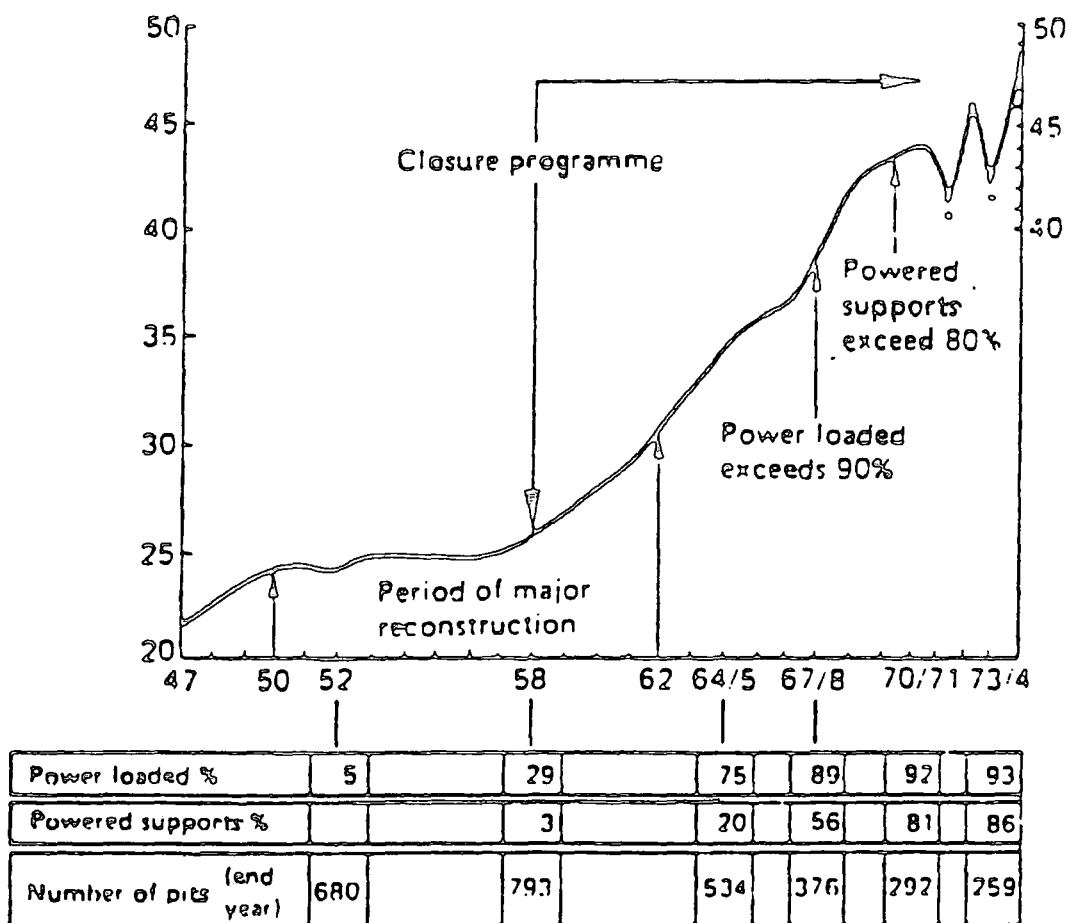
483

1972

280

FIGURE 5:2

Increase in UK Output Per Manshift
and the Pit Closure Programme



Source : Paper prepared by T.R. Carr, Mining Research and Development Establishment, NCB.

FIGURE 5:3



Colliery productivity up by 75%

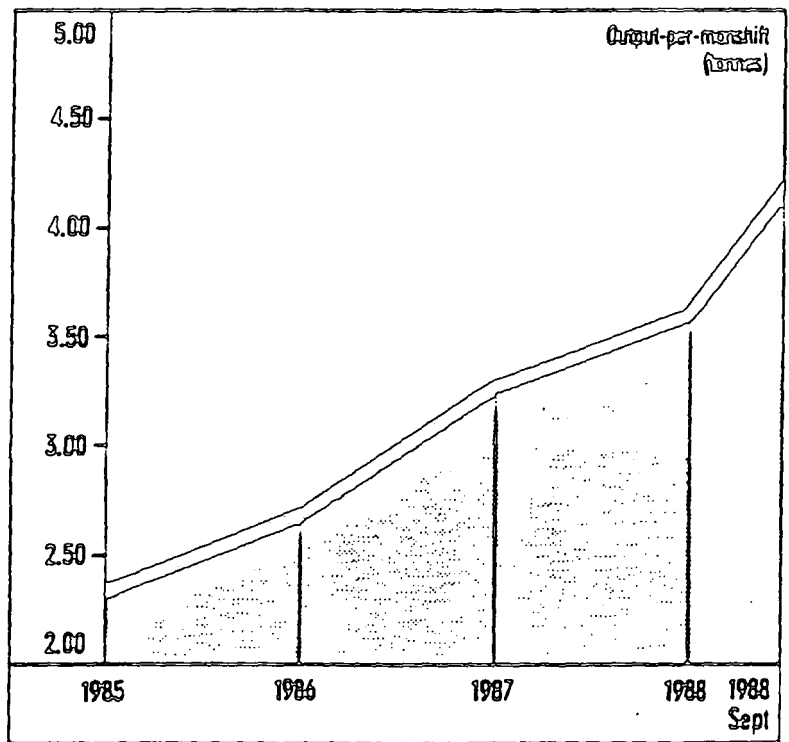
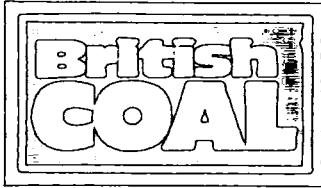
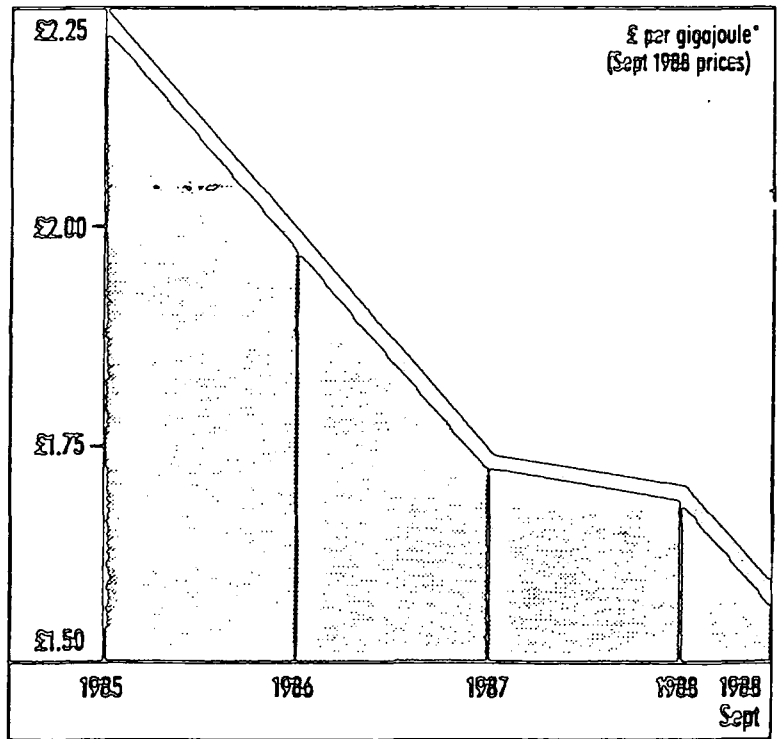


FIGURE 5:4

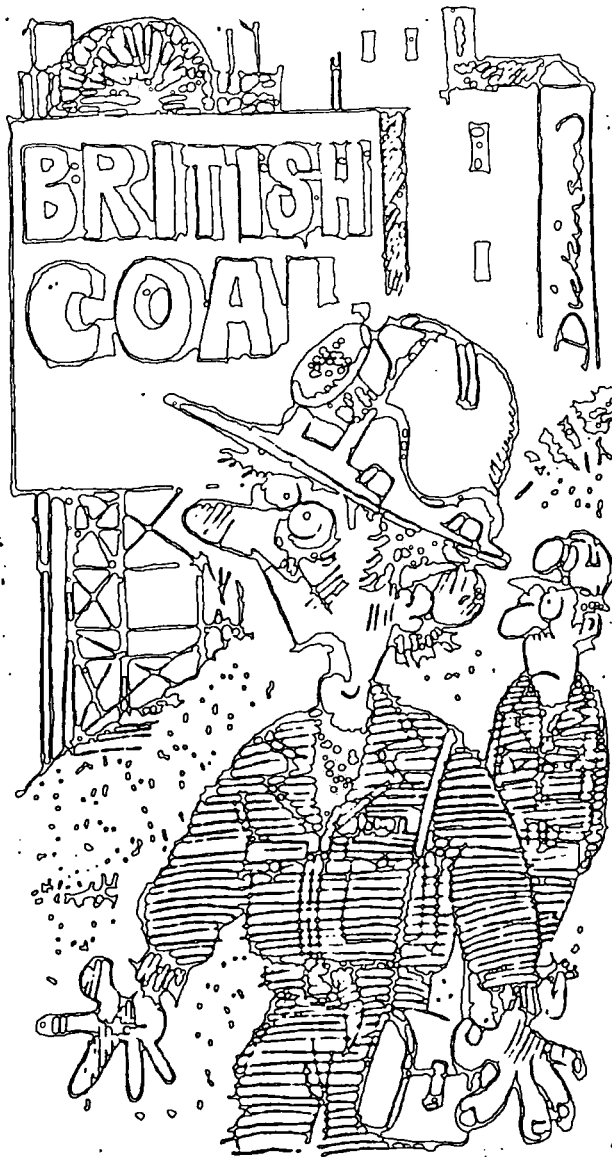


Colliery operating costs down by 30%



*Gigajoules (approximately) measure the heat energy in coal and are the main indicator of comparative coal performance. Coal qualities and types vary. For example, anthracite (32.5 to 34 GJ/tonne) has a higher heat content than steam coal for power stations (24-25 GJ/tonne).

FIGURE 5:5



“Where am I? When I went
down it was called National
Coal Board”

This cartoon appeared in the Financial Times, 30-04-86,
shortly after the Coal Board had decided to change its
name to one reflecting a "business" rather than a
"national institution".

