Energy-Related Federal Agency Activities

Introduction

The federal government has spent heavily on energy development for most of this century. In some cases, involvement has evolved from peripheral activities. For example, government spending on hydroelectricity grew from efforts at flood control, irrigation, and navigation, necessary prerequisites to develop much of the West. Investments into fission and fusion began with the extensive nuclear weapons program undertaken during World War II. Regardless of its origin, government intervention in energy markets, and spending on energy, has continued to grow and has had a significant impact on the nation's energy choices.

This section develops a snapshot of federal energy-related spending in FY89. Spending is not a measure of the actual benefits received by individual energy types or the energy sector overall. In some cases, the value of the benefits may exceed the amount spent by the federal government. In other cases, a poorly designed and implemented program may result in actual benefits which are much lower than expenditures. The timing of the spending and the realization of concrete benefits to a particular energy type can be separated by decades. The lags between expenditure and benefit may be forward or backward. For example, oil and gas exploration today benefits from geological work done in prior decades. Similarly, costs of environmental mitigation from energy use today may not be borne by the federal government for years to come.

We Measure Spending, Not Market Impact

In order to evaluate the impact that federal expenditures have had on energy choices, we would need to be able to trace through from expenditure to benefit to the impact of that benefit on market behavior. The present study is concerned only with the expenditures portion of this equation. Where large expenditures in a single year cover costs for multi-year projects or problems, we have converted expenses into annualized capital flows. For example, although loan defaults for the Rural Electrification Administration are recognized in 1989, they reflect losses since 1973. The aim of this adjustment is to match the costs of these multi-year programs to the period over which the benefits were provided to the energy sector.

To generate annualized subsidy estimates, we needed to make decisions regarding the appropriate period of benefit (or cost) and interest rates. Data from the individual agencies were used whenever available to estimate these variables. High and low estimates were also generated when significant discrepancies over assumptions, estimation methods, or third-party estimates existed. The major differences between the estimates are outlined in Table 1 below.

Table B4-1: Differences Between the High and Low Estimates for Agency Programs

Low Estimate - Cost to Government	High Estimate - Value to Industry
-Low estimates of program losses and loan defaults -Outlays for operating expenses -Interest rate subsidies based on the government's cost of borrowing	-Higher estimates of program losses and loan defaults -Outlays for operating expenses -Interest rate subsidies based on the private sector cost of borrowing -Imputed rate-of-return only to crop insurance programs and the Naval Oil Reserve, due to data availability -Tax-exempt status of operations included only for publicly-owned power and the Naval Oil Reserve, again due to data availability

In general, the low estimate reflects the minimum actual cash cost to the federal government of engaging in a particular activity. The high estimate measures the value of these same services to the recipient. In addition to incorporating the upper range estimates for direct cost to the federal government, the high estimate also begins to reflect the benefit that the government provides by serving as a financial and risk-bearing intermediary. For example, if an energy firm receives federal funds at an interest rate 3% less than it could get from a bank, its reduced interest payments are counted as a subsidy in our high estimate, even though they are not reflected in federal outlays.

Two additional types of federal program subsidies, the intermediary benefits of loan guarantees and required rates of return on government-owned enterprises, are not included even in the high estimate. Since federally-guaranteed debt has no default risk, borrowers receive an interest rate discount. However, our estimate includes guarantees only when the government must make good on them; the value to the recipient through reduced interest rates is not included. Similarly, government ownership of energy enterprises, such as the Power Marketing Administrations, have no required rate of return. (Only for crop insurance programs and the Naval Oil Reserve, where data were available, was an imputed rate-of-return added to the high estimate). Very few investors would put up billions of dollars for many decades and expect no profit. The fact that there is no required rate of return allows the enterprise to sell power at a lower rate.

In measuring federal agency subsidies to the energy sector, agency obligations, rather than agency outlays are used in some cases. In these instances, obligation data were available on a more disaggregated level, allowing a more precise allocation of total agency spending to the energy sector.[1]

We Measure Agency Subsidies From a "No Budget, No Energy Policy" Baseline

The "proper" role of government is characterized in as many different ways as there are people defining it. Rather than attempting to pick *the* proper role of government, we build our subsidy estimates from a zero baseline. On the program side, this means that we assume that all expenditures on energy benefit the sector in one way or another.

If a provision is theoretically available to all economic sectors, we include the energy portion of it as a subsidy if it provides large benefits to the energy sector or creates a distinct advantage for a certain type of energy resource. For example, heavy subsidies to water infrastructure construction and maintenance are not undertaken to benefit energy transport, *per se*. However, since oil and coal comprise the largest users of these systems, these industries receive much of the value of the federal subsidization.

While our baseline encompasses a broader view of subsidies than is typically used, it has the advantage of providing a consistent basis for comparing subsidies across energy types. Obviously, our choice of a baseline and the allocation of program spending to particular fuels all reflect subjective judgments. Other analysts might devise broader or narrower definitions to work from and we provide data on a disaggregated level (throughout Appendix B) to enable researchers to adjust our estimates to reflect alternative assumptions.

There is no clear point at which energy markets stop and other markets begin. Federal subsidies to industry, transport, and real estate will all influence energy consumption patterns in some way. We limit our analysis by including transport subsidies only as they affect the distribution of energy, ignoring subsidies that shape modal choice (see Appendix A-3 for more detail on transport issues). Agency spending on real estate was not included since this spending did not appear to directly reduce the cost of efficiency in buildings, though it absolutely impacts demand patterns for energy services. Finally, we include at least some of the agricultural subsidies that influence the cost of biomass fuels, primarily ethanol from corn.

Our baseline also includes a number of government activities that provide non-energy benefits, since they provide significant benefits to the energy sector as well. For example, the Strategic Petroleum Reserve has a national security component, but also specifically benefits oil. Environmental protection is another example where energy is a major, though not the only, beneficiary of particular programs. We regard federal expenditures intended to identify and mitigate the environmental impacts of producing or using energy as subsidies to the sector.

This baseline is consistent with the view that environmental and other externalities, being by definition uncompensated costs associated with using energy, are subsidies to the sector. Federal spending on environmental mitigation or R&D, for example, reduce the share of costs that would otherwise be borne by private firms (in the form of environmental regulations, safer and cleaner

[1]This creates some errors in estimates since not all obligated money is actually spent. However, the errors go in both directions. In many cases, cash outlays for 1989 were less than the energy services actually purchased since leftover funds from the prior year were also spent in FY 1989.

equipment designed to avoid the threat of future lawsuits, or insurance premiums to cover unanticipated environmental costs) or by citizens in the affected area. Although we do not attempt to calculate the value of environmental externalities to the energy sector, we do provide a more detailed description of externalities in Appendix A-4. The accompanying table presents a compendium of studies comparing the relative magnitude of the costs of environmental controls and the damages caused by pollution.

Some government activities we include provide tax-payer supported benefits accruing in part or entirely to foreign energy producers or consumers. Programs such as Export-Import Bank energy loans share the benefits between U.S. equipment producers and the recipient country. Other programs, such as grants to developing nations through the Multilateral Development Banks, have a less clear link.[2] Appendix A-4 presents a more detailed description of the international aspect of energy subsidies.

Subsidies are Not All Bad

It is also important to remember that our use of the word "subsidy" does not necessarily imply that the expenditure is unworthy from a societal perspective. Conventional wisdom suggests that subsidies, because they distort price signals and substitution behavior, reduce economic efficiency and overall well-being. As mentioned in the main report, there may well be cases, however, in which the expenditures identified here overcome specific market failures and, as a result, actually improve overall welfare. Some research and development expenditures and utility regulation may fall into this category. This study does not attempt to judge the worthiness of individual expenditures, but rather to provide a gross estimate of the magnitude of federal support.

There are Six Types of Federal Agency Interventions

Agency interventions fall into six main categories: grants; loans, loan guarantees, and insurance; research and development support; market planning; direct ownership of assets; and administrative and regulatory costs. Not every agency is involved with each type of intervention. In fact, many agencies may be involved only with one or two. Each type of intervention is described in more detail below.

Grants

Federal funds may pay all or part of some private-sector energy-related activities, reducing the share of total costs borne by the private sector. This reduces the cost structure for the subsidized industry, making it more difficult for unsubsidized industries to compete. Grants may be in the form of cash outlays, or the provision of subsidized or free access to other federal resources.

Grants may be used to correct for past damages, either health or environmental. The clearest example is payments to Black Lung victims by the Social Security Administration. While government intervention in these areas is justifiable on moral grounds, it nonetheless confers a subsidy on the original industry (in this case coal) which benefitted from lower production costs historically by ignoring worker health, and is now not fully compensating the victims.

[2]Nations are prohibited from linking their financial support for the Multilateral Development Bank to requirements that the borrowing nation purchase products from them. Nonetheless, U.S. firms have a sizable presence in markets for large scale power plant equipment and services, and are likely to benefit at least somewhat from the developing nation's ability to purchase energy-sector products and services.

Loans, Loan Guarantees, and Insurance Programs

Loans. Federal loan programs provide subsidies through interest rates, repayment terms, and defaults. Loans may be lent directly to corporations at favorable interest rates, sometimes significantly below the government's cost of borrowing. Loan repayment schedules, such as those available to the Power Marketing Administrations, may also be highly favorable to the lender.

Favorable repayment conditions generate subsidies by allowing borrowers to defer repayment until the end of the loan life. Even though the nominal value of the loan will eventually be repaid, since the duration of these loans is longer than what was normally available in the capital markets of the time, the federal government will have to refinance the loan at new market rates, but will not be able to adjust the interest rates on its loans to the long-term borrower. Thus, deferring repayment until the end of the lending period shifts all interest-rate risk to the federal government and allows borrowers to pay back loans in inflated (perhaps greatly so) dollars. (See the Power Marketing Administration section under DOE and the Background Information on Debt chapter for more details).

Loan Guarantees. Federal loan guarantees eliminate the default risk to the lender by shifting it entirely to the federal government, enabling the borrower to obtain much more favorable loan rates. Often, without the federal guarantee, the loan would not have been approved at all. In other cases, the interest rate would have been higher. Our subsidy estimates incorporate the value of guarantees only through defaults which the government must pay back. This understates the true value of loan guarantees to the energy sector.

For both loans and loan guarantees, the interest rates and other fees charged to borrowers have rarely included enough of a premium to cover the large defaults on which the government must make good. These high default rates are probably due both to the fact that the government lends to higher risk ventures than do private lenders, and to less stringent risk assessment prior to approving loans. Defaults on direct and guaranteed loans from both the Export Import Bank and the Rural Electrification Administration are a large percentage of outstanding obligations.

Insurance. Federally-provided insurance programs have many of the same characteristics as loan and loan guarantee programs. Premiums often don't cover policy losses, and federal risk-bearing is often cheaper than the equivalent service on the private market due to economies of scale and no required rate-of-return. As with loan programs, not every competing energy service has similar access to federal insurance, introducing market distortions.

We categorize insurance programs run by a federal agency and financed at least in part through premiums as agency activities. Indemnification programs, where the federal government holds a private entity harmless for the costs of particular activities (e.g., a nuclear reactor accident) by agreeing to pay damages, or by shifting risks to the public, are included in the Other Interventions section of the report. Unlike insurance programs, these market interventions do not have premiums, and do not have any federal agency responsible for regularly assessing risk exposure.

Intermediary Benefits. All of these loan, guarantee, and insurance programs provide an intermediary benefit to borrowers, since the federal government can borrow funds and absorb risks more cheaply than most private entities can. Since not all participants in energy markets have equal access to advantageous rates on federal loans, guarantees, and insurance, this access becomes an additional barrier to entry. The high estimates for agency programs providing loans and insurance include the value of this

intermediation. Due to poor data on the interest rates of guaranteed loans, the value of intermediation for loan guarantee programs could not be calculated.

Measuring the Benefits. Interest rate subsidies for the low estimate are calculated using the difference between the Treasury (or, in some cases, the Federal Financing Bank) borrowing rate and the interest rate charged to the entity. Our high estimate uses the cost of funds to power borrowers in the private capital markets. Generally, we use the weighted average cost of new gas, power, and light bonds from the Moody's bond rating service as a proxy for this cost. Where a different proxy rate is used, the rationale for doing so is clearly presented.

The high estimate better reflects the net advantage received by the subsidized entity relative to substitutes through its access to government borrowing. Defaults on loans and loan guarantees are based on estimates by the relevant federal agencies in the form of their "provision for losses" entry in their financial statements. A detailed description of how we calculated loan-related subsidies and statistical data on interest rates is included in Chapters B6 and B7 of this Appendix.

As with direct grant programs, loan and loan guarantee programs may sometimes be justified on the grounds that they improve societal equity. For example, the Rural Electrification Administration subsidizes rural sub-sectors of the country to improve their quality of life. Again, while these expenditures may be justifiable (or have been justifiable at one point in time), they do distort market choices. For example, subsidizing rural electrification will obscure the point at which extending transmission lines becomes more expensive than building small scale decentralized power or on-site renewable sources.

Research and Development

The federal government is heavily involved with research and development at virtually every level of energy markets. This includes research into theoretical future energy forms, mineral location, combustion and transportation systems, research on pollution reduction, and the health and environmental effects of particular pollutants. Economic theory suggests that government-sponsored research may be efficient since private research efforts may be easily copied once successful, making it difficult for the private entity to capture the full benefits of its investments in R&D.[3]

While "generic" investments into R&D may be supportable on theoretical grounds, the distribution of spending for R&D purposes can make federal intervention highly distortionary. Similarly, the controls on spending may not be as well targeted as in a private entity, reducing the overall efficiency of R&D investments. Spending billions on new uranium enrichment techniques while there is a surplus of enrichment capacity even with current infrastructure means that the funds are not going to other uses which may have a higher return. In short, R&D spending can shift market interest away from one form of energy towards another based on the availability of research money rather than on the underlying economics of the energy product.

In addition, "generic" research is sometimes not so generic. With the exception of research into the workings of nature, research is generally driven by the most demanding use for a product or technology. As knowledge of the process and technology improves over time, costs fall, production

[3]While patents limit copying to some degree, many are easy to work around and provide valuable information to other companies developing somewhat related products.

capacity grows, and technologies will diffuse through the economy into lower value uses. For example, microchips were first used in expensive computers before cheap watches. In energy markets, similar occurrences led to fission reactor development in the military sector before they were transferred to the commercial sector. In each case, the economic justification for the research came from the high value use; spillover was simply a bonus.

As a result, allocating R&D expenditures to particular energy types requires some judgment. In this paper, we do not consider federal government spending on naval fission reactors as a subsidy to commercial fission (although the commercial segment undoubtedly benefitted), since the naval research would have occurred regardless. Similarly, we do attribute research on such items as ceramics in part to efficiency (for high temperature motors), since these are among the most demanding uses driving the R&D.

A similar argument may be used for research into the magnitude and severity of a variety of environmental problems. Without particular forms of industrial or human activity, there would not be particular forms of emissions to deal with. Without those emissions, there would be no need to study the impacts of those emissions on the planet and its inhabitants. Therefore, for example, research into problems such as global warming are allocated to energy on the basis of the energy sector's total contribution to greenhouse gases.

Ownership of Energy-Related Infrastructure

Intervention here includes all construction, maintenance, and operating costs of energy-related facilities or service organizations owned directly by the federal government. The Uranium Enrichment Enterprise and Power Marketing Administrations are examples of this category of intervention. Also included are unrecovered investments into such items as transportation infrastructure which benefits energy as a major user of the waterways, although other groups may also benefit. These subsidies are prorated based on the energy sector's share of total use.

Government-ownership provides direct subsidies through capital losses, operating losses, and the absence of accruals for future costs associated with ownership. In addition, the fact that government enterprises absorb significant operating risks, yet do not have any required rate of return for investors (the taxpayer) reduces the costs borne by the enterprise still further, increasing the barriers to entry for substitute energy services.[4] Finally, government enterprises may cross-subsidize within its organization, offsetting losses in one area by increasing prices in another. Since the government has monopoly power in many of its areas of operation, cross-subsidies are much easier to maintain than for competitive private companies.

Capital Write-offs. Not all spending on plant and equipment proves to be productive, or productive for as long as expected. In such cases, the now worthless capital must be written off as a capital loss.[5] In a private industry this loss is generally written off as soon as possible. Government assets in some agencies are also written off quickly once losses are recognized. However, until recently

[4]While some areas of government involvement, such as uranium enrichment, have historically been forbidden for private enterprise, the lack of an adequate return on capital still affects energy markets by making nuclear power more attractive relative to energy services provided primarily by private entities who don't have the luxury to operate it as a non-profit enterprise.

[5]Losses in joint government-private ventures would be allocated to the owners based on share of ownership. Capital losses reflect a write-down of undepreciated capital.

few federal enterprises had comprehensive-enough accrual accounting for these types of problems to show up.

Our treatment of capital write-offs is somewhat different from the method used by the private sector since we are constructing a "steady-state" capital flow to approximate the annual costs of a given government activity. Therefore, we amortize losses back in time over the estimated period of loss. For example, billions of dollars of defunct investment into the Uranium Enrichment Enterprise since 1969 have yet to be recovered through sales of enriched uranium. Rather than recognizing the total loss in 1989, we converted them into an annual "premium" for these 20 years. This premium has the same net present value as writing off the losses entirely in 1989, but better reflects the fact that the UEE pricing of services or recognition of capital write-offs throughout the period was too low.[6] This premium is a measure of how much more UEE would have put aside to protect against losses if it had known in 1969 how things were going to turn out.

As a practical matter, write-offs prior to 1989 will not affect the 1989 estimates, and therefore are not converted into annualized premiums. In some cases, the period of loss may go forward in time rather than backwards. For example, a modification of a loan or sales contract may reduce the future cash flow stream. In such cases, losses are amortized forwards rather than backwards. The annualization of losses reduces our 1989 estimate - significantly in some programs (and increases it in other years). However, the resulting estimate of federal subsidies is also less volatile year-to-year, and better measures the annual value of subsidies.

Estimates on the magnitude of unrecovered federal government capital are often quite controversial. For example, independent estimates for the Uranium Enrichment Enterprise range from $3-10 billion. Much of this disparity is due to differing assumptions on the period of loss. In addition, part of the controversy stems from what price constitutes a reasonable charge for the sale of government assets to the private sector. This price, in turn, is determined by which operations are included in the amount the government is trying to recover through privatization. Part of the issue may also be political since agencies with large capital losses may be viewed as inefficient or mismanaged.

This issue is less relevant for our purposes since even items that are to be written off prior to any asset privatization are real losses and count as subsidies. The only impact would be on the timing of the write-offs. Those taken prior to 1989 will not be included in our subsidy estimates, whereas losses not yet recognized would continue to accrue interest and be included. The value used is the total investment which has not been recovered, rather than the value for privatization. Where there are divergent values even for this, we use a high and a low estimate.

Operating Subsidies. Losses in government operations may originate from current operations as well as from poor investment decisions regarding capital or R&D. Like capital losses, operating losses are usually covered through additional taxpayer money. Over the long-term, however, operating subsidies and capital losses are generally combined in Agency accounting under "unrecovered federal investment," or some similar classification. Our estimates reflect operating subsidies in this manner.

---

[6]Government capital write-offs sometimes result from improper depreciation of capital purchases. Depreciating capital purchases generate very different behavior in private sector tax accounting versus the public sector. The private sector will choose to minimize the write-off period since this maximizes tax benefits. The public sector agencies that depreciate their assets (not all do) may sometimes use the estimated service life, but will often choose to maximize the write-off period since this may help to improve the apparent cost-effectiveness of current activities.

Absence of Accruals for Future Costs. Government entities, like private entities, must over time bear costs to close certain facilities or clean up certain wastes. While the timing and exact amounts of these outlays may be imprecise, it is clear to all participants that these are real costs which must be paid. As with issues such as pension accounting in the private sector, federal endeavors which do not provide for these costs over the life of the facility confer a subsidy to the current users of the product or service created, making it appear cheaper than it really is. The clean-up costs (or similar expense) will then have to be borne either by future users or by future taxpayers, neither of whom benefitted from the initial facility. We have tried to impute these subsidies whenever appropriate. When there is no information on the expected costs of future cleanups, we use current cleanup expenditures as a proxy when available.[7]

No Rate of Return. Private entities will not stay in business unless they earn a high enough return to satisfy the various claims on funds - primarily from the owners and lenders. While the lack of a rate of return for government enterprises is not an out-of-pocket taxpayer subsidy, it does reduce the operating costs of one enterprise, creating a cost advantage over substitute energy forms. This advantage is not due to the underlying economics of the energy type, but rather to the type of owner. Unfortunately, we were unable to determine an appropriate rate of return for the wide range of government enterprises. As a result, even our high estimate does not quantify the impact of an absence of a rate of return on energy consumers by enabling them to purchase energy services for less money.

Without a rate of return, the government is essentially absorbing operating risks for free. Most activities involve some risk, both financial and otherwise. Areas in which the federal government is involved, such as uranium enrichment or constructing ports and harbors, often involve tremendous risk. Were a private entity completing these tasks, their prices would be driven up and their earnings would be driven down through a process of sharing risk through insurance, and sharing returns (to compensate for the higher risk) through higher interest rates from debt holders or a higher required rate of return from equity holders. Government entities do few of these things. Risks are mostly borne through government guarantees that whatever future damage or losses occur will be paid by taxpayers.[8]

One argument suggests that this form of risk internalization does not constitute a subsidy at all, since damages are paid for by the same entity that would have purchased insurance in the first place (the federal government). However, true self-insurance requires periodic risk assessments and the creation of provisions for expected losses. In the absence of such provisions, since damages are always uncertain and often irreversible, paying them after they occur does not generate the price signals (such as high insurance premiums and borrowing rates) that allow an investor to tell whether one future investment is more or less risky than another.

Furthermore, the party bearing the risk (the amorphous taxpayer) is, in fact, very different from the party gaining the benefit of lower current operating costs (e.g., the consumer of enriched uranium). This differs from most self-insurance plans where the managers responsible for safety-related choices bear at least some financial risk (such as through stock holdings) for making the wrong choices. As a result

[7]The use of such proxies creates errors in the matching of cleanup costs and historic and current activity. For example, cleanup at DOE sites is just beginning and costs will likely escalate considerably. Thus, using current expenditures as a proxy for the accruals for future cleanup costs is likely to be too low, although technological developments may help decrease some costs over time.

[8]Some agencies do purchase some insurance. For example, BPA does pay for property and liability insurance as required by the Price-Anderson act for its operation of nuclear plants. These costs are passed through to BPA by the parties with whom BPA contracts. (Barringer, 4/13/92 and 8/18/92). However, even in cases such as this, a substantial portion of the operating risk may well be borne by the government and taxpayers, rather than the beneficiaries of the enterprise.

of poor price signals and divergent interests of the actors, government self-insurance does little to ensure that relative risks are incorporated into investment choices.[9]

Below-Market Provision of Services and Cross-Subsidies. A government entity may produce a good (such as has been alleged with electricity from the Tennessee Valley Authority used in the uranium enrichment process) that is sold at below-market prices. Such sales provide a subsidy to the purchasing entity (be it private or another government agency).[10] To the extent possible, these distortions are measured in this report.

Cross-subsidization, where the prices for one product (e.g., irrigation for farmers) are subsidized with increased prices on another, more dependent or less-powerful customer (e.g., Bonneville Power Administration electricity sales to consumers), can introduce market distortions as well. Where identifiable, large cross-subsidies are included and adjusted for in this report, as they are in the case of Bonneville. Corrections for cross-subsidies can result in negative subsidy estimates for some fuels in some categories.

Tax-Exempt Status. Many federal enterprises provide energy goods and services which compete with private suppliers, but which are exempt from paying federal taxes. Because public firms do not pay federal taxes, do not require a rate of return, and often have the ability to sustain very large long-term losses, they can price their services below market, and net earnings will be non-existant. At first glance, it would appear that the tax-exemption for the Uranium Enrichment Enterprise, for example, is worthless since it always loses money, and no net income implies no tax liability.

This conclusion would be very wrong. UEE had a great deal of control over its product pricing for much of its operating life (although not currently) and could have earned market rates of return. It is because capital still flowed to this use regardless of the after-tax return on investment, that UEE -- and all of the government owned product and service organizations -- were able to price at the level they have. It was this depressed pricing that, in turn, created barriers to entry for alternative supply and demand technologies that had to earn a return on investment sufficient to pay investors and the federal tax coffers.

Government-owned enterprises compete in a number of ways. Some, such as the Army Corps waterways repair work, may compete directly with private firms that are capable of providing the same service. Other enterprises may not currently have direct private competitors. In some cases, this may be due only to the market power (through size or regulation) that the federal enterprise exerts, keeping available private substitutes out. For example, the private sector could build power plants to compete with the Power Marketing Administrations, or the PMAs themselves could be privately owned and operated. In other cases, economies of scale may preclude cost-effective direct competition, as with uranium enrichment (though a private venture is now being planned) or the Strategic Petroleum Reserve. Even in these cases, the tax-exempt status reduces the cost structure of the federally-owned enterprise, placing competing energy resources which must pay taxes and earn a rate of return, at a disadvantage.

---

[9]For a more detailed description of the divergent interests ("agency theory") see Michael Jensen and William Meckling, "Specific and General Knowledge, and Organizational Structure," presented at Nobel Symposium No. 77, Contracts: Determinants, Properties and Implications, Stockholm, August 18-20, 1990; and Eugene Fama and Michael Jensen, "Separation of Ownership and Control," Journal of Law and Economics, Vol. XXVI, June 1983, pp. 301-325.

[10]Pricing differentials do not always denote cross-subsidies, since other factors such as contracting, volume of purchase, or type of power may be responsible.

Market Planning Functions

Markets react to uncertainty with suspicion by demanding higher returns, limiting investment, or simply steering clear of volatile markets with risky, uncertain returns. Federal intervention can reduce the risks of these volatile supply markets and informational uncertainty. For example, the Strategic Petroleum Reserve reduces the risks of an oil supply cut-off or unexpected price spikes. This intervention reduces the risks associated with a sole reliance on oil and may dampen the market signals (such as through oil pricing and futures markets) to diversify energy sources. Similarly, information collected by the Energy Information Administration provides market information which helps industry players evaluate markets and investments. Similar market information is available at a cost from investment or consulting firms.

Administrative, Overhead, and Regulatory Costs

Overseeing federal programs in the energy sector also costs money. Overhead, in the form of general physical plant and administrative expenses, are associated with every government activity. We allocate these costs to particular fuels on a percentage basis. For example, if 10% of the Department of Energy's total spending is on fusion research, 10% of the agency overhead would be allocated to fusion. Where possible, overhead is allocated on a more specific basis. Thus, overhead for the uranium enrichment program (as opposed to DOE's Office of the Secretary) would be completely allocated to fission.

This allocation is predicated as a first guess. Allocating based on share of total spending may be less accurate than using an alternative basis, such as the number of people who must be overseen. However, given the available data, we view the use of share of spending as an acceptable estimate. While probably somewhat inaccurate, the results will surely be better than not recognizing that a broader scope of activities necessitates growth at all levels of administration. In the main report, we provide an estimate without general overhead expenses to demonstrate that the magnitude and distribution of subsidies changes very little even if overhead costs are excluded.

Some federal spending in the energy sector may be better classified as "oversight" rather than "overhead." Oversight of regulations, or of markets in general, can take the form of valuable government services which improve the efficiency of the overall marketplace. Public health and safety regulations are examples of traditional government services.

However, even when the government service is clearly worth the cost, it may make more economic sense to fund the service with fees from the affected industry. The cost of nuclear safety oversight provided by the Nuclear Regulatory Commission, for instance, is a government service which should be provided. Nonetheless, it also reflects some of the risk associated with using nuclear power, risk which would not exist with other electricity-generation technologies. Our estimates include the cost of federal regulation associated with the energy sector. As with administrative costs, however, we also provide an aggregate estimate in the main report which excludes regulatory costs unrelated to externalities.

Agency Revenues are Deducted from Subsidy Estimates Where Appropriate

Federal agencies sometimes receive money for particular activities. A portion of their spending is classified as "Reimbursable Program," which means that they receive payment for that effort from other

government agencies or private entities. Since these efforts require no outlay of public funds, we have tried to exclude funding in these areas from our analysis.[11] Although the federal budget clearly delineates the volume of spending on reimbursable programs, the detailed budget justifications from each agency do not always do so. Some errors may have resulted because of this.

Some programs have revenues from two other methods: user fees or sales of products. These receipts are sometimes included as part of the reimbursable program described above. In cases where they are not included in the reimbursable section, we deduct offsetting collections from user fees from the total outlays, reducing the magnitude of the subsidy. User fees are described in more detail in Chapter B3 of this Appendix.

Deducting the sales of products from subsidy totals is not always appropriate, and was not always done. For example, the Mineral Management Service collects royalty payments from federal oil and gas leases. Deducting these receipts from operating costs would ignore the fact that the royalties are payment for a natural resource, independent from the cost of collecting royalties. Were a private entity managing MMS, lease prices would have to cover the cost of managing the leases, plus an adequate return on the resource sale.

Structure of the Agency Section

Agencies that provide some subsidy to energy in any of the above ways are presented beneath their parent agency. Thus, the Forest Service, since it is part of the Department of Agriculture, is listed with USDA. Agency departments and quasi corporations run by particular agencies are listed separately in each Agency section. Worksheets for each agency quantified follow the text, and provide details on how the subsidy magnitude was calculated.

Budget spending categories related to energy are described in text first. Quantitative spending data follow, with figures listed in millions of dollars unless otherwise noted. Where necessary, spending is allocated first to energy in general, and then to particular fuels. We have tried to get agency data disaggregated enough to eliminate as much of the guess work on beneficiary fuels as possible. However, we have made some subjective judgments, and have at least tried to make these judgments visible to readers.

The allocation methodology is listed in the final column or the notes of the charts. We have used allocation data from same year as the spending data whenever possible.

Summary Tables of energy subsidies by Agency and energy type precede the beginning of the detailed descriptions of agency programs.

Energy-Related Activities for Some Agencies Have Not Been Quantified

This chapter does not include subsidy estimates for a number of agencies involved in support for energy, although it does include some qualitative descriptions of their energy-related activities. The table

[11]Reimbursable programs may well require incremental additions to overhead which are not reflected in the levels of reimbursements. Due to measurement problems, these distortions are ignored.

below lists agencies for which quantified subsidy estimates have not been completed. The estimated value of subsidies to the energy sector through the agencies listed below in 1984 was $1.64 billion (1989$).[12]

Table B4-2: Energy Spending Not Quantified in this Chapter

Significant Energy-Related Spending	Minor Energy-Related Spending
Department of Agriculture:	Department of Agriculture:
Forest Service	Agricultural Research Service
Department of Commerce:	Cooperative State Research Service
Nat'l Oceanic and Atmospheric Admin.	Economic Research Service
Department of Interior:	Forestry Incentives Program
Bureau of Indian Affairs	Soil Conservation Service
Bureau of Land Management	Executive Branch:
Bureau of Reclamation	Council on Environmental Quality
Fish and Wildlife Service	Office of the U.S. Trade Representative
U.S. Geological Survey	Office of Management and Budget
Department of Treasury:	Office of Science and Technology Policy
Internal Revenue Service	Department of Commerce:
Environmental Protection Agency	International Trade Administration
National Science Foundation	Export Administration
National Aeronautics and Space Administration	Nat'l Instit. of Stds. and Technology
	Department of Health and Human Services
Unknown Magnitude Energy-Related Spending	Centers for Disease Control
	National Institutes of Health
Overseas Private Investment Corporation	Department of Interior: Bureau of Mines
Small Business Administration	Department of Labor:
U.S. Trade and Development Program	Occupational Safety and Health Admin.
	Adjudication Services
	Department of State:
	Agency for International Development
	UN Environmental Program
	Department of Transportation
	St. Lawrence Seaway Devel. Corp.
	Federal Highway Administration
	Nat'l Hghwy Traffic Safety Admin.
	Federal Emergency Management Agency
	Federal Maritime Commission
	International Trade Commission
	National Institute of Building Sciences
	Occupational Safety and Health Review Comm.
	Legislative Branch:
	Congressional Budget Office
	Congressional Research Service
	General Accounting Office
	Joint Committee on Taxation
	Office of Technology Assessment

[12]Based on estimates by Rick Heede, Federal Energy Subsidies: Agency Obligations, Draft. Rocky Mountain Institute, 1986; and Rick Heede, Richard Morgan and Scott Ridley, The Hidden Costs of Energy, (Washington, DC: Center for Renewable Resources, 1985).

USDA: COMMODITY CREDIT CORPORATION (CCC)

The CCC offers a variety of services to farmers which reduce both the risk and the cost of agricultural production. The main areas of involvement are crop production loans, price-deficiency payments, and crop acreage restrictions.

CCC Programs Supporting Ethanol

Crop Production Loans

The CCC provides farmers with crop production loans with the future crop serving as collateral for the loan. Feed grains (including corn), wheat, rice, cotton, and soybean crops are eligible. These loans are non-recourse in that the CCC can not seek other farm assets to cover loan expenses if the crop does not cover the loan cost. In addition to production loans, the CCC provides interim financing which allows the grower to hold production from market in anticipation of higher prices.

CCC loans act as price supports with the loan rate setting a price floor. Once the value of the crop falls below the loan rate plus crop selling costs, the farmer will be better off giving the crop to the CCC rather than selling it himself. Changes in the 1985 Food Security Act introduced more flexible loan rates which react to world prices. However, the Secretary of Agriculture still has discretion over the degree to which loan rates reflect market forces. (APWG, 6).

The 1985 Act also moved the CCC more into the realm of a direct price support program by allowing growers to repay loans at the lower of the loan rate or the world price for the commodity in question. This provision reduces grower defaults, which then require federal management of the defaulted crops. Finally, the FSA allowed the CCC to pay farmers and others "in-kind," (using stockpiled crops rather than cash). (APWG, 7).

CCC loans benefit ethanol since corn, regardless of whether it is ultimately used for feed or for fuel, is eligible.

Target Price-Deficiency Payment Program

The net effect of this program is similar to that of production loans: to guarantee a minimum price for the produce (including corn). A target price for each eligible crop is set by law. To the extent that market prices were below the target price, farmers receive the difference in cash. The payouts are equal to (target price - market price) x (base acreage) x (program yields). "Base acreage" refers to the number of acres each farmer has which are eligible for price supports. "Program yields" refer to the historical yields per acre on the farm. Farms with a higher percentage of total acres enrolled in the support program, and with higher historic yields per acre are eligible for higher total payments. (APWG, 7).

Restrictions in the 1985 farm bill have helped reduce the increase in total payouts by reducing the allowable increases in base acreage and yield history.[13]

[13]The use of base acreage in calculating farm support payments has increased farm environmental problems. Since acreage withdrawn from production of a supported commodity is removed from the eligible base acres, crop rotation and diversification (which reduce the need for both pesticides and fertilizers) becomes much more costly.

Crop Acreage Restrictions

Crop acreage restrictions reduce the total number of acres of a given crop in a number of ways. CCC may require that a certain number of acres of crops in surplus be idled in order to be eligible for farm support payments. In addition, the CCC may pay growers directly to divert acres to other uses, or leave it fallow. CCC payments for crop diversions were insignificant in 1989 (less than $2 million). The bulk of USDA's crop diversions are under the Conservation Reserve Program which pays farmers not to plant on environmentally-sensitive or highly erodible land. The CRP program is handled in the next section of this report.

Crop Support Payments Not Included in CCC Figures

A number of federal farm support payments are not included in CCC crop supports. In addition to the CRP program mentioned above, crop insurance under the FCIC is also excluded. Although the CCC does have the statutory requirement to transfer funds to the FCIC if the insurance fund is insolvent, these transfers are not reflected in the commodity-specific data published by the CCC.

Sales receipts on Title I and Title II of the Food For Peace program (loans or food grants to offset starvation) could not be disaggregated from the accrual budget figures used. However, these costs amounted to less than 3 percent of cash receipts in 1989. (Presentation 0391, Output 6). The resulting errors in the overall level of farm support are not significant.

About the CCC Estimates

The CCC often has a very long cycle of involvement with a particular crop. A commodity loan given at the beginning of a growing season and later defaulted on will turn into crop inventory on the CCC's books. It may remain in inventory for years, during which time crop storage costs (or payments to producers for storage) will accrue. Inventory may then be sold at a partial or total loss, or given in lieu of cash payments to producers. Losses will be recognized at this point, although this may be years after the actual cash outlays have been made.

One line item, "Net realized loss, support & related," measures the losses on corn CCC support programs on an accrual basis rather than through cash outlays. It includes the transfer of valuable government assets, such as crop inventories, to the grower. (Pazdalski, 10/20/92). This accrual measure better represents the annual benefits to the corn sector. Therefore, we use this measure as the basis for estimating 1989 subsidies to the ethanol sector.

A number of program expenses are lumped into general overhead rather than allocated to specific commodities. These expenses include such items as interest costs on loan payments, crop disaster assistance not otherwise recorded, and storage facility operations. These costs are sometimes extremely large. For example, 1989 supplemental disaster assistance payments, given in the form of crop-certificates rather than cash, were worth almost $3.4 billion. (USDA-CCC Net Expenditures by Commodity/Program). Only the high estimate includes the ethanol share of the full disaster payments. Additional details on this may be found on CCC.WK1 (worksheets for USDA follow the Farmers Homer Mortgage Administration).

Tax-Exempt Status and Lack of a Required Rate of Return

If CCC were a private corporation providing crop credit, it would be required to earn a positive return on invested capital, and net income would pay federal income taxes. The fact that CCC does neither allows it to over more attractive terms than a private-sector provider could offer. Although this increases the subsidy benefitting ethanol, we were unable to quantify it.

Sources

Agricultural Policy Working Group (APWG), Agricultural Policy for the 1990s, (Washington, DC: Government Research Corporation and Economic Perspectives, Inc., June 1989), pp. 6, 7.

Pazdalski, Rich. USDA, CCC Budget Division. Personal communication, 10/20/92.

Sronce, Phil. USDA, Grains Analysis Division. Personal communication, 10/20/92.

USDA. 1991 Budget Summary.

USDA, CCC. Table: "CCC Net Expenditures by Commodity/Program, FY 1980 - FY 1991," Jan. 29, 1992, p. 2.

USDA, CCC. Table: "Corn: Expenditures & Receipts, FY 1989." Presentation #0391, Output 6.

USDA: CONSERVATION RESERVE PROGRAM

In 1985, the Conservation Reserve Program was created to target USDA acreage reductions towards highly erodible crop land. CRP works by paying farmers to idle this land for a 10-year period. (APWG, 9). We treat CRP payments as a subsidy to ethanol production because it uses federal money to pay growers to stop environmentally detrimental practices which most other industries must pay to stop themselves. In the same manner that tax-exempt bonds for pollution-control equipment is treated as a tax subsidy for polluting energy industries, so too are CRP payments treated as grant-based subsidies to agricultural production of ethanol.

Through FY 1990, 34 million acres were enrolled in the CRP program (USDA, 49), about 18% of which were corn (see CRS.WK1 for details).

Sources

Agricultural Policy Working Group (APWG), Agricultural Policy for the 1990s, (Washington, DC: Government Research Corporation and Economic Perspectives, Inc., June 1989), pp. 6, 7.

USDA, Agricultural Stabilization and Conservation Service. "Conservation Reserve Program Logo Package," July 1, 1992.

USDA. 1991 Budget Summary.

USDA: FEDERAL CROP INSURANCE CORPORATION

Crop insurance has been federally provided for some crops since the 1930s. The Federal Crop Insurance Act of 1980 greatly expanded the risks and crops covered. (GAO/RCED-89-19, 12). To the extent that this program covers biomass crops (such as corn), the energy sector is a beneficiary.

The FCIC protects farmers by insuring them against substantial crop damage or loss, other than that due to negligence or failure to use proper farming practices. Generally, the policies do not cover the full loss. This is similar to a deductible on health insurance policies. The FCIC now acts primarily as a reinsurer, although prior to 1980, it was actively involved as a primary insurer as well. Private insurance companies provide first tier coverage, and the FCIC pays for most of the losses on policies sold by these firms. In addition, the FCIC pays the private firms for insurance sale costs and policy service activities such as claims adjustment. The private insurers do share in the policy gains and losses to some degree, improving their incentive to manage the insurance process well. (GAO/RCED-89-19, 1).

Historically, crop insurance coverage was based on the average yields for the county in which the farm was located. A crop guarantee was set at the county average, and farmers producing above the average were penalized since their additional crops were not insured. Farmers who normally produced below the county average were rewarded since they received insurance on a production increment they could not produce even under favorable conditions. In 1987, the Actual Production History Program was fully implemented with the goal of basing coverage on the production history of the individual farmer. (GAO/RCED-89-19, pp. 1,5). However, the FCIC was having difficulty ensuring that the private insurers which it guaranteed were adequately assessing the actual crop history so that it could provide accurate production guarantees.[14] Similarly, the Corporation's price forecasts were generally less accurate than those generated by other organizations, increasing program losses. (GAO/PEMD-92-4).

Premium Shortfalls

Farmers receive a federal subsidy from federal crop insurance in two ways. First, premiums have not, on average, covered the claims paid out. Second, federal provision of insurance provides access to inexpensive risk bearing (due to economies of scale in insurance and access to federal financing) and does not require any rate of return. The net effect of these benefits is to reduce the cost of crop insurance, reducing the price of agricultural commodities to some degree.

Although the 1980 FCIC Act required that the program be actuarially sound so that premiums covered losses, and a reserve be built up to cover unforeseen losses, this had not happened through 1989.

Interest on Funds

Interest on funds affects FCIC program costs in two ways:

Collection Time of Premiums. Whereas private insurers collect premiums before providing insurance coverage, FCIC policy premiums "are generally collected at the end of the growing season when the crops are harvested." (FCIC Fin. Statements, 1989 and 1990, p. 19). This has two impacts. First, FCIC loses the opportunity to earn interest on the premium revenue, an important source of additional funds in private insurance. Second, late collection may increase the likelihood of non-payment of premiums,

[14] An FCIC information system to track indemnity payments found that between 1981 and 1989, 6% of the individual policy holders collected 28% of all indemnities, often with many repeat payments to the same policy holders. This pattern is the result of premiums that were not adequately adjusted to reflect insurance risks. Efforts to adjust premiums to solve this problem began in 1990. (Financial Reports for 1990 and 1991, 4).

although the risk to the grower of not being able to get crop insurance the following year may be a sufficient check to non-payment.

Interest Earned on Treasury Balances. FCIC does not earn interest on balances held with Treasury. (Financial Statements 1989 and 1990, 23). The Financial Statement does not provide detailed information on how big these balances are, or how long they are held for. Nor is there information on whether these balances are premium income or simply Congressional appropriations. If the FCIC holds large balances of premium income with Treasury without earning interest on it, our subsidy estimate will be somewhat overstated. However, since premiums are collected at the end of the policy period, not the beginning; and since the FCIC has been losing money for most of the last ten years, the exclusion of interest earned on positive balances is not likely to be a significant source of error.

Reinsurance Risk-Sharing

Beginning with the 1980 legislation, the FCIC was supposed to act as a reinsurer to policies sold by private companies, for which the private companies bore a share of the risk of program loss. The benefit of acting as a reinsurer rather than the primary insurer is that it allows market forces to generate program efficiencies in risk assessment, premium setting, and policy distribution.

Unfortunately, the risk sharing arrangements throughout the 1980s did not force the private companies to carry enough risk of losses to create the above incentives. In fact, under the contract terms prevailing in the 1980s, the private insurers "realized small gains as the result of underwriting in the years when the policies they sold had large losses, which were borne almost entirely by FCIC." (GAO/RCED-92-35). The result of these perverse incentives were large losses on the reinsurance programs throughout the 1980s. (GAO/RCED-92-25, 26).

About the Estimates

Insurance programs may run periodic losses as unforeseen circumstances create short-term losses.[15] Over the longer term, however, they should at least break even. We average ten years of FCIC insurance and reinsurance losses for corn to incorporate this aspect of insurance. A portion of the financing for FCIC shortfalls is paid via monetary transfers from the Commodity Credit Corporation (CCC). These transfers are counted in the FCIC estimate rather than the CCC estimate due to the manner in which USDA tracks the spending.

Government insurance, because it doesn't require a rate-of-return, provides additional benefits as an intermediary to the farm sector. Assuming that private crop insurers would want the same after-tax return on premiums as the average for all property and casualty insurance, we add an additional 6 percent[16] to the low estimate to reflect the value of federal intermediation in the high estimate.

---

[15]Private insurers will generally accrue a surplus of funds before a disaster strikes so that existing reserves are available to pay off claims.

[16]In 1988, the industry earned an after-tax return of $11.7 billion on premiums of $193.3 billion. (U.S. Department of Commerce, Table 856).

Subsidies to the FCIC benefitting corn are allocated to ethanol in proportion to the percentage of the total corn crop which is converted to ethanol, as shown in ETHANOL.WK1 following the Farmers Home Mortgage Administration section of the text.

Sources

USDA, Federal Crop Insurance Corporation. Financial Statements as of September 30, 1990 and 1989 Together With Auditors' Reports. August 12, 1991.

USDA, Federal Crop Insurance Corporation. Financial Statements as of September 30, 1991 and 1990 Together With Auditors' Reports. March 31, 1992.

U.S. Department of Commerce. Statistical Abstract of the United States 1990. Tables 856 and 857.

U.S. GAO. Crop Insurance: FCIC Should Strengthen Actual Production History Program Controls, December 1988. GAO/RCED-89-19.

U.S. GAO. Crop Insurance: Inaccurate FCIC Price Forecasts Increase Program Costs, December 1991. GAO/PEMD-92.4.

U.S. GAO. Crop Insurance: Program has not Fostered Significant Risk Sharing by Insurance Companies, January 1992. GAO/RCED-92-25.

USDA: FARMERS HOME ADMINISTRATION

The Farmers Home Administration (FmHA) has two program areas directly benefitting energy: it's Business and Industry program and the Agricultural Credit Insurance Fund. Part of the Agricultural Credit Insurance Fund supports farm housing purchases. While farm housing subsidies undoubtedly reduce the required income from farming to stay in business (with indirect impacts on commodity prices), they are not quantified here.

FmHA had many of the same financial reporting problems as REA as of 1987. These included not recording loan interest-rate subsidies, not writing off uncollectible loans, not entering and tracking all loan guarantees, and not accurately estimating an allowance for loan and loan guarantee defaults. The current status of dealing with these problems is not known. (GAO/AFMD-89-20).

Business and Industry Program

Administered by FmHA, the Business and Industry Program provided loan guarantees to ethanol production plants. Many of the plants FmHA provided guarantees on have gone bankrupt (see FHMA.WK1 which follows) forcing the government to make good on its guarantee. New guarantees have not been authorized since 1987. (Hamilton, 10/8/92).

Agricultural Credit Insurance Fund

Farm Operating Subsidies

The Fund insures or guarantees farm ownership, soil and water, farm operating, and emergency loans to individuals. Some benefits for Indian tribes and farming associations are also available.

FmHA has, over time, been shifting from direct lending to loan guarantees with an interest rate subsidy to increase private lending in rural areas. The interest rate subsidy, estimated at 3 percent, ensures that the private sector loan rate will be equal in cost to the direct loans previously provided by FmHA. (USDA, 56, 57).

As of 1989, the Fund provided $879m in unsubsidized loan guarantees and $856m in direct loans. (USDA, 57). *We did not attempt to calculate the subsidy to biomass crops through this program.*

Sources

Hamilton, Blanche. USDA. Personal Communication, 10/8/92.

Segal, Midgon. Alcohol Fuels. (Washington, DC: Congressional Research Service), July 15, 1988. CRS IB74087.

U.S. Department of Agriculture. 1991 Budget Summary.

U.S. GAO. Financial Audit: Farmers Home Administration's Losses Have Increased Significantly, December 1988. GAO/AFMD-89-20.

U.S. OMB. Budget of the United States Government, Fiscal Year 1989, pp. A-482 - A-484.

USDA: Commodity Credit Corporation

Part 1: Corn Support Payments by CCC

A. Support Payments for Corn, FY 1989, $Millions

	1989	
Outlays		
Loans made - commodity	1,259.7	
Purchases (cash)	(10.2)	
Storage & Handling	225.6	
Transportation	10.7	
Processing and Packaging	3.7	
Producer Storage Payments	120.4	
Loan Collateral Settlements	(47.5)	
Deficiency Payments - Cash	3,117.0	
Diversion Payments - Cash	(1.7)	
Disaster Payments - Cash	2.6	
Miscellaneous Expenditures	(66.6)	
Total	4,613.7	
Receipts		
Loans Repaid - Commodity	1,657.9	
Sales Proceeds - Title II	20.0	Primarily food-export loans or grants
Sales Proceeds - Other	28.4	to prevent starvation.
Misc. Receipts	44.8	
Total Receipts	1,751.1	
Net Expenditures, Support & Related	2,862.6	Cash outlays. Differs from figure below since excludes accrued expenses such as in-kind payments.
Net Realized Loss, Support & Related	6,260.2	Accrued program losses (from USDA, see cite below) to reflect non-cash transfers of value such as through crop-certificates.

Source: USDA, Grains Analysis Division, "Corn Expenditures & Receipts," Presentation No. 0391, Output6. Provided by Phil Sronce, GAD.

B. Historical Table on CCC Net Expenditures on Corn

Year	Amount ($Millions)	Year	Amount ($Millions)
1991	2,386.7	1985	4,402.7
1990	2,449.9	1984	(933.7)
1989	2,862.6	1983	5,719.8
1988	8,227.1	1982	4,280.6
1987	12,346.3	1981	(666.5)
1986	10,523.8	1980	1,256.3

Total, 1980-91	52,855.8
Average Cash Outlay	4,404.7

Source: USDA, "CCC Net Expenditures by Commodity/Program," Jan. 29, 1992.

Part 2: Overhead and Administrative Expenses of the CCC Not Allocated to any Crop

	FY89 ($Mils)	Notes
Storage Facility Costs	(11.1)	
Operating Expenses	627.9	
Net Interest Costs on Loan Payments	96.2	
Other	679.3	
Total	1,394.3	
Corn Share of CCC Program Overhead:		
Net Expenditures by CCC, 1980-1991		
Corn	52,855.6	
All Crops	133,274.9	(1)
Corn percentage of Direct Program	39.66%	
Estimated Corn Share of Overhead	553.0	(2)

Notes:

(1) CCC net expenditures for all crops excludes all administrative expenses.

(2) Corn share = Corn % of CCC net expenditures x total overhead in FY89

Sources:

U.S. Department of Commerce, "Statistical Abstract of the United States, 1991," Table 1137

USDA, Commodity Credit Corporation, "CCC Net Expenditures by Commodity/Program, FY 1980-FY1991," Jan. 29, 1992, p. 2

Part 3: Special Crop Disaster Payments in FY89

	$Mils	Corn Share	
1988-90 Crop Disaster Assistance	3385.9	769.2	(1)

	Acres planted (Mil. acres)	Percent
Corn share of 1988 acreage planted		
Corn (other than sweet corn)	67.7	22.72%
Hay (Note 2)	65.1	21.85%
Soybeans	60.8	20.40%
Wheat	76.6	25.70%
Cotton	10.6	3.56%
Potatoes	1.3	0.44%
Tobacco (Note 2)	0.6	0.20%
Sorghum for grain	12.6	4.23%
Rice, rough	2.7	0.91%
Total	298.0	100.00%

Notes:

(1) The crop disaster assistance payment was a one-time outlay and dropped to $5.4 million in 1990. The payment is not counted under other USDA disaster assistance programs, and was paid in commodity-equivalents rather than cash. The corn share is calculated by multiplying the payment by the percentage share of corn acreage planted in 1988.

(2) Data on acres planted for hay and tobacco were not available; acres harvested used instead.

Source:

U.S. Department of Commerce, "Statistical Abstract of the United States, 1991," Table 1156.

USDA, Commodity Credit Corporation, "CCC Net Expenditures by Commodity/Program, FY 1980-FY1991," Jan. 29, 1992, p. 2.

Part 4: Summary of Support for Corn through the CCC

	Low Est.	High Est.	Notes
Outlays for Crop Support	4,404.7	6,260.2	(1)
Corn Share of Overhead	553.0	553.0	(2)
Corn Share of Special Crop Disaster Payments	76.9	769.2	(3)
Total	5,034.5	7,582.4	

The net benefits to corn are allocated to ethanol on ETHANOL.WK1 which follows the last worksheet on USDA corn-support programs.

Notes:

(1) The low estimate treats the CCC programs as a form of insurance against market price fluctuations. Therefore, the average net expenditures for corn over the period 1980-91 is used as a proxy for the annual loss. The difference between accrual based accounting and the cash basis used here diminishes when a long time-frame is used. The high estimate uses the accrued benefits to corn in 1989.

(2) Calculated in Part 2, above.

(3) The low estimate treats the special disaster payments as a form of windfall insurance which happens only once per decade. Thus, the low estimate is equal to 10% of the amount paid to corn in FY89.

USDA: Conservation Reserve Program

Part 1: Land Diversion Payments and Program Management Costs

	1989 ($Mils)	
Annual Rental Payments		
Cash	1148.6	
CCC Commodity Certificates	13.5	
Cost-sharing assistance	182.3	
Technical Assistance	27.9	
Total	1372.3	OMB '91, A-459

Source: U.S. OMB, "Budget of the United States Government, Fiscal Year 1991," p. A-459.

Part 2: Reductions in Base Acreage Under other USDA Diversion-Payment Programs (through July 1991)

	Mil. Acres	Percentage	Notes
Corn Base Reduction	4.055	17.92%	(1)
Wheat Base Reduction	10.62	46.93%	(1)
Upland Cotton	1.371	6.06%	(1)
Sorghum	2.423	10.71%	(1)
Barley	2.804	12.39%	(1)
Oats	1.355	5.99%	(1)
Total	22.628		
Total Acres Enrolled through 7/91	35.4		
Base Acreage Reduction Data/Total CRP	63.92%		This shows that the above data represents almost 2/3 of total CRP enrollment, suggesting that it is a fairly good allocation basis.

Notes:

(1) A number of USDA programs pay farmers to divert land from production, either to protect the land, or to reduce the supply of a commodity. Farms signing-up for the CRP program must shift acres registered for payment under another program to the CRP. These base reductions represent the amount of land covered under other diversion or farm support programs which are now enrolled in CRP.

Source: USDA Agricultural Stabilization and Conservation Service, "Conservation Reserve Program 'Logo Package,'" July 1, 1992, p. 9.

Part 3: Corn Share of CRP Payments and Program Costs

Assuming the pattern for the entire CRP matches that for the 64% represented in base acreage reductions:

	$Millions
Total Program Cost in 1989	1,372.3
Est. Corn Share of CRP Acreage	17.92%
Subsidy Accruing to Corn	245.9

The net benefits to corn are allocated to ethanol on ETHANOL.WK1 which follows the last worksheet on USDA corn-support programs.

USDA: Federal Crop Insurance Program and Export Enhancement Program

Part 1: Overall Cost of FCIC Insurance Programs

Year	Admin. & Op. Exp.	Net FCIC Fund Costs (1)	Total Fed. Costs (2)	Net Insur. Losses	Net Reinsur. Losses	Capital Transfers From the CCC ($Millions) (3)
1980	28.0	186.2	214.2			
1981	92.0	75.1	167.1	32.4	(3.4)	250
1982	139.3	221.6	360.9	137.8	(6.0)	
1983	131.3	355.7	487.0	220.6	75.6	
1984	177.6	309.8	487.4	81.7	125.4	
1985	199.6	316.0	515.6	92.2	150.5	
1986	193.5	303.9	497.4	43.6	190.8	450
1987	169.9	135.5	305.4	7.3	(4.7)	300
1988	198.3	765.5	963.8	89.4	526.7	900
1989 (4)	354.3	399.7	754.0	66.3	342.9	400
1990 (4)	363.4	229.3	592.7	69.6	170.6	300
1991 (4)	330.1	245.9	576.0	20.9	229.6	
Totals	2,377.3	3,544.2	5,921.5	861.8	1,796.0	2,600.0

NOTES:

(1) Includes insurance and reinsurance program outlays not covered through premiums charged to the insured parties, and write-off of bad debts

(2) Fund losses plus admin. and operating costs. Data from the Rural Development, Agriculture, and Related Agencies Appropriation Hearings for 1991, part 4, pp. 473, 474.

(3) FCIC Fin. Statements, 1989-90, p. 25. Transfers reflect a source of funds, but value is already reflected in earlier columns.

(4) Data for 1989-91 are from the FCIC Financial Statements for 1989-90, p. 14; and for 1990-91, p. 14.

Part 2: FCIC Historical Losses on Insurance of Corn Crops, 1948-1988

(Excludes Sweet Corn)

	FCIC Insurance			FCIC Reinsurance		
	Premiums	Losses	Premium Shortfall (Surplus)	Premiums	Losses	Premium Shortfall (Surplus)
Tot. for 1948-1980	290.9	315.2	24.3	N/A	N/A	N/A
1981	66.1	50.7	(35.4)	4.7	1.8	(2.9)
1982	53.3	27.8	(25.5)	19.0	10.1	(8.9)
1983	22.7	64.3	41.6	17.8	46.2	28.4
1984	37.0	34.7	(2.3)	68.0	59.0	(9.0)
1985	25.0	16.2	(8.8)	89.5	54.9	(34.6)
1986	16.8	15.3	(1.5)	83.7	67.6	(16.1)
1987	10.1	6.0	(4.1)	69.6	41.0	(28.6)
1988	10.3	28.1	17.8	83.2	270.6	187.4
Premium Subsidy (Surplus), 1980-88			(18.2)			115.5
Period of Loss			9.0			9
Average Loss (Gain)/Year			(2.0)			12.8

* Estimates assume that loss pattern in FY1989 matches the average for 1980-88. Since overall FCIC reinsurance losses remained quite high in 1989 (see above), this assumption may be too low.

Source: "Rural Development, Agriculture, and Related Agencies Appropriation Hearings for 1991," part 4, pp. 561, 576

Part 3: Overhead Expenses Not Recovered Through Premiums

A. Administrative Costs in 1989

	In $Millions
Reinsurance Administrative	265.9
Sales and Service Contractors' Administrative	18.6
Claims Adjustment Contractors' costs	7.1
Provision for uncollectible accounts	1.3
Claims Litigation	0.3
Interest Expense	0.3
Salaries and Other	60.9
Total Administrative Expenses	354.4

Source: FCIC 1989 and 1990 Financial Statements, p. 14

B Corn Share of Overhead Expenses

	Acres (000s)	
Net FCIC-insured Acres, FY 1989	10,558	
Corn FCIC-Insured Acres, FY 1989	1,856	
Corn Share of FCIC Enrolled Acreage	17.58%	
Corn Share of Admin. Expenses	62.3	Corn share of FCIC acreage x tot. admin. expen

Source: "Rural Development, Agriculture, and Related Agencies Appropriation Hearings for 1991," Part 4, p. 475

Part 4: Summary of FCIC Losses Related to Corn, FY 1989

	Low Est.	High Est. (1)
Average Annual Corn Insurance Losses (Gains)	(2.0)	
Average Annual Corn Reinsurance Losses (Gains)	12.8	
Corn Share of Admin. Expenses	62.3	
Net Subsidy to Corn	73.1	77.5

(1) The high estimate incorporates a 6% premium to reflect the fact that federally-provided insurers do not require any profit margin. The 6% figure was the average after-tax-profit rate of the property and casualty insurance market in 1988. (U.S. Dept. of Commerce, "Statistical Abstract of the United States, 1990," Table 856.

The net benefits to corn are allocated to ethanol on ETHANOL.WK1 which follows the last worksheet on USDA corn-support programs.

USDA Farmers Home Administration and DOE Office of Alcohol Fuels
Loan Guarantees for Ethanol Production

Part 1: Historical Data on Federal Loans and Loan Guarantees Supporting Ethanol Production

A Loan Guarantees through the FmHA Business and Energy Program

Recipient	Amount ($Mils)	Type	Status
Clinton-Southeast Joint Venture (GA)	1.85	Guarantee	Defaulted
Idahol Fuels (ID)	0.475	Guarantee	Defaulted
Farm Fuel Production (IA)	3.8	Guarantee	Defaulted
Kentucky Agricultural Energy Co. (KY)	35.2	Guarantee, 11/84	Defaulted
American Fuel Technologies (MD)	2.5	Guarantee	Loan Repaid
ADC-1 (NE)	20	Guarantee, 10/82	Sold at no Loss
Boucher Rural Products (NE)	0.28	Guarantee	Defaulted
Dawn Enterprises (ND)	20	Guarantee	Defaulted
South Point Ethanol (OH)	32	Guarantee, 5/81	Repayments are Current
Carolina Alcohol (SC)	0.495	Guarantee	Defaulted
Sepco, Inc (SD)	0.35	Guarantee	Defaulted
Coburn Enterprises (SD)	0.75	Guarantee	Defaulted
Elgin Alcohol Fuels, Inc. (IA)	2.6	Committment	Funds never disbursed
High Plains Corp. (KS)	20	Committment	Funds never disbursed
Alchem, Ltd. (ND)	8.4	uarantee, 6/87	Repayments are Current

B. Loan Guarantees for Ethanol Production Through the Department of Energy, Office of Alcohol Fuels

Recipient	Amount ($Mils)	Type	Status
New Energy (IN)	127	Guarantee	Defaulted March 1987; DOE paid bank and became lender. NPV losses in restructuring are not tracked.
Tennol Inc. (TN)	65	Guarantee	Defaulted; DOE now owns the plant.
Agrifuels Refining Corp. (LA)	78.9	Guarantee	Defaulted 8/87; DOE paid $69.9m. Currently trying to sell. Will be a loss.
Circle Energies (NE)	41	Guarantee	Guarantee never approved
Minnesota Alcohol Producers (MN)	42	Guarantee	Guarantee never approved
Kentucky Ag. Energy Corp. (KY)	9.8	Coop. Agreement	Bankruptcy; FmHA (USDA) is trying to sell
South Point Ethanol (OH)	24.5	Guarantee	Loan payments are current.
Columbia Energy Resources (WA)	1.76	Coop. Agreement	Facility was never built. DOE recovered some of the money it fronted.

Sources: USDA, Office of Energy. "Fuel Ethanol and Agriculture: An Economic Assessment." August 1986, pp. 6,9. Ag. Economic Report 562.
Migdon Segal, "Alcohol Fuels," (Washington, DC: Congressional Research Service, July 15, 1988), pp. 12, 13. CRS IB74067.
Blanche Hamilton, USDA Farmers Home Administration, personal communication, 10/16/92.
Dan Beckman, DOE Office of Alcohol Fuels, personal communication, 10/19/92.

Part 2: Summary of Federal Losses

	FmHA	DOE
Total Defaults	63.2	273.46

Caveats:

(1) Some defaulted loans may have been partially paid (e.g., the $78.9m loan to Agrifuels Refining), reducing realized losses on the guarantees to the federal government.

(2) A number of the facilities remain in operation, owned by the government. These facilities are for sale, although the sale value will probably not recover the full amount paid in the guarantee.

(3) Book recognition of the losses and cash outlays to cover them may be separated by years.

Part 3: Allocation of Loan Guarantee Losses to Ethanol for FY89

All defaults occurred prior to FY89. Therefore, no subsidies are allocated to ethanol for 1989.

Derivation of Ethanol Subsidies from Corn Subsidies

Part 1: Summary of Corn Subsidies by USDA, FY 1989 ($Millions)

	Low Est.	High Est.	Ethanol Share Low Est. (1)	Ethanol Share High Est. (1)	Source	Spending Type	Carbon Increasing?
Commodity Credit Corporation	5,034.5	7,582.4	208.4	326.5	CCC.WK1	Insurance	No
Federal Crop Insurance Corporation	73.1	77.5	3.0	3.3	FCIC.WK1	Insurance	No
Farmers Home Admin. Ethanol Loan Guar.	0.0	0.0	0.0	0.0	ETHLOAN.WK	Loan/Guar.	No
Conservation Reserve Program	245.9	245.9	10.2	10.6	CRP.WK1	Grant	No
DOE Office of Alcohol Fuels Ethanol Loan Guar.	0.0	0.0	0.0	0.0	ETHLOAN.WK	Loan/Guar.	No
Total	5,353.6	7,905.8	221.6	340.4			

Notes:

(1) The low estimate uses the higher corn-to-ethanol conversion rates shown in Part 3, and used in Part 2 to calculate the share of the total corn crop used to make ethanol. The high estimate uses the lower conversion rate. Corn subsidies are allocated to ethanol as a percentage of the 1989 corn crop used for ethanol production.

Part 2: U.S. Ethanol Production and Consumption, and Corn Production

Year	Ethanol for Fuel Sales (Mils. of gallons)	Ethanol for Fuel Production (1)	Imports (2)	Gasohol Sales (Mil. gal.) (3)	Corn Production (Mils. bushels) (4)	Corn Used to Produce Fuel Ethanol (Mil. Bshls) Low Est. (5)	Corn Used to Produce Fuel Ethanol (Mil. Bshls) High Est.	Corn Used for Ethanol as a Percent of Corn Production Low Est.	Corn Used for Ethanol as a Percent of Corn Production High Est.
1979	40	N/A		400		15.4	16.0		
1980	80	N/A		800	6,639	30.8	32.0	0.46%	0.48%
1981	85	N/A		850	8,119	32.7	34.0	0.40%	0.42%
1982	234	210		2,340	8,235	80.8	84.0	0.98%	1.02%
1983	443	375		4,430	4,175	144.2	150.0	3.45%	3.59%
1984	567	430		5,670	7,672	165.4	172.0	2.16%	2.24%
1985	792	650		7,920	8,876	250.0	260.0	2.82%	2.93%
1986	798	750		7,980	8,226	288.5	300.0	3.51%	3.65%
1987	825	810		8,250	7,131	311.5	324.0	4.37%	4.54%
1988	828	822	6	8,280	4,929	316.1	328.7	6.41%	6.67%
1989	753	810	0	7,530	7,525	311.5	324.0	4.14%	4.31%
1990	756	890	0	7,560	7,933	338.0*	356.0	4.26%	4.49%

*See note 5 for details on this value.

Notes:

(1) Sales = Production plus imports. However, farm subsidies accrue only to domestic production. Therefore, ethanol imports are ignored while ethanol exports are included.

(2) Import data from DOE, 1990, p. 3. 1989 and 1990 surplus production was used primarily for exports to Brazil.

(3) Gasohol contains 10% ethanol. Thus, gasohol sales = 10 x ethanol sales for fuel.

(4) Corn production includes exports, since the exported corn also receives crop subsidies.

(5) Corn used to produce ethanol assumes a conversion rate of 2.5 gals/bushel for the low estimate and 2.6 gals/bushel for the high estimate. The low estimate for 1990 is the one exception, and uses a point estimate provided in DOE 1991, p. 2.

Sources:

(1) Migdon Segal, "Alcohol Fuels," (Washington, DC: Congressional Research Service, July 15, 1988), pp. 12, 13. CRS IB74087.

(2) U.S. Department of Commerce, "Statistical Abstract of the United States, 1991," Table 1147; and Table 1141 in the 1990 Edition.

(3) U.S. Department of Energy, Office of Alcohol Fuels, "11th Annual Report on the Use of Alcohol in Fuels," 1990, and "12th Annual Report...," 1991.

Part 3: Conversion Rates of Feedstock Crops to Ethanol

Crop	Gals. of Ethanol/bushel of crop	Est. Net Feedstock Cost/gallon	
Corn	2.5 - 2.6	0.54-0.66	Wet vs. dry milling; most efficient facilities have yields = 2.6 gal/bushel.
Grain sorghum	2.5	0.54	Cost/gallon was calculated in the report using 1985 prices.
Wheat	2.5	0.87	
Potatoes for Processing	1.4	2.81	
Sugar Beets	20.3	1.08	
Sugarcane	17	1.68	
Sweet Potatoes	2.35	4.23	

Source: USDA Office of Energy, "Fuel Ethanol and Agriculture: An Economic Assessment," August 1986, p. 18.

USDA: FOREST SERVICE

The Forest Service supports the energy sector primarily through its involvement with timber and fuelwood management and through some research on global climate change ($13.8 million in FY 1989). (USDA Budget Summary, 22). The provision of timber at below-market rates, or below the Forest Service's cost of making the timber available reduces the cost of fuelwood to the end user. *Energy subsidies from the Forest Service were not quantified in this study.*

National Forest System (OMB '92, 4-427).

Land and Resource Protection. Protection and maintenance of National Forest System users, resources, lands and facilities, including roads and trails.

Renewable Resource Management and Utilization. Provides for the management and utilization of the timber, mineral, range, recreation, wildlife, fisheries, watershed, and soil resources on National Forest System Lands.

General Administration. Oversees activities associated with managing the National Forest System.

Construction. Construction of roads, trails, and buildings. Only some of the expenditures subsidize energy by reducing the costs of timber harvests.

Research Construction. Includes some expenditures for retrofitting research facilities for improved energy efficiency.

Road and Trail Construction. Funds construction to improve access to Forest System areas for recreation and utilization of their natural resources.

Timber Purchaser Construction. "Roads may be constructed and/or reconstructed by a timber purchaser who in turn receives credit against timber value as a reimbursement. These roads are those required within a timber sale area specifically for the removal of the timber, but which will remain on the National Forest development road system for resource management purposes after the timber sale contract is completed." (OMB '92, 4-429).

Forest Research. Funds research in a number of areas benefitting timber producers, including forest management research, forest products and harvesting research, forest protection research, resource analysis research, and forest environment research. Recent high priority areas include: global change, as related to forest resources; water quality impacts of mining, pest epidemics, atmospheric deposition, and increased timber harvesting and fire. ('91 USDA budget summary, 54, 55). Ozone-affected forests: research agenda is listed in the Forest Service FY '89 Annual report, pp. 76-85.

State and Private Forestry. The Forest Service provides forestry assistance to States and private timber holders with regards to pest management, fire protection, and forest management and utilization. (OMB '92, 4-430).

Tongass Timber Supply Fund. Funds management and below-cost timber sales on the Tongass National Forest. (OMB '92, 4-423).

Offsetting Collections: Timber Receipts.

(Billion Board Feet)	1985	1986	1987	1988	1989
Offered[17]	11.5	11.7	11.5	11.3	10.5
Sold	10.8	11.0	11.3	11.0	8.4[18]
Harvested	10.9	11.8	12.7	12.6	12.0
Value of Harvest ($million)	720.6	786.9	1,016.0	1,235.7	1,209.7

Source: United States Department of Agriculture, Report of the Forest Service, Fiscal Year 1989, February 1990, pp. 31, 126

There were a number of problems with the way the Forest Service estimated its costs and revenues associated with timber sales in FY 1988. Since the evaluation of these practices was not published until March 1991, it is likely that at least FY 1989 had similar errors. First, the amortization of the costs of timber harvested were amortized over an unrealistically high volume of timber, thereby understating the cost of timber harvested.

Second, the costs of road improvements were amortized over the forest rotation period, resulting in too little expenses being recognized in a given year.[19] Other costs "should have been capitalized as permanent improvements to land and not amortized."

Third, the Forest Service did not recognize fire losses in the year incurred. (GAO/AFMD-91-18). Nor did it deduct the cost of support services to carry out the sales.

Timber purchaser road credits, although not received in cash, are generally included in the Service's estimates of timber receipts, which they use to offset the costs of the sale. Part of these road benefits accrue to future timbering; part to recreational use of the land.[20]

Finally, there is an issue with treating timber receipts as an offset to program expenses rather than as a royalty on the sale of a limited natural resource.

---

[17]Does not include 250,081 sales of forest products that could not be converted into board feet, perhaps such as Christmas trees and fuel wood removed by individuals.

[18]Appeals, litigations, and Spotted Owl Temporary Restraining Order delayed the offer and award of 1.8 BBF of sales.

[19]Another GAO study surveyed engineers regarding the realistic life of a road. Road surfaces were estimated to last between 3 and 25 years; culverts and bridges 20 to 50 years. The life of a road bed was estimated to be indefinite. (GAO/AFMD-90-48BR, 37). Contrast this to the 1,810-year amortization period for roads and reforestation expenses used for the Chugach forest (Alaska) in 1988, or the numerous forests for which the amortization period exceeded 100 and 200 years. (Rice, National Forests, A1 - A4).

[20]The use of timber roads for recreation is sometimes a mixed blessing as pristine wildlife refuges become accessible to potentially heavy recreational use.

Even when timber sales overall provide a net gain to the Treasury, sales on many of the National Forests lost money. On average, the taxpayer would have saved $406 million/year between 1982 and 1987 if the Forest Service had not allowed timbering on money-losing forests. The figure for 1988 was about $114 million and for 1990 was $257 million. No equivalent data for 1989 were available. Assuming that 1989 losses reflected the downward trend in below-cost sales of the late 1980s (i.e., that 1988 and 1990 figures are significantly less than the average for 1982-87), a proxy value of the average of 1988 and 1990 can be used. Thus, of the estimated $185.5 million that could have been saved in 1989 had no below-cost sales been undertaken, at least 17.2% accrued to biomass energy (fuelwood).[21] This leads to a biomass subsidy of $31.9 million. (Derived from Rice, all documents).

Forest Service Permanent Appropriations. These include a number of expenditures with subsidize the use of wood as a fuel. Although many of these items are funded through offsetting collections, they reduce the value of the offsetting collections net the provision of services. Since total timber receipts were deducted from total subsidies above, the portion used for energy-related permanent appropriations is added back here. (OMB '92, 4-436).

Forest and Rangeland Research Trust Fund. Small research trust funded by gifts.

Expenses, brush disposal. Supports Forest Service removal or treatment of slash and other debris from cutting operations. Funded by payments from timber licensees.

Restoration of Forest Lands. Pays for restoration of timber lands left unreclaimed by timber purchasers who default on their timber claims. Funded through claim settlements and bonds and deposit forfeiture.

Timber Purchaser Roads Constructed by Forest Service. Funds road construction of timbering roads for qualified small businesses who choose to have the Forest Service build the roads rather than do so themselves. Funded by timber receipts.

Timber Salvage Sales. Funds to begin salvage of insect-infested, dead, damaged, or down timber, and to remove associated trees for stand improvement; and for preparation of timber sales to replace sales lost to fire or other causes, and for preparation activities to replace sales inventory of the shelf, including timber support. (OMB '92, 4-436). Expenditures are funded by salvage sale receipts. Not counted is the free removal of firewood from salvage areas by small scale operators. (Heede, 11).

Tongass Timber Supply Fund. Pays to maintain the supply of timber from the Tongass National Forest at 4.5 billion board feet/decade. Funded by timber receipts on sales of Alaska timber. The fund was traditionally a permanent appropriation. However, Congressional action in FY 1988 and 1989 required annual appropriations for this item to be funded. For this reason, Tongass outlays during those years were listed under "other appropriations" rather than in this trust fund.

Working Capital Fund. Provides equipment repair, maintenance crew support, signage, and other related services to keep the forests operating and the Forest Service able to do its job. The Fund is a self-sustaining revolving fund financed through user fees and depreciation payments from the beneficiaries

[21] 17.2% of timber in 1987 went for fuelwood. This figure does not include the energy derived from wood waste by the pulp, paper, and lumber industries. (Statistical Abstract, Table 1176).

of the expenditures. The fund is treated here only where there are shortfalls (subsidies) or surpluses (offsetting gains). (OMB '92, 4-438).

Payments to the States. 25 percent of the funds collected from the timber sales is forwarded to the States. Funds collected from sales include deposits for reforestation under the Knutson-Vandenberg Act, purchaser road credits, and in FY 1988 and 1989, timber salvage sale receipts as well. These inclusions result in cash outlays from the Forest Service for non-cash revenues or payments for services. The net result is that the states actually receive more than 25 percent of the FS's deposits to the National Forest Fund. (OMB '92, 4-437; Gorte, 49).

Payments to Counties. Payments to counties to compensate for foregone property taxes are made under the Payments in Lieu of Taxes Act.

Payments to Minnesota. Reimbursements to St. Louis, Cook, and Lake counties out of timber receipts for foregone property taxes.

Cooperative work, Knutson-Vandenberg. Deposits from timber purchasers to reforest timber sale areas, improve stands, and protect other resources.

Cooperative work, Other. Deposits from timber purchasers, research organization, and private abutter to National Forests for resource protection, road maintenance, etc.

Reforestation Trust Fund. Funded by tariffs on imports of solid wood products for use in general reforestation and timber stand improvement. Prior to FY 1988, the Forest Service was not permitted to use the interest earned on fund balance for reforestation. The U.S.-Canadian free trade agreement could change this source of funding. However, for FY1989, this budget item, although not funded by U.S. taxpayers, nonetheless constituted a subsidy to the industry. (Gorte, 39).

Off-Budget Subsidies

Forgiveness of Timber Contracts Purchased at High Prices. Contracting for products and services in private industry always involves risks associated with changes in market conditions. When the market rises, contracts may yield windfall profits. When the market falls, losses may be equally large. In either case, however, the contract remains valid except in the case of bankruptcy.

Federal timber contracts are not so sacrosanct. While windfall profits accrue to the timber industry, federal intervention has sometimes enabled the industry to opt out of contracts now unfavorable due to market declines. In the 1984 Federal Timber Contract Payment Modification Act (Buy-Out Act), 436 purchasers of Forest Service and BLM timber bought out of 11 billion board feet of timber priced at $2.9 billion for $184 million. (GAO/RCED-89-117, 1). Of this amount, 9.7 billion board feet valued at $2.5 billion (and bought-out for $172 million), was from Forest Service Lands. (GAO/RCED-89-117, 4). [BLM: 279 contracts, 1.3b board feet, $436m value, $11.9m buy out; also p. 4]. The net benefit to industry from these two buyouts was $2.9 billion less $184 million, or $2.716 billion. Using the 17.2% rate of timber use for fuelwood (Stat. Abstract, Table 1176), approximately $467 million accrues to biomass fuels. Since waste from paper and timber production both utilize wood wastes as a fuel, this estimate is likely to be too low.

In late 1988, additional contract relief in the form of deferred payments for harvested timber were also implemented. Qualified deferrals will be paid, with interest, over a 5-year period (secured by a promissory note), or 10 years in situations of compelling need. (GAO/RCED-89-117, 6). Through

December 1988, the Forest Service had a maximum deferral of $18 million [BLM: $16 million]. (p. 7). Since the proposed interest rate is, at a minimum the 5-year treasury bill rate, and most likely the prime rate, we do not consider the deferral as a subsidy since there is no loss of cash. (GAO/RCED-89-117, 16). There is, however, a benefit to industry since they would have had to pay higher interest rates than the prime rate to carry the debt on private markets.

Sources

Gorte, Ross and M. Lynne Corn. Forest Service Budget: Funds and Special Accounts. Washington, DC: Congressional Research Service, January 27, 1989, CRS 89-75 ENR.

Heede, Rick. Federal Energy Subsidies: Agency Obligations, Draft Report. Rocky Mountain Institute, 1986.

Rice, Richard. "Timber Receipts and Expenditures on the National Forests, by Forest Service Region, 1987 and 1988." Washington, DC: The Wilderness Society, December 13, 1988.

Rice, Richard. "Taxpayer Losses from National Forest Timber Sales, FY 1990." Washington, DC: The Wilderness Society, May 1991.

Rice, Richard. National Forests: Policies for the Future, Volume 5 - The Uncounted Costs of Logging. Washington, DC: The Wilderness Society, August 1989.

U.S. Department of Agriculture, Forest Service. Report of the Forest Service, Fiscal Year 1989. US GPO, 1990.

U.S. GAO. Federal Timber Sales: Legislative and Administrative Assistance Provided to Timber Purchasers, April 1989. GAO/RCED-89-177.

U.S. GAO, Financial Audit: Forest Service's Financial Statements for Fiscal Year 1988, March 1991, pp. 7,8. GAO/AFMD-91-18)

U.S. GAO. Timber Sales Program: Issues Surrounding the Timber Sales Cost Reporting System, February 1990. GAO/AFMD-90-48BR.

U.S. Office of Management and Budget. Budget of the United States Government, Fiscal Year 1992.

USDA: RURAL ELECTRIFICATION ADMINISTRATION

The Rural Electrification Administration was created in 1935 as a Depression-related unemployment relief program. It's purpose was to bring electrification, and therefore modernization, to rural America. Prohibitive costs of developing electrical infrastructure in these thinly populated areas made private market provision of services unlikely. In 1935, only 11.6% of the farms in the U.S. had electricity; by 1953, 90.8% of the farms were electrified. ('91 Brief History, 7).

The initial intent of the REA was to provide government loans at the government's cost of borrowing. However, the Pace Act of 1944 set the interest rate on REA current and future loans at 2%. Although this rate approximated the government's cost of funds at the time, it gradually became more and more out of sync with the market.[22] In 1973, the "normal" loan rate was raised to 5%, with 2% loans only available in hardship cases. ('91 Brief History, 2). Loans were initially used to finance not only generation and transmission equipment, but the purchase of electric appliances and farm equipment as well. (Cole et al, p. 154). This has since been restricted to electrical supply and transmission.

Until recently, REA's accounting practices failed to realistically assess loan defaults on direct and guaranteed loans, or to incorporate the cost of interest rate subsidies. At some point, continued investment into distribution of centrally-generated power becomes more expensive than newer, smaller scale, on-site technologies, such as wind, solar, or efficiency. Without clear tracking of true costs of electrification efforts, these trade-offs will not be made efficiently.

REA Subsidies

Subsidized Loans. Interest rates significantly below-market (generally 2-5%) confer subsidies to the borrower. The difference between the government's long-term cost of funds and the rate charged borrowers is the interest rate subsidy for the low estimate. Our high estimate measures the difference between the rates charged by REA and the rate for a private sector borrower with virtually no default risk, using the corporate Aaa bond rate as a proxy. This comparison enables us to measure the value of federal intermediation on borrowing without double-counting REA borrower defaults (through actual defaults and the default premium on the cost of funds). Subsidized loans fall into two main categories:

Forgiveness of Interest Payments of Revolving Fund Capitalization. In 1973, the Rural Electrification and Telephone Revolving Fund was created. This fund had $7.4 billion in debt at this time, reflecting borrowing from the Treasury between 1953 and 1973 that had not yet been repaid. Congress forgave repayment of all future interest on the debt. Interest and principal payments received from borrowers, rather than paying back the Treasury appropriation, were to remain in the Fund to finance future activities. The debt to Treasury, in the form of 40-year notes almost all remains outstanding, with debt maturities beginning in 1993. (1990 Report of the Administrator, 25). Therefore, all interest subsidies continue today. In addition, the 40-year lending exceeds the government's longest available borrowing period, requiring the federal government to refinance the debt at some point during its life. At refinancing, the government is exposed to significant interest rate and inflation risk. We incorporate this risk by measuring the interest cost to the government at refinancing (rather than in the year the debt was originally issued) to the interest paid by the lender.

Negative Interest Rate Spread on Newer Debt. Beginning in 1975, the Revolving Fund again needed to borrow money, which it did by issuing paper "Certificates of Beneficial Ownership" (CBOs) in return for cash. The funds were then lent to borrowers at rates below the cost to the REA. Since the CBOs are all 30-year notes, and the loans to borrowers are generally 35 years (GAO/AFMD-90-73, 21),

[22] By 1984, this margin reached 10%, the highest subsidy in the Fund's history. (CBO rev. and spend '91, p. 35).

all of this debt remains outstanding. The interest rate subsidy generates subsidies every year, for the duration of the loan.

Defaults on Direct Loans. Through at least 1977, REA had a very low default rate. (Cole et al, 257). This likely results from below market interest rates on loans, long payback periods, and liberal loan restructuring for utilities in trouble as much as from careful risk management. A slow-down in the rate of electricity demand growth as well as REA borrower participation in nuclear projects markedly changed this picture. Since 1984,

> several of REA's major electric program borrowers are experiencing severe financial difficulties due to their participation in the financing of large power plants, some of which are nuclear...REA's practice of restructuring the debt of its troubled borrowers was considered in developing allowances for loan losses. REA restructuring agreements often incorporate the issuance of additional guarantees as well as the issuance of contingent notes, for which repayment is contingent upon future events, such as sustained load growth. Because of the troubled borrower situation, significant uncertainties exist relating to the ultimate recovery of REA's outstanding exposure in these lending arrangements. (GAO/AFMD-90-73, 22).

A Congressional Research Study (88-665 E) points to 1973 as the beginning of problems for borrowers. First, the passage of the Power Plant and Industrial Fuel Use Act and increased uncertainty about spiraling oil prices induced many power plants to move away from dependence on oil, increasing the rate of investment into new plants. Second, the Federal Financing Bank was created, and a new financing system for cooperatives allowed generation and transmission cooperatives (G&Ts) to borrow from the FFB. G&Ts borrowed billions of dollars, with REA as the guarantor, for new plant including equity participation in nuclear utility construction. Enormous cost overruns in many of these projects threw the cooperatives into default. (CRS 88-665 E, 3).

Following the practice used in private industry, REA finally began to accrue provisions for expected loan losses. We use these expected losses in 1989, converted to annual payments over the period of loss. Based on the CRS study, 17 years (1973-1989, inclusive) is used as the period of loss over which the current provision for loss is annualized.

Nonaccruing loans. Interest collection on loans declared "non-accruing" is stopped, although the loan has not yet been written off. This foregone interest is not included in the provision for loan losses, and is therefore counted as a subsidy to borrowers in its own right.

Special Rates on Accelerated Loan Repayment. In an effort to "get loans off of its books," REA allowed prepayment of "certain REA guaranteed Federal Financing Bank Loans, as well as the sale or prepayment of REA direct or insured loans, at discount, by the borrower." ('91 Brief History, 2). In some cases, REA simply paid off direct loans by guaranteeing the private sector loans used by the very same borrower. Although discounts for prepayment were provided, REA often retains the ultimate risk for non-payment. ('89 Brief History, 4). This subsidy contains two parts:

Prepayment at a Discount. The special prepayment plan allowed borrowers to prepay loans at a net present value of 59 percent, with the condition that the prepaying cooperative would not be allowed to borrow from the Revolving Fund again. (CRS 88-665 E, 7). Loans worth $580 million were prepaid in FY87. The present value of these losses were $299m. (GAO/AFMD-90-73, 33). According to REA, additional loan prepayments in FY88-90 did not involve any discount. (Redde, 5/4/92). Loan volumes

prepaid in these years were $2 billion (FY88), $2.4m (FY89) and $123.8m (FY90). (Audit Report, 11). Unlike capital losses and defaults which reflect under-accrual in the past, this discount prepayment reflects a voluntary change in contracting arrangements impacting the magnitude of future cash flows. As a result, the loss is amortized going forward.

Waived Prepayment Penalties. Two special statutory provisions

> required REA to accept certain FFB-financed loan prepayments at book value without prepayment penalties during fiscal years 1988 and 1987. Likewise, REA was allowed to prepay FFB borrowings, used to finance these loans, without prepayment penalty. (GAO/AFMD-90-73, 33).

Total waived penalties amounted to $450m in FY88 and $161m in FY87. Waived penalties on FY89 and FY90 prepayments were $0.2m and $37.9m, respectively. As with the prepayment discounts, these penalties are amortized going forward, over time. Since these penalties reflect a decision of the lender to allow prepayment, we do not count the waived penalties as a subsidy in its own right, but rather treat only the prepayment discount as a subsidy.

Defaults on Guaranteed Loans. Since 1974, REA has been allowed to provide guarantees for loans made by other lenders (primarily the Federal Financing Bank). ('89 Brief History, 17). Thus, if borrowers defaulted on these loans, REA would be responsible for payment. REA has begun to accrue for estimated losses on guaranteed loans. This accrual for probable losses as of 1989, and annualized over the same period as the direct loan defaults, is used to estimate the value of this subsidy.

Intermediation on Loan Guarantees. A federal loan guarantee, even if the borrower does not default, has a significant value to the recipient. In REA's case, the value of the guarantee to the rural electric recipient is the difference between the interest rate without a federal guarantee and the rate with it. This difference is primarily due to default risk (which we capture through our measure of actual REA defaults), but also includes an additional premium above and beyond the default premia (such as more expensive risk-bearing than the federal government) which we were unable to measure here.

Congressional Appropriations. Congressional appropriations cover the administrative costs of running REA as well as cash shortfalls due to the revolving fund's lending or default status. Administrative costs for the rural electric program is treated as a direct subsidy to electricity (administrative costs of telephone and CATV programs are excluded). Recapitalization of the revolving fund reflects cash transfers rather than the accruals for expected defaults and shortfalls mentioned above. To better approximate the annual subsidy (i.e., to reflect accruing losses on bad loans and negative interest rate exposures), the methods described above are used rather than cash outlays.

Interest Losses on Restructured Loans. Restructured REA loans generally involve stretching out the repayment period and sometimes reducing the expected payments. According to REA, loans are restructured while maintaining the same net present value. (Lei, personal communication; Redde, personal communication). Although annual reports record an interest loss on restructuring, this is a deferral of payments, not a loss. REA may face some additional interest rate risk as a result.

Many of the restructuring arrangements involve the issuance of contingent debt, where REA is reimbursed for past loans so long as borrower revenues exceed a certain level. These contingent payments are not certain, and REA may never be paid back. However, REA has adjusted its accrual for losses to take this risk into account. (Audit Report, p. 3).

Lack of a Required Rate of Return and Tax-Exempt Status. REA operates very much like a bank. Yet unlike a private bank, REA does not have to earn a positive return on invested capital, nor does it have to pay any federal income taxes on its net income (if it has any). As a result, even if REA were to operate at break-even, it would provide financing at a cheaper rate than is available to many of the energy alternatives (non-grid solar, wood, propane; and efficiency) with which it competes. As a result, efficient decisions regarding substitutes for rural electricity may not be pursued. These factors are not reflected in our estimates of REA subsidies.

Sources

Cole, R.J. et al. An Analysis of Federal Incentives Used to Stimulate Energy Consumption, Pacific Northwest Laboratory, prepared for the U.S. DOE, August 1981.

Lei, Eva. Rural Electrification Administration, personal communication, 2/20/92.

Morrison, Sylvia. Rural Electric Cooperative Defaults: Origins, Current Status, and Implications. Congressional Research Service, October 1988, 88-665 E.

Redde, Bob. Rural Electrification Administration, personal communication, 5/4/92.

U.S. Congressional Budget Office. Selected Spending and Revenue Options, June 1991.

U.S. Department of Agriculture, Office of the Inspector General. Rural Electrification Administration: Financial Statements As of September 30, 1990 and 1989, Together With Auditor's Report. May 1991. Audit Report #09600-1-HQ. [Cited as "Audit Report."]

U.S. Department of Agriculture, Rural Electrification Administration. A Brief History of the Rural Electric and Telephone Programs. February 1989. [Cited as "'89 Brief History"].

U.S. Department of Agriculture, Rural Electrification Administration. A Brief History of the Rural Electric and Telephone Programs. January 1991. [Cited as "'91 Brief History"].

U.S. Department of Agriculture, Rural Electrification Administration. Report of the Administrator, Fiscal Year 1990. August 1991.

U.S. Department of Agriculture, Rural Electrification Administration. REA Financed Generating Plants. January 1991. Publication 200-2.

U.S. General Accounting Office. Financial Audit: Rural Electrification Administration's Financial Statements for 1988 and 1987, June 1990. GAO/AFMD-90-73.

Rural Electrification Administation

Part 1: Foregiveness of Interest on Treasury Debt at Revolving Fund Capitalization

Issue Date	Length (Years)	Face Amount	Unpaid Balance	Refinance Year	LOW ESTIMATE Treas. Refin. Rate	LOW ESTIMATE Annual Interest Subsidy	HIGH Corp. Aaa Rate	HIGH ESTIMATE Annual Interest Subsidy
			(1)	(2)	(3)	(1)*(3)	(4)	(1)*(4)
1953	40	202.5	81.4	1983	0.1118	9.1	0.1204	9.8
1954	40	248	248	1984	0.1241	30.8	0.1271	31.5
1955	40	270	270	1985	0.1079	29.1	0.1137	30.7
1956	40	269	269	1986	0.0778	20.9	0.0902	24.3
1957	40	434	434	1987	0.0859	37.3	0.0938	40.7
1958	40	394.5	394.5	1988	0.0896	35.3	0.0971	38.3
1959	40	240	240	1959	0.0413	9.9	0.0438	10.5
1960	40	215	215	1960	0.0406	8.7	0.0441	9.5
1961	40	427.5	427.5	1961	0.0392	16.8	0.0435	18.6
1962	40	70	70	1962	0.0399	2.8	0.0433	3.0
1963	40	405	405	1963	0.0405	16.4	0.0426	17.3
1964	40	683	683	1964	0.0419	28.6	0.0440	30.1
1965	40	484	484	1965	0.0427	20.7	0.0449	21.7
1966	40	66.5	66.5	1966	0.0477	3.2	0.0513	3.4
1967	40	462	462	1967	0.0501	23.1	0.0551	25.5
1968	40	883	883	1968	0.0545	48.1	0.0618	54.6
1969	40	463.3	463.3	1969	0.0632	29.3	0.0703	32.6
1970	40	0	0	1970	0.0687	0.0	0.0804	0.0
1971	40	1109.9	1109.9	1971	0.0612	67.9	0.0739	82.0
1972	40	0	0	1972	0.0601	0.0	0.0721	0.0
1973	40	201.9	201.9	1973	0.0712	14.4	0.0744	15.0
1974	40	0.6	0.6	1974	0.0806	0.0	0.0857	0.1
1975	40	0	0	1975	0.0799	0.0	0.0883	0.0
1976	40	455.6	455.6	1976	0.0761	34.7	0.0843	38.4
Total		7,985.3	7,864.2			487.2		537.5

Notes to Part 1:

(1) Unpaid balance outstanding as of 1989.

(2) The refinance year was calculated assuming that initial financing was done with 30-year Treasury bonds. See "Technical Description of Debt" (Chapter B7) for additional details.

(3) Long-term treasury bond rate in refinancing year.

(4) Rates used here are the borrowing rate for Corporate Aaa bonds, which approximates the default-free cost of money for non-government entities. Using the utility cost of borrowing would double-count default risk between this section and the actual REA defaults shown below.

Part 2: Negative Interest Spread on Additional Borrowings

			LOW ESTIMATE			HIGH ESTIMATE		
Year	REA Loan Int. Rate	Amt. Borrowed From FFB	Rate Paid to Treas.	Negative Spread	Annual Interest Subsidy	Corporate Aaa Cost of Funds	Negative Spread	Annual Interest Subsidy
1976	0.0402	166.4	0.0821	0.0419	7.0	0.0843	0.0441	7.3
	0.0402	187.3	0.0810	0.0408	7.6	0.0843	0.0441	8.3
1977	0.0388	0.0	0.0000	0.0427	0.0	0.0802	0.0414	0.0
1978	0.0435	97.0	0.0847	0.0412	4.0	0.0873	0.0438	4.2
	0.0435	187.0	0.0879	0.0444	8.3	0.0873	0.0438	8.2
1979	0.0427	283.3	0.0920	0.0493	14.0	0.0963	0.0536	15.2
	0.0427	302.2	0.0943	0.0516	15.6	0.0963	0.0536	16.2
1980	0.0437	329.1	0.1253	0.0816	26.8	0.1194	0.0757	24.9
	0.0437	360.0	0.1206	0.0769	27.7	0.1194	0.0757	27.3
1981	0.0438	380.0	0.1293	0.0855	32.5	0.1417	0.0979	37.2
	0.0438	303.0	0.1533	0.1095	33.2	0.1417	0.0979	29.7
1982	0.0448	268.4	0.1394	0.0946	27.3	0.1379	0.0931	26.9
	0.0448	187.0	0.1192	0.0744	13.9	0.1379	0.0931	17.4
1983	0.0490	156.8	0.1078	0.0588	9.2	0.1204	0.0714	11.2
	0.0490	69.2	0.1161	0.0671	4.6	0.1204	0.0714	4.9
1984	0.0495	187.6	0.1241	0.0746	14.0	0.1271	0.0776	14.6
1985	0.0499	346.9	0.1063	0.0564	19.5	0.1137	0.0638	22.1
1986	0.0500	0.0	0.0776	0.0275	0.0	0.0902	0.0402	0.0
1987	0.0496	0.0	0.0000	0.0280	0.0	0.0938	0.0442	0.0
1988	0.0496	0.0	0.0000	0.0280	0.0	0.0971	0.0475	0.0
1989	0.0500	0.0	0.0000	0.0275	0.0	0.0926	0.0426	0.0
1990	0.0497	64.0	0.0876	0.0379	2.4			
	0.0497	272.0	0.0895	0.0398	10.8			
Total		4,167.2						
Total Annual Interest Subsidy on CBOs Through '89					265.1			275.5

Notes to Part 2:

(1) REA loan rate is the weighted average for loans approved during that year. ('90 Report of the Administrator, p. 29).

(2) Where loans made in a year with no new borrowing, the prior year's interest rate is used as a proxy under the assumption that borrowing was unneeded because old funds remained.

(3) CBOs refer to "Certificates of Beneficial Ownership." REA's 30-year certificate of debt, all of which remain outstanding in 1989.

Part 3: Derivation of REA Weighted Ave. Earnings on Lending, 1973-1989

Year	Ann. Wghtd. Ave. Lending Rate	Electric Loans Approved	Weight
1973	0.0372	617.9	0.0016
1974	0.0452	618.6	0.0021
1975	0.0442	700.0	0.0024
1976	0.0402	937.5	0.0029
1977	0.0388	850.0	0.0025
1978	0.0435	900.0	0.0030
1979	0.0427	1,000.0	0.0033
1980	0.0437	925.0	0.0031
1981	0.0438	850.0	0.0029
1982	0.0448	850.0	0.0029
1983	0.0490	850.0	0.0032
1984	0.0495	850.0	0.0032
1985	0.0499	562.0	0.0022
1986	0.0500	651.9	0.0025
1987	0.0496	628.4	0.0024
1988	0.0496	622.1	0.0024
1989	0.0500	622.1	0.0024
1990	0.0497	622.1	
Totals Through 1989		13,035.5	
Weighted Ave. Rate			0.0451

Sources:

REA, "A Brief History of the Rural Electric and Telephone Programs," January 1991, p. 15

REA "Report of the Administrator, FY90," August 1991, p. 29.

Part 4: Defaults on Loans and Guaranteed Loans at end of FY89

A. Non-Accruing and Defaulted Loans and Guarantees	$Millions	
Total Defaults	8,300.0	('90 Rept. to Admin., 4)
Defaults yet to be Restructured	2,300.0	('90 Rept. to Admin., 4)
Allowance for losses on Electric Loans	1,614.8	Auditors Report, 5
Allowance for losses on loan guarantees	366.7	99.7% of total accrual, based on FY90 data. (Audit Report, 11, 17).
Total	1,981.5	
Estimated period of loss 17 years (Note 1)		
REA Weighted Average Lending Rate, 1973-1989	4.51%	From Part 3 above
Annualized Payment to Accrue for Loss Provision in 1989	80.0	Assumes historic annual provision for losses totalling current accruals.
Interest Foregone on non-accruing loans in 1989	249.3	Auditors Report, 6
Net Annualized Losses from Non-performing Assets	329.3	
B. Losses on Discount Prepayment of Loans		
Present Value of Interest Losses on Advance Repayments	299.0	(GAO/AFMD-90-73, p. 33)
Amortization Period of Prepayment Loss	17.5 years	See Note 3
Weighted Average Interest Foregone	4.51%	From Part 3
Annualized Value of Foregone Interest	25.1	
Waived pre-payment penalties in FY87-FY89 included in total	0.0	See Note 2. (GAO/AFMD-90-73, p. 33; Auditors Report, notes, p. 11)
Total Prepayment Losses	25.1	

Sources:

REA "Report of the Administrator, FY1990," p. 22.

USDA Office of the Inspector General, "REA Financial Statements and Auditors Report, 1989 & 1990," May 1991. Report #09600-1-HQ.

U.S. GAO. "Financial Audit: Rural Electrification's Financial Statements for 1988 and 1987." GAO/AFMD-90-73.

Notes to Part 4.

(1) Defaults were facilitated by changes in borrowing regulations beginning in 1973. Only since then have cooperatives been able to contribute funds to generation and transmission projects. This date is used as the beginning of the problem period, for a total accrual period of 17 years (CRS, 88-665 E, p. 3).

(2) $611 million in waived prepayment penalties between 1987-1989 are excluded since REA initiated the pre-payment.

(3) This period of loss reflects 1/2 of the average loan life of 35 years, assuming that the pre-paid loans reflected the average of outstanding debt.

Part 5: Value of Intermediation on REA Loan Guarantees

	$Millions	
Loan Guarantees Outstanding as of 1990	23,500	EIA, p. 66.
Ave. Interest Rate Premium Paid by		
Lower-Rated Power Utilities (percent)	0.46%	Actual premium likely to be even larger; see Note 1 below.
Bond Insurance premia for borrowers BBB or better:	0.25%-2%	Petersen, p. 23
Annual subsidy Not Estimated		Note 2

Notes to Part 5.

(1) The interest rate premium shown reflects the average interest spread between Standard & Poors' utility bonds rated AA and BBB for the period 1941 to 1989 (the period for which we could obtain data). Most REA borrowers are less financially stable than the large utilities, implying that without a government guarantee most would fall into the lower bond rating category, or below.

(2) Defaults on guaranteed loans are used as a proxy for the intermediation value of federal loan guarantees, since a large part of the difference between the interest rates on REA-guaranteed loans and the cost of loans without the guarantees is due to default risk.

Sources:

DOE, EIA, "Federal Energy Subsidies: Direct and Indirect Interventions in Energy Markets," Nov. 1992.

John Petersen, "Innovations in Tax-Exempt Instruments and Transactions," National Tax Journal, Vol. XLIV, No. 4

RATES2.WK1 (See Chapter B7).

Part 6: Annual Appropriations for Administration and Overhead

	FY89 Obligation
Administration, Rural Electrification Program	16.6

Source: OMB, "FY91 Budget of the U.S.," p. A-471.

Part 7: Summary Table and Allocation of Subsidies to Fuel Types

A. Energy Mix of REA-Financed Installed Capacity

	KW Capacity	% of Total
Coal Electric	23,744,000	61.70%
Gas Electric		
Gas steam	1,323,000	
Gas Diesel Engines	39,753	
Gas Turbines	672,470	
Gas Combined Cycle	588,967	
Total Gas	2,624,190	6.82%
Oil Electric		
Oil Steam	565,000	
Oil Diesel Engines	273,590	
Oil Turbines	7,778,000	
Oil Combined Cycle	82,500	
Total Oil	8,699,090	22.61%
Fission Electric	3,267,770	8.49%
Hydroelectric	145,365	0.38%
Total Installed Capacity	38,480,415	100.00%

Source: REA, "REA Financed Generating Plants," January 1991, p. 41.

B. Summary of Subsidies in 1989

	Low	High
Interest Foregiveness on Trust Fund Capitalization	487.2	537.5
Negative Interest Spread on CBOs	265.1	275.5
Losses on Non-performing Assets	329.3	329.3
Annualized Losses on Discount Loan Prepayment	25.1	25.1
Intermediation Value of Guarantees	Not	Estimated
Administration of Rural Electric Program	16.6	16.6
Total	1,123.3	1,184.0

C. Cross Subsidies on Defaults

Borrower	Type of Invest. Triggering Default	Pot. Loss To Gov't	Share of Losses
Sunflower Elect. Coop	Coal	287.3	
Big R. Elect. Corp.	Coal	1,288.8	
Soyland	Fission	475.0	
WIPCO	Fission	443.6	
Wabash	Fission	622.5	
Wolverine	Fission	900.1	
Cajun	Fission	2,235.6	
VT G&T Coop	Fission	43.4	
New Hampshire	Fission	214.5	
IL Valley Elect	?	24.0	
VT Electric	Fission	22.1	
Total Fission Losses		4,956.8	75.60%
Total Coal Losses		1,576.1	24.04%
Total Unknown Losses		24.0	0.37%
Total Losses		6,556.9	

Potential losses to the U.S. reflect exposure as of 3/88 and do not necessarily reflect actual losses.

Source: Sylvia Morrison, "Rural Electric Cooperative Defaults: Origins, Current Status, and Implications," U.S. Congressional Research Service, October 1988, pp. 13-37

D. Allocation to Fuel Mix

	LOW ESTIMATE						HIGH ESTIMATE					
	Total	Fission Electric	Oil Electric	Gas Electric	Coal Electric	Hydro Electric	Total	Fission Electric	Oil Electric	Gas Electric	Coal Electric	Hydro Electric
Fuel Share of Capacity Weight	100.00%	8.49%	22.61%	6.82%	61.70%	0.38%	100.00%	8.49%	22.61%	6.82%	61.70%	0.38% From Part 6A
Interest-Free Trust Fund Cap.	487.2	41.4	110.1	33.2	300.6	1.8	537.5	45.6	121.5	36.7	331.6	2.0
Loss on CBOs	265.1	22.5	59.9	18.1	163.6	1.0	275.5	23.4	62.3	18.8	170.0	1.0
Loss on Discount Loan Prepymt.	25.1	2.1	5.7	1.7	15.5	0.1	25.1	2.1	5.7	1.7	15.5	0.1
Intermediation on Guarantees	Not Estimated; see notes to Part 5						Not Estimated, see notes to Part 5					
Program Adminstration	16.6	1.4	3.8	1.1	10.2	0.1	16.6	1.4	3.8	1.1	10.2	0.1
Share of Defaults Weight	99.63%	75.60%			24.04%		99.63%	75.60%			24.04%	
Plus "unkown" defaults	0.37%	0.03%	0.08%	0.02%	0.23%	0.00%	0.37%	0.03%	0.08%	0.02%	0.23%	0.00%
Net Share of Defaults	100.00%	75.63%	0.08%	0.02%	24.26%	0.00%	100.00%	75.63%	0.08%	0.02%	24.26%	0.00%
						100.00%						
Defaults	329.3	249.1	0.3	0.1	79.9	0.0	329.3	249.1	0.3	0.1	79.9	0.0
Total REA Subsidies in 1989	1,123.3	316.5	179.8	54.2	569.8	3.0	1,184.0	321.6	193.5	58.4	607.3	3.2

USDA: OTHER BRANCHES NOT QUANTIFIED

A number of other USDA agencies have some involvement with the energy sector. Areas include:

Agricultural Research Service

- Ways to protect natural resources from the harmful effects of fuel-related air and water pollutants.
- Research on agricultural uses for coal-plant scrubber residues
- Research on biomass fuel development
- Ways to improve the energy efficiency of agricultural systems
- Global climate change research ($0.7 million in 1989)

Cooperative State Research Service

- Global climate change research ($4.4 million in 1989)

Economic Research Service

- Tracks data on agriculture, food, natural resources, and water quality used in policy and strategic analyses
- Global climate change research

Agricultural Conservation Program

- Researches ways to improve energy efficiency of agricultural systems

Forestry Incentives Program

- Supports conversion of private woodlots into productive timber and fuel uses.

Soil Conservation Service

- Support for amelioration of land and water problems from energy-related land uses such as timbering and mining.

Farm Credit System (FCS)

The FCS is "a collection of member-owned banks that provide loans to farmers and ranchers for real estate and farm operations." (Halicki, 25). Since the FCS can issue securities backed by the federal government, it operates similarly to a government agency. It can access credit less expensively than non-government entities, passing these savings on to members. Since corn is one of the most widely grown crops in the U.S., these financing benefits may be reflected, in part, in reduced corn (and fuel ethanol) prices.

Sources

Halicki, Tom. "Farming Against the Grain," National Voter. January 1988, V. 37, No. 5.

USDA. 1991 Budget Summary.

EXECUTIVE BRANCH: SUPPORT FOR MULTI-LATERAL DEVELOPMENT BANKS

The Multi-Lateral Development Banks finance development projects around the world to facilitate economic development. Many energy facilities worldwide have been financed by these institutions. In fact, the MDBs have been one of the most important sources of energy investment capital and analysis for the developing world. These Banks have, in turn, been heavily financed by the U.S. federal government. In 1989, for example, the U.S. contributed over $1 billion in concessional loans (which are like grants) alone. Additional support in the form of contributions to bank operating costs add to this figure. The U.S. federal government partially contributed to the benefits accruing to foreign energy markets through reduced borrowing costs. In addition, to the extent that MDB energy projects have been biased for certain energy types, the federal government contributes to this bias.

Adopting integrated resource planning in MDB lending, as is happening in many U.S. utility districts, could lead to significant improvements in efficiency of energy generation, transmission, and consumption throughout the developing world. This approach would have a positive impact on global pollution as well. The U.S. can exert some influence over the lending practices of the MDBs in this direction through its replenishment of concessional loan funds, and through its presence on the board of directors for the general lending.

The MDBs

The MDBs work to improve living standards in developing countries through project loans and technical assistance. Project loans finance the construction or reconstruction of physical assets. Technical assistance loans provide funds to buy expertise used to improve the management of existing assets. Each bank usually has three subsidiaries. One makes loans only to the central governments of the developing countries, with the government in the recipient nation guaranteeing repayment. Loans to the private sector may be made so long as they go through, and are guaranteed, by the relevant government. In addition, each MDB has an affiliate which lends directly to the private sector at market rates. Finally, another division handles concessional loans to the poorest nations. These loans have payback conditions which make them essentially grants.

The World Bank includes the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). The IBRD was established in 1945 and is owned by the governments of 155 countries, in proportion to their financial support. Most of the lending is financed by direct borrowing on world financial markets, although member governments often provide guarantees on the debt, making borrowing easier and cheaper. Governments in recipient countries must also guarantee the loans, and pay interest rates slightly above the Bank's cost of borrowing. ('91 Annual Report, 3).

IDA was established in 1960 to serve the poorest nations, based on per capita GNP. IDA loans generally have heavily subsidized interest rates and more favorable repayment schedules. They are more like credits or grants than loans. ('91 Annual Report, 3). In addition, the International Finance Corporation (IFC) serves as a private sector lending affiliate. One other subsidiary organization of the World Bank Group is the Multilateral Investment Guarantee Agency (MIGA). MIGA was established in 1988 to increase foreign direct investment in developing nations by insuring against non-commercial (i.e., political) risks. Towards this end it also provides technical support to recipient governments on how to minimize these risks.

Inter-American Bank (IDB). Established in 1959 and based in Washington, DC. Private sector affiliate, the Inter-American Investment Corporation, is in its early stages of development.

African Development Bank (AfDB). Established in 1964 and headquartered in the Ivory Coast. Private sector affiliate in early stages of development.

Asian Development Bank (ADB). 1966, Manila, Philippines. Private sector affiliate is the Private Sector Division. In addition, ADB has the Asian Finance Investment Corporation, financed primarily by international commercial banks.

European Bank for Reconstruction and Development. The European Bank is a new development lending institution and is headquartered in London.

Governance and Lending Policies

The Banks are governed by a board of directors comprised of representatives from both the developed and the developing world. Loan funds are borrowed on the open market and lent at slightly higher rates to recipient nations. The World Bank and the Regional Banks often coordinate and co-finance loans. All recipient governments must guarantee repayment. (Philips, 40-42).

Some loans, either to the poorest nations, or at certain times to other nations, have been made at concessional interest rates. In some cases, countries have received concessional rates on some supply-side loans, but normal rates on demand-side loans. (Philips, 49). Loans in the energy sector support three types of activities. *Investment loans* finance specific projects. For energy, this includes loans for new energy projects (this is the largest category), for the energy sector in general (where the country is capable of planning the project distribution themselves), or for emergency repairs following disasters. Other MDB loans include *adjustment loans* (which support macroeconomic policy shifts) and *technical assistance loans* (which support guidance or training activities). (Philips, 48).

According to Philips, there has recently been a shift towards increased use of sectoral loans. Sectoral loans provide more latitude for the recipient country, and conversely less control over how the funds are used by the bank.

Loans to the Energy Sector

The MDBs and the International Finance Corporation approved $65 billion in energy loans between 1980 and 1990. Of this, 67% was by the World Bank, 11% by the ADB, 16% by the IDB, 4% by the AfDB, and 2% by the IFC. (Philips, 52). Technical assistance grants from the United Nations Development Program, but administered by the MDBs add more than $50 million of additional funding to the energy sector. (Philips, 52). Energy comprises the second largest category of bank lending, after agriculture.

In recent years, more attention has been paid to the efficiency of transmission, pricing, and administration of existing infrastructure. However,

> in determining which energy investments are lowest in cost, the banks do not include demand-side measures such as end-use energy-efficiency. Nor do they include environmental costs in determining the cost of energy supply projects. Nor does the MDBs' recent focus on improving the efficiency of electricity supply extend to demand-side efficiency improvements. (Philips, 58).

About the Estimates

The subsidy estimate on the accompanying spreadsheet includes only a portion of the U.S. support for the banks in 1989 supporting the energy sector. The net value of additional funds, in the form of pledges of operational support, could not be quantified.

The mix of energy supported was based on lending patterns for the World Bank, and is explained in detail in the worksheet. Since support for the MDBs is a cost to the U.S. taxpayer, we include the payments in our estimates of energy subsidies. Part of this support likely accrues to both foreign consumers and foreign equipment suppliers since MDB bylaws do not allow financial support to be linked to required purchases of a particular nation's products. However, since U.S. firms are large players in the oil, gas, and electric utility industries, a sizeable portion of MDB funding probably benefits U.S. energy equipment suppliers through increased equipment sales.

Sources

Philips, Michael. The Least Cost Energy Path for Developing Countries: Energy Efficient Investments for the Multilateral Development Banks. (Washington, DC: International Institute for Energy Conservation, September 1991).

The World Bank. Annual Report, for the years 1991 and 1992.

The World Bank Industry and Energy Department. Recent World Bank Activities in Energy, Revised Edition. (Washington, DC: The World Bank, October 1989. Industry and Energy Department Working Paper Energy Series Paper No. 7.

Multilateral Development Banks (MDBs)

Part 1: Funding of the MDBs in 1989 by the United States Government ($Millions)

Institution	Cash Paid In 1989	
World Bank		
International Bank for Reconstruction and Development (IBRD)		
International Development Association (Concessional Loans)		
Outlays	50.0	OMB, A-407
Pledge for Capital Replenishment, pmts. begin. '91	827.0	
International Finance Corporation		OMB, A-408
	4.9	OMB, A-408
Inter-American Development Bank		
Paid-in Capital		
Fund for Special Operations (Concessional Loans)	31.6	OMB, A-408
Inter-American Investment Corp	25.7	
Obligations from prior year	0.0	
Total Outlays	59.2	
	116.5	
Asian Development Bank		
Asian Development Bank, near market loans		
Asian Development Fund (Concessional Loans)		
	154.0	OMB, A-409
African Development Bank		
Paid-in Capital		
African Development Fund (Concessional Loans)	7.3	OMB, A-410
	34.0	
Total, Concessional Loan Contributions	1,040.7	
Total, Paid-in Capital for other Lending	153.0	
Total, All Categories	1,193.7	

Source: Office of Management and Budget, "Budget of the United States Government, FY 1991," pp. A-407 - A-410.

Part 2: MDBs Loan Approvals to the Energy Sector, 1980-1990 (Note 1)

A. Total Loan Approvals for Energy

	Amount (Mils. $1991)
African Development Bank	2,497
Asian Development Bank	7,580
World Bank (Note 2)	44,660
International Finance Corporation	1,152
Inter-American Development Bank	10,940
Total	66,829

Source: Philips, p. 52.

Notes:

(1) Loan approvals are disbursed over a number of years, and not all loans which are approved are actually disbursed.

(2) The World Bank total shown here does not agree with the World Bank total below because this figure is in 1991$ vs. 1989$ below; includes 1989 and 1990 data; and was aggregated by a different researcher.

B. Loan Approvals Benefitting End-Use Efficiency

All Energy Loan Approvals	66,829
End-Use Efficiency Approvals	
African Development Bank	0.0
Asian Development Bank	121.8
World Bank	254.0
International Finance Corporation	59.5
Inter-American Development Bank	2.0
Total	437.3
End-Use Efficiency as a Percent of Total Loans	0.65%

Source: Philips, pp. 56-65.

C. Importance of Multilateral Bank Lending for Energy

Energy Lending Shares of Total Lending
World Bank, 1970s and 1980s — 15.00% World Bank, 4/27/92, p. 12
No data on other MDBs

MDB Lending for Energy as a % of Developing Countries' Total Energy Capital
World Bank, 1980s — 7.00% World Bank, 4/27/92, p. 12
Plus providing access to additional co-financing

Part 4: Energy Mix of Installed Electrical Infrastructure in Developing Nations, 1989

Electricity Type	Capacity (TeraWatts)	Percentage Shares Of Tot. Capacity	f Non-Nuclear mestic Capac.	Of Domestic Capacity (1)
Hydro	674	33.20%	34.81%	33.43%
Geothermal	11	0.54%	0.57%	0.55%
Nuclear	80	3.94%		3.97%
Oil Thermal	224	11.03%	11.57%	11.11%
Gas Thermal	120	5.91%	6.20%	5.95%
Coal Thermal	907	44.68%	46.85%	44.99%
Net Imports	14	0.69%		100.00%
Total	2030			

Source: World Bank, 2/90, 9

Notes:

(1) Shares of Domestic Capacity eliminate net imports for use in calculations of loans to support electricity infrastructure, shown below.

Part 5: World Bank Lending for Energy, As a Proxy for All MDB Lending

A. Raw Data with Some Combined Use-of-Proceeds Categories

	Allocation Shares (5)	1980-1988 Data Are in Millions of Nominal Dollars 1980	1981	1982	1983	1984	1985	1986	1987	1988	Cumulative Lending (Mil 1989$) (1)	
Oil and Gas Production (Note 2)		287.0	649.5	1,063.0	1,036.6	654.0	752.4	231.1	347.3	358.0	6,525.0	
End-Use Efficiency				30	60.6			25	27	11.4	180.2	Philips, 61.
Electricity												
Hydro		7,809.0	845.6	106.8	665.0	1,124.0	335.5	379.8	542.0	365.6	16,673.4	
Oil/Gas Thermal		52.0	5.0	176.6	38.8	178.2	0.0	618.2	214.4	33.4	1,514.1	
Oil Share, Est.	65.12%	33.9	3.3	115.0	25.3	116.0	0.0	402.5	139.6	21.7	985.9	
Gas Share, Est.	34.88%	18.1	1.7	61.6	13.5	62.2	0.0	215.7	74.8	11.7	528.2	
Coal Thermal		835.2	65.0	698.5	256.0	493.0	300.0	284.8	561.8	262.7	4,625.4	
Geothermal		37.6	0.0	0.0	44.4	0.0	0.0	0.0	0.0	44.5	155.7	
Non-Fuel-Specific Electricity Spending												
Transmission/Distrib.		564.3	225.9	708.2	680.8	540.2	1,546.1	803.8	1,310.6	759.3	8,344.3	
Rural Electrification		87.0	124.9	395.3	29.6	238.7	0.0	77.6	0.0	0.0	1,197.3	
Power Sector		0.0	0.0	0.0	0.0	0.0	0.0	500.0	0.0	300.0	867.3	
Technical Assistance		35.3	56.6	45.8	40.4	75.3	68.7	122.7	62.9	59.9	667.8	
Total		686.6	407.4	1149.3	750.8	854.2	1614.8	1504.1	1373.7	1119.2	11,076.7	
Estimated Beneficiaries of Non-Fuel-Specific Electricity Spending (Note 3)												
Hydro	33.43%	229.5	136.2	384.2	251.0	285.6	539.9	502.9	459.3	374.2	3,703.2	
Geothermal	0.55%	3.7	2.2	6.3	4.1	4.7	8.8	8.2	7.5	6.1	60.4	
Nuclear	3.97%	27.2	16.2	45.6	29.8	33.9	64.1	59.7	54.5	44.4	439.6	
Oil Thermal	11.11%	76.3	45.3	127.7	83.4	94.9	179.4	167.1	152.6	124.4	1,230.7	
Gas Thermal	5.95%	40.9	24.3	68.4	44.7	50.8	96.1	89.5	81.8	66.6	659.3	
Coal Thermal	44.99%	308.9	183.3	517.1	337.8	384.3	726.5	676.7	618.0	503.5	4,983.4	
											11,076.7	

B. Lending Data, Consolidated by Energy-Type

	1980	1981	1982	1983	1984	1985	1986	1987	1988	Cumulative (Mil 1989$)	Pct.
Oil and Gas Sector											
Oil Share	143.5	324.75	531.5	518.3	327	376.2	115.55	173.65	179	3,262.5	8.01%
Gas Share	143.5	324.75	531.5	518.3	327	376.2	115.55	173.65	179	3,262.5	8.01%
End-Use Efficiency	0.0	0.0	30.0	60.6	0.0	0.0	25.0	27.0	11.4	180.2	0.44%
Electric Sector, Direct Plus General (Note 3)											
Hydro	8,038.5	981.8	491.0	916.0	1,409.6	875.4	882.7	1,001.3	739.8	20,376.6	50.00%
Geothermal	41.3	2.2	6.3	48.5	4.7	8.8	8.2	7.5	50.6	216.2	0.53%
Nuclear	27.2	16.2	45.6	29.8	33.9	64.1	59.7	54.5	44.4	439.6	1.08%
Oil Thermal	110.1	48.5	242.7	108.7	210.9	179.4	569.7	292.2	146.1	2,216.7	5.44%
Gas Thermal	59.0	26.0	130.0	58.2	113.0	96.1	305.2	156.6	78.3	1,187.5	2.91%
Coal Thermal	1,144.1	248.3	1,215.6	593.8	877.3	1,026.5	961.5	1,179.8	766.2	9,608.8	23.58%
Total	9,707.4	1,972.5	3,224.2	2,852.2	3,303.4	3,002.7	3,043.0	3,066.2	2,194.8	40,750.5	100.00%
GNP Deflator (Note 4)	85.7	94	100	103.9	107.7	110.9	113.6	117.4	121.3	126.3	RATES2.WK1

Sources: Philips, 61; World Bank, 10/89, pp. 10, 49.

Notes:

(1) The cumulative lending in 1989$ was calculated by adjusting lending data for each year into 1989$, then summing them.

(2) Loans to this sector often benefit oil and gas jointly. As a proxy for detailed loan data, benefits were split equally between the two fuels.

(3) The allocation of electricity support loans, such as transmission and rural electrication, assume that these loans benefit the generating sources in proportion to the generating capacity present. While the MDBs do not lend to nuclear power projects, nuclear plants do exist in some developing countries. Therefore, loans for supporting infrastructure and management are as likely to benefit nuclear plants as any other type of generation.

(4) GNP price deflator data are from the "1991 Economic Report of the President." Details may be seen on RATES2.WK1 in Chapter B7.

(5) Allocation shares for oil/gas electric are based on the share of each of overall LDC generating capacity in 1989. The allocation shares for electricity-related loans use the shares of LDC capacity excluding power imports, shown in Part 4 above.

Part 6: Allocation of U.S. Suppport to MDBs to Energy Types

	Share	Lending Support ($Millions)	Grant Support	Total	Source	Carbon Increasing?
U.S. Support for MDBs in 1989		153.0	1,040.7	1,193.7	Part 1	
Approximate Share of Total Loans Going to the Energy Sector	15.00%	23.0	156.1	179.1	Part 3C	
U.S. Lending and Credits, by Recipient Fuel						
Oil and Gas Sector						
Oil Share	8.01%	1.8	12.5	14.3	Percentage shares from	Y
Gas Share	8.01%	1.8	12.5	14.3	Part 5B	Y
End-Use Efficiency	0.44%	0.1	0.7	0.8		
Electric Sector, Direct Plus General (Note 3)			0.0	0.0		
Hydro	50.00%	11.5	78.1	89.5		N
Geothermal	0.53%	0.1	0.8	0.9		N
Nuclear	1.08%	0.2	1.7	1.9		N
Oil Thermal	5.44%	1.2	8.5	9.7		Y
Gas Thermal	2.91%	0.7	4.5	5.2		Y
Coal Thermal	23.58%	5.4	36.8	42.2		Y
	100.00%					
Total		23.0	156.1	179.1		

Sources for MDB Spreadsheet

(1) Michael Philips, "The Least Cost Energy Path for Developing Countries: Energy Efficient Investments for the Multilateral Development Banks," (Washington, DC: International Institute for Energy Conservation, Sept. 1991), p. 52.

(2) World Bank, Industry and Energy Department. "The Bank's Role in the Electric Power Sector: Policies for Effective Institutional, Regulatory, and Financial Reform," April 27, 1992.

(3) World Bank, Industry and Energy Department. "Capital Expenditures for Electric Power in the Developing Countries in the 1990s," February 1990. Paper #21

EXECUTIVE BRANCH: VARIOUS FUNCTIONS

A number of functions in the executive branch are related, at least in part, to energy. *While described qualitatively below, quantitative subsidies were not calculated.*

Council on Environmental Quality and Office of Environmental Quality

CEQ analyzes environmental trends and develops and recommends environmental policies for the President. They also assist in coordinating Federal environmental programs that involve more than one agency. CEQ's budget was $0.85m in 1989 (OMB '91, A-392).

National Critical Materials Council

The National Critical Materials Council assists in the coordination of materials policies and programs and works with the various agencies with mineral and materials policy and program responsibilities. Since no fuel minerals are included on in the federal strategic and critical materials inventory, we conclude that this council is not energy related. (Statistical Abstract, Table 1215).

Office of the United States Trade Representative

Develops and coordinates U.S. trade policy, including in energy. Net outlays in 1989 were 15.3 million. (OMB '91, A-398). Heede allocated based on the energy portion of exports.

Agency for International Development (OMB '92, 4-296)

An unknown portion of AID funding supports energy development in other countries. The type of energy sources supported may affect the health or viability of U.S. suppliers, or the evolution of particular technologies. Two specific energy support figures could be found; there may be more.

Private Sector, Environment, and Energy, Development Assistance. Total outlays for 1989 were $129 million (OMB '91, A-413). Energy-related spending included at least 5m for rural electrification in Central America in 1992 (OMB '92, 4-296) and $10m for clean coal retrofits for power plants in Krakow, Poland in 1991. (OMB '91, A-412).

Historical Support for Nuclear Electric. AID, "through its capital assistance, technical assistance, and program assistance programs, has provided at least $83.3 million [through 1975] in financial assistance to 27 foreign countries." This includes a $72m loan to India for the Tarapur nuclear power station. Though the bulk of these disbursements were loans, the repayment conditions seemed quite favorable, making the transaction into more of a grant. (GAO/ID-75-63, p. 12).

United Nations Environmental Program

An unknown portion of the UNEP budget supports work on energy-related environmental problems. 9.5m in '89 (OMB '91, A-411)

Sources

U.S. GAO, U.S. Financial Assistance in the Development of Foreign Nuclear Energy Programs, May 28, 1975. GAO/ID-75-63.

U.S. Department of Commerce. Statistical Abstract of the United States, 1990. Table 1215.

EXECUTIVE BRANCH: OFFICE OF MANAGEMENT AND BUDGET

OMB develops, monitors, and reviews all federal budget procedures and agency submissions. Efforts to oversee energy-related agency-expenditures is essentially a government-overhead cost allocated to the expenditures OMB monitors. Outlays for 1989 were $39.4 million. (OMB '91, A-396). *Quantitative estimates for OMB are not included here.*

Budget Review.

Natural Resources, Energy and Science. Examines and reviews programs and budget requests in these areas.

National Security and International Affairs. Heede allocated 1% of these to reflect the spending related to the Army Corps of Engineers, contributions to the International Atomic Energy Administration and the IEA, the World Bank, etc., and to security-related endeavors such as the Strategic Petroleum Reserve.

Budget Review. Heede allocated by the energy share of GNP. A better allocation would be by total government share of spending that goes to energy.

Economics and Government. Same as above.

OMB Overhead. Allocated by the energy share of OMB spending.

Director's Office. Direction and coordination of OMB activities.

Management. Development and oversight of government-wide management policies.

Information and Regulatory Affairs. Paperwork reduction and management; telecommunications and statistics policies.

Sources

Heede, Rick. Federal Energy Subsidies: Agency Obligations, Draft Report, p. 132. Rocky Mountain Institute, 1986.

U.S. OMB. Budget of the United States Government, Fiscal Year 1991.

EXECUTIVE BRANCH: OFFICE OF SCIENCE AND TECHNOLOGY POLICY

Advises the President on policies in science and technology and on the utilization of science and technology in addressing important national problems. Reviews, with OMB, the R&D budgets for all Federal agencies and coordinates these efforts. Total outlays were 1.3 million in 1989. (OMB '91, A-398). The energy share is probably quite small.

DEPARTMENT OF COMMERCE: INTERNATIONAL TRADE ADMINISTRATION

The International Trade Administration supports U.S. export industries, and works to enhance exports in particular industrial segments. Quantitative estimates were not done for ITA.

Trade Development. Program assesses the competitiveness of various U.S. industries; performs trade and investment analyses in support of industry programs and trade policy; and conducts export promotions programs directed toward industry sectors.

International Economic Policy. Develops regional and multilateral economic policies, and provides marketing services directly to firms trying to expand exports through the Foreign Commercial Service. Current emphasis is on the expansion of trade with Mexico.

Import Administration. Investigates anti-dumping and countervailing duty cases to ensure imports are in compliance with U.S. law.

U.S. and Foreign Commercial Service. State and international offices help U.S. firms with export plans through providing information, promotion of firms in trade shows, etc.

DEPARTMENT OF COMMERCE: EXPORT ADMINISTRATION

The Export Administration monitors U.S. exports to ensure that they are consistent with domestic national security, foreign policy, and short-supply objectives. Energy-related expenditures are probably centered around nuclear technologies and export of natural resources issues (short-supply). Total direct program in 1990 was $41.7m. (OMB '92, 4-455). Quantitative estimates of the energy share of Export Administration spending were not done.

DEPT. OF COMMERCE: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA supports the energy industry through its mapping and coastal management functions. In addition, its monitoring and management of environmental problems (in part stemming from energy extraction and use) reduce the share of these costs which must be borne by energy industries directly. Total outlays in 1989 were $1,154 million. (OMB '91, A-544). *NOAA energy subsidies were not quantified in this report.*

Operations, Research, and Facilities

National Ocean Service. Provides for management of the nation's ocean and coastal zones. Activities include research and study of these areas to improve management of the resources. Much of the work also centers around the monitoring of the environmental degradation of these areas. Ocean data is also used for the licensing of deep seabed hard minerals exploration and commercialization. Heede allocated 5 percent to energy, ostensibly due to NOAA's role in ocean thermal research and regulation, a role that has been eliminated.

Mapping, Charting, and Geodesy Programs. Work associated with the production and distribution of nautical and aeronautical charts and the geodetic referencing system.

Observation and Assessment. Work associated with NOAA's technical work such as tide data surveys; information aiding response to oil and hazardous material spills; minimizing the adverse affects of marine pollution; and providing for the collection, analysis, modelling, and output of oceanic and related atmospheric observations." (NOAA, 9).

Ocean and Coastal Management. Provision of information necessary for the use and exploitation of marine resources, including minerals.

National Marine Fisheries Service. Monitors and manages marine fisheries, including mammals and endangered species. Heede attributed a portion of the cost of this service, associated with the preparation of Environmental Impact Statements for tankers and oil and gas drilling, to energy. (Heede, 15).

Information Collection and Analysis. Collection, analysis, and dissemination of detailed information on fish stocks, marine mammals, and endangered species and their habitats.

Conservation and Management Operations. Management of fish stocks, marine mammals, and endangered species, and the enforcement of fishery laws and regulations.

State and Industry Assistance Program. Funds fisheries development and product quality and safety research.

Ocean and Atmospheric Research. Research aimed at improving the quality of NOAA's other services. Energy-related expenditures include climate predictions and understanding of environmental systems necessary for national policy formulation, such as for acid rain or global warming. Research also funds the enhanced use of mineral ocean resources. Heede assigned a 2% share of expenditures to energy; I suspect the portion is a good deal higher now.

Climate and Air Quality Research. Includes acid deposition, global warming, stratospheric ozone depletion. Global warming funding was slated to rise from 18m to 87m in FY 91. (NOAA, 14).

Atmospheric Programs. Advance storm warnings. Peripheral benefits to the energy sector (such as through better prediction of changes in the earth's electromagnetic flux) are quite small.

Ocean and Great Lakes Programs. FY '91 request included some study of the role of the ocean in global change. Other than this, not really energy-related.

National Environmental Satellite, Data, and Information Service. Operates satellites to collect global environmental data and information products and services to a variety of users.

Satellite Observing System. Costs associated with NOAA's satellite observing system, including LANDSAT and polar and geostationary orbiting environmental satellites.

Environmental Data Management. Provision of data from the satellite monitoring to all NOAA programs.

Program Support. Funds operations, real estate, and administration of the above programs.

Fisheries Contingency Fund. Program provides compensation to commercial fishermen for damages to or loss of fishing gear, including loss of profits, related to oil and gas exploration, development, and production on the Outer Continental Shelf (OCS). (OMB '92, 4-461).

Coastal Zone Management Fund. Not much detail in OMB budget. Heede and Battelle allocated 20 percent to cover assistance to State and local government agencies for OCS oil and gas development. (Heede, 15).

Coastal Energy Impact Fund. No detail on what it does. The fund has been running a surplus in 1989 and 1990. The Omnibus Budget Reconciliation Act of 1990 has earmarked repayments from this program to go into the Coastal Zone Management Fund for "program development grants and demonstration projects related to the coastal zone." (OMB '92, 4-463).

Damage Assessment and Restoration Revolving Fund. Has funded natural damage assessments and restoration. Damages seem to be associated with oil, gas, and hazardous wastes. Funded in 1991 with an initial $5 million appropriation. Future funding is supposed to come only from awards, judgments, and settlements obtained from responsible parties. (OMB '92, 4-464). Also appears as though the initial appropriation was removed and replaced with a $500,000 spending authority from offsetting collections alone.

Sources

Heede, Rick. Federal Energy Subsidies: Agency Obligations, Draft Report. Rocky Mountain Institute, 1986.

NOAA. Budget Summary, Fiscal Year 1991.

Office of Management and Budget. Budget of the United States Government, Fiscal Year 1992.

DEPARTMENT OF COMMERCE: NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Previously known as the "National Bureau of Standards," this agency establishes standards of measurement which underlie the U.S. economy. The argument made for attributing some of the costs to the energy sector is that this Agency provides services significantly benefitting the energy sector, and which that sector would have to pay for independently in the absence of the government programs. (OMB '92, 4-468). Total outlays for 1989 were $147 million. (OMB '91, A-553). *Subsidies through NIST were not quantified.*

Measurement and Engineering Research and Standards.

Electronics and Electrical Engineering. Research in electronics and electrical measurements to support fundamental electronic technologies that underlie all modern electronic systems. Energy-related research includes high temperature superconductors.

Manufacturing Engineering. High precision dimensional measurement, robotics, coordination between engineering and manufacturing, calibration standards, etc. Benefits energy through improving the efficiency of manufacturing processes and through the ability to manufacture the critical, high precision parts for the energy sector.

Materials Science and Engineering. "Research in materials characterization, nondestructive evaluation, metallurgy, polymers, and ceramics measurement methods, standards, data, and other technical information of processing, structure, properties, and performance of materials." According to Rick Heede of the Rocky Mountain Institute, the energy sector is a main beneficiary of this research, through such items as "nuclear power plants, nuclear waste disposal, steam electric plants, photovoltaics, fusion energy, oil refining, oil and gas drill bits, ceramic materials for boilers and combustion engines, composites and other advanced materials for efficiency improvements." (Heede, 18).

Building and Fire Research. A portion of the research on buildings may go into energy efficiency. Research in the past studied general toxicity. This is apparently related to indoor air pollution, and therefore should be attributed to energy efficiency. General building and efficiency standards also fall into this category.

Physics. Efforts establish new physical standards, measurement methods, and reference data. A significant portion of this effort probably goes to the fission and fusion sectors through research on neutron standards, atomic spectra, etc.

Chemical Science and Technology. Research into chemical and biological systems to support accurate chemical analyses. May benefit energy through study of toxicity measurement and reclamation and treatment techniques.

Technology Assistance. "This activity formulates and implements policy guidelines related to national and international standardization development activities and commercial measurement and supports the primary means by which NIST transfers its developed measurement techniques, standards, and data to industry, university, and government. *Funds for the non-energy inventions programs will not be requested in 1992" (emphasis added).* (OMB '92).

Research Support Activities. General overhead.

Industrial Technology Services. Provides seed grants to support university-level research on "generic precompetitive technologies." New program; grants will not be given out until 1991. May have energy components. 49.1m budget authority for '91. (OMB '92, 4-469).

Sources

Heede, Rick. Federal Energy Subsidies: Agency Obligations, Draft Report. Rocky Mountain Institute, 1986.

Office of Management and Budget. Budget of the United States Government, Fiscal Year 1992.

DEPARTMENT OF DEFENSE: ARMY CORPS OF ENGINEERS

Army Corps activities impact energy in two main ways. First, they build and maintain hydroelectric facilities, primarily those operated by the Power Marketing Administrations. Second, they build and maintain ports, harbors, and the nation's inland water transportation system. The cost of some, but not all, of its activities are paid for by user charges rather than taxpayers. The proportion of costs recovered from users has gradually increased over time.

Historically, most of the costs of capital infrastructure development were financed through Congressional appropriations. There has been no attempt to recover these historic costs through increased charges on current users.[23] Initial construction of dams was for irrigation, navigation, and flood control; electric power generation was of secondary concern. Hydroelectric generation, however, is now a major justification for new construction and Army Corps maintenance of power projects is allocated entirely to hydroelectricity. New construction is capitalized and energy assets are transferred to the Power Marketing Administration upon completion. These costs are incorporated in the PMA sections.

The main categories of energy-related spending are presented below. Spending on coastal and inland waterways primarily benefits oil and coal, bulk users of waterborne transport. Benefits are allocated based on the shares of total goods moved through a facility. Some of the maintenance costs both for waterborne transport and for hydroelectric facilities are paid via user fees. The Army Corps' main areas of activity are presented below along with their source of user fees. These activities are presented on the Army Corps spreadsheet which follows the text.

Army Corps Activities Related to Water Transport or Hydroelectricity

General Investigations. Involve the collection and study of basic information pertaining to river and harbor, flood control, shore protection, and related projects.

General Construction and Power Plants. Carrying out flood control and shore protection plans; construction of river and harbor transport systems; power projects; removal of obstructive bridges; and the detailed studies necessary to carry out these tasks.

Navigation Projects. Includes channels and harbors and mitigation of shore damages attributed to navigation projects; locks and dams; and funds for the inland waterways users board.

Major Rehabilitation and Dam Safety. Includes rehabilitation work for flood control, navigation, and multi-purpose power projects. Only the last two are viewed as benefitting energy.

Aquatic Plant Control. Control and removal of aquatic plants that impede waterborne transport.

Operation and Maintenance. Covers costs associated with the preservation, operation, maintenance, and care of existing river and harbor, flood control, and maintenance of harbor channels.

Regulatory Prog. Funds support permit evaluations, enforcement, studies, and envir. impact statements.

General Overhead. Activities include the Office of the Chief Engineers, division offices, data support centers, and the Board of Engineers for Rivers and Harbors. Costs are allocated in proportion to Corps direct spending.

---

[23]Between 1950 and 1977, the Federal government spent $15,971 million (1989$) on inland and coastal navigation programs (of which an estimated $10,406 million, or 65% accrued to the petroleum sector). (Cone et al, Battelle Memorial Institute, 219).

User Fees for Main Army Corps Operations

Harbor Operations and Maintenance. Between 1987 and 1990, 40 percent of these costs were recovered through the Harbor Maintenance Trust Fund, established in 1986. Beginning in FY 1991, up to 100 percent of these costs *may* be provided from the Fund, although this does not necessarily mean that 100% of the costs *will* be covered by user fees. This Fund is collected from a 0.125 percent ad valorem fee on commercial cargo loaded and unloaded at specified U.S. public ports, and from charges and tolls from the St. Lawrence Seaway.

General Construction of Transportation Projects. One half of the construction and rehabilitation cost of specified inland waterway projects is paid from the Inland Waterways Trust Fund (with the rest paid by Treasury). This Fund, established by the Inland Waterways Revenue Act of 1978 (amended in 1986), is financed through taxes imposed on the fuel in vessels engaged in commercial waterway transportation.

Maintenance and Operation of Dams and Other Improvements of Navigable Waters. One half of the fees collected by the DOE for private construction, operation and maintenance of dams, conduits, and reservoirs are used for the maintenance and operation of Federal dams and other navigation structures, and for improvement of navigable waters. All of the fees levied by DOE for headwater improvements resulting from Federal projects go to this same purpose.

Fish and Wildlife Protection Appropriations: These are initially funded by Congressional appropriations. Depending on the nature of the project, some of these costs may be recovered from the Power Marketing Administrations, albeit over a long period of time.

Tax-Exempt Status No Required Rate of Return. The Army Corps activities benefitting water transport and hydroelectricity could be done by private engineering firms. The fact that an extensive federal organization is willing to provide these engineering and construction services at no required rate of return reduces the cost of these services to the recipient energy industries. Coupled with Army Corps' exemption from federal corporate income taxes, the cost of these services is reduced even further. For activities such as coal and oil transport, the cost savings from these operating characteristics can be significant.

Sources

Brandt, Verne. Chief, Civil and Revolving Fund Operations Branch, Finance and Accounting Division, U.S. Army Corps of Engineers. Personal Communication, September 27, 1991.

Heede, Rick. Federal Energy Subsidies: Agency Obligations, Draft. Rocky Mountain Institute, 1986.

U.S. Army Corps of Engineers. Secretary of the Army's Report on Civil Works Activities, FY 1987 and FY 1988, Vol. 1.

U.S. House of Representatives, Committee on Appropriations. Energy and Water Development Appropriations for 1991, Part 1. U.S. Army Corps of Engineers, p. 192. (Y4.Ap 6/1:En 2/2/991/pt.1).

U.S. Office of Management and Budget. Budget for the United States Government, 1991, p. A-617 - A-629.

Department of Defense

Army Corps of Engineers, Civil Program

Part 1: Energy-Related Spending (FY89, $Millions)

Program	Total Program	Total Power or Transport	Beneficiary Sector: Hydro	Inland Trnsport	Coast Trnsport	Allocation Basis
GENERAL CONSTRUCTION						
Advance Engineering and Design	0.0	0.0				Negligible
Navigation Projects						
Channels and Harbors	128.3	128.3		55.4	72.9	Inland/Harbor mix
Locks and Dams	323.4	323.4		323.4		All to inland waterways
Inland waterway user board	0.1	0.1		0.1		All to inland waterways
Flood Control at Multi-Purp. Power proj.	52.6	26.3	26.3			50% to hydro., reflecting flow regulation and newer, electricity-driven projects.
Major Rehab. & Dam Safety For:						
Navigation	0.5	0.5		0.5		All to inland waterways
Multi-purp. Power Projects	3.1	3.1	3.1			All to hydro
Aquatic Plant Control	7.9	7.9		3.4	4.5	Inland/harbor mix
Less Inland Waterway Trust Funds	(69.6)	(69.6)		(69.6)		All to inland transport
OPERATION AND MAINTENANCE						
Channels and Harbors	439.0	439.0		189.5	249.5	Inland/harbor mix
Locks and Dams	306.2	306.2		306.2		All to inland
Multi-purp. Power Projects	338.6	338.6	338.6			All to hydro
Protection of Navigation	25.9	25.9		11.2	14.7	Inland/harbor mix
Less Recreational User Fees	(15.0)	0.0				Neither recreational costs or revenues included
Less Harbor Maintenance Trust Funds	(159.0)	(159.0)			(159.0)	All to harbors
GENERAL EXPENSES/OVERHEAD - Direct						
Board of Engineers, Rivers and Harbors	2.9	2.9		1.3	1.6	Coastal/interior transport mix
Coastal Engineering Research Board	0.3	0.3			0.3	All to Harbors
Total Direct Program		1,373.9	368.0	821.4	184.5	
Total Army Corps Program	3,256.2					Total includes items not reflected here
Pct. of Tot. Program		42.2%	11.3%	25.2%	5.7%	
GENERAL INVESTIGATIONS (total obligations)	144.7					
Nav., flood damage prevent., shore. prot	39.0	16.5	4.4	9.8	2.2	Share of Corps direct spending
Comprehensive Basin Studies	2.8	1.2	0.3	0.7	0.2	Share of Corps direct spending
Phase I, Advance Engineering & Design	0.6	0.3	0.1	0.2	0.0	Share of Corps direct spending
Preconstruction Engin. & Design	53.3	22.5	6.0	13.4	3.0	Share of Corps direct spending
Collection and Study of Basic Data	17.4	7.3	2.0	4.4	1.0	Share of Corps direct spending
Research and Development	20.6	8.7	2.3	5.2	1.2	Share of Corps direct spending
Less Rivers and Harbors Trust Funds	(6.5)	(2.7)	(0.7)	(1.6)	(0.4)	Share of Corps direct spending
Total General Investigations		53.7	14.4	32.1	7.2	
TOTAL PROGRAM OUTLAYS (from above)	3,256.2					
REGULATORY PROGRAM	62.3	26.3	7.0	15.7	3.5	Share of Corps spending
GENERAL EXPENSES/OVERHEAD - Indirect						
Office of Chief Engineers	46.8	19.7	5.3	11.8	2.7	Share of Corps spending
Division Offices	63.2	26.7	7.1	15.9	3.6	Share of Corps spending
Support Centers	8.5	3.6	1.0	2.1	0.5	Share of Corps spending
OTHER OFFSETTING COLLECTIONS						
Funds allocated by Power Mktng Admins.	(377.2)	(377.2)	(377.2)			Hydro. Reimbursements for Army Corps work
Headwater Benefit Fees	(4.6)	(4.6)		(2.0)	(2.6)	Coastal/interior mix
TOTAL		1,122.1	25.6	897.1	199.3	

Notes:

(1) Spending on power-projects is allocated to hydroelectricity.

(2) Spending which benefits both inland and coastal waterways is allocated to each based on share of total ton-miles.

(3) Subsidies by mode are allocated to fuels based on the fuel share of the total volume of freight using the mode.

Part 2: Derivation of Mix Between Coastal and Inland Waterways Transport

	Total	Inland (Bil. ton-miles)	Coastal/Harbor
Atlantic Coast Waterways	25.9		25.9
Gulf Coast Waterways	37.9		37.9
Pacific Coast waterways	22.8		22.8
Mississippi River System	251.6	251.6	
Great Lakes System	72.5	72.5	
Total	410.7	324.1	86.6
Percent	1.0	78.9%	21.1%
Total Volumes Transported (Mil. Short tons)			
Domestic	1,076.5		
Inland (78.9%)		849.5	
Coastwise (21.1%)			227.0
Foreign Import	507.7		507.7
Foreign Export	383.3		383.3
Total	1,967.5	849.5	1,118.0
Percents		43.2%	56.8%

U.S. Dept. of Commerce, Statistical Abstract of the United States, 1990, Tables 1083 and 1085.

Part 3: Mix of Waterborne Transport, 1989

	Percentage Shares	
	Domestic	Oceanborne
Oil	37.8%	39.4%
Coal and Coke	19.9%	10.7%

(1) Shipments of logs and lumber do not benefit wood fuel, since timber grades are not burned. Data are therefore not included.
(2) Domestic shipping includes coastwise, internal, and lakewise shipments.

Source: U.S. Army Corps of Engineers, "Waterborne Commerce of the United States, 1989," National Summary, Table 2. See TRANSPORT.WK1 for more detail.

Part 4: Allocation to Fuel Types

		Energy Shares			
	Total Prog.	Electric Hydro	Oil	Coal	
Hydroelectric Facilities	25.6	25.6			All to hydro
Coastal Transport	199.3		78.5	21.4	Energy share of oceanborne transport
Inland Waterway Transport	897.1		339.2	178.3	Energy share of inland waterways shipping
Total Subsidies by Fuel	643.0	25.6	417.7	199.6	

DEPARTMENT OF DEFENSE: NAVY SUPERVISOR OF SALVAGE

The Navy Supervisor of Salvage maintains an inventory of $200 million worth of oil spill clean-up equipment. Between FY88-90, this equipment was used in 11 commercial spills, including the Exxon Valdez and the American Trader spill in 1990. Navy equipment retrieved 50 percent of the oil recovered from the Valdez.

The equipment is stored at two points: Williamsburg, VA and Stockton, CA. To the extent that the commercial oil sector can avoid purchasing, maintaining, and manning oil spill equipment due to the Navy inventory, this program constitutes a subsidy to crude oil. Even if the oil industry must reimburse the Navy for the costs of deploying their oil spill equipment, they still receive a net benefit by avoiding the capital charges on the equipment.

Our high estimate imputes the avoided interest at the private sector cost of borrowing. Our low estimate of zero assumes that the Navy charges for the use of the equipment include recovery of the invested capital so that the private sector is indifferent between owning their own oil spill cleanup equipment or using the Navy's.

Source

U.S. GAO. Coast Guard: Coordinating and Planning for National Oil Spill Response, Sept. 1991. GAO/RCED-91-212.

DOD: Navy Supervisor of Salvage

Part 1: Oil Spill Cleanup Equipment Held by Navy But Available for Commercial Spills

	Source
24 Skimming systems	
18 Storage bladders	GAO/RCED-91-68, pp. 19-20
21 Submersible pumping systems	

Part 2: Estimate of Benefits Accruing to the Commercial Oil Sector

	Low Est.	High Est.	
Estimated Value:	200 million	200	GAO/RCED-91-68, pp. 19-20
Financing rate in 1989	8.49%	9.26%	See Note 1; data from RATES2.WK1.
Annual holding cost on equipment	17.0	18.5	
Pct. of Capital Cost Assumed Not Recovered Through Charges to Industry	0.00%	100.00%	
Net Estimated Subsidy	0	18.5	

Low Estimate 0.0 All benefits crude oil

Assumes commercial sector repays full capital holding charges to Navy when relying on Navy stock during spills

High Estimate 18.5 All benefits crude oil

Assumes commercial sector can avoid purchasing equipment by relying on Navy stock during spills. Interest imputed at private borrowing rates. Estimate should be scaled up to reflect avoided training and manpower costs as well, but data were not available.

Notes:

(1) Long-term financing rates are used to reflect the long-term nature of these capital purchases. The low estimate uses a 10-year Treasury bond rate, since oil spill equipment is unlikely to last the 30 years necessary to justify using a 30-year rate. The high estimate uses a Corporate Aa bond, assuming that the petroleum companies would fall into this highest category.

Source: U.S. GAO, "Coast Guard: Coordinating and Planning for National Oil Spill Response," Sept. 1991. GAO/RCED-91-212.

NATIONAL SECURITY COSTS RELATED TO OIL TRANSPORT

The United States has long maintained a large military presence in the Persian Gulf. Among other regional interests, these forces ensure the safe shipment of oil from the area. In some instances, such as the protection of Kuwaiti oil tankers during the Iran-Iraq war, the connection between military actions and oil imports is clear. With other activities, such as the Desert Storm invasion of Kuwait, the connection is slightly less apparent. However, it is clear that the U.S. is reliant on this oil both directly and indirectly. Directly, we import a great deal of oil from the region. Indirectly, even if we did not, any cut-off in supplies from the region would cause price jumps in oil worldwide. In addition, some federal defense costs are associated with developing ways to protect the Alaskan pipeline.

Estimating the military costs is difficult for many reasons. First, information on defense costs is much less available than that for most other government programs. Second, deciding what portion of defense costs to ascribe to oil protection is problematic. Oil is not the only interest in the region (though it is probably the major one), so that some military presence would likely exist even if there were no oil. In addition, some of the forces there might be there in part because it is a good area to train. That is, military expenditures for Gulf activity would not drop to zero even if there were not oil or interests there, since the people and material might simply move elsewhere.

Nonetheless, a number of researchers have tried to estimate the incremental cost of protecting the Gulf oil supplies. This range is enormous, varying from relatively small to huge depending on the assumptions made about the relevant regional defense costs to include. At the low-end, the Department of Defense estimates a cost of $1 billion/year, ascribing very few of the operational costs in the region to the protection of oil supplies. At the high-end, Earl Ravenal[24] of the CATO Institute estimates a total cost of $70 billion per year. (CRS, 32). Ravenal ascribes all operational costs to oil protection, with the implicit assumption that oil is the driving force behind the U.S. regional presence. In addition, he ascribes some related costs in terms of preparedness and planning to deal with mid-East disruptions, to oil.

Protection of the Alaskan Pipeline

In 1989, the Alaskan Pipeline (TAP) transported 2½ times as much oil into the U.S. per day as did the Persian Gulf. (Sabonis-Chafee, 713). Furthermore, while terrorists may take out a single discrete tanker here and there, total disruption of waterways would still be difficult. A pipeline, however, is entirely shut down by a terrorist attack anywhere along its traverse. The importance of protecting the Alaskan pipeline for U.S. security is clear.

The first line of defense of the pipeline is provided by its owners, the Alyeska Pipeline Co. They have around-the-clock armed guards at pump stations and other key facilities; aerial and ground surveillance of the pipeline; fencing in certain areas; controlled access to certain facilities; intrusion detection at certain facilities; and dedicated communications. (GAO/RCED-92-58BR, 12). This defense is paid for privately.

In addition, however, support from a number of state and federal government agencies is not reflected in the cost of the oil. This support is primarily in the form of contingency planning, although some other activities may be included as well. According to a recent GAO report,

> The state and federal governments have plans to assist in protecting the pipeline. The Alaska State Troopers, Alaska's National Guard, the FBI, and DOD's Alaskan Command

[24]Though cited in CRS, his argument is put forth in Designing Defense for a New World Order: The Military Budget in 1992 and Beyond (Washington, DC: The Cato Institute, 1991).

> all have specific plans to protect TAPS. If Alyeska is unable to cope with a given situation, it can call upon any of these agencies for assistance. (GAO/RCED-92-58BR, 12).

All groups surveyed by GAO "praised Alyeska's security efforts and noted its cooperation... Nevertheless, they also stressed that it is impossible to completely secure 800 miles of pipeline and related facilities from a determined attack of trained terrorists." (GAO/RCED-92-58BR, 15).

Sources

Congressional Research Service, The External Costs of Oil Used in Transportation. June 17, 1992. 92-574 ENR.

MacKenzie, James, Roger Dower, and Donald Chen. The Going Rate: What it Really Costs to Drive. (Washington, DC: World Resources Institute), June 1992.

U.S. GAO. Trans-Alaska Pipeline: Ensuring the Pipeline's Security. November 1991. GAO/RCED-92-58BR.

Sabonis-Chafee, Terry. "Oil Security and Hidden Costs," Science, February 10, 1989, p. 713.

Federal Energy Subsidies:

Energy, Environmental, and Fiscal Impacts

Technical Appendix
(Appendix B)

by Douglas N. Koplow
Lexington, Massachusetts

April 1993

The Alliance to Save Energy
Energy Price and Tax Program
Mary Beth Zimmerman, Program Manager