

Surrey Energy Economics Centre

Discussion Paper Series

**Editors: David Hawdon, Peter Pearson and Paul Stevens
Department of Economics, University of Surrey,
Guildford, Surrey GU2 5XH**

**ENERGY PRICING: REGULATION
SUBSIDIES AND DISTORTION**

**Ian Brown, David Harvey
Gerald Leach, Gordon MacKerron
Peter Pearson and Paul Stevens**

March 1988

SEEDS No. 38

STUDY GROUP ON THIRD WORLD ENERGY POLICY

These papers were given at:

Workshop on Energy Pricing: Regulation, Subsidies and
Distortion

King's College London, 1 October 1987

ISBN 1852370254

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INTRODUCTION AND SUMMARY

by Peter Pearson and Paul Stevens
Surrey Energy Economics Centre
Department of Economics University of Surrey

At previous meetings of the Third World Energy Policy Study Group, the issue of energy pricing policies and subsidies had proved to be a recurring theme with many and crucial implications. It was therefore decided to devote a whole session to the topic and the sixth workshop, held at King's College London and financed by British Petroleum focussed on energy pricing and subsidies in less developed countries (ldcs). By way of a contrast to earlier meetings, three of the five papers which were presented examined the issue in the context of the industrially developed countries in an attempt to see what lessons might be gleaned.

The proceedings began with a paper from **Ian Brown (Association for the Conservation of Energy)** which considered the energy subsidies in the USA for the year 1984. He estimated that in the year total Federal subsidies to the energy sector was at least 44 billion US dollars. This was approximately 500 dollars per household per year. The total was composed of three broad categories. First, some 30 billion dollars were accounted for by various tax deductions including such items as investment tax credit, expensing of construction period interest, and public utility tax exemptions. A major beneficiary of these exemptions was the electricity sector. The second category was some 8.5 billion dollars in the form of direct government expenditures on Agency Program Outlays. These included expenditure on the Environmental Protection Agency and on the Strategic Petroleum Reserve. The final category was some 5.5 billion dollars on loans and loan guarantees.

Ian Brown then considered the subsidies by different type to the various energy subsectors -electricity, oil, gas, coal and renewables. Of these subsectors, electricity received 65 percent of the total while oil and gas together received 25 percent. The capital-intensity of the electricity sector would inevitably lead to its receiving the lion share of the subsidies. However, Brown raised the issue of the US Department of Energy's claim that the subsidy program was fair pointing out that in return for the 65 percent of the subsidy bill, electricity produced only 13 percent of US energy. Based on heat value, he pointed out that electricity received eleven times as much subsidy per unit of output than oil, gas and coal and forty eight times as much a energy saving technologies. Furthermore, of the electricity subsidy, more than half went to the nuclear sector although that sector provided only 15 percent of electricity generated.

The paper then turned to the implications of these subsidies (and their uneven distribution) and the US energy market in particular and the economy in general. Among some of the effects listed were a skewed distribution of private investment which militated against energy conservation and resulting in a higher-than-otherwise US energy/GDP ratio. Brown concluded his

paper by pointing out that the nature of energy subsidies in terms of both their growth and maintenance were due almost entirely to political imperatives rather than any economic logic.

In discussion it was pointed out that virtually all US industry receives subsidies in one form or another and that some subsidy level could be justified on the grounds of a divergence between private and social rates of discount. This then gave rise to a discussion on what if anything was different about energy subsidies compared to subsidies in other sectors.

The next paper by **David Harvey (University of Newcastle)** was concerned with an issue closely related to the energy subsidy issue, namely the effect of subsidies on land use in the UK agricultural sector. The paper began with a brief summary of the links in terms of economic theory between the imposition of subsidies and the consequent effects on land use. He pointed out that if all agricultural production is subsidised, then there is no economic rationale for switching land between different uses. However, intensity of land use would be expected to increase as would the value of the land. Based upon recent UK experience, Harvey presented the preliminary results of a simulation model of agricultural land use in England and Wales in which levels of agricultural support were altered.

After considering the policy effects for England and Wales, he considered the analogous implications for ldc's. For England and Wales, the simulations based on zero subsidies pointed to a change in land use in the traditional grazing areas rather than in the cereal producing regions. Given that most energy type crops have requirements similar to cereals, this implied that energy crops must compete effectively with cereals given present conditions. Also, the view that cereals receive a very heavy subsidy does not take full account of the subsidies to other land-use activity and so is overly partial.

Harvey felt that a similar market-based logic could also apply in ldc's, particularly because reduced levels of protection tends to increase world cereal prices. There maybe some possibilities of substituting biomass energy for imported fossil fuels in some ldc's, but such a switch would be very much influenced by the relative prices of cereals, energy crops and other energy sources. Export of energy crops from the ldc's was thought to be unlikely given the high proportion of the cif element in the final price.

Gerald Leach (International Institute for Environment and Development), presented a paper on urban prices of firewood, charcoal and kerosene. He began by emphasising the existence of large spatial variations in both absolute and relative prices and their trends. Explanations of these difference were of crucial importance because they are central to questions of urban energy planning and consumer welfare and also to issues of conservation, fuel switching and the availability of biomass fuel. He stressed however how little we really knew of such issues because of the poor data coupled with the complexity of urban market chains and

the structure of prices.

Leach then turned to a brief outline of the deforestation price model. In the first phase of this model, there is a plentiful supply of forest and tree resources given the relatively low population. However, as consumption rises, tree cutting (including non-energy uses) exceeds the natural regeneration rates leading to deforestation. This is most noticeable around the peri-urban areas. As a result woodfuel prices rise because of increases in the costs of collection and transportation. Rising transport costs also encourage the charcoal trade given the relatively lower percentage of cif in total value for charcoal versus wood. Thus phase two of the model is characterized by rapid deforestation and rising prices. Phase three is more of the same but at more acute levels. However, at some point woodfuel prices are capped by alternative fuels and a process of substitution occurs leading to a stabilization of woodfuel prices. However, because of the relative cheapness of the energy using appliance (ie at basic a simple fireplace) plus the existence (albeit on a reduced scale) of some 'free' wood, the woodfuel price would tend to stabilize above the price equivalence of alternative energy based upon the price per unit of useful energy.

Leach then pointed out that a World Bank Study had tried to empirically test the model and found considerable support for its accuracy. The study also revealed that the movement from phases 1 to 2 could occur extremely quickly leading to dramatic changes in price. While suggesting that the model provided some insights, Leach made the important point that really it was too aggregated to be of real practical help to the policy makers.

Even in aggregate terms there are too many exceptions to the general pattern. The model also neglects a number of other important variables which would affect woodfuel prices. The few existing micro studies of the urban woodfuel markets imply that in the complex chain which characterizes the urban markets, there are many stages where both costs and margins vary widely in response to the market. Leach cited the example of differences in labour rates on a spatial basis for the various tasks involved in collecting, processing and marketing the wood and charcoal. Equally there can be large variations in transport costs due to such factors as truck size, capacity use, fuel and repair costs, seasonal requirements for alternative loads and travel conditions. Furthermore, the marketing structures both at the wholesale and retail levels tend to be extremely complex, usually more so for wood than charcoal. Leach discussed these issues in the context of data on fuel price trends and market price structures.

Leach identified an important policy issue as the improvement of the efficiency of the woodfuel markets in order to reduce both 'excess' profits and 'wasteful' costs. If this could be achieved, possibly via greater competition then it might be possible to encourage sustainable production and keep final consumer prices down. Ways of achieving this might include the integration of

wholesaling and transportation and the formation of consumer cooperatives to buy fuel directly from truckers thereby cutting out some of the middlemen.

Leach concluded by emphasising that all he had been doing was asking questions rather than providing answers. This was because the answers were invariably particular to a country or region and that in most cases there was insufficient data to provide even a starting point to consider answers.

The paper by **Paul Stevens (University of Surrey)** re-examined the case for border pricing of energy in ldc's. He began by reviewing the main elements of the arguments that had been put forward in favour of border pricing, especially of petroleum products, following the two oil shocks of the 1970s. The macroeconomic argument was centred upon the idea that border pricing would provide relief for balance of payments deficits by encouraging 'conservation' via higher prices, and would reduce fiscal deficits by reducing or wholly eliminating fuel subsidies. The microeconomic argument was that based upon neo-classical economics 'correct' pricing would improve the efficiency of the allocation of resources within an economy. Stevens considered both arguments and suggested that the answer to the question - 'should oil prices be set at border levels?' - was a qualified 'no'.

A frequent counter to the efficiency argument for border pricing is to suggest that equity considerations require subsidies to make fuel such as kerosene more cheaply available to the poorer sections of the population. However, Stevens felt that the case for kerosene subsidies (as opposed to some other way of helping the poor to obtain fuel) was not strong given that the rich consumed proportionately more kerosene. Instead, he focussed on the efficiency aspect of the argument. The collection and use of woodfuel can entail significant 'externalities' associated with deforestation, soil erosion and other forms of environmental damage (although other land-use practices are often even more responsible). However, the social costs of these externalities tend not to be reflected in the explicit or implicit prices of woodfuel, and consequently 'too much' wood is used. Put another way, the price of woodfuel is effectively too low. Border pricing of kerosene implies a rise in its price relative to that of woodfuel. If this leads to substitution from kerosene and towards woodfuel, then the externality problems associated with woodfuel may be exacerbated. If it is not possible to internalise these externalities into the woodfuel price, then it may be desirable not to raise kerosene prices to border levels.

Stevens then examined a set of questions relating to this argument, including: 'is woodfuel underpriced?'; 'have relative price changes led to a switch towards woodfuel?' and 'why can't the woodfuel externalities be internalised?'. On this last question, he reviewed the economist's traditional methods of internalizing externalities, namely the use of taxation, regulations enforced by law, unification and bargaining through the assignment of property rights. He suggested that the

traditional methods are in most cases either not feasible or not desirable.

Turning next to the macroeconomic side of the argument, Stevens questioned the assumption that increased product prices will immediately produce substantial reductions in subsidy costs and import expenditures in ldc's where the government and its agents consume the lion share of commercial energy. In such cases, the reduction in subsidy bill would simply be transferred into increased expenditure in another part of the budget for the energy bill. Moreover, the price elasticity of demand for energy of the public sector who meet the bill out of someone else's money may be lower than that of the private sector, so muting the 'conservation' response.

Thus on both macro and micro arguments there are, Stevens asserted, grounds for reconsidering the case for border pricing. In fact, in many cases the recent fall in world oil prices has not been passed on to consumers, so that in many countries domestic prices now lie above border prices. However, he pointed out that 'underpricing' kerosene or other oil products would in turn produce their own distortions. It was a question of which route produced the least evil. Stevens argued that a move away from the current price levels seems unlikely, for a number of reasons, including: a desire for energy self-sufficiency, fears that border prices may rise again, and the fact that energy taxes represent an attractive source of government revenue. He suggested, therefore, that there was reason for serious concern about the possible impacts of high prices for commercial fuels relative to woodfuel.

The final paper of the workshop was given by **Gordon Mackerron (University of Sussex)** and was also concerned with the question of pricing criteria. Specifically, Mackerron set out to examine the differences between what the industrial countries advised the ldc's to base their energy pricing policy upon, and what they actually did themselves. He began by arguing that most analyses of energy pricing policies for ldc's are based upon the idea that a 'correct' policy should first set prices high enough to cover accounting costs plus a surplus and then establish a price structure compatible with principles of long run marginal cost. This implied for most of the ldc's both a raising and a re-structuring of energy prices. These policy recommendations are justified on the grounds that they would promote efficient energy use and appropriate investment decisions.

Mackerron however felt that this type of approach suffered two weaknesses derived from a neglect of the political economy of price-setting. The first weakness was that the policy devoted insufficient attention to policy objectives outside of the energy sector which the government may be seeking to achieve via pricing policy. The second weakness was that such policy rarely if ever specified how it might be feasible either organisationally or politically to move from an existing situation to a new price path. Mackerron suggested that much of this narrowness of vision could be explained by the virtual monopoly held by economists in

the analysis of energy pricing policies.

By means of examining some European experience of energy pricing policies, most notably those of the UK, Mackerron clearly illustrated the kinds of difficulties which the ldc's could face if they tried to limit policy practise to objectives confined to the energy sector. While European countries tend to pursue pricing policies which are 'internal' to energy objectives when the economic scene is calm, they frequently switch to differently motivated policies in more stormy economic waters. For example at times of the need to control inflation or public expenditure. In particular, long-term energy price strategies are often influenced by non-energy policy motives. For example, subsidies to industrial energy inputs to secure international competitiveness such as in the Netherlands vis a vis gas pricing and subsidies to 'old' industries in chronic decline such as the UK and German coal industries.

It is possible to dismiss all such policies as undesirable 'distortions'. However, Mackerron made the point that if industrialized countries with relatively stable smoothly functioning market systems could not avoid the undesirable influence of economic efficiency/energy policy objectives by wider economic and political objectives or constraints, it is unrealistic to expect the ldc's to fare better. However, this is not to argue for giving up the type of price analysis performed by economists where it can be used. But, more time should be spent on considering alternative policies which might alleviate the alleviation produced by inappropriate price structures. If treating symptoms rather than causes is second best, economists should know very well just how second best are the situations they study.

ENERGY SUBSIDIES IN THE UNITED STATES

by Ian Brown
Association for the Conservation of Energy

BACKGROUND

In 1984, the most recent year for which figures are available, more than \$44 billion in federal subsidies was given to the energy industry, over \$30 billion of that sum provided in the form of tax breaks to established energy producers, with the remaining \$14 billion being on specific programme outlays and on loans and loan guarantees.

\$44 billion represents a quarter of the annual budget deficit of the USA. In individual terms this means that tax money used to subsidise energy producers was equivalent to at least \$523 for every household in the US in 1984.

However the allocation of these subsidies is awarded neither according to the scale of energy provided nor with reference to the promise of a developing technology. A breakdown of the \$44 billion is illuminating. More than \$41 billion of the total \$44 billion 1984 subsidy was provided to mature energy technologies which had attained full commercialisation several decades previously. The largest single receiver of subsidies is the nuclear industry - more than \$15 billion, the equivalent of a bill to each American household of \$125. The oil industry receives \$8.5 billion, a bill roughly equal to \$100 per household. Other subsidies include some \$4.6 billion and \$2.3 billion paid out to the gas and hydro-electric industries respectively. Energy conservation receives only \$864 million.

WHAT ARE THE SUBSIDIES?

There are three major categories of expenditure. The first and largest among these are tax deductions. The Federal Government offers a broad range of incentives through special provisions in the tax code. These allow for a number of things. For example - exemptions or deductions from gross incomes, provision of a special credit, a preferential tax rate, or deferral of tax liability. Inevitably, such provisions result in revenue losses to the Treasury, estimated at \$30.1 billion of the total \$44 billion energy subsidy for 1984. An important note is that the Senate Committee on the Budget projected total tax expenditures of 1984 of \$306 billion. Energy subsidies alone account for one tenth of that total.

There are a number of tax expenditure items which make up this total of \$30 billion. These include the Accelerated Cost Recovery System (ACRS), which allows an investment to be written off in fewer years than it actually depreciates - and which accounted for around \$11.5 billion in subsidies the Investment Tax Credit (ITC), which is a credit of 10 per cent of the

purchase price of income-producing machinery - and which accounted for around \$55 billion in subsidies the Expensing of Construction Period Interest - allowing a business to immediately write off financing costs of construction projects rather than capitalising these - which accounted for approximately \$4 billion in subsidies and the tax-exempt status of public utilities, costing over \$4 billion for both bond interest exemption and income tax exemption. Inevitably because of their highly capital intensive nature, the sectors which benefit uppermost from these expenditures are electric utilities, particularly with regard to nuclear plant construction, and secondly the oil and gas industry.

On top of these tax expenditures are two other major identifiable Federal energy-related expenditures. The first of these is direct government expenditures to the energy sector, which totalled nearly \$8.5 billion in fiscal year 1984. This sum includes expenses incurred by R and D projects fostered by the Department of Energy, and the construction of dams and waterways by the Army Corps of Engineers. There are also a number of regulatory bodies and protection agencies which have energy related budgets. These include the Environmental Protection Agency, the Nuclear Regulatory Commission and the Mine Safety and Health Administration. Finally, costs are incurred by federal grants and by programmes which seek to cover market failures. In this category the Strategic Petroleum Reserve - petroleum stored in order to counter the effects of an international crisis - is a good example.

The third major category of subsidies are Loans and Loan Guarantees. These are the costs to the Treasury of providing interest-rate subsidies and paying for occasional defaults on principal repayments. Since most of these costs are off-budget they tend to escape routine scrutiny in Congress and the press.

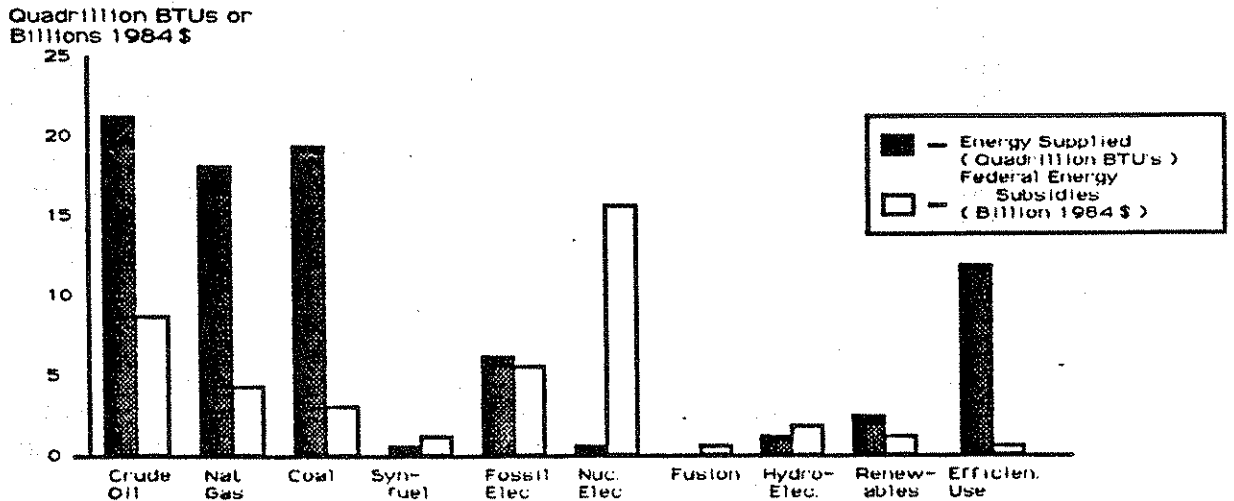
The estimated cost for this type of expenditure, all unrecoverable from agency revenues, was \$5.5 billion in fiscal year 1984.

These are the expenditures or subsidies which together had a combined cost for the US taxpayer in 1984 of over \$44 billion. Not included are the seven billion dollars in uranium enrichment costs which the Department of Energy has yet to recover from the private sector the abandonment by the Department of Energy in 1985 of an unnecessary uranium enrichment plant in Ohio after \$300 million had been spent substantially reduced interest rates received by federal power projects from the Treasury the Treasury cost of the corporate tax write-offs for a great many abandoned projects such as nuclear and synfuel plants disincentives to production and to consumption and finally more intangible costs incurred through damage to the environment.

The list of subsidies to energy - subsidies being defined as Federal expenditure that makes energy appear cheaper to final consumers than its full economic cost - is considerable. This in itself is bad enough, but what makes the situation worse, are the inequities inherent in the allocation of these subsidies. Figure

1 shows that certain industries received a disproportionate amount of the subsidies, compared to the energy supplied.

FIGURE 1: FEDERAL ENERGY SUBSIDIES IN 1984 AND ENERGY SUPPLIED



ELECTRICITY AND NUCLEAR - Energy Resource or Technology

In 1984, Federal subsidies to electric utilities totalled \$28 billion, equivalent to a bill of \$333 per household. The bulk of this support, about \$15 billion, came in the form of tax breaks for plant construction, adding up to about \$5 billion. In addition, companies involved in electricity production receive what has been described as a 'double-dip' benefit - once from the subsidies for the production of oil, gas, coal and uranium- and on the other side from subsidies for construction of plants to burn these fuels.

TABLE 1: FEDERAL SUBSIDIES TO ELECTRIC UTILITIES (fiscal year 1984 billions of 1984\$)

Nuclear electric	\$15.56 billion
Fossil electric	\$5.63 billion
Fuel subsidy	\$3.80 billion
Hydro electric	\$2.36 billion
Renewable sources	\$0.65 billion
TOTAL	\$28.00 billion

All this adds up to extremely heavy support of electric utilities. The justification for this support is tied to a short-term rationale that hiding the costs and providing the illusion of low cost electricity helps to spur manufacturing and production.

In the long term though the subsidies are tied to a strategy to electrify the economy. To this end, Department of Energy officials appeared before a Senate committee in the spring of 1985 and predicted the need for as many as 580 new coal and nuclear plants by the year 2000. Cost estimates for such a building programme run to more than two thousand billion dollars - an amount larger than the entire US national debt.

The sagacity of investing such a huge amount of money in a finite energy resource must be questioned. When one considers the continued under-performance of nuclear power - the principal beneficiary of any such investment plan - then doubts multiply.

In 1984 taxpayers gave more than \$15.5 billion in nuclear subsidies alone: more than one third of all energy subsidies. Yet nuclear power provided a mere 15% of US electricity sold or 1.9% of all delivered energy, about half as much as wood delivered. Perhaps even more damning is the fact that the total of subsidies provided was very nearly as much as the total retail revenue from 1984 nuclear output.

**TABLE 2: FEDERAL SUBSIDIES TO NUCLEAR ENERGY
(fiscal year 1984 billions of 1984\$)**

ACRS	\$3.45 billion
ITC	\$1.43 billion
Expensing of interest	\$2.99 billion
Tax-exempt pollution-control bonding	\$0.73 billion
Tax-exempt publicly-owned utility bonding	\$1.24 billion
Other tax expenditures	\$0.11 billion
Agency outlays	\$2.28 billion
Loans and guarantees	\$3.32 billion
TOTAL	\$15.56 billion

Despite this, capital continues to be sunk apace into nuclear coffers. Over the next decade the cumulative subsidy to nuclear power will be at least an additional \$40 billion and perhaps as much as \$100 billion. This is an astonishing commitment to make to an industry where costs have risen dramatically in the last two decades. Nuclear electricity which cost \$499 per KW of capacity to produce in 1971, now costs nearly \$3000 to produce.

There is no reason to believe that this upward climb will be halted.

Even if only a portion of the forecast for two trillion dollars in new plants is undertaken it will absorb capital which could be used by competing energy sources to produce more energy at less cost and less risk. Further construction of plants would also cause subsidies to be frozen into place for a longer period of time by extending the commitment to electrification of the economy.

OIL

Oil, received \$8.58 billion in 1984 Federal subsidies, a large proportion of which come in the form of tax deductions. With oil supplies dwindling and many wells being operated as marginally producing 'stripper wells' - that is wells which yield less than 10 barrels of oil a day - it must be seriously questioned whether it makes economic sense to encourage production of oil that requires a subsidy when lower-cost efficiency measures can replace that oil. Critics charge that taxpayer subsidy for the costs of three or more dry wells for every producing well promote unnecessary drilling activity and continues consumption at unrealistic rates, boosting the prices future Americans will have to pay for energy security.

TABLE 3: FEDERAL SUBSIDIES TO OIL
(fiscal year 1984 billions of 1984\$)

Intangible Drilling Costs	\$0.89 billion
Percentage Depletion Allowance	\$0.74 billion
ACRS	\$3.78 billion
ITC	\$1.89 billion
Agency Direct Outlays	\$1.27 billion
TOTAL	\$8.58 billion

GAS

In 1984 gas provided nearly 24% of US energy requirements and received \$4.61 billion in subsidies. Like oil, a large percentage of these subsidies came in the form of tax deduction. The most important issue facing the gas industry is whether Electricity increased subsidies will encourage too high a level of exploration and drilling, thereby causing over consumption, or if efficient use will extend the life of domestic supplies and help keep consumer bills down.

TABLE 4: FEDERAL SUBSIDIES TO GAS
(fiscal year 1984 billions of 1984\$)

Intangible Drilling Costs	\$0.53 billion
Percentage Depletion Allowance	\$0.44 billion
ACRS	\$3.78 billion
ITC	\$1.11 billion
Agency Direct Outlays	\$0.32 billion
TOTAL	\$4.61 billion

Electricity, oil and gas are by far the largest beneficiaries of federal energy subsidies. Together they account for over 90% of all subsidies received. Other sectors of the US energy industry receive relatively insignificant support from subsidies.

COAL

Coal, the next highest recipient of subsidies, provided 22.4% of the nation's energy at the end of 1984. The great proportion of the \$3.4 billion in subsidies came in agency outlays - dominated by payments of Black Lung benefits (\$1.4 billion).

TABLE 5: FEDERAL SUBSIDIES TO COAL
(fiscal year 1984 billions of 1984\$)

Programme Outlays	\$1.65 billion
ITC	\$0.18 billion
ACRS	\$0.35 billion
IDC	\$0.11 billion
Depletion	\$0.60 billion
Other Tax Expenditures	\$0.51 billion
TOTAL	\$3.40 billion

SYNFUELS

The Synfuels industry has produced insignificant supplies in recent years, but received \$640 million in subsidies in 1984. Over half of this sum was made up in the form of tax deductions.

**TABLE 6: FEDERAL SUBSIDIES TO SYNFUEL
(fiscal year 1984 billions of 1984\$)**

ACRS AND ITC	\$0.36 billion
Programme Outlays	\$0.18 billion
Loans and Loan Guarantees	\$0.10 billion
Price Supports	not estimated
TOTAL	\$0.64 billion

RENEWABLE ENERGY

Renewable energy received \$1.7 billion in Federal subsidies. These subsidies covered areas as diverse as RD and D programmes, tax deductions and exemptions, and residential business supply incentives.

ENERGY EFFICIENCY

Energy efficiency lies at the other end of the scale to nuclear power, receiving in 1984 \$864 million in Federal support - approximately \$10 per household in the USA.

IMPLICATIONS OF THESE SUBSIDIES

Proponents of tax subsidies for conventional fuels and electric utilities argue that tax breaks are needed in their industries to help expand domestic supplies, thus avoiding the pitfall of becoming more dependant on insecure and costly imports. Such an argument is untenable for two reasons. Firstly renewable energy and energy efficiency can expand domestic supply much faster and cheaper per unit of energy than conventional fuels. Secondly, dependance on expanding domestic supplies of non-renewable energy - a finite resource - only hastens the day of declining production and the need for even larger future imports.

Logic demands either that all forms of energy supplies are subsidised equally - allowing renewable energy and energy efficiency to compete on an equal footing with alternatives like nuclear power - or that the entire energy sector is de-subsidised, meaning that true energy costs are no longer concealed and that the tendency to under invest in energy productivity might be halted. Unfortunately, entrenched, powerful, vested interests demand something entirely disparate to logic, and having altogether more political muscle than simple commonsense, have tended to get their way.

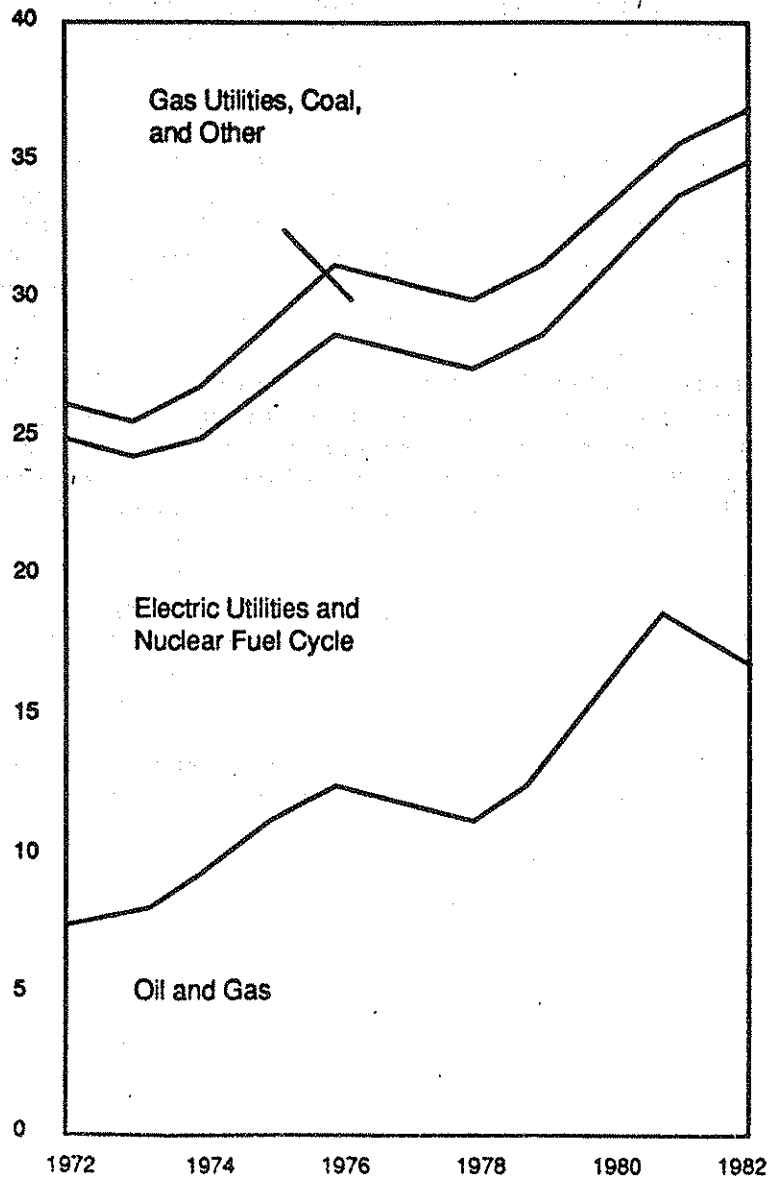
In late 1984 a tax reform plan was offered by the Treasury Department. Known as Treasury I, it proposed desubsidisation of all energy sources. A bold plan, it bordered for some on the verge of heresy and met with an onslaught of criticism and

lobbying from major energy producers. Inevitably the plan was quashed and the white flag raised. The President's subsequent tax reform proposal - Treasury II - took the 'enlightened' step of offering to eliminate nearly all subsidies to renewable energy and energy efficiency whilst retaining the vast majority of subsidies still available to oil, gas and electric utilities. The inequities inherent in the allocation of subsidies to the energy sector not only remained unresolved, if anything they were exacerbated.

The effect these skewed subsidies have on the energy market, energy prices and energy consumption is manifold. If subsidies disproportionately favour certain industries then they are given an unfair advantage over their rivals. It is not simply a case of a vast proportion of Federal capital finding its way into the pocket of a chosen few. Each Federal dollar of asymmetric subsidy cannot help but leverage many more dollars from private investors, who, attracted by the extra subsidies, follow a pre-selected path, whilst cheaper, more efficient alternatives remain under-capitalised. For this depressingly familiar display of follow-the-leader the taxpayer has the pleasure of paying twice-once for the subsidies and again, on a far larger scale, for the higher energy prices which are the by-product of inefficient investment.

The cost of investment in new energy producing plant and equipment is staggering. In 1986 the total amount of money channelled into this area was \$125 billion - nearly 40% of capital investments in the entire US economy. Clearly it is in the interests of the US economy that these enormous sums of capital are efficiently and evenly allocated. Unfortunately neither is the case

FIGURE 2: PERCENTAGE OF TOTAL US CAPITAL EXPENDITURE COMMITTED TO ENERGY SUPPLY



A high percentage of investment in inefficient means of supply inevitably affects the price and availability of energy for decades to come. Additionally, a large amount of capital invested in one area reduces the availability of reasonably priced capital to other sectors.

In 1982, direct investments (excluding subsidies) in nuclear power-plant construction were twice as large as total 1982 direct investments in the motor-vehicle, iron and steel industries

combined. Despite this however, and despite a total private and public sector investment to the order of \$200 billion, nuclear power continues to deliver only half as much energy as wood. 'Why?'. Why do such uneconomic investments continue to attract support through the provision of subsidies? Why are the more viable alternatives ignored? Because of the political muscle of the nuclear industry, and the continued belief in the US Dept. of Energy that Nuclear power is the bright new future. I can vouch at first hand to the very pro nuclear views of the Electricity Division of D o E.

By oversubsidising costly supply relative to efficiency, the US weakens both its domestic economy and its international competitiveness. In 1984 the US trade deficit was \$123 billion, \$51 billion of which was for fossil fuel imports. The US used nearly twice as much primary energy per dollar of GNP as did Japan in 1984 and two and a half times as much as Denmark.

Unfortunately, subsidies are the underlying factor causing this waste. By hiding the real costs of energy, subsidies eliminate fair competition and rob consumers of any real choice. Without fair competition a system of inefficiency is perpetuated and much of the \$419 billion spent annually on energy in the USA is wasted. If market prices reflected real costs and the Federal government did not provide \$44 billion in subsidies to energy producers annually, consumers would be encourage to become more efficient. The result would be fewer investments, wiser investments and tens of billions of dollars of capital per year freed-up for use in other sectors of the economy.

But the entrenched system of energy subsidies would take substantial political will to change, and I think that the recent Tax Reform Act, which has left the present system of subsidies largely in place shows that this will is lacking. Despite the golden opportunity that the recent tax reform gave to 'killing off sacred cows', both Congress and the Administration seem to be committed to channelling energy subsidies into the same pockets that have welcomed them in the past - which one commentator I read succinctly described as 'so breathtakingly dumb that it borders upon the surreal'. Unhappily, surreality and subsidies look likely to remain part of the US energy industry for some time to come.

Subsidies and Land Use

By: Prof. David Harvey,
Department of Agricultural Economics, Newcastle upon Tyne

Introduction

This short paper outlines the relationship between agricultural subsidies and land use from an economic perspective and illustrates this with reference to the evidence in the UK. It is in three parts: 1. the economic theory; 2. the recent history of agricultural land use in the UK; and 3. the preliminary results of a recent simulation of the effects of eliminating agricultural support in the UK on agricultural land use.

I. Theory:

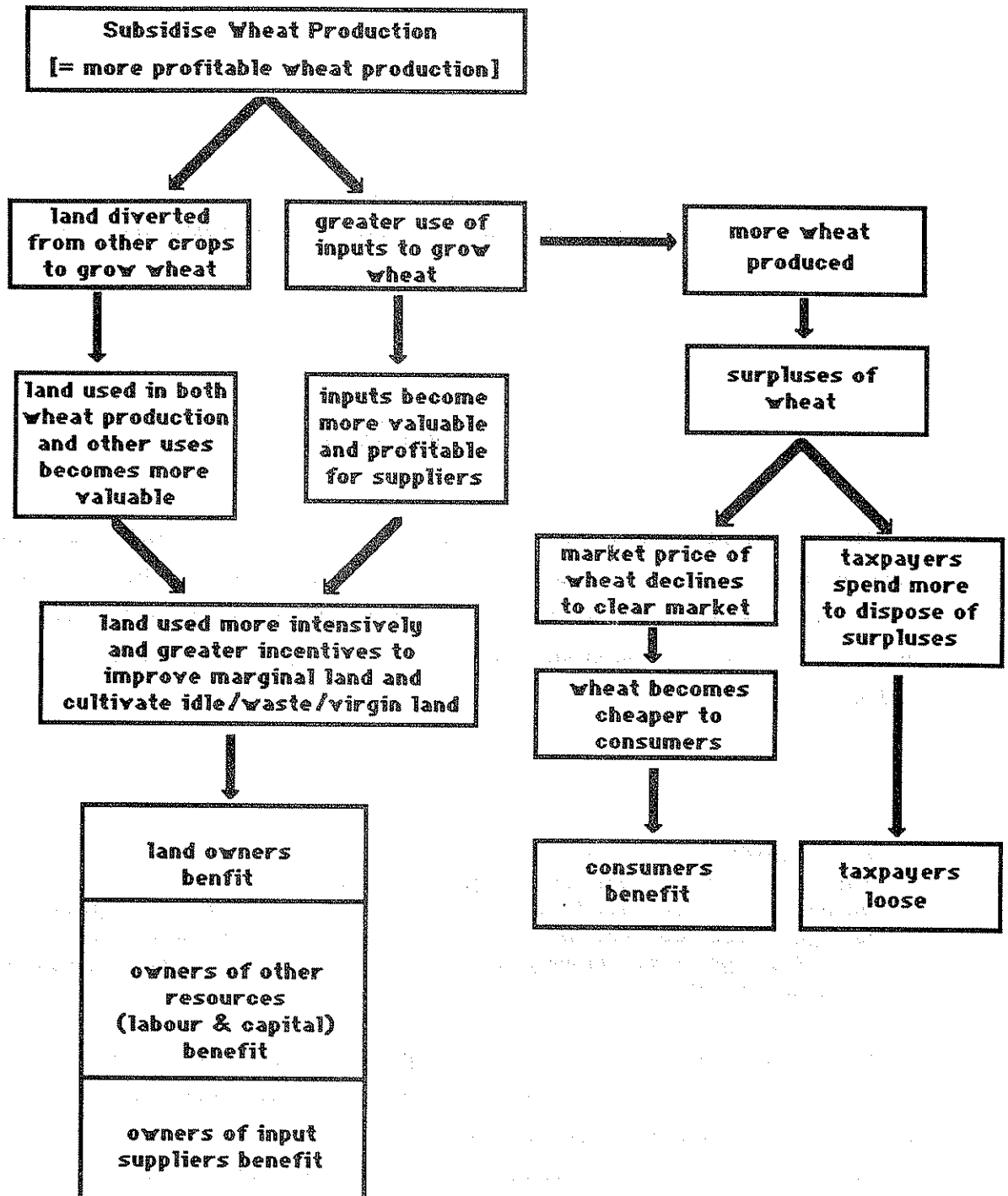
*The price of pig is something big,
because, its corn, you'll understand,
is high priced too because it grew
upon the high priced farming land.*
(H.J.Davenport)

*If you'd know why land price is high,
Consider this: its price is big
because it pays thereon to raise
the costly corn, the high priced pig.*

Figure 1 illustrate the theoretical relationships between agricultural subsidies and land use using the example of wheat production. The exact method of providing the subsidy affects the consequences as far as the consumer and taxpayer are concerned. If the Common Agricultural Policy instruments are used, then the market price of wheat is increased, so that the consumer pays more for the 'subsidised' wheat, and therefore consumes less than otherwise. Since there is more production under the subsidy the

surplus is greater because the consumption is also less under this method, and the taxpayer costs of surplus disposal relate to the reduced consumption as well as the increased production. If, however, the deficiency payment system is used, as was the case in the UK before entry to the EC, then the market price for wheat is not altered, so consumption of wheat does not change, but production is encouraged and the cost of support is all borne by the taxpayer (through the deficiency payment as the difference between the supported price and the market price on the total production quantity). This effect is not shown in the figure.

Figure 1. The Economic consequences of subsidising wheat production

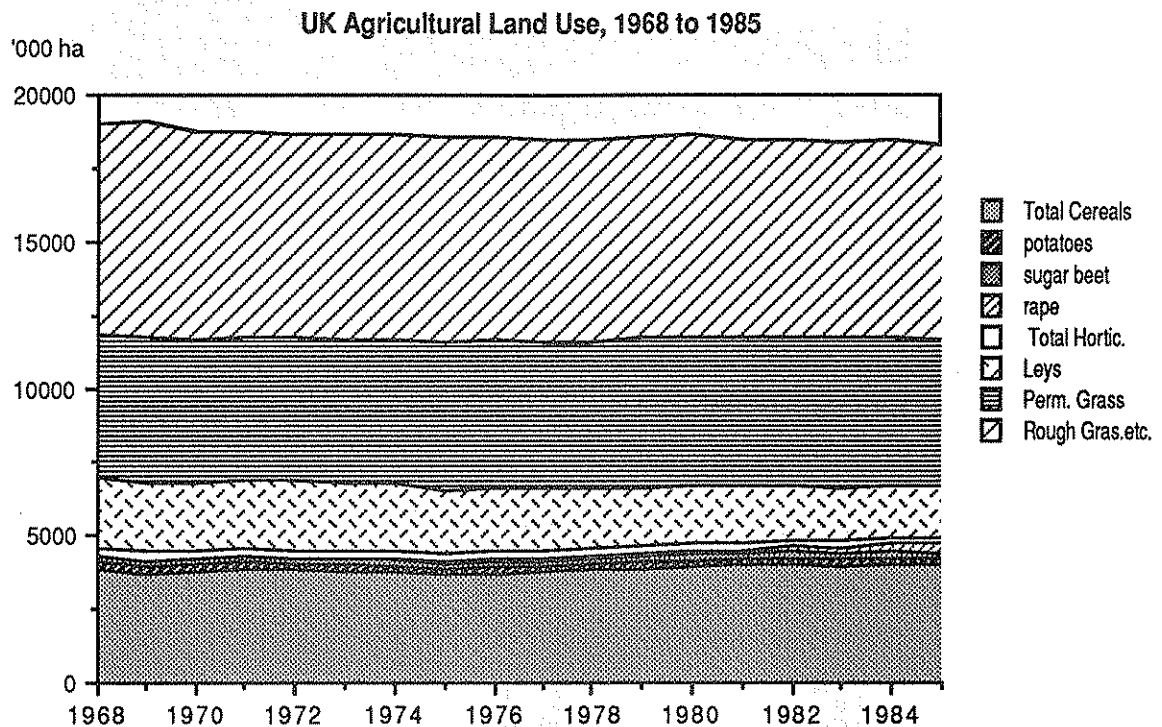


When all (or most) agricultural production is subsidised, then there is no economic advantage to switching land from one agricultural use to another and land simply increases in value and intensity with little change in use. However, if the subsidies to agriculture are high enough, then land may be diverted from other uses into agriculture as a result of the agricultural subsidies. It might be noted that technical change in agriculture affects profitability, with similar consequences for land use and production.

II. History and Evidence

Figure 2 shows little evidence of major change in land use in the UK over the period from 1968 to 1985, in spite of the fact that the level of protection and subsidisation of British Agriculture increased substantially over this time period. This is because nearly all the available land is used for agriculture in the UK anyway, and the increase in subsidisation occurred for most crops.

Figure 2

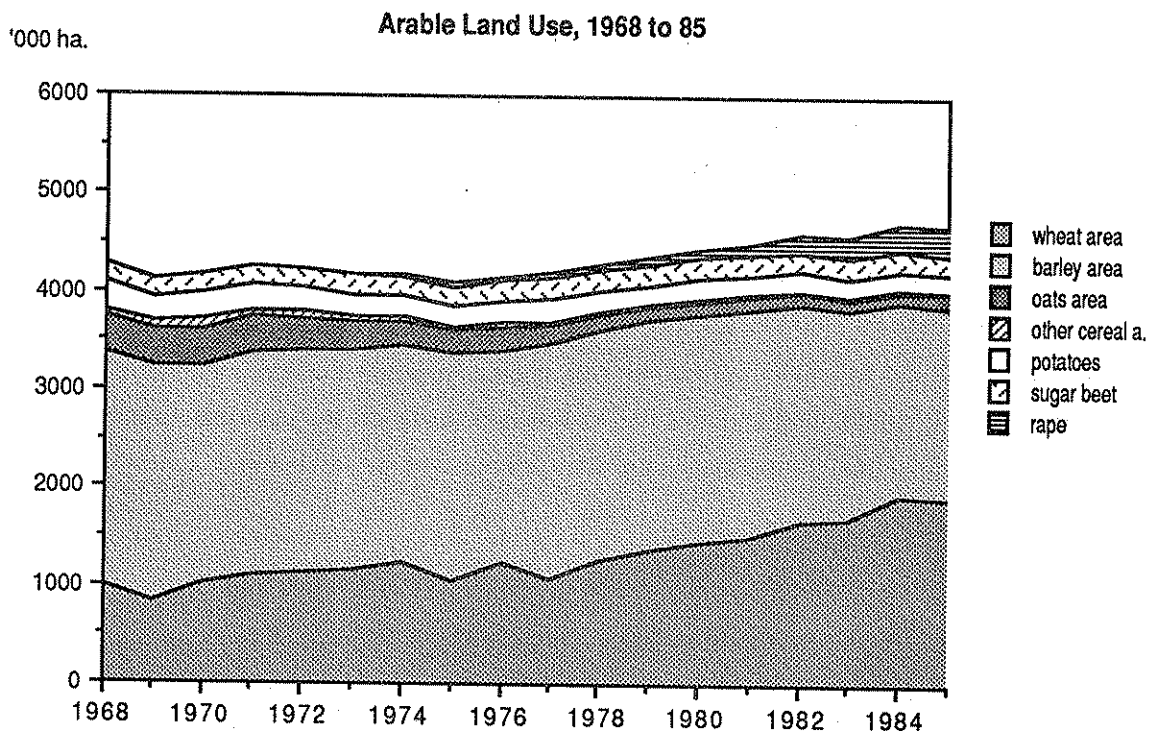


Source: MAFF, June Census results, Agricultural Statistics.

However, the CAP does subsidise cereals, especially wheat, and oilseeds rather more than other crops and farm products. The effects of this, augmented by the technical change especially in cereal yields, have been to increase the cereal acreage, and more particularly wheat and rapeseed acreages, in the UK, shown in figures 2 and 3.

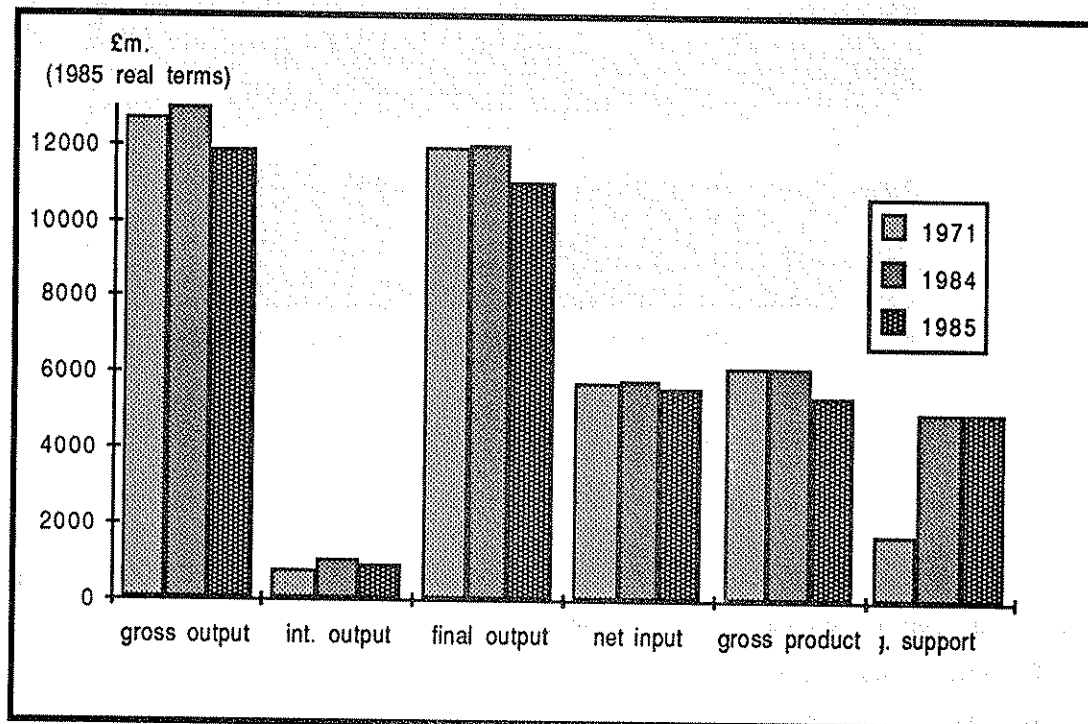
Over this period, product prices in real purchasing power terms have fallen, offsetting the increase in the volume of production, while input costs have increased in spite of the technical improvements making each unit of input more productive than in the past. These changes have been associated with a substantial increase in the real value of agricultural support, as shown in Figures 4 and 5.

Figure 3



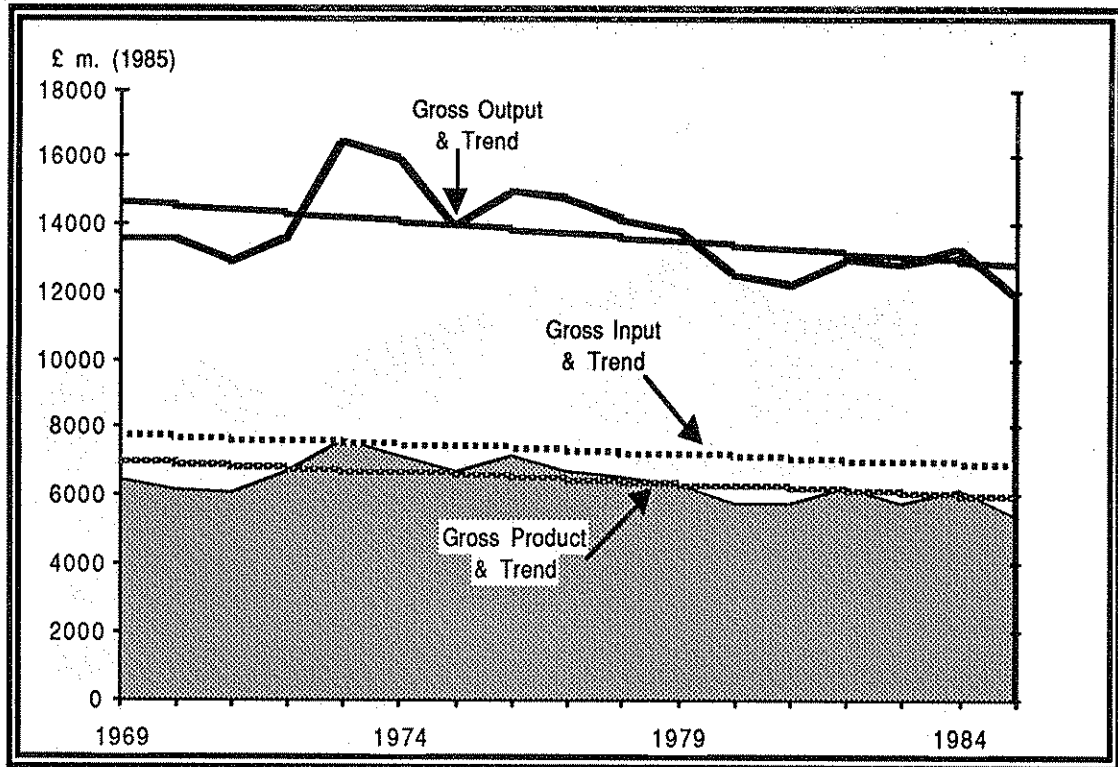
Source: MAFF, June Census results, Agricultural Statistics.

Figure 4: Changes in UK Gross Output and Components, 1971/2 to 1985



Source: HMSO, MAFF and author's calculations.

Figure 5. UK Agricultural Gross Output, Input and Product, 1969 - '85

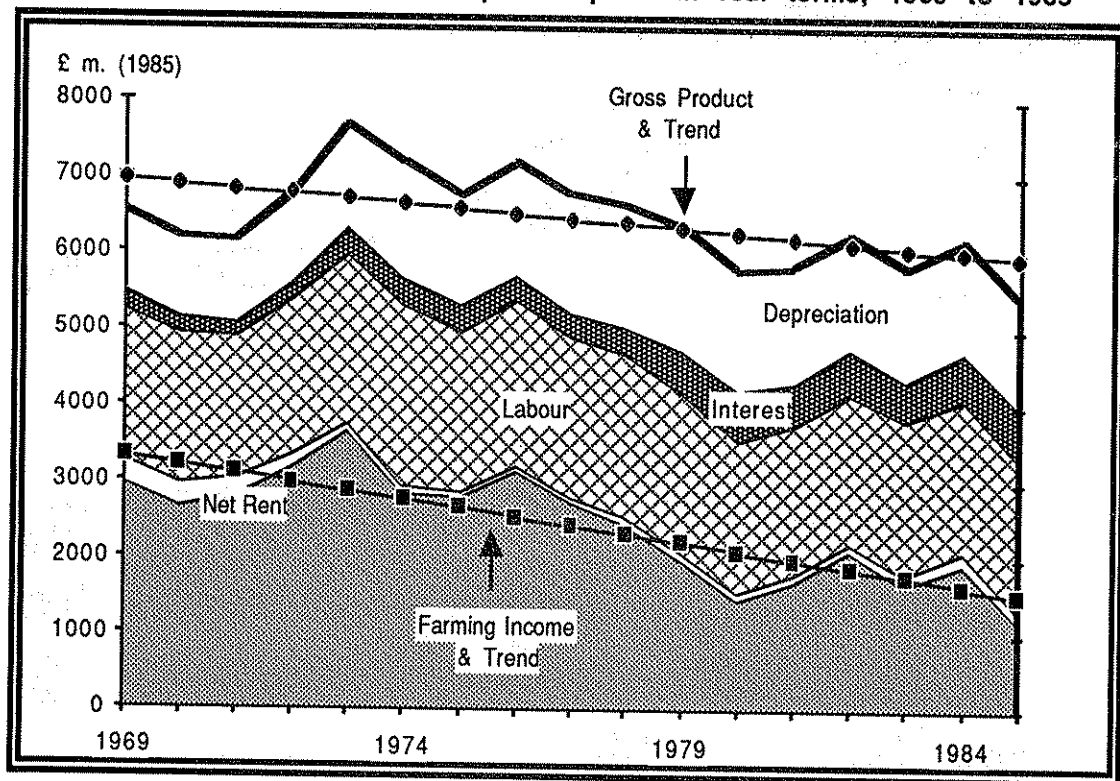


Source: HMSO, MAFF and author's calculations.

The gross product of the agricultural sector is the returns to farming which are available to pay the labour, management, capital investment and land employed in farming. In spite of subsidisation, this has been falling in real terms over the period. But the claims on this gross product have also altered. The share going to capital, especially, has increased (interest and depreciation costs), see Figure 6, so that the net farm income (which is left over after all these other claims have been met) has fallen substantially in real terms. It should be noted that the figures for net rents (the only return to land identified in this figure) refer only to the rents actually paid by tenant farmers to landlords. In spite of the fact that rents have increased over the period, the figures shown here indicate that the total rent bill has fallen. This is because the total area of land which is actually rented has fallen substantially over the period, much more land is now owner operated than was the case at the beginning of the period.

The general picture of agricultural development implied by these figures for UK agriculture over the recent past is consistent with the theory outlined in section 1 of this paper. Increased subsidisation has increased the volume of output, but has been associated with a decline in output prices (and in real returns in the UK) and has also been associated with an increase in costs and intensity of land use. Although not shown in these figures, the prices and rents for agricultural land have also behaved largely as expected from the theory over this period.

Figure 6. Gross Product and component parts in real terms, 1969 to 1985



Source: HMSO, MAFF and author's calculations.

III. Preliminary Simulation Results.

In a recent research project carried out by the Centre for Agricultural Strategy at Reading University under the author's direction, some simulations have been made of the possible land use and environmental consequences of changing the CAP (CAS report to the DoE, Countryside Implications of Possible Changes in the CAP, 1986). Table 1 summarises the policy scenarios examined in this preliminary research.

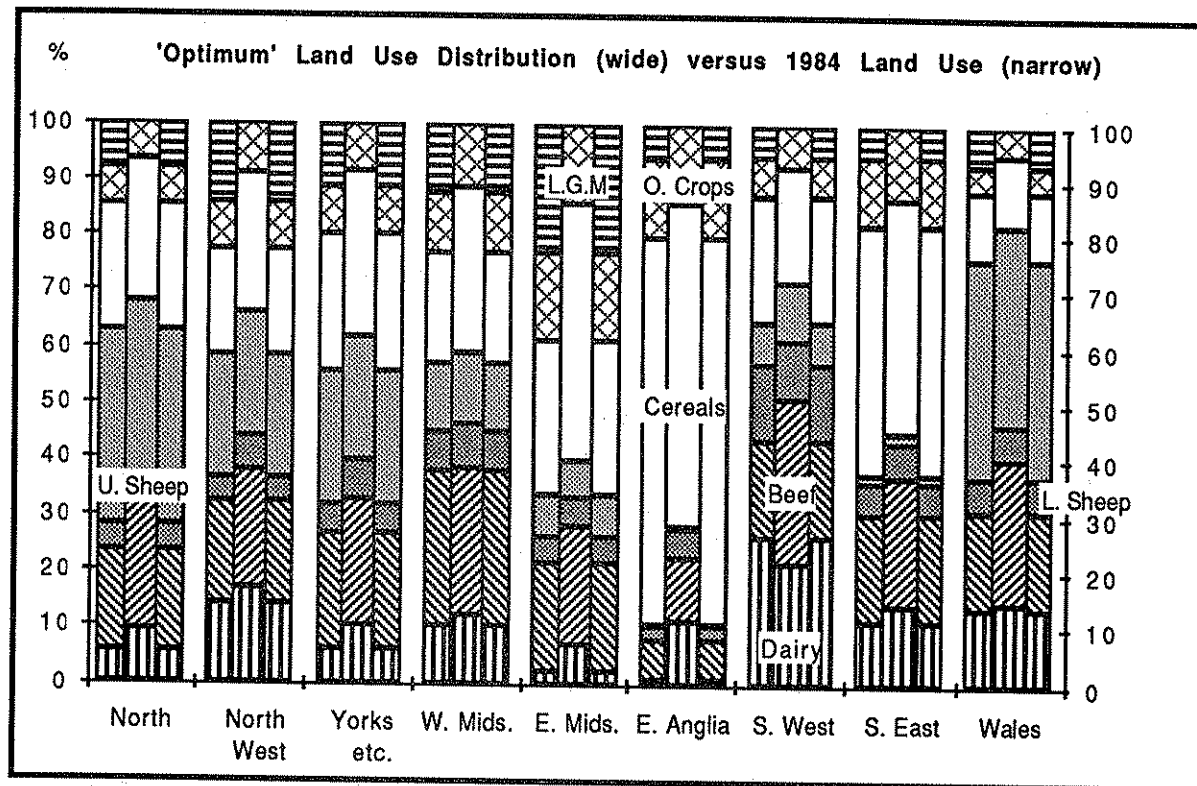
Table 1 Summary of policy scenarios

Policy Scenario	Price Changes (to the farmer)	Quota Limits	Other Changes
Fundamentalist:	None, other than trend changes	Milk only, as '85	None
New Libertarian:	European Free Trade eg. cereals -22% L'stock prods. -40% Milk -32%	None	None
Pragmatic: (Co-reponsibility levies)	Cereals -15% Beef -5%	Milk only, as '85	None
Crisis:	None	Cereals & Beef @ EC Consumption levels (+ Milk)	None

The 'New Libertarian' scenario amounts to the elimination of the CAP completely and indicates the level of subsidy to producers. In order to estimate the effects of these changes, a model of the agricultural industry is needed which indicates the changes in land use which might follow changes in prices like this. The model constructed for the project was a prototype, and not particularly detailed. Without imposing any of the policy changes, the model suggested that agriculture in England and Wales could have produced its base year output (for 1984) with less land than it actually used - see Figure 7 - suggesting that approximately 1 m. ha were 'surplus to requirements. Such an estimate is, in fact, pretty consistent with other estimates that have been made of surplus land in the country. They are, however, likely to be wrong. The CAS model used farm gross margins as the condition for allocating land to various forms of production, and ignored the fixed labour and capital costs associated with farming. The 'optimum' 1984 land use pattern, which involved leaving 1m. ha idle, actually only improved the total industry gross margin by 1.7% over the result for using all of the farm land. This minimal improvement in gross margins would not be sufficient to repay the additional labour and capital requirements for the implied more intensive production on the remaining agricultural land. Work is currently going on to extend and improve this prototype model to take account of the fixed costs of agriculture. For the present, however, the results indicated in Figure 7 suggest that there is some room for release of labour and

capital from agriculture under present conditions particularly in the north and west of the country - shown by the LGM (low gross margin or idled land).

Figure 7.



[To read this figure, view the central column for each region as being superimposed on a background wider column - the two side columns being identical and representing the wider background column]

Figure 8 indicates the changes under each of the scenarios for the major commodities, including the (spurious) LGM land for the whole of E&W. The most striking result is that elimination of the CAP results in greater cereal acreages than at present, with a corresponding reduction in lowland livestock activities. This is a reflection of the fact that, although all farm commodity prices fall if the support is eliminated, the prices of livestock fall more than cereals (because of the world price effects) and so cereals become relatively more profitable and more are grown. In contrast, although sheep prices do fall, the upland sheep activities seem remarkable robust. What the model is saying is that farm incomes would fall dramatically, with a consequent reduction in the value and earnings of the people involved in agriculture either directly or as owners of land and capital employed in the industry, but that in most cases (in spite of the crude nature of the model) land remains in agriculture.

The changes in Gross Margins (Gross Product) for each of the scenarios are as follows:

Fundamentalist	+9.9%	Pragmatic	-10.8%
Crisis	-10.0%	New Libertarian	-40.9%
		(using all land)	-43.6%

It should be noted that, under the elimination of the CAP, the gross margins are only improved by a minimal 2.7% by leaving upwards of 1.2m ha idle, and again the comments above on the implications of this apply here too.

The overall implications of these results can be summarised as follows:

1. Land Use changes are relatively minor, even under extreme assumptions and the most extreme policy scenario (elimination of all subsidies);
2. Land Use Practices, on the other hand, likely to change significantly as a result of reducing or eliminating subsidies, particularly the tendency for agriculture to become more extensive, which is a proper interpretation of the LGM land areas - a reflection of the extent to which agriculture would become more extensive in its production practices.
3. There is a very limited prospect of a lot of 'idle' land looking for alternative (energy) uses as subsidies are reduced.
4. Therefore, energy crops must compete economically with food and feed crops, which they may be able to do more effectively as the returns to conventional crops (and uses) is reduced.

Figure 8: Land Use Implications of changes in subsidy levels -E&W

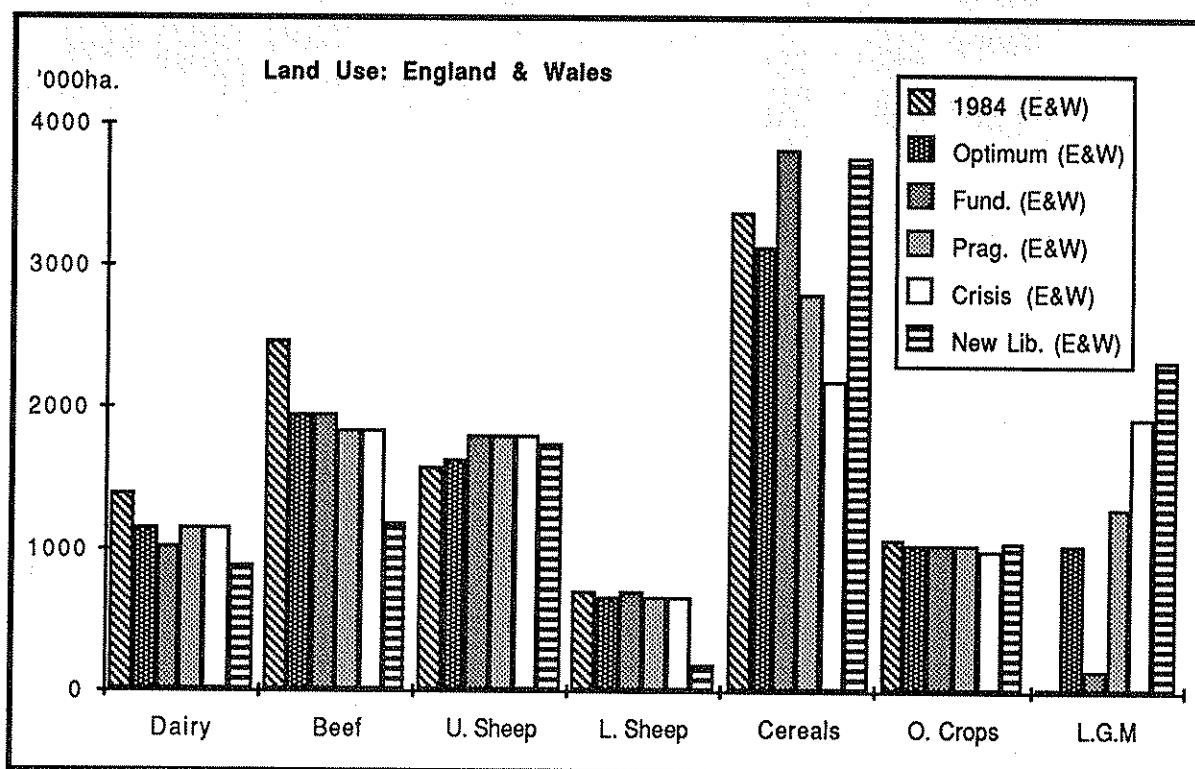
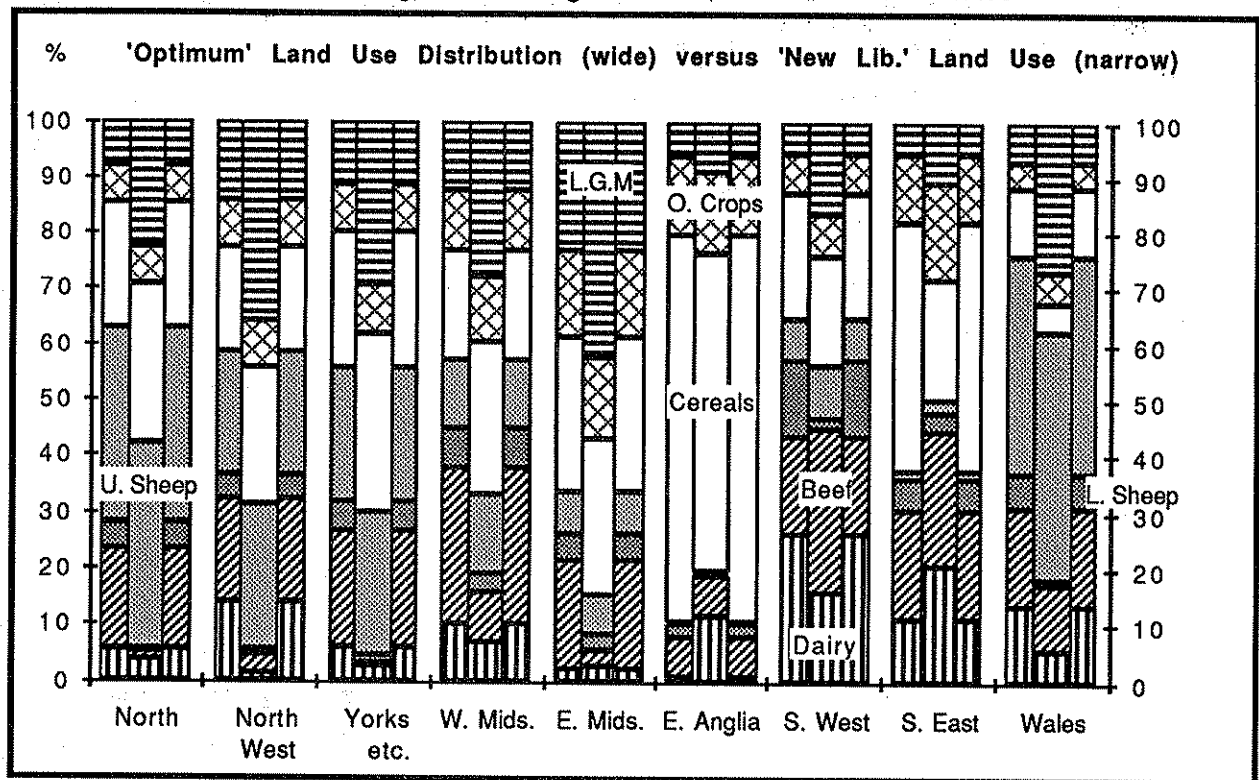


Figure 9 shows the results by region for the most extreme policy scenario, the elimination of the CAP. In the light of the above comments, the regions most likely to revert to a more extensive agriculture in this prototype model are those in the North and West of the country, and not in the East and South East, where the bulk of the cereals are grown. However, the present model does not include other land using activities (trees and tourism etc.) which would be expected to alter this picture somewhat. Current research is devoted to extending the model to incorporate these activities.

Figure 9 Land Use Changes Resulting From Elimination of Subsidies



The implications of eliminating subsidies and market support completely in England and Wales can be summarised as follows.

1. Most prospects for alternative crops, under the no subsidy scenario, are shown to be not in the cereal areas but in the traditional grazing areas (North, Midlands and Wales)
2. Since most energy crops are similar in their requirements to cereal crops, this implies that energy crops must compete effectively with cereals under current conditions, and that the argument that cereals are heavily subsidised overlooks the fact that other land using activities are also subsidised and is thus too partial.
3. Similar market based logic is likely to apply internally in LDCs, especially since reduced protection would tend to increase world cereal prices.
4. Nevertheless; may be some scope for substituting biomass energy for imported fossil fuels in some LDCs, depending on relative prices of cereals, energy crops and fossil fuel sources.
5. As a final comment, there are likely to be limited prospects for export of energy crops from LDCs, because transport costs are likely to be prohibitive.

FUELWOOD AND ENERGY PRICES IN URBAN AREAS OF DEVELOPING COUNTRIES

Gerald Leach

International Institute for Environment and Development

INTRODUCTION

This paper considers urban firewood and charcoal prices, but also looks at their main competitor, kerosene. The absolute and relative prices of these fuels vary enormously between countries and usually between cities in each country. So also do the price trajectories over time. Yet it is vital for policy to understand the causes of these differences and dynamics, since they underpin crucial issues of urban energy planning. These include the welfare of urban consumers faced by high fuel prices, economic incentives for the sustainable production of biomass fuels and the prospects for fuel saving measures and fuel substitution, planned or otherwise.

Unfortunately, poor data and the fact that urban market chains and price structures can be exceedingly complex means that it is hard to construct robust, causative models of price behaviour. This paper will therefore be mainly descriptive. It will describe the broad conditions which seem to determine urban price levels in most places, but it will also examine the many locally specific factors which can undermine aggregate models and sweeping generalisations.

THE DEFORESTATION PRICE MODEL

Received wisdom, based on experience in many countries, says that woodfuel prices respond to decreasing wood resources in a three stage process [Barnes 1986]. In Phase 1, population is low compared to forest and tree resources, wood is plentiful and prices remain low. At some point, tree cutting for farm land, timber and fuel begins to exceed natural regeneration rates and significant deforestation sets in, notably around cities. The costs of harvesting and/or transporting woodfuels increase and woodfuel prices rise. Since wood resources can be mined out quite suddenly, prices may flare up exceptionally quickly. As the outreach distance for urban supplies increases, a charcoal trade may begin or expand rapidly. This is Phase 2, where rapid price increases are found alongside rapid deforestation. In Phase 3, deforestation is severe and woodfuel prices are high. However, because consumers can switch to alternative fuels, woodfuel prices are 'capped' by the prices of these alternatives and may be quite stable. Since woodfuel stoves are cheaper than for other fuels, and some wood can usually be collected 'free', woodfuel prices tend to stabilise above the price equivalent (in useful energy terms) of competitors.

Douglas Barnes of the World Bank has tested this model on aggregate time series data for 19 countries and broadly confirmed it. The range of prices and rates of price change in his sample were very large. For example, firewood prices varies from \$12/m³ in Sri Lanka to \$248/m³ in the Ivory Coast. Charcoal prices were close to \$90/tonne in Madagascar and Zambia, but \$670/t in Togo. Price changes (in constant currencies) varied from a rise of 14.9% annually for firewood in the Ivory Coast to a fall of 7.3% a year for charcoal in Zambia.

One of his main findings was that the onset of Phase 2 can occur suddenly and produce very rapid price increases. Phase 1 countries, with few immediate incentives for reducing woodfuel demand or increasing supplies, are just the countries where such actions, with their inevitable time lags, are most needed.

But Barnes also found that several other factors which are not normally considered were apparently at work. Although the findings were weak in the statistical sense there were definite signs that:

1. High average income holds down woodfuel prices, since it facilitates substitution into alternative fuels. Small increases in income push up the price of woodfuels in the short term, but substantially higher incomes lead to lower woodfuel prices in the longer term compared to alternative fuels. Income rather than price seems to be the main cause of interfuel substitution.
2. Woodfuel prices do not automatically adjust to the prices of alternative fuels. There was some evidence that sharp increases in kerosene prices pulled up woodfuel prices. However, low kerosene prices do not reduce the price of woodfuels unless there is a major shift towards higher or at least more equitable distribution of income. Kerosene subsidies, on their own, are not effective in reducing deforestation.
3. Firewood prices are related to per capita forest area. But charcoal prices are much more closely related to income and urban growth rates - ie. to factors of demand rather than supply.

THE NEED FOR LOCAL DATA AND MODELS

Such aggregate models are all very well but are of little practical use to real world planners and policy makers. Even at the aggregate level there are too many exceptions which buck the trend, while anyone who has examined woodfuel markets will appreciate that a number of major influences on final prices - each locally specific and showing large inter-city differences - have been ignored.

Woodfuel markets have complex structures, with many stages and types of operator in each. They have been studied carefully for only a very few cities, and even then usually only for a single

period of time. These few studies show that in the major stages of a woodfuel market chain there are many points at which costs and margins may be extremely variable, and susceptible to change over time from market pressures. Some examples are given below:

Labour rates and labour hours for wood harvesting, transport to roadside collection points (and for charcoaling) can vary widely. In Kenya (1986) charcoaling labour rates ranged from 30 shillings per man day close to urban areas to 18 shillings for rural areas and 11 shillings for rural migrant labour [Byer 1987]. Allowing for differences in charcoaling times and efficiencies, labour costs per tonne of charcoal produced varied nearly 5-fold, from 200 to 947 shillings.

Taxes on the exploitation of state or other common property resources are almost invariably so small that - if paid at all - they have only a small impact on final prices.

Transport costs are of course known to depend on many factors apart from haulage distance, including truck size, payload, fuel and repair costs, and truck hire charges where relevant. In many African countries, operational trucks are so scarce that owners can raise their charges to those of the highest bidder, usually someone who carries high value or perishable goods ie. not woodfuels. This can lead to large seasonal and annual cost variations. Modes of transport operation are also critical to costs and thus to producer-wholesaler price mark-ups. They may include (1) truck owners who deal only with woodfuels, making an empty journey from the city to rural pick-up points ('return transporters'), (2) 'back haulers' who carry loads on the outward journey and woodfuel on the return trip to the city, (3) integrated transporters, with trucks owned and operated by high volume wholesalers who thereby gain better control over supplies and price margins, and (4) 'for hire' trucking services.

Wholesalers and retailers provide numerous services, with varying labour and other costs and opportunities for profit taking. These services include: transport within the city, 'break of bulk' to small volumes for sale, bagging and bundling, storage and security costs, and stall licence fees. Fuelwood market structures are usually more complex and varied than for charcoal, since there is typically a greater mix of transport modes and operators (foot, donkey cart, small to large truck, rail, etc.) and also of firewood qualities and unit volumes for sale.

Table 1 gives a hint of the scale of possible variations by showing part of the charcoal price structure in three Tanzanian cities in the wet and dry season.

TABLE 1

**CHARCOAL PRICE STRUCTURE FOR THREE TANZANIAN CITIES,
DRY AND WET SEASONS 1986/87 (SHILLINGS PER CHARCOAL BAG)**

	DRY			WET		
	DSM	Dodoma	Mwanza	DSM	Dodoma	Mwanza
<u>Production</u>						
Costs	-	-	-	-	-	-
Tax and Levy	7	7	7	5	5	5
Ex-kiln Price	67	77	87	77	87	107
<u>Transport</u>						
Av. distance (km)	(125)	(125)	(250)	(125)	(125)	(125)
Rental	34	12	120	-	-	-
Handling	5	5	10	-	-	-
Margin	55	37	34	-	-	-
TOTAL	94	54	164	174	139	194
Ex-truck price	160	130	250	250	225	300
Retail price (bag)	-	-	-	375	280	450

SCOPE FOR MARKET ADJUSTMENT

A major policy issue is the extent to which woodfuel markets can be made more efficient, so that 'excess' profits are trimmed, 'wasteful' costs are cut, and the mark-up from primary producer to final retail sale is reduced. If this can be done there is obviously greater scope (1) for raising revenues on the use of 'free' common property resources, (2) encouraging sustainable wood production for fuels, and (3) using surplus natural forest resources at greater distances from cities - all without raising final consumer prices.

Competition in multi-actor markets should induce such changes, but perhaps only when retail prices are rising fast and/or consumers think they are 'too high'. The scanty evidence we have appears to be conflicting. At one extreme, a survey by Mike Prior [1984] of 218 urban firewood merchants in Bangladesh - where prices are exceptionally high and markets are long established and not monopolised by a few big traders - found that retailer's mark-ups ranged from under 10% to over 200%. At the other extreme, in Ouagadougou, Burkina Faso, fuelwood scarcity and rapidly rising prices have led to a major shake out which has cut transporters' margins and increased prices demanded by

primary wood producers: see Table 2 [Bertrand 1986]. Recognised ways of holding down prices include integration of wholesaling and transporting (through economies of scale and reduced profits on each stage) and forming consumer cooperatives to buy fuels directly from truckers.

TABLE 2
TRENDS IN COST COMPONENTS OF FIREWOOD
PRICES IN OUAGADOUGOU 1975-83

	1975	1983	Ann.% increase 1975-83
Retail Price (CFA F/kg)	7.0	22.0	15.4
<u>As Index:</u>			
Retail price	100	100	
Gross Margin of city traders	29.6	22.7	12.1
Transport costs	21.4	27.3	18.9
Net margin of Transporters	40.0	4.5	-12.1
Price to Producers	10.0	45.5	39.4

(Annual % increase is not inflation corrected)

CONCLUSION

This brief paper has raised more questions than it has answered. This is largely because the answers are location specific and there are few locations for which we have specific data - either on the structure of markets and prices or even on final price trends. This is a scandal given the much greater knowledge of but relatively minor role played by alternatives to woodfuels in most developing countries

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**THE ECONOMIC CASE FOR BORDER PRICING OF ENERGY -
THE NEED TO RECONSIDER**

Paul Stevens
Surrey Energy Economics Centre University of Surrey

BACKGROUND TO OIL PRODUCT PRICING

During the 1970s, consumers in many developing countries were protected from the rise in international crude oil prices associated most dramatically with the First Oil Shock of 1973. This was achieved by keeping the price to the final consumer at pre-1973 levels and providing the supplier (normally a government agent) with a subsidy to cover the higher cost of crude oil. Thus product prices remained below ruling international prices (so-called border prices). This gave rise to a growing campaign orchestrated by the World Bank and the IMF to persuade (force?) developing countries to drop such subsidies and move towards border prices of oil products. Two arguments were put forward in favour of such a move. The macro-economic argument claimed that higher product prices would lead to conservation thereby relieving the balance of payments problems associated with higher oil prices. Furthermore, the reduced subsidy would relieve pressure on government spending. The micro-economic argument claimed that 'correct' pricing implicit in a move to border prices would improve the allocation of scarce resources within the economy. Non-border prices it was argued cause distortions in the working of the market mechanism leading to a sub-optimal resource allocation.

At the time, two counter-arguments were used against the micro-economic argument. The macro argument was unchallenged. The first was the equity argument. The inevitable counter in economics to the efficiency argument. Kerosene is consumed by the poor therefore a subsidy was a way of redistributing income. However, all the evidence pointed (and indeed still does) to the fact that it is the higher income groups which tend to consume kerosene either in the domestic sector or (albeit illegally) as an additive to diesel. On these grounds the equity argument really is a non-starter.

The second counter-argument (which is the one I wish to resurrect) concerns fuel switching. The move to border prices would increase the price of kerosene. This would encourage people to switch back to woodfuel. The consumption of woodfuel causes serious externalities ranging from soil erosion to climatic changes. Since these externalities are undesirable it is logical to retain the kerosene subsidy as a way of avoiding the damage. The argument can be extended to products other than kerosene but for the purposes of this paper I am concentrating on the household sector.

At the time this argument was dismissed on the grounds that there was no evidence such fuel switching would take place. The result of the arguments and World Bank/IMF pressure was that in the early 1980s, (also greatly encouraged by the crude price rises

associated with the Second Oil Shock), most developing countries moved to border pricing of oil products. The object of this paper is to question the validity of that move by looking again at the fuel switching argument and also raising a challenge to the macro-argument for border pricing.

THE MICRO-ARGUMENT REVISITED

There is now sufficient evidence that fuel switching from kerosene to wood does take place¹. Furthermore, no one would dispute that deforestation causes serious damage. However, there is a problem with the argument which must be addressed. Much of the deforestation which occurs is not due to the use of wood for energy. It is probably true to say that in many cases, land clearance and commercial logging is the greater villain. If woodfuel use makes no contribution to deforestation, the following argument loses its force although deforestation is not the only externality associated with wood burning. However, I assume that at least some of the deforestation is due to wood gathering for fuel if only in a peri-urban context.

The economics of the argument would go as follows. Wood is underpriced vis a vis kerosene. Although it is important to note that the converse is not true in the sense that kerosene is not 'over priced' vis a vis wood if kerosene is correctly priced at border levels. Wrong prices mean wrong signals which mean a misallocation of resources. The explanation for wood's underpricing has two strands. First, if you assume for institutional reasons that wood is an exhaustible resource, neither traded nor subsistence woodfuel includes the user cost. Second, the wood use involves externalities (ie costs of use which are not reflected in the 'price'). It is this externality issue upon which I wish to focus. Economics textbooks list possible methods by which externalities can be internalized and hence reflected in the price of the good. The problem is that the methods are either not feasible or not desirable for the case of woodfuel in developing countries. The methods of internalization are as follows:

Legislate for standards - at its simplest level the government makes it illegal to cut live wood for fuel. Such legislation in ldc's would be virtually unenforceable.

Impose a tax to raise the price - The collection costs of such a tax would be prohibitive and in any case how could the authorities tell if a twig had been taxed or not? There is also the problem of imposing any tax on

¹A more detailed version of this paper is shortly to be published - P J G Pearson (Ed.) Energy Policy in an Uncertain World, Macmillan London 1988. In the extended version there is some documentation of this evidence.

subsistence use.

Unitization - This can be simply expressed as one agent's action damaging another agent. If the agents are merged the damage is internalized. In the wood context this might be taken as suggesting the externality be viewed as inter-generational. Public awareness campaigns might get the present generation to hold back from wood use for the sake of the next generation. However, I would view this as unrealistic. It would simply not work except in the sort of environment which would be so repressive that in any case branch breaking could be made a hanging offence! In other words the legislative solution is adopted.

Bargaining - Agent A's action damages agent B's 'property' (clean air, clean water, silence etc.). The problem can be solved by allowing B to negotiate with A for compensation for the right of A to damage the 'property'. Thus the damage becomes an explicit internal cost to A. The problem with the bargaining solution lies in the fact that such a method of internalization requires clear cut property rights. Thus only if someone is a clear owner of the tree can they then sell it. At first sight this implies enclosure as the only way of securing such property rights. This would be undesirable on the grounds that it would probably further increase rural-urban migration (undesirable) and further increase rural poverty (undesirable). This however, may be too simplistic since it starts from the assumption that common access land is a free good. In reality this may not be so and the usage of such land may well be governed (at a local level) by extensive regulation even if only based upon custom. It is therefore possible that slight changes in tenure or simple enforcement of existing 'rules' might provide sufficient property rights to enable the bargaining solution to be possible without the traumas of enclosure.

Thus (leaving aside the last possibility) the argument is as follows :-

If the underpricing of wood leads to damaging externalities and you cannot internalize the externalities (ie increase the price of wood) then to avoid the damage the only solution is to lower the kerosene price and move away from border prices. Two specific points need to be added. The border prices of 1983 are not the border prices of 1987. The collapse of oil prices in 1986, despite the partial recovery in 1987 have left international crude oil prices significantly below their 1983 level. In general little of this has been passed onto the consumer (although it is early days) which implies that oil products are now actually being taxed rather than subsidized. Thus the argument for lowering domestic prices is reinforced.

There is however, a general weakness with the overall argument from the point of view of a professional economist. If my argument were to be acted upon, then it implies that energy as a factor input in the economy would be relatively cheaper compared to other factor inputs. This would produce distortions in the allocation of resources. However, externalities associated with woodfuel also create distortions and it is therefore a question of choosing between the lesser of two evils. It could be argued that where woodfuel predominates in the energy demand mix, it is more important to correctly price woodfuel (ie the dominant fuel) than kerosene (the lesser fuel). It is however, not an easy issue.

THE MACRO-ECONOMIC ARGUMENT

The main thrust of the attack on the macro argument stems from the fact that in most developing countries it is the government and its agents which tend to be the most important users of commercial energy. This has two implications. First, removing the subsidy simply switches government expenditure from the subsidy chapter of the budget to the fuel bill chapter. Thus any fiscal relief will be illusory. Secondly, public bodies (other things being equal) will have less incentive to conserve energy. It is not their money which pays the fuel bill but the tax payers' money. Unless the price increase is passed onto the final consumer in such a way as to reduce the demand for the implied service, reduction of imports will also be illusory.

CONCLUSION

Both on the basis of the micro and macro arguments, the case for border pricing appears to be significantly weaker than was believed in the early 1980s. In reality, this probably will do little or nothing to persuade governments to move away from the current domestic price level of oil products. First because many governments are pursuing (rightly or wrongly) a policy of energy self-sufficiency which requires high domestic prices. Second because given the political traumas involved in increasing the prices in the first place, governments would be unlikely to agree to now reduce them. This is reinforced by the current conventional wisdom view that oil prices will in any case bounce back to high levels. Finally, developing countries' governments always have problems in raising revenue. Taxation of oil products is a taxman's dream. It can be easily and cheaply taxed at source, it has a relatively large tax base, and it might be thought of as something of a luxury product thereby introducing an element of progressivity into the tax system. For these reasons domestic prices will probably remain at their current high levels in many countries. Eventually rapid depletion of wood sources for fuel (plus land clearance and commercial logging) will raise the price of woodfuel but by then the damage will have been already and possibly irreversibly done.

ENERGY PRICING: INDUSTRIALISED COUNTRY PRACTICE VERSUS CRITERIA FOR DEVELOPING COUNTRIES

Gordon MacKerron
Energy Programme SPRU University of Sussex

INTRODUCTION

When aid agencies lend money to developing countries for energy (usually electric power) projects, they usually advise or require the recipient countries to follow specific price policies. These policies generally involve two objectives: financial viability, often expressed as a rate of return on assets, or a target contribution to self-financing of new investment and the achievement of economic efficiency, through either border pricing (for internationally tradeable energy commodities) or marginal cost pricing (for non-tradeables)¹. We shall refer to these two objectives generically as the viability rule and the efficiency rule. It is important to recognise that the two rules may be mutually inconsistent if marginal costs are systematically below average costs. In such cases marginal cost pricing produces financial losses, though this possibility is not a major focus of this paper.

In practice, many developing country governments and energy utilities have failed to follow one or both of these two pricing rules. Responses to this situation have mainly come from economists who have re-iterated the undoubted benefits that would flow from more successful adherence to the viability and efficiency rules. These re-iterations have often involved complex and sophisticated modifications to allow for particular developed country circumstances (eg. protection of poor consumers)².

However a repeated failure to observe apparently rational policy objectives needs to be explained in terms of political economy as well as the repetition and elaboration of rationality. This paper does not attempt such a political economy analysis for developing countries: instead it asks whether or not industrialised countries characteristically follow the kinds of pricing policies that their aid agencies advocate for aid recipients. If industrialised countries, with their better developed and more sophisticated market systems, find it difficult to adhere to orthodox accounting and economic principles in their energy pricing policies, this suggests that developing countries will find it even harder. This may mean that if there are serious barriers to the implementation of 'rational' pricing rules in developing countries, then

¹See for instance, Collier, H, Developing Electric Power Thirty years of World Bank Experience, John Hopkins, Baltimore, 1984.

²Munasinghe, H. Energy Pricing and Demand Management, Westview Press, Boulder, Colorado, 1985 is a good example.

alternative policies, designed to achieve similar results, may need to be considered.

An earlier paper³ provides a brief evaluation of OECD country pricing policies in terms of viability and efficiency objectives. This paper concentrates in more detail on the recent history of energy price policies in the UK. The case of coal is taken as an example of border pricing criteria, and electricity as an example of marginal cost pricing, while both are examined in terms of the financial viability rule.

SCOPE AND FOCUS

There are of course a number of types of energy price. Broadly⁴ we can distinguish:

- i) Supplier prices, which are paid by Governments or energy utilities for primary energy inputs which are either first transformed into secondary form (eg. coal to electricity) or are distributed more or less directly to final consumers (eg. via a gas grid)
- ii) Producer prices, which are paid by firms for the delivery of energy for use in production. When quantities are large enough, these prices are usually negotiated bilaterally, often in secret
- iii) Consumer prices, which are paid by households for deliveries of energy for domestic or transport use, and are usually determined by a published tariff structure. Small industrial and particularly service sector industries may often participate in these tariffs.

In this paper our main focus is on the determination of the price of coal to the electricity supply industry in England and Wales (a category [i] price), and on the determination of electricity prices to most producers and all domestic consumers (mainly category [iii]). Some 81% of all coal sold in the UK for non-metallurgical purposes in 1986 went to electricity production⁵,

³Mackerron, G, "Energy Pricing: Some Developed Country Experience" paper prepared for the Annual Meeting of the CEC/Developing Country Energy Planning Network, Brighton, 25-28 May 1987.

⁴Following D. Newbery in Pricing Policy in R. Belgrave and M. Cornell Energy Self-Sufficiency for the UK? Gower, Aldershot, 1985.

⁵Department of Energy Digest of UK Energy Statistics 1987, Table 15 p.33.

so that the coal price we are considering is much the most important.

Because there is now a reasonable well-developed international market in steam coal, the appropriate category for 'efficient' coal pricing is border prices (ie the price at which steam coal can be landed at UK Ports). While electricity is beginning to be traded on a significant scale in continental Europe, there are technical limits on UK trade at quite low levels. The maximum trade possible between England and Wales and other sources is of the order of 3 GW, compared to a system demand that characteristically varies between 20 and 40 GW. The appropriate category for efficiency pricing here is therefore marginal cost (either short- or long-term).

OFFICIAL UK ENERGY PRICE POLICIES

The electricity supply (ESI) and coal industries were taken into state ownership in the immediate post-1945 period, and the founding statutes required them to break even, taking one year with another. This implied a minimal form of the financial viability rule. Dissatisfaction with low rates of return and cross-subsidisation led to a series of non-statutory interventions by successive Governments from the early 1960s onwards⁶. The most important interventions came as a result of White Papers in 1961, 1967 and 1978. In 1961, medium term financial targets were introduced in an attempt to make all nationalised industries more financially self-sufficient. The 1967 White Paper, the triumph of the post-1964 arrival in government of professional economists, explicitly introduced the idea that prices of non-tradeables should be based on long run marginal cost, and specified a test discount rate (initially 8%) for the appraisal of new public sector investments. By 1978 there was a retreat from the purity of the 1967 marginal approach. Marginal pricing principles were still officially encouraged but where financial viability and efficiency rules might conflict, preference was to be given to financial viability.

No further coherent statements of pricing policy have appeared, but the 1978 changes were the precursor of a more complex and formalised system of financial controls which developed mainly in the early 1980's. From a price policy viewpoint, these had two major elements:

- i) the medium term financial target, determined generally on a three-year rolling basis. In principle it was this target which was the determinant of the other elements in the framework

⁶A J Surrey Government and the Nationalised Industries in A. Harrison, J. Gretton and G. MacKerron (Eds.) Energy UK 1986, Policy Journals, Newbury, 1986 pp 42-44.

- ii) external financing limits (EFLs) which are an annual form of cash limit, designed, officially, to encourage the pursuit of efficiency in the everyday managerial sense.

Figure 1, to which we return later, shows the accounting relationship between the various forms of financial control. Although there have been no post-1978 statements of price policy of any coherence, there has been a retreat from the more or less clear idea of marginal cost pricing towards the much less well-defined notion of 'economic' pricing.

It is clear, therefore, that official British policy towards energy prices is close to the policies that are commonly advocated for developing countries - a mixture of viability and efficiency, with preference given to the viability over the efficiency objective should they come into conflict. It is worth noting that in common with much economics writing on the subject, official price policies have only recognised objectives that are internal to the energy system, and, within the energy system, have recognised only the efficiency/viability objectives. Observation suggests that energy price policies, like other important areas of energy policy, can frequently serve other non-energy objectives eg anti-inflationary, regional or social policy. Energy price policies can also serve other objectives within the energy system that are not reducible to viability or efficiency eg. conservation and fuel substitution, or ensuring security of supply.

The remainder of this paper concentrates on the extent to which the viability/efficiency pricing rules have in practice been followed during the 1980's in the British coal and electricity supply industries.

COAL PRICES

A decade ago the world market in steam (non-metallurgical) coal was, at 50-60 million tonnes (mt), barely half the level of annual UK coal production and there was only a rudimentary spot market. By 1986 the world market had reached about 175 mt (getting on for double UK output) and there is a well developed spot market in North West Europe, centred in Amsterdam, Rotterdam and Antwerp (ARA). Over the course of the decade, therefore, it has become increasingly possible to regard steam coal as a genuinely tradeable commodity. Prices paid for UK-origin coal can now therefore sensibly be compared against the border price of imported coal. Indeed the UK nationalised coal industry (now known as the British Coal Corporation or (BCC) itself recognises this. Their investment appraisals now use a forecast of the imported price of coal to value expected future UK output and, as we shall see, marginal tonnages delivered to the CEGB are now priced with some reference to potential competition from imports.

It is of some importance that the price of BCC coal to the ESI is subject to the operation of clear criteria. This is because it has a peculiarly non-market character: a price structure which

results in transactions of some £3.5 bn annually is determined by a single negotiation between a virtual monopolist and a virtual monopsonist. In recent years the two parties, the Central Electricity Generating Board (CEGB) and BCC, have negotiated five-year 'understandings' (without legal force) within which precise annual tonnages and prices are determined.

Table 1 shows the resulting price relativities between BCC coal sold to the CEGB and imported coal at a number of dates between 1982 and 1987. The ARA prices are originally expressed in US dollars and are generally for fuels of higher heat content than the 24.5 GJ/tonne that is characteristic of BCC power station coal. The prices shown in Table 1 have therefore been converted into sterling and standardised to British thermal content levels. Inevitably the sterling prices reflect fluctuations in the bilateral £/\$ exchange rate as well as movements in the dollar denomination price. For instance, the steep fall in the ARA price between late 1985 and late 1986 is attributable more to the decline in the dollar than to decline in the dollar price of coal.

It is arguable whether the ARA price is a true reflection of a border price because coal bought in Rotterdam would clearly bear an additional trans-shipment cost to the UK. On the other hand, there is no reason why a UK importer could not import international coal directly into the UK at roughly equivalent prices to these of ARA. This is because most international coal is of South African, US, Australian and increasingly Colombian origin and therefore already travels long distances to ARA: the freight rates to the UK are likely to be higher only if, as will sometimes be the case, the cargoes are smaller. But in general the ARA price is a fair indication of border price levels.

It is clear that the relatively large price differentials between domestic and foreign-origin coal (above 25% in every year except 1984) could only be sustained by a policy of protecting the UK industry. The dominant purchaser, the CEGB, was not, until the miners' strike of 1984/5 permitted to import more than 1% of its requirements (ie. less than one million tonnes per year) and while there are no longer formal restrictions of this kind, the CEGB now chooses to import no more than 1 mt. This no longer costs the CEGB so dearly as in earlier years, because in response to the wider availability of international coal, and government pressures to make the British coal industry more market-orientated, BCC now price marginal tranches at levels designed to compete with international coal. (The £29.50 price level applies to 12 mt. and the £33.50 price to 10 mt.). In addition to pricing vulnerable marginal tonnage closer to border prices, BCC has also succeeded in reducing its average price to the CEGB (around £42.00 in 1987) both in current and in real terms. This partly reflects the historically unprecedented increases, of the order of 40%, in labour productivity in British coal mines over the last two years.

Despite this improving performance in the domestic industry, a weak dollar and a weak steam coal market have conspired to reduce the border price more quickly than the domestic price, so that the average BCC price of coal to the CEGB is now double the ARA

price. This does not, of course mean that the CEGB could obtain large amounts of coal at 20 per tonne. The world market is still small and if the CEGB rapidly attempted to supplant more than the 22 mt. of relatively cheap British coal by imports, it would undoubtedly substantially increase the border price. But the fact remains that even the cheapest BCC tranches are of the order of 30-40% above border prices.

This failure to match border prices might matter less if the second pricing rule financial viability, could be ensured. However the BCC is not financially viable, at current output levels, even at prices above border levels. Figure 2 shows the marginal cost of UK coal in 1986/87. It demonstrates that even at the highest border prices of recent years the cheapest BCC output would be marginal in financial viability terms, and the more expensive bulk of output would be clearly loss-making. It is therefore not surprising that BCC has made substantial financial losses in all recent years⁷.

The British coal industry has been rapidly reduced in size in recent years, has substantially increased its labour productivity and has significantly reduced its real price levels to the ESI. In these circumstances it has been able to move towards a border price-related price structure. However its cost structures are generally out of line with those of the newer, mainly open-cast mining operations in several other countries which make coal available on the international market. The consequence is that it has neither achieved financial viability nor as yet, and despite real efforts, matched border prices. There are hopes that financial viability will be achieved within two or three years and that a margin of output may be sold at genuine border prices (though these two objectives are in conflict unless there are very large further cuts in UK coal output and/or a sharp rise in border prices).

It is clear, therefore, that concern with financial viability and efficiency, while not absent, have not been the prime determinant of coal pricing policy. The UK coal industry constitutes a clear case where objectives or constraints external to the energy system - in this case to do with employment, social and possibly regional factors - have taken effective precedence over viability and efficiency considerations within the energy sector. This is of course not necessarily to condemn such objectives or constraints and their resulting practice. It is rather to show that when, in an industrialised country context, accounting and economic objectives in price policy conflict with broader considerations outside the energy system, these wider objectives (or constraints) can prove decisive, sometimes over extended time periods.

⁷See Manners, G. The exchequer Costs of the NCB Into the 1990s in Harrison, A., Gretton, J. and MacKerron, G. (eds) Energy UK 1986, Policy Journals, Newbury, 1986 pp 22-32.

ELECTRICITY PRICES

Electricity pricing is a particularly complex area. The ESI has been the focus of much of the marginal cost pricing literature, and in countries like France and the UK it is one of the few industries where serious and sustained attempts have been made to introduce marginal cost-based pricing structures. A vast theoretical and empirical literature on marginal cost pricing has subsequently grown up, concentrating on a wide variety of issues, including the appropriateness of short-run and long-run variants of marginal cost rules and on the substantial practical difficulties of making marginal cost principles operational. Rather than rehearsing these arguments in detail we concentrate here on the relationship between some specific UK price decisions and marginal cost principals. We turn first however to the viability rule.

In contrast to the UK coal industry, there is no doubt that the criterion of financial viability has been not so much met in the ESI, as over-fulfilled. This can most conveniently be shown in Table 2. The EFL column shows the net financial transactions between the industry and Government. A positive EFL indicates a net flow of funds into the industry, while a negative EFL indicates the opposite direction of flow. It is important to note that the ESI cannot borrow funds for investment except through Government. A negative EFL means, therefore, that the industry is fully self-financing (ie. pays for all current investment out of current income) and that in addition it is repaying debts incurred in earlier periods.

Table 1 therefore shows that the ESI has not only been fully self-financing since 1981/2, it has also been paying off its past debts at an accelerating rate. The industry as a whole is now close to being debt-free, so that in the absence of privatisation, further large negative EFLs would soon constitute an unambiguous tax on electricity consumers. As it is, with investment running at some £1.2 bn⁸ and negative EFLs running at £1.4 bn, some 25% of the price of electricity is going to fund past and present investment, and is independent (over and above) the full revenue costs of running the industry. This is financial viability with a vengeance.

There is no doubt that the industry is currently repaying its debt at a rate substantially faster than would be required of a private company in the open capital market. In 1986/87 the industry repaid about one-third of its debt of £4.2 bn⁹ and would be debt-free, at this rate, in almost exactly two years. This inevitably leads to the suspicion that Government policies towards the ESI are driven more by a desire to maximise revenue from the industry for broader macro-economic purposes than simply to secure financial viability within the industry.

⁸Electricity Council Annual Report and Accounts 1986/87, London, 1987, p 6.

⁹Electricity council op cit p 10.

This suspicion is fuelled by the unusual circumstances of the ESI's price increase of 2% in 1984, and the very recent announcement that electricity prices will rise by around 15% over the next eighteen months. In principle (Figure 1) the EFL is supposed to be a residual, its magnitude mainly determined by the medium financial target. In 1983/84 however, the chain of causation was clearly reversed, and the EFL drove the rate of return, which in the end would have been well above target (but for the effect of the miners' strike).

The circumstances were that in late 1983 it became clear that the ESI would probably achieve a negative EFL of £520m rather than the £418m originally set¹⁰. In October of that year the industry recognised that its 1.4% financial target for 1983/84 and 1984/85 could be achieved with a slight reduction in tariff levels in 1984/85, though it did not intend to reduce prices, in order not to mislead consumers about long term price movements. In November the Government announced an EFL supposedly derived from the financial target, of £740m, significantly higher than would be needed to achieve this target. The unexpectedly high negative EFL was defended by Government on a number of grounds including 'pressures on public expenditure', as well as some view of long-run marginal cost (LRMC).

Despite this high EFL, the industry nevertheless felt that it might well be able to meet it (and thereby substantially overshoot its financial target) without a price increase. In an extraordinary move, the Government then claimed a superior financial judgement and imposed a price increase of 2%, thus ensuring a yet further overshoot on the financial target and, (critically) an even larger negative EFL ie. an increase in revenue for itself. The conclusions of the Select Committee were plain:

'Neither in terms of the need for the industry to meet its financial target nor on the basis of the Government's policy of economic pricing for electricity, are we persuaded by the case for a two per cent price increase on 1 April.'

(Conclusion (v) House of Commons, op cit, p ix) and

'We cannot avoid the conclusion that the only plausible motivation for the large increase in the ESI's negative EFL for 1984-85 (which has led directly to the decision to recommend a two per cent price increase from 1st April) was the Government's wish, on grounds of macro-economic policy, to raise additional revenue in order to reduce the Public Sector Borrowing Requirement.'

(Conclusion (ix), House of Commons, op cit, pp ix-x).

This case could of course be isolated and exceptional. However the very recent intervention by the Secretary of State for Energy

¹⁰This section is based largely on House of Commons Energy Committee Electricity and Gas Prices, 1st Report, Session 1983/84, Vol 1 Report and Appendices, HC 276-1, February 1984, especially pp.xx to xxii.

to impose yet higher financial targets on the ESI for the next two financial years is equally difficult to reconcile with orthodox viability or efficiency criteria. The 3.75% and 4.75% rates of return will imply price increases of 8-9% in 1988/89 and around 15% by 1989/90. The justification offered for these new targets has been two-fold: to achieve a more satisfactory rate of return, and to allow the industry to finance its heavy future investment commitments. The investment-finance argument is little short of ludicrous: by 1990 the industry will be debt-free, and would at that time be generating an investable surplus of over 2 bn at current price levels. With investment running at only just over 1 bn in 1986/87, it is impossible to imagine that in two years time the industry will need to generate annual investable surpluses of around 3 bn. As for financial viability, 25% of current price levels are already in excess of total running costs. An extra 15% on prices, without expectation of any serious cost increases, can only lead to 'super'-viability, or, more accurately, monopoly profit levels¹¹.

Again, therefore, electricity prices are being set not by the industry but by direct Government intervention. Again the prices set cannot be reconciled with viability criteria. In 1983/84 revenue-raising for macro-economic policy reasons seemed predominant in 1987, revenue-raising is probably the principal motivation, but this time via the expectations that the industry can more profitably be sold off (plans to privatise having been firmly announced) than at lower price levels.

When we turn to the question of whether electricity prices correspond to marginal cost principles, we need to distinguish between the level and the structure of prices. Since the late 1960s the CEGB has, through its bulk supply tariff to Area Boards (who distribute electricity to final consumers) implemented a form of MC structure. In this tariff, now quite finely differentiated, marginal cost-based 'messages' are given to Area Boards which in their turn - though necessarily more crudely - try to reflect marginal cost structure to final consumers. There has been much debate about the appropriateness of the precise form of the Bulk Supply Tariff but no-one seriously doubts that it is a serious attempt to operationalise marginal principles.

¹¹It may be wondered why the charge of monopoly profits is levelled at an industry apparently aiming to earn less than 5% rate of return on net assets. It must be remembered that the industry calculates rates of return using current cost accounting conventions: at historic cost (the method normally used by private industry), 4.75% would be a rate of well over 20%. In addition there is substantial dispute over the valuation of assets in current cost terms. While the industry officially values them at some £37 bn (at March 1987) the expected sale price for the industry - before the increases in financial target to 3.75% and 4.75% - amounted to only some £16 bn or so. Against this kind of market valuation, profit levels are substantially higher than the official figures imply.

Whether price levels have reflected marginal costs is another matter. In 1982 an authoritative external review¹² concluded that in a SRMC framework prices were clearly too high, given the large surplus capacity that then existed. The industry, focussing on LRMC, believed that the 1983/84 price levels were 'equivalent to a broadly mid-point view on long run marginal costs'. This all implies that the price levels to apply in 1988/89 and 1989/90 will be well above long run marginal cost levels. This is not the place to enter into the theoretical discussion that would be necessary to evaluate these arguments precisely. However, it is quite clear that marginal principles have not explicitly informed electricity price policy decisions taken by Governments in the 1980s. The Chairman of the Electricity Council (a federal body with formal responsibility for price setting) told the Energy Committee, during the 1983/84 price controversy, that 'the Treasury have not talked to me or to any of my officers about economic pricing'¹³. Thus electricity prices, while certainly informed by marginal cost structure, have not manifestly been influenced by any view of marginal cost levels.

CONCLUSIONS

The conclusions that we can draw for the UK on energy pricing are that viability and efficiency rules, while not always absent as considerations in price policies, have not been the principal determinants of coal or electricity price levels. While viability had been achieved, or over-achieved, for electricity, it has not been attained for coal. In the efficiency area, coal prices have been substantially above border levels, while in electricity marginal structures prevail, with price levels almost certainly too high relative to marginal cost. Generally in coal price policy, viability and efficiency have been subservient to objectives or constraints of a social, employment and possible regional character, while in electricity price policy, considerations of macro-economic policy (including, recently, the desire to privatise more profitably) have been dominant.

Industrialised countries can therefore systematically over-ride the efficiency and viability rules in the interests of what governments see as more important policy objectives or constraints. The UK, like other industrialised countries, has a highly specialised energy policy-making organisation and a government with an ostensible commitment to limiting its own powers of intervention, and to allowing market forces to determine economic and energy outcomes. If in these circumstances we find a market and political structure (as in coal) which does not achieve either viability or efficiency objectives, or (as in electricity) repeated interventions by

¹²Coopers and Lybrand Associates Report on Consulting Work in Connection with the Review of the Bulk Supply Tariff, Department of Energy, London, February 1984, para 6.31, page 92.

¹³House of Commons, op cit, p.xxiv.

Governments in the interests of policy objectives that are entirely unrelated to the energy system (let alone to viability of efficiency) we should not be surprised if developing country governments exhibit similar inabilities to achieve viability of efficiency in their price-making policies. This is made all the more likely because, to generalise broadly, developing countries tend to have a less well developed market organisation, less well differentiated energy policy-making structure and - often - more avowedly interventionist political styles.

Wishing that things were different, in both industrialised and developing countries, is not helpful in trying to improve policy-making processes. As we manifestly live in a 'second best' world, it is necessary to recognise the real constraints that may hinder the achievement of 'rational' energy pricing policies in developing countries and think through what alternative policies might alleviate the undoubted harm that failure to achieve viability and efficiency undoubtedly impose on energy (and other) systems. This could include systematically examining the negative impacts of existing (low) price policies (eg excessive demand stimulation) and proposing alternative means to circumvent them (eg by taxing energy-intensive capital goods). It could also involve trying to think of non-energy price policies which might help serve the non-energy objectives for which price policies are currently used. These paths are not themselves without difficulties, but if there are serious political constraints in achieving rational energy prices it is as well to admit it, analyse it and start thinking of alternatives, rather than mere wishing them all away.

FIGURE 1
SOURCES AND APPLICATIONS OF THE ELECTRICITY
SUPPLY INDUSTRY S FUNDS

Item	Influenced by
Income from electricity sales	Pricing principles
less: total expenditure on revenue account	Performance aim
equals: .. Operating profit	Financial target agreed by Government
less: Interest Payments	
plus: Depreciation	Related to current value of assets
plus: Other provisions and miscellaneous capital receipts	
less: Capital investment	Government approval
plus or minus: ... Changes in working capital (mainly fuel stocks and unbilled revenue)	
equals: .. External financing requirements or repayment	EFL agreed by Government

Source: Electricity Council memorandum, p. 9 in House of Commons Energy Committee Electricity and Gas Prices 1st Report, Session 1983/84, Vol II, HMSO, 276-II, January 1984.

TABLE 1
PRICES OF UK-ORIGIN AND IMPORTED COAL 1982/1987

	NCB/BCC Price (Pithead)			ARA Price	% Difference
	£/tonne			£/tonne	
November 1982	40.7			25.2	38
October 1983	40.7			30.0	26
October 1984	41.4			35.2	15
October 1985	43.3			27.7	36
November 1985	46.9			33.2	29
November 1986	46.9	35.9		22.7	37
September 1987	46.9	33.0	29.5	20.2	34

Sources: A Holmes, J Chesshire and S Thomas Power on the Market FIBI, London, 1987, Table 1, page 111, Financial Times International Coal Report various issues and author's own calculations.

TABLE 2

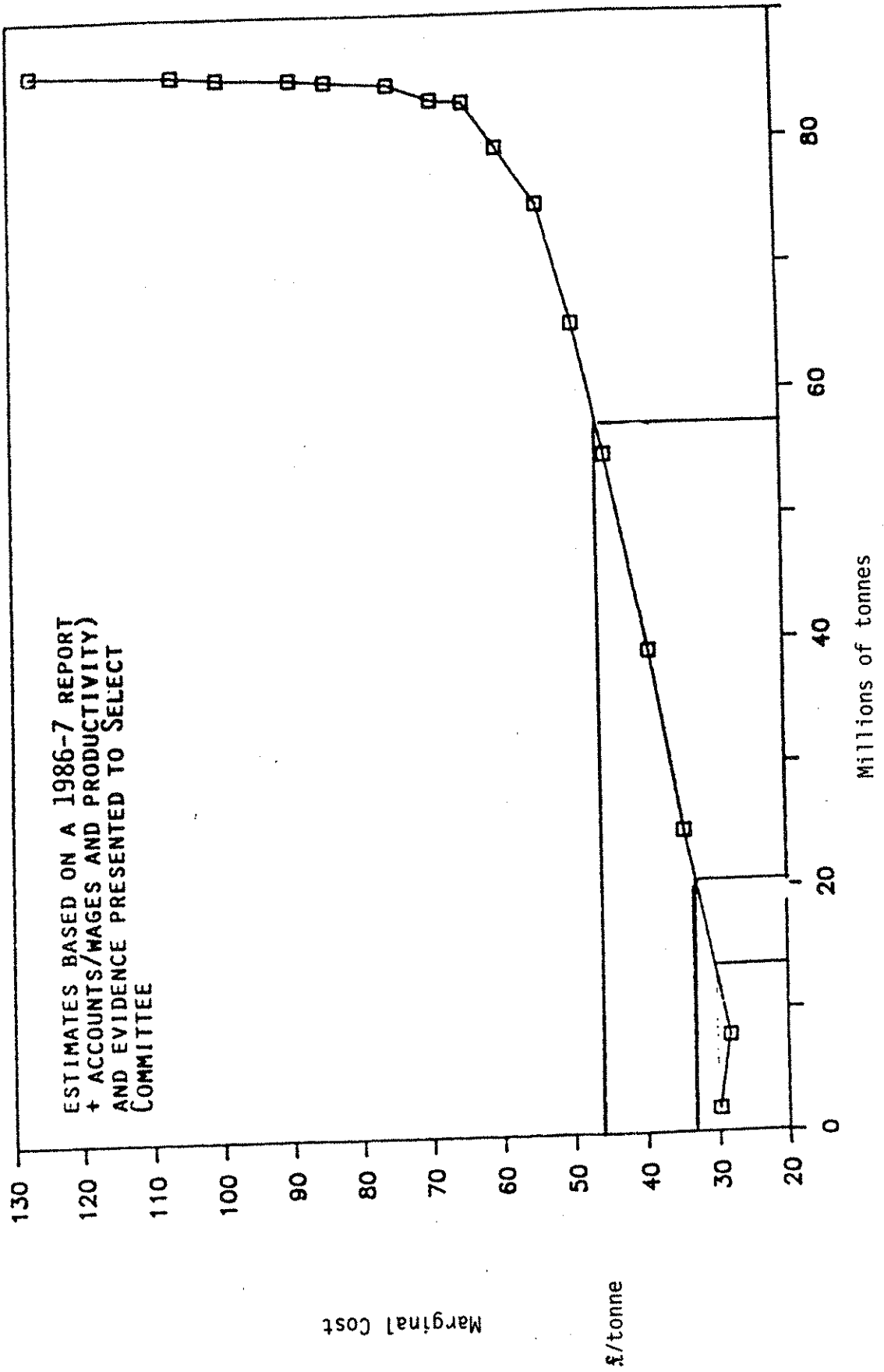
EXTERNAL FINANCING LIMITS AND FINANCIAL TARGETS FOR THE
ELECTRICITY SUPPLY INDUSTRY IN ENGLAND AND WALES

	External Financing Limit (EFL) £m	Financial Target
1978/79	-75	
1979/80	-232	10% (Historic cost basis)
1980/81	-187	
1981/82	-165	1.7% (Current cost basis [CCA])
1982/83	-148	
1983/84	-418	1.4% (CCA)
1984/85	-740	
1985/86	-1128	
1986/87	-1416	2.75% (CCA)
1987/88	-1305	
1988/89		3.75% (CCA)
1989/90		4.75% (CCA)

Sources: House of Commons Energy Committee Electricity and Gas Prices 1st Report, Session 1983/84, Vol II, HMSO, London, 276-II, February 1984, Appendix III of memorandum submitted by Electricity Council various Annual Reports and Accounts.

Figure 2

Marginal Cost of UK Coal 1986-87



Source: Robinson, B, 'Demand Prospects and the Role of Coal' paper presented to IFS/SPRU Seminar on Energy Demand into the 1990s, London Press Centre, 28 September 1987.

