

## **SECURITY OF SUPPLY: A MAJOR NEGLECTED FOSSIL FUEL SUBSIDY**

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### **Summary**

Various groups have attempted to set a monetary value on the externalities (that is, those costs not reflected in the market price) of fossil fuel usage based on damages caused by emissions of particulates, sulfur dioxide, and oxides of nitrogen and carbon. One externality that has been neglected in this type of analysis, however, is the cost of maintaining a secure supply of fossil fuel, in particular of petroleum from the Middle East. Military expenditures for this purpose are relatively easy to quantify based on US Department of Defense and Office of Management and Budget figures, and amount to between \$1 and more than \$3 per million Btu, based on total fossil fuel consumption in the US. (These costs should be compared to the average price of about \$2.40 per million Btu paid by US utilities for oil and natural gas in 1993.) Open acknowledgment of such expenses would, at the very least, have a profound effect on the perceived competitiveness of all non-fossil fuel technologies.

### **Introduction**

It is now widely accepted that the market price of fossil fuels does not reflect the total burden they place on society. Costs imposed beyond this price are termed externalities; some examples of collateral damages from fossil fuel use include forest and lake destruction from acid rain, the ravaging of the land for coal mining, health problems caused by smog, and climate modification due to greenhouse gas emission. Conventional economics ignores the cost of these destructive side effects.

Finding mechanisms by which the market is forced to acknowledge these burdens has proven to be extremely difficult and contentious for a variety of reasons. While the benefits of fossil fuels are immediate and local, the burdens are often only evident at a much later date or far from the point of usage or by people who are powerless to demand compensation. In addition, it is often hard to quantify the damages in any conventional sense. For example, acid rain has caused widespread destruction of remote forests and lakes in central New York, New England, and Canada. Since these are not used to provide lumber or fish, but rather mostly for recreation, their exact value to society is not easily defined. Greenhouse gasses from fossil fuel burning will almost certainly modify the earth's climate in the next century, but it has not yet been possible to agree on if or how much the present generation should invest to minimize this.

Utility regulators in Massachusetts and Nevada have attempted to set a monetary value on the damage caused by power plant emissions of particulates, methane, volatile organic compounds and oxides of sulfur, nitrogen, and carbon. This would increase the cost of electricity from advanced natural gas combined cycle plants by \$0.0137/kWh (see Table

1). These "environmental adders" are used to compare the cost of power from these plants with alternatives such as increased efficiency and other generation options. It must be emphasized that these figures have not been widely accepted. For example, the cost of damage from CO<sub>2</sub> emission is based on a charge of \$100/ton for carbon emission, which is equivalent to an increase in the price of natural gas of \$1.45/mmBtu. This would nearly double the current US market price. To even have a chance of being widely accepted, such a fee would most likely have to be based on clear scientific evidence; this evidence is lacking at present, and may come too late to prevent major damaging changes from taking place.

Pollutant	Cost (\$/lb)	Cost (¢/kWh)
NO <sub>x</sub>	3.4	0.21
SO <sub>x</sub>	0.78	0.00
CO	0.45	0.01
Particulates	2.09	0.02
Volatile Organic Compounds	2.77	0.02
CO <sub>2</sub>	0.012	1.11
CH <sub>4</sub>	0.12	0.00
Total		1.37

Source: Reference 1.

There is one other externality, however, which is almost always neglected in these discussions, and that is the cost of providing a secure supply of fossil fuels. The United States is dependent on petroleum to meet 39 percent of its primary energy needs, of which imports now cover more than 50 percent. During the Cold War, much of the cost of protecting the source of these imports could be rationalized as a part of countering the threat of world domination by the Soviet Union and its client states. The collapse of the Soviet Union has removed this threat, yet oil supplies remain menaced by other countries and ideologies, and the US military budget remains near its Cold War level in some measure to guard against any interruption in the supply.

Moreover, these costs should be viewed as a subsidy not only to petroleum consumers, but to all US consumers of fossil fuel. It is clear that, unlike the situation in 1973, it is now technically feasible in many cases to substitute natural gas or even electricity for petroleum as a transportation fuel. Concern for air quality in large metropolitan areas is already making natural gas and battery automobiles much more appealing; any doubt about the reliability of petroleum supplies would enhance this appeal. Large scale use or

even the promise of such use would without a doubt put significant upward pressure on natural gas prices, and to a lesser extent coal prices. Thus, the past practice of assigning military costs exclusively to petroleum, neglecting the interlocking relationship of all fossil fuel prices and the possibility of fuel substitution, should be viewed as part of an incomplete analysis.

### **US military and other expenditures**

What portion of current US military expenditures can be assigned to the maintenance of fossil fuel supply security? The most credible relevant analysis to date has been done for the 1994 military budget of \$278 billion by the Center for Defense Information and the Brookings Institute. Here, spending was apportioned according to the deployment of forces as reported by the Department of Defense; the costs that could be assigned directly to the Middle East were \$73 billion, about 26 percent of the total military spending.

It should be noted that this methodology is severely flawed; for example, during the Persian Gulf War, many units assigned to Europe were sent to the Middle East. Yet, from Figure 1, the US appears to be spending \$112 Billion to defend Europe, even though its main adversary has vanished. Clearly, expenditures of this magnitude could only be justified if they served to support vital US interests in nearby regions. The \$73 billion attributed to the Middle East grossly underestimates the real outlays.

In addition, total current military spending does not reflect total current other costs which are a consequence of this policy. For example, interest on the national debt is about \$203 billion (1994); a significant fraction of this debt is due to deficit financing for military expenditures. Veterans benefits were \$38 billion in 1994; again, a fraction of these expenses should be allocated as being a consequence of this same policy. Foreign military and economic aid to the Middle East is of the order of \$5 billion, reflecting that region's importance to the US.

Figure 1. Mission breakdown of 1994 US military spending; total spending is \$278 billion. Sources: Brookings Institute, Congressional Budget Office, Dept. of Defense, and the Center for Defense Information (CDI), Washington, DC; chart prepared by the CDI.

To simplify matters, only costs based on current military expenditures will be considered in computing the cost of this externality. Current military outlays that can be assigned to the security of supply mission can be given maximum and minimum values (Table 2). The lowest is \$73 billion, based on the current disposition of forces (Figure 1) and the highest \$227 billion; the latter assumes that all costs other than those for the nuclear forces and the defense of the US and Latin America are assigned to fighting one war in the Middle East.

Figure 2. US Primary energy consumption in Quads ( $10^{15}$  Btu) by category, 1994.

### **US Fossil Fuel Utilization**

Total primary energy consumption for the US in 1994 is shown in Figure 2. Fossil fuels provided 75.5 Quads, or 85 percent, of the 88.5 Quads of primary energy consumption. Coal (19.6 Quads) is used almost exclusively for electric power production, while natural gas (21.2 Quads) is used mainly for industrial, residential and commercial applications; both of these fuels are supplied from abundant North American reserves. Petroleum provides by far the largest share of fossil fuel consumption, 34.7 Quads, or about 46 percent, most of which is used in the transportation sector. Nearly half of all US oil consumption is covered by imports, about 50 percent of which are supplied by OPEC (Organization of Petroleum Exporting Countries) nations.

It is clear that petroleum dominates US energy consumption, and that supplies from the Middle East, with two-thirds of known crude oil reserves, is critical in satisfying US demand. Moreover, oil production from the Middle East, now 40 percent of total oil production, is expected to increase to 52 percent of the total shortly after the year 2010. Clearly, maintaining the stability and control of this region is a significant issue.

### **Estimating the Cost of Security of Supply**

Based on the above range of current military expenditures and current US fossil fuel consumption patterns, a range of costs for providing for a secure supply of fossil fuels can be calculated; these are listed in Table 2. Costs are assigned to all fossil fuels, or to oil and natural gas, or to oil only. Given current oil prices of less than \$18/bbl (\$3.20/mmBtu), and current natural gas prices of less than \$2.00/mmBtu, it is evident that even for the minimum level of current outlays, \$73 Billion, and the maximum amount of fossil fuel considered to be affected, 75.5 Quads, the impact of this policy is significant.

Low market fossil fuel prices are indeed an illusion if one includes the cost of maintaining secure supplies. This adds a minimum of about \$1.00/mmBtu to the cost of natural gas, compared to the 1993 average price to utilities of \$2.57/mmBtu; it adds \$5.75/bbl of oil compared to the current price of about \$18/bbl, and about \$20/ton to the price of coal which currently costs about \$29/ton. This apportioning of costs is debatable to some degree; a larger fraction of the costs might be assigned to oil and a smaller fraction to coal, given the large demand supplied by imported oil and the relative lack of flexibility of coal as a substitute fuel. It is clear, however, that the real cost of fossil fuels to US citizens is much higher than that which is reflected in their market prices, and that an externality reflecting the subsidy required to insure security of supplies should be included in any discussion of the cost of energy.

The range of per unit costs and cost allocations in Table 2 is extremely large. In order to better define the debate, it is proposed that costs be apportioned over all fossil fuels (75.5

Quads), rather than over one or two categories. This would lessen US regional friction by providing a unified approach to the problem. A surcharge on coal is evidently the most difficult to justify, given its large domestic reserves and limited ability to substitute for petroleum. This could be handled by mandating that a large fraction of the charge be returned to the coal mining regions to rehabilitate lands that have been destroyed by strip or underground mining, and to compensate miners and their communities for the occupational diseases associated with coal mining.

It is also proposed that the sum of \$150 billion be taken as what might reasonably be allocated to the mission of providing for a secure supply of fossil fuel. Given the other current costs of debt service, veterans benefits and foreign aid cited above, as well as the size of the military budget, this estimate is certainly to be regarded as quite conservative. Even with a proposed military budget of about \$260 billion in 1996, which both the current administration and Congress are pledged to increase, the \$150 billion estimate is easily justified.

Therefore, a surcharge of \$2.00/mmBtu on all fossil fuels should be considered as equitably reflecting the cost of providing for a secure supply of fossil fuels for the US.

Table 2 Maximum-minimum security of supply costs (1994)		
Military Costs (\$Billion)	Maximum (One War) 227	Minimum 73
Fossil Fuel Category	Maximum Per Unit Cost (\$/mmBtu)	Minimum Per Unit Cost (\$/mmBtu)
All Fossil Fuels	3.1	1.0
Oil and Natural Gas	4.2	1.3
Oil Only	6.7	2.3

There are several compelling advantages to framing this issue in terms of a monetized externality:

- It is non-confrontational. It has been, is, and will continue to be US policy to intervene in the Middle East. This is recognized; the only concern here is to assign the costs of this intervention in a rational manner.
- It is non-judgmental. It does not question the wisdom of this current policy.
- It builds on language that is accepted and acceptable. The environmental community has spent several decades educating the public on the costs of externalities. This approach takes advantage of this excellent work.
- Costs are verifiable. Unlike the case for global warming, no complex models are needed to compute the cost of the imposed burden. Costs are available from the Department of Defense and the Congressional Budget Office.

## **Conclusions**

The recognition of the military cost of providing for a secure supply of fossil fuels would have important implications for other current US public policies such as utility restructuring, stranded utility investments, industrial competitiveness, competition within the utility industry and between this industry and independent power producers, as well as the competitiveness of many supply side and demand side technologies. The real cost of fossil fuels to US citizens is certainly much higher than that which is reflected in their market prices; a value of \$2.00/mmBtu for the provision of security of fossil fuel supplies is fully warranted.

Open acknowledgment of the costs associated with this policy would also provide a transparent rationale for an energy tax on all fossil fuels. This would substantially enhance the competitiveness of non-fossil fuel technologies and also provide a well-justified stimulus to sustainable development policies.

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## **REFERENCES AND NOTES**