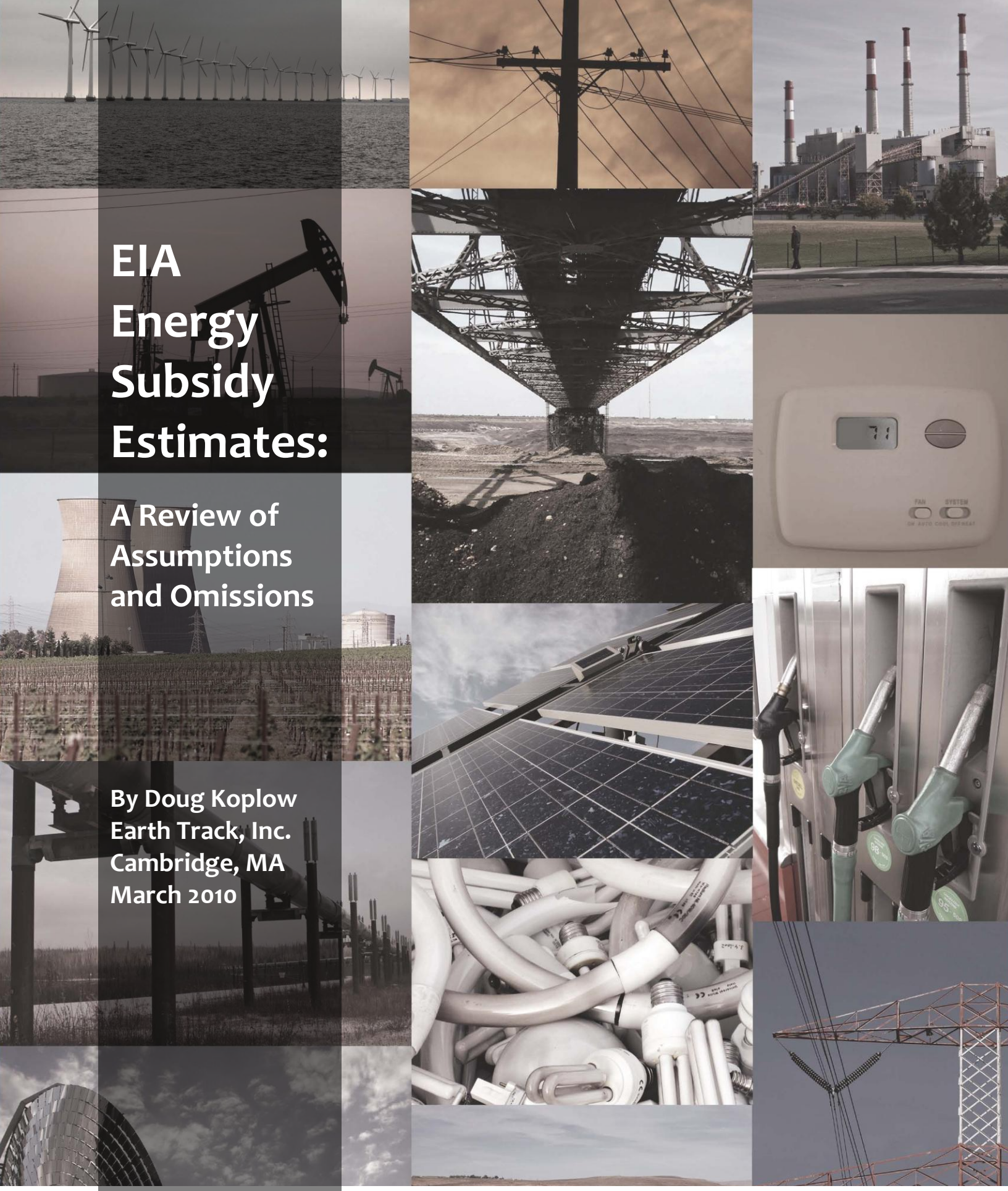
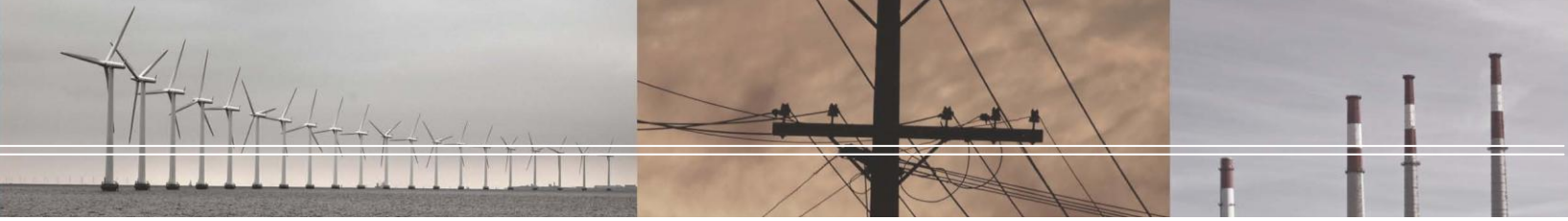


EIA Energy Subsidy Estimates:

A Review of Assumptions and Omissions

By Doug Koplow
Earth Track, Inc.
Cambridge, MA
March 2010

earth track
www.earthtrack.net



Based in Cambridge, MA, Earth Track focuses on improving transparency for government subsidies that harm environmental quality and impede market access for cleaner technologies. Earth Track also runs a website on this same topic to inform people about new work in the area of natural resource subsidies and subsidy reform, and to educate a variety of audiences on what subsidies are, how to value them, and how they affect market structure.

This study reviews subsidy estimation techniques prevailing in the United States, as applied by the U.S. Energy Information Administration, the energy statistics arm of the federal government. A related paper by this author, *Measuring energy subsidies using the price gap approach: What does it leave out?*, examines the benefits and limitations of the most commonly used subsidy measurement approach in international studies of energy subsidies.

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EIA Energy Subsidy Estimates: A Review of Assumptions and Omissions

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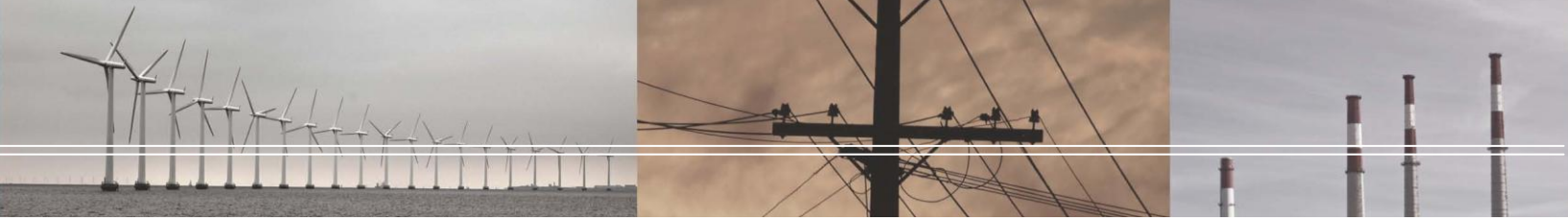
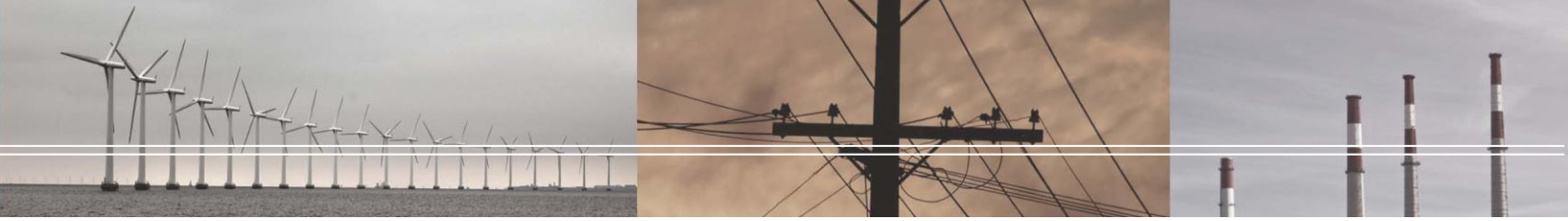
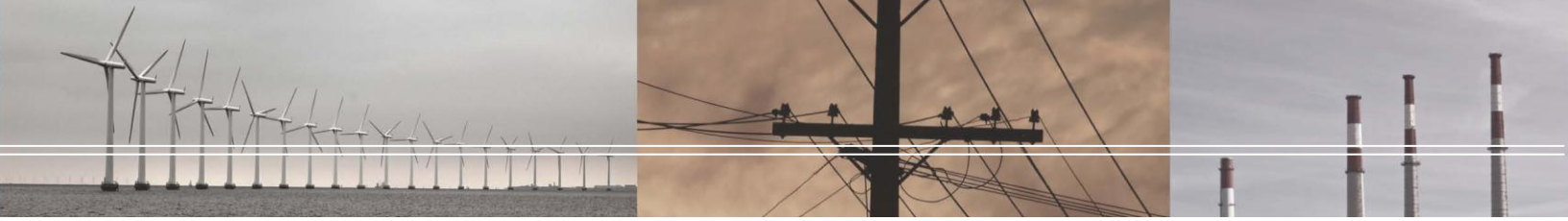


Table of Contents



List of Tables



Acknowledgments

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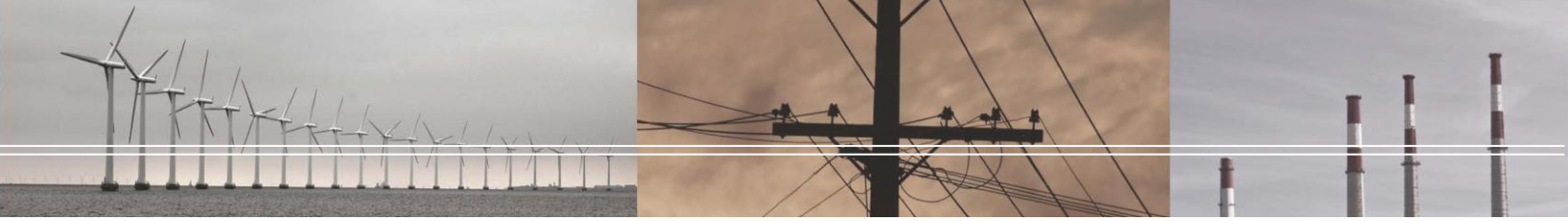
The views expressed in this paper are those of the author and do not necessarily represent those of the reviewers, UCS, or the GSI. Any remaining errors or omissions are the sole responsibility of the author.

About the Author

Doug Koplow is the founder of Earth Track in Cambridge, MA. He has worked on natural-resource subsidy issues for the past 20 years, and served as an advisor on subsidy transparency to a variety of organizations, foundations, and international agencies. Focusing mainly on energy subsidies, his publications are regularly cited across the political spectrum. Koplow's most recent work has detailed the growing scope and magnitude of government subsidies to biofuels and nuclear energy. He has evaluated the causes of wide variation in U.S. energy subsidy estimates in the past, including in an article published in the *Annual Review of Energy and the Environment*. He holds a B.A. in economics from Wesleyan University and an MBA from the Harvard Business School.



Executive Summary

In 2008 the U.S. Energy Information Administration (EIA) issued a report, its third since the early 1990s, that detailed federal subsidies to the nation's energy sector. Because EIA is the government's energy statistics arm, these assessments inevitably garnered much attention and carried a great deal of weight. Unfortunately, EIA's subsidy tallies systematically undercounted energy subsidies, and in doing so they falsely conveyed the impression that energy subsidies do not affect the country's energy path.

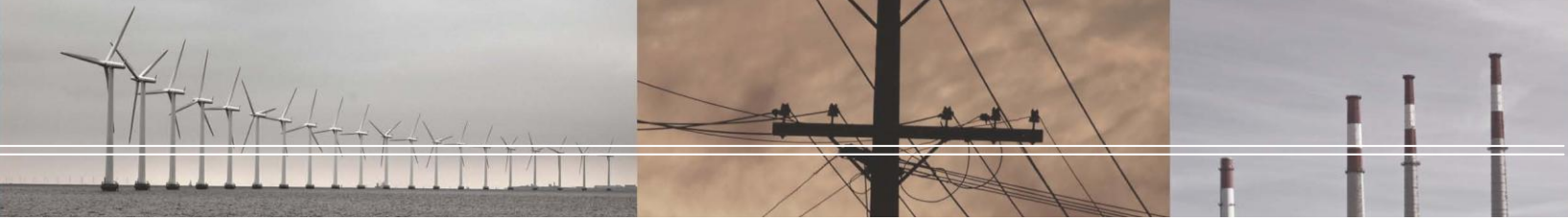
There have been a variety of problems with EIA's approach. These ranged from the limited sources it used in its research to the many subsidies of great benefit to the energy sector that the Administration ignored in its total—the result of overly narrow definitions and inconsistent application of its stated inclusion criteria. In combination, problems of estimation and omission in EIA's work render a picture of subsidies that has more to do with the scope and manner of its research than with the actual impact of policies in place. The impact of these problems on subsidy totals and reported support for particular fuels is summarized in Table ES-1.

Much is riding on a logical and cost-effective economic transition away from greenhouse gas-intensive fuels. The increasing involvement of government in the energy sector makes EIA's work on energy subsidies ever more important to get right. Only through systematic review of subsidy programs can the market distortions that these existing policies cause be addressed.

In providing details on the problems with EIA's work, this report aims to ensure that any future work the Administration carries out on the topic of energy subsidies will be done with a greater degree of freedom from political interference, with systematic coverage of all types of subsidies, and with more openness to existing work on the topic even if that work challenges previous core assumptions of the EIA research team.

If EIA is to remain tasked with tracking federal subsidies, its work must be more systematic across subsidy types and show enhanced transparency. Analyses should be produced according to a regular, preannounced schedule. Results will thus be more representative, and the Administration will be able to staff the project more consistently and invest in building the necessary screening and valuation tools over time.

EIA should have the freedom to scope its research task as needed. Congressional directives for at least the past two studies have been highly prescriptive—specifically listing policies, such as accelerated depreciation, that could not be included in the subsidy totals.



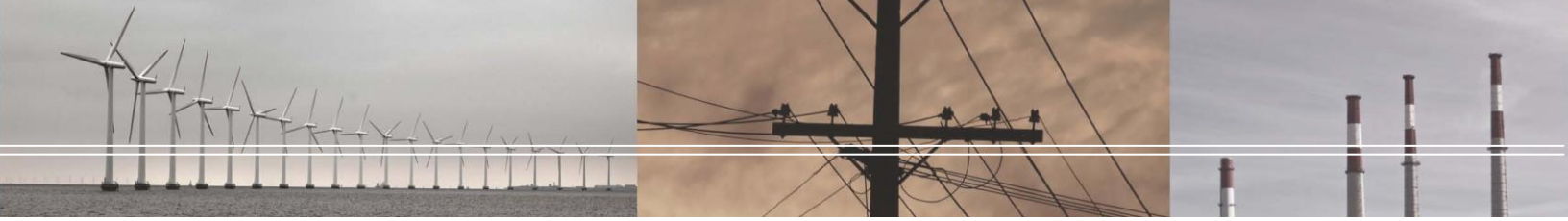
Such strictures eroded EIA's analytic independence and reduced the value of the resulting work. EIA staff have acknowledged that these limitations sometimes led to the exclusion of policies.

Any restrictions placed on the type of sources EIA is allowed to use should be made public. EIA's 2008 report did not contain a single citation for nongovernmental organization (NGO) work on subsidies, even though NGOs have been active in the field for decades and actually built up the estimation methodologies in some areas. If Congress or the U.S. Department of Energy (of which EIA is a part) is placing restrictions on sources, this policy needs to be made public so that it can be challenged as necessary. Research quality is normally better if a variety of sources can be used.

EIA should use range estimates rather than point estimates for the majority of subsidy transfers that are not simply cash payments. Tax, credit, insurance, and minimum purchase requirements are all examples of policies that provide substantial subsidies to the energy industry but that also require a complex process of estimation to quantify. When EIA oversimplifies—as in including only single measurement values in its totals for subsidies to federal power marketing administrations; or in using only Treasury Department estimates of tax-expenditure losses even when the Joint Committee on Taxation's (JCT's) estimates for the same provision are hundreds of millions of dollars higher—it creates a significant problem.

Point estimates convey artificial precision, understate subsidy totals, and skew the reported fuel-by-fuel subsidy mix by billions of dollars. Adding JCT estimates to the subset of tax subsidies that EIA included in the past would by itself have extended reported subsidies by more than 30 percent, or some $5.3 billion per year. The largest percentage increases in subsidy value from this adjustment would flow to oil and gas (124 percent higher), nuclear power (66 percent higher), and coal (53 percent higher).

EIA must do a much better job of evaluating subsidy impacts on new investment. EIA has adopted a "snapshot" approach, which measures subsidies at a single time. While this is a useful metric, is it not sufficient as the *only* metric of subsidy magnitude. In the past five years, scores of new and very large subsidies have been enacted, of particular benefit to new coal and nuclear plants, but because these facilities have not yet come online, EIA has pegged the subsidies at zero. As a result, these programs' enormous influence on the economics of new energy investments was entirely missed in EIA's work. Every future report should contain not only a snapshot subsidy estimate but also a marginal analysis of the impact of subsidies on the levelized cost of new investments. Both the California Energy Commission and the Congressional Research Service have used this approach, as has EIA in some of its other activities.



EIA needs to evaluate long-term actuarial balance, not short-term cash surpluses, when assessing whether particular trust funds provide subsidies. Many trust funds cover very long-term care issues (e.g., nuclear waste) or must accrue surplus funds to cover anticipated longer-term losses. In the past, EIA has too quickly concluded that excess cash in a trust fund indicated no subsidies, thereby understating total subsidies to nuclear, coal, and oil in particular.

Where EIA has changed important decision rules across studies, past estimates need to be recalibrated so as to ensure accurate time trends. For example, EIA reported tax losses in its earlier two studies using an "outlay equivalent" metric that evaluated the after-tax benefit of the tax subsidies. This practice was discontinued in their 2008 analysis, depressing reported tax subsidies by 20–30 percent as a result. Similarly, some public power subsidies were evaluated but not included in subsidy totals in earlier EIA work due to stated measurement problems. The 2008 report finally included at least a low-end subsidy value for the provisions, but it did not adjust tallies from earlier studies upward to reflect this change. Use of an inconsistent baseline skews both the time trend and the reported results by billions of dollars.

In its future reports, EIA should adopt a more systematic review of subsidies to the energy sector. Current work omits far too many programs that provide the sector with large and directed subsidies. EIA's rules for inclusion are sometimes arbitrary or inconsistently applied. For example, the Administration includes tax-exempt energy-related private activity bonds (of which roughly $150 million were issued in 2006) while excluding up to $36 *billion* in tax-exempt energy-related municipal bonds issued that same year. Because some types of subsidies are very important to one fuel and not at all to others, the Administration's decisions to exclude entire classes of subsidies can dramatically skew reported inter-fuel numbers. Specifically, future studies must make a much better effort to characterize and quantify subsidies related to insurance and administrative oversight of market activities, minimum purchase requirements and associated tariff protection, subsidies to bulk energy transport and energy security, export credit assistance, and capital depreciation and bond issuance.

EIA should not lump all supposedly renewable technologies into a single category. The approach, dominated by large subsidies to corn ethanol, presents an inaccurate pattern of actual support across fuels. Future work should do a better job of segmenting out beneficiary energy forms.

Table ES-1 provides a summary of the key analytic problems with EIA's work, a rough estimate of the anticipated increase in total subsidies should the problem be corrected, and an estimate of which types of energy would see the largest increases in reported subsidies.

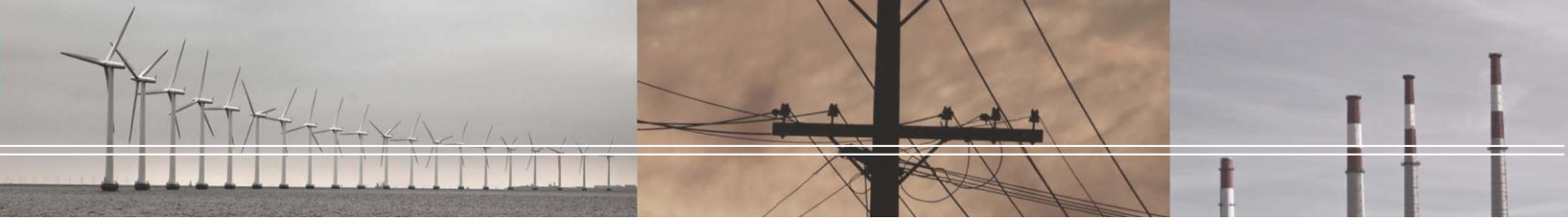
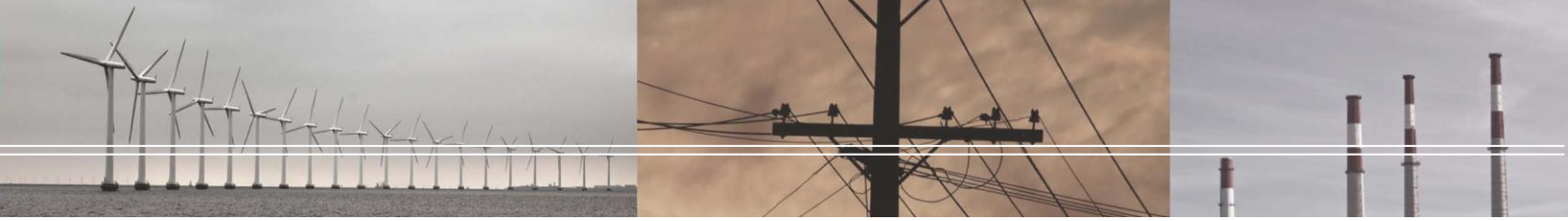


Table ES-1. Expected Bias Resulting from EIA Subsidy Definition and Valuation Conventions

Issue	Scale of impact/year	Issue understates subsidies to:
Use of point rather than range estimates	$5.3 billion for subset of tax expenditures alone	Oil, gas, nuclear, coal, efficiency
Use of revenue-loss rather than outlay-equivalent metric for tax subsidies	Billions	Oil, gas, wind, biofuels
No marginal analysis of new and expanded subsidies	Billions	Clean coal, nuclear
Use of current account rather than actuarial balance on trust funds to assess subsidy level	Billions	Nuclear, fossil (to a lesser extent)
Omission of subsidies related to insurance and publicly provided market oversight	Billions	Nuclear, coal, hydroelectricity
Omission of minimum purchase requirements such as Renewable Fuel Standard	Billions	Liquid biofuels; renewable electricity if federal RPS enacted
Omission of support to bulk fuel transport infrastructure	~1–2 billion	Oil, coal, and, to a lesser extent, ethanol and liquefied natural gas
Omission of support to energy security	>$10 billion	Primarily oil, with some benefits as well to nuclear and natural gas
Omission of subsidized credit through export credit agencies and multilateral development banks	Unknown	Oil, gas, coal, renewables, new nuclear
Omission of use of tax-avoiding corporate forms	Unknown	Oil, gas, coal
Omission of lease-related subsidies	>$1 billion	Oil and gas, synfuels
Inadequate reflection of subsidies to public power	>$1 billion	Coal, natural gas, nuclear, hydroelectricity
Omission of most accelerated depreciation to energy	Billions	Oil, coal, natural gas, wind, biofuels, new nuclear
Omission of most energy-related tax-exempt bonds	Billions	Coal, natural gas, wind, biofuels



1. Introduction

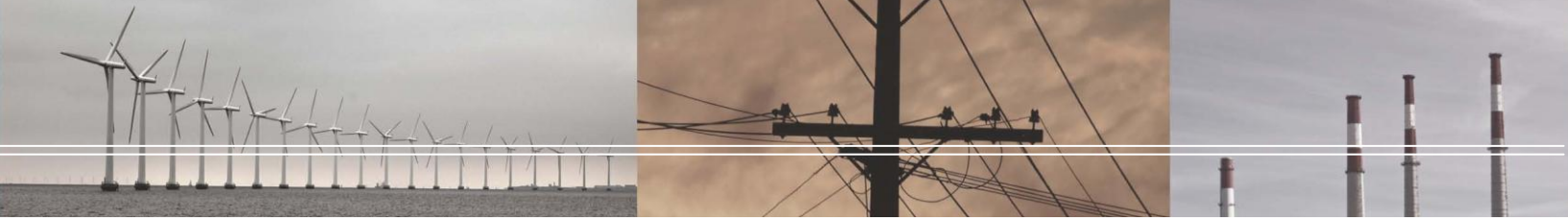
In April 2008, the U.S. Energy Information Administration (EIA) published *Federal Financial Interventions and Subsidies in Energy Markets*, its third report on the topic. The first version was completed in 1992, with an update in two parts released in 1999 and 2000. In its most recent published treatment of subsidies (2008), EIA estimated total U.S. subsidies to all forms of energy at close to $16.6 billion per year. Of this amount, EIA indicated that the largest share (29.4 percent) went to renewable energy sources.

Because the report was published by the energy statistics arm of the U.S. government, its findings received widespread coverage, both in the media and among industry associations, and it exerted a great deal of influence. This is unfortunate, as EIA's estimates were well below more systematic reviews of U.S. energy policy, and the Administration's analysis understated the degree to which government intervention in energy markets distorts inter-fuel competition and investment patterns.

EIA's 2008 results were driven by a number of factors, including a narrow authorized research mandate; an inconsistent application of its own stated guidelines on what to include; the omission of programs greatly benefiting the energy sector; the use of point estimates, despite the presence of a fairly wide dispersion in available values; and the imprecise or inaccurate attribution of particular subsidies to specific fuels. These limitations have contributed to the too-low estimates in earlier EIA reports as well (Koplow 1993b, Koplow and Dernbach 2001).

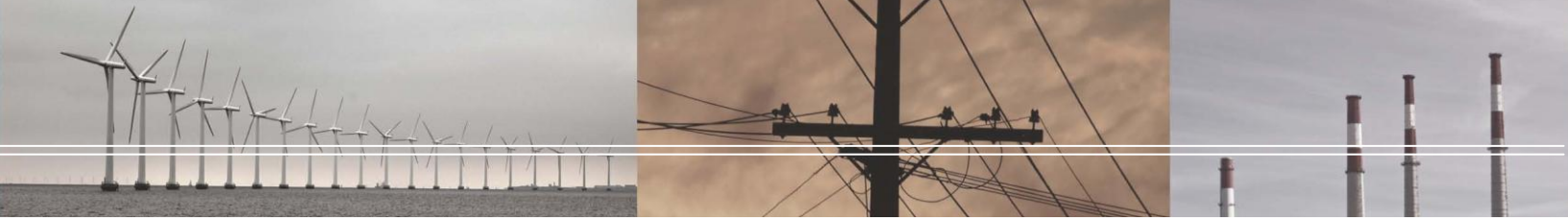
In addition, by focusing only on a current "snapshot" of subsidy flows to each energy type, the conclusions dramatically understated the influence of large, though relatively new, subsidies on marginal investment decisions. Finally, the report grouped many energy resources into a single "renewable energy" category. This grouping lumped together small subsidies to a range of renewable electricity technologies with very large subsidies to fuel resources, such as corn ethanol. In fact, the category of "liquid biofuels" (primarily corn ethanol) accounted for 64 percent or more of the total subsidies reported for renewables in all three EIA studies. The result was widely quoted numbers that masked more informative trends on subsidies to specific renewable electricity technologies, and how they compared to conventional electricity fuels and technologies.

The relative shares of subsidies were also problematic. Because EIA's overall subsidies to specific fuels were low (many of them less than $1 billion), its analysis of relative subsidies by fuel type was highly sensitive to the authors' policy inclusion and valuation decisions. Even one or two adjustments to these factors would greatly change relative support levels by fuel.



EIA's subsidy-intensity metrics (subsidy per kWh) were also affected by these adjustments, though not by as much as the total subsidy values.

This paper presents a detailed review of the limitations in EIA's work and suggests better ways to evaluate important policy areas. Section 2 establishes context on EIA's numbers, discussing the structure of the Administration's research efforts and comparing their results to subsidy evaluations conducted by a variety of other parties over the past 30 years. Section 3 provides an overview of crosscutting themes in EIA's work that have affected its results. Section 4 offers more detail on the limitations of this work and the types of bias that they introduce into its results. Section 5 gives a summary of key issues and policy recommendations for future subsidy studies.



2. EIA Estimates Consistently Rank at Low End of U.S. Subsidy Evaluations

Three decades of research on U.S. energy subsidies provide a useful backdrop against which to contrast EIA's approach and results. This body of work also provides important context for the more detailed discussion that follows. Table 1 summarizes these studies (updated from Koplow and Dernbach 2001), with results from each of EIA's assessments shaded. Section I of the table includes multi-fuel subsidies, while Section II includes a number of additional fuel-specific studies, with estimates compared to those of EIA for the same fuels.

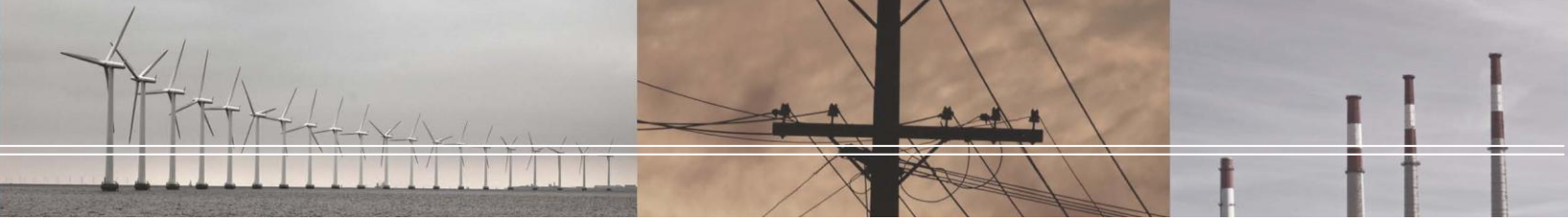
In the multi-fuel assessments, it is useful to note that the two lowest subsidy estimates released over the past 30 years were both generated by EIA. Although EIA's most recent subsidy valuation of $16.6 billion to all energy sources was roughly double its previous estimate, it remains well below the more than $75 billion per year in subsidies estimated for a similar time period by this author (Koplow 2007b).

An equivalent pattern is evident in the comparisons of fuel subsets. EIA values for nuclear power are roughly one-third the subsidy values calculated in nuclear-specific studies and half the value or less for liquid biofuels. Even excluding the International Center for Technology Assessment outlier, which includes a variety of difficult-to-value externalities, EIA's estimates for oil and gas are a small fraction of the others.

Changes in the policy environment over time are one factor driving differences across the studies. However, EIA values lag the pack even among reports covering similar timeframes. In addition, the impact of policy variation on subsidy values is minimal in the studies covering long time frames, as annual average values have been used.

Subsequent sections of this paper address the many technical issues that drive EIA's low values. However, three structural elements of EIA's studies deserve mention, as these factors contributed to insufficient breadth:

- **Narrow peer review.** EIA's earlier studies did not go through a broad peer review. The reviewers that the Administration consulted did not have a cross-section of interests, specializations, and backgrounds that would have made them more likely to challenge the studies' methods, calculations, or presentation. The 2008 report followed a similar pattern, with only three reviewers. While these reviewers were listed, there was no information on how much time they took, whether they were paid (all three were well-respected academics with heavy demands on their time), and whether they had any areas of strong disagreement with EIA's approach that were not integrated into the final report. A useful contrast can be drawn with the



Government Accountability Office (GAO), which routinely includes comments from other agencies (and GAO's responses to them) in the body of its reports. Given the controversy of energy subsidy research, greater transparency on the peer review would be warranted.

- **Restricted set of sources.** The 2008 report differs strikingly from earlier EIA efforts in that it contains no references to work done by nongovernmental organizations (NGOs) on energy subsidies. Given that many of these entities have been active in the subsidy arena for decades and have made important contributions to the approaches used to identify and value subsidies, this omission is surprising. The extent to which the chapter authors did use NGO materials as background reading is not known; however, none are listed among the eight pages of references. In contrast, EIA's 1999 report included an entire appendix discussing NGO and foundation-supported work, with differences in the programs noted.

  While it is not possible to speculate with confidence on what lay behind EIA's exclusion of these resources in 2008, the exclusion is so universal as to suggest that a formal policy on sourcing may have been in effect. If EIA was intentionally restricting specific source materials from its research mandate, the rationale for this decision should at least have been included in the introduction of the report. In any case, study results are normally stronger when a broad mix of source materials is used.

- **Narrow research mandate.** Senator Lamar Alexander (R-TN), the requestor of the EIA report, provided a narrowly worded mandate that focused on electricity and source fuels used in the electric sector. It read in part: "To expedite its completion, the analysis should be limited to subsidies provided by the federal government, those that are energy-specific, and those that provide a financial benefit with an identifiable budget impact. Broad policies or programs that are applicable throughout the economy need not be considered" (EIA 2008: 254). For example, his letter explicitly instructed EIA not to count accelerated depreciation benefits available to the energy sector if other sectors as well could take advantage of them. Such "general" benefits are often deployed unequally across energy resources.

  It is quite likely that the imposed constraints affected the outcomes, and not only for the 2008 report. Earth Track's 2000 correspondence with some of the authors of the 1999 EIA study indicated that the wording of the research mandate for that analysis did result in some policies being excluded that EIA had been able to include in 1992. Such history must not be repeated. As the main statistical arm of the Department of Energy, EIA should be granted sufficient power in all of its studies to reject research requests that could potentially bias the results.

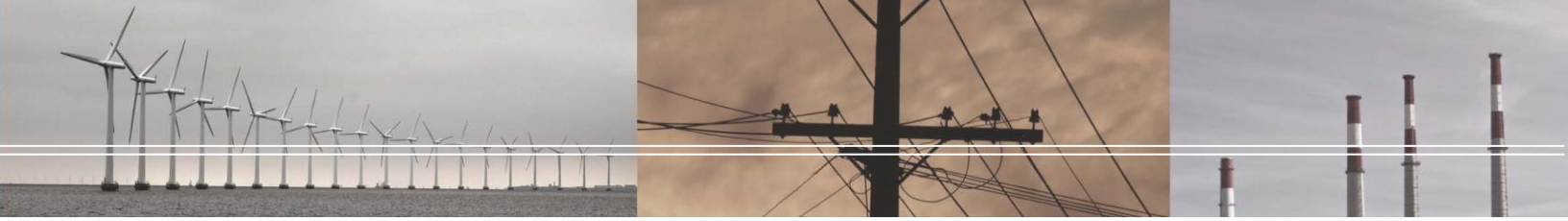


Table 1. Sixty Years of U.S. Energy Subsidies: EIA Studies in Comparison with Other Research

Study, Publication Date, Sponsor	Data Year(s)	Fuels Included	Total Subsidies/Year, Average Values	Notes
			(Billions of 2007$)	
I. All fuels				
Energy Information Administration (1992) for U.S. DOE	1989–92	All	$7.9	
Energy Information Administration (1999 and 2000) for U.S. DOE	1998–99	All	$8.2	
Pacific Northwest Laboratory (1978) for U.S. DOE—average annual value	1933–78	All	$12.6	
Management Information Systems (2008)—average annual value	1950–2006	All	$13.1	(1)
Management Information Systems (1998)—average annual value	1950–97	All	$14.6	(1)
Energy Information Administration (2008) for U.S. DOE	2006–07	All, with focus on electricity	$16.6	
Koplow (1993a) for Alliance to Save Energy	1989	All	$43.3	
Koplow (2004) for the National Commission on Energy Policy	2003	All, but not all program types	$56.5	
Koplow (2007b) for the Organisation for Economic Co-operation and Development	2006	All, but not all program types	$76.0	
Heede et al. (1985) for the Center for Renewable Resources	1984	All	$77.4	
II. Comparison with additional studies covering subsets of fuels				
A. Nuclear power				
EIA (1999 and 2000)—nuclear portion only	1999	Nuclear	$0.7	
EIA (1993)—nuclear portion only	1992	Nuclear	$1.2	
EIA (2008)—nuclear portion only	2007	Nuclear	$1.3	
Bowring (1980)—draft for EIA	1950–1979	Nuclear, but not all programs	$2.2	(2)
Goldberg (2000) for the Renewable Energy Policy Project	1943–1999	Nuclear	$3.1	
Komanoff and Roelofs (1992)	1950–1990	Nuclear	$3.5	

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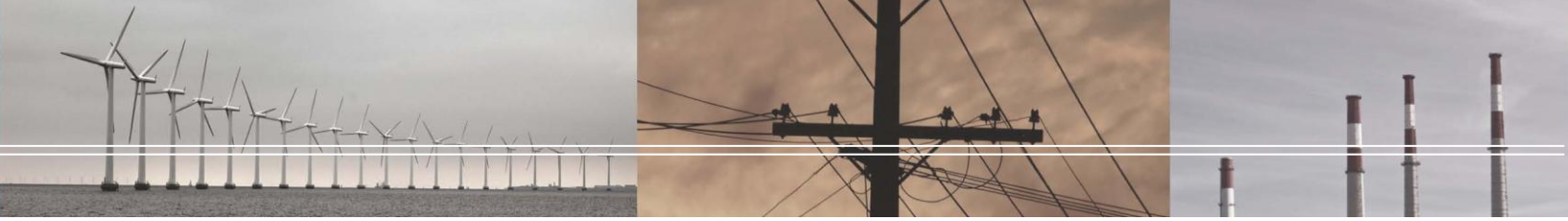


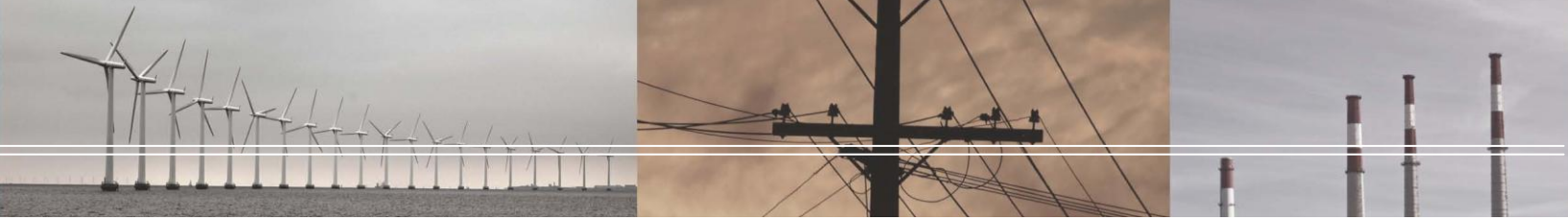
Table 1, continued

Study, Publication Date, Sponsor	Data Year(s)	Fuels Included	Total Subsidies/Year, Average Values	Notes
B. Fossil fuels				
EIA (1992)—oil and gas portion only	1992	O&G portion	($0.5)	(3)
EIA (1999 and 2000)—oil and gas portion only	1999	O&G portion	$2.1	
EIA (2008)—oil and gas portion only	2007	O&G portion	$2.1	
Koplow and Martin (1998) for Greenpeace	1996	Oil only	$32.2	
International Center for Technology Assessment (2005)	2003	Oil, mostly defense-related	$133.2	(4)
Wahl (1996) for the Institute for Local Self Reliance	1996–97	Oil, with some natural gas	$257.8	
Hwang (1995) for the Union of Concerned Scientists	1990–91	Oil, with some natural gas	$270.4	
International Center for Technology Assessment (1998)	1998	Oil, with some natural gas	$1,412	(5)
C. Liquid biofuels				
EIA (1999 and 2000)—liquid biofuels only	1999	Liquid biofuels	$0.9	
EIA (2008)—liquid biofuels only	2007	Liquid biofuels	$3.2	
Koplow (2006) for Global Subsidies Initiative	2006	Liquid biofuels	$6.6	
Koplow (2007a) for Global Subsidies Initiative	2007	Liquid biofuels	$9.0	

Sources: Updated from Koplow and Dernbach (2001); individual reports are listed in report reference section.

Notes:

(1) The MISI methodology is also problematic in its treatment of tax subsidies, nuclear power, and oil and gas price controls, to name a few issues.
(2) Time span covered varied by policy; use of 40-year span depresses annual values somewhat. Though analysis was prepared for EIA, the report was supposedly never released in final form.
(3) Negative value represents EIA credit to oil for motor fuel taxes going to general fund rather than highways. EIA did not deduct general funds flowing to road projects from this calculation.
(4) Includes oil security subsidies only.
(5) Value is much higher than all other estimates because it includes a variety of energy, safety, and health externalities related to both fuels and driving.



3. Omissions, Valuation and Attribution Problems Understate Subsidy Magnitude and Skew Fuel Comparisons

The 2008 EIA study's aggregate subsidy estimates, and its subsidy distribution across fuels, were directly affected by a variety of valuation and attribution problems as well as by the omission of policies with wide-ranging effects on energy markets. Section 3 provides an introduction to these generic issues, while Section 4 offers a much more detailed look at particular issues—including, where possible, the quantification of their impacts.

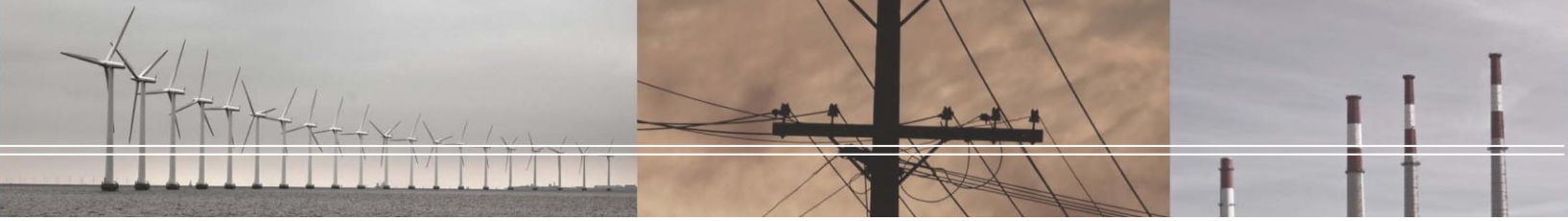
3.1 Use of point estimates conveys artificial precision, understates subsidy magnitude

Subsidies are often equated with cash payments. In reality, however, governments transfer value to private parties using many different techniques and types of interventions. Table 2, which provides an overview of common types of interventions, demonstrates that most of the methods are far more complicated to quantify than cash grants.

Tax subsidies are a case in point. Estimating their value requires information on the details of the tax break, the baseline rate that the recipient would pay in the absence of the subsidy, and the level of activity in the economy among firms or individuals able to make use of it. Because published estimates are often prospective, they rely on models of economic growth rather than on tabulation of actual tax return filings. Retrospective analysis of actual tax filings are sometimes done, but only on a selective basis.

Credit and insurance subsidies are no less complicated. Valuing them generally requires counterfactual assessments of how markets would behave in the absence of government support; they must typically be done by examining reasonably comparable situations without subsidies. Minimum purchase requirements or tariffs can be more complex still. These policies transfer large amounts of wealth to targeted industry sectors, often through changes in the mix of competitive suppliers or changes in the market price.

Given this complexity, it is not surprising that multiple government bodies often generate markedly different estimates of the same subsidy provision. Varying estimates can be handled either by ignoring some of the values entirely, by identifying the subset based on the most reasonable assumptions and data, or by reporting the estimates as a range. EIA has taken the first approach, often reporting a point estimate even where its own text and analysis acknowledges more than one plausible valuation.

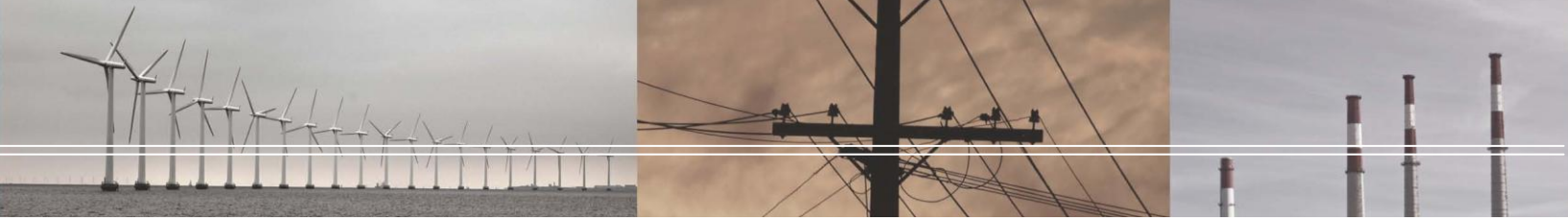


Reporting only point estimates dramatically reduces both the scope and scale of reported government interventions in markets. For example, including a range estimate on tax subsidy provisions alone would have boosted the numbers that EIA reported in 2008 by more than $5 billion (estimates from the Joint Committee on Taxation are routinely higher than those from the Treasury, on which EIA relied).

Table 2. Types of Government Interventions

Intervention Type	Description
Access*	Policies governing the terms of access to domestic onshore and offshore resources (e.g., leasing)
Cross-Subsidy*	Policies that reduce costs to particular types of customers or regions by increasing the charges paid by other customers or regions
Direct Spending	Direct budgetary outlays for energy-related purposes
Government Ownership	Government ownership of all or a significant part of an energy enterprise or supporting service organization. Often gives rise to a variety of other forms of subsidy and cross-subsidy.
Import and Export Restrictions*	Restrictions on the free flow of energy products and services between countries
Information	Provision of market-related information that would otherwise have to be purchased by private-market participants
Lending	Below-market provision of loans or loan guarantees for energy-related activities
Price Controls*	Direct regulation of wholesale or retail energy prices
Purchase Requirements*	Required purchase of particular energy commodities, such as domestic coal or biofuels, regardless of whether other choices are more economically attractive
Research and Development	Partial or full government funding for energy-related research and development
Regulation*	Government regulatory efforts that substantially alter the rights and responsibilities of various parties in energy markets, or that exempt certain parties from those obligations
Risk	Government-provided insurance or indemnification at below-market prices
Tax*	Special tax levies on, or exemptions that are of benefit to, energy-related activities

*Can act as either a subsidy or a tax, depending on policy specifics
Source: Based on Koplow (1998)



3.2 EIA fails to consider long-term trends and the impacts of subsidies on new investment

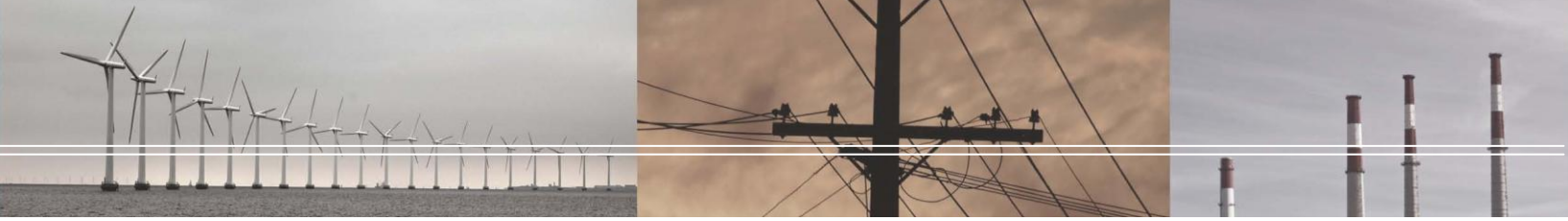
EIA has chosen to apply a "snapshot" approach to federal subsidies, measuring existing programs based on their uptake by existing production facilities. This approach is reasonable in trying to estimate current levels of support. However, no single measure is appropriate for all circumstances, and the single-year snapshot approach suffers from two important weaknesses:

- **Inability to reflect even large multiyear trends.** Not all government activities can be easily summarized by a single year of activity. Some programs, in fact, may exist to dampen longer-term volatility or risk exposure in targeted sectors. These types of activities may exhibit large shortfalls or surpluses in particular years. Evaluating associated subsidies requires annualizing program balances over the period of activity so as to get a more accurate view of steady-state levels of support. EIA's treatment of trust funds provides a useful example: short-term surpluses sometimes lead it to ignore the programs even where there is an expected long-term financing shortfall. A proper conclusion would be to flag these deficits as a subsidy.

- **Fails to capture subsidy impacts on new investment.** Omitted from EIA's quantified analysis are large policy changes that have been implemented recently but are not yet being tapped by target facilities. Program ramp-up time inside government, continued technical evolution, or construction periods before plants begin operations may be driving the lags. However, during this lag period even very generous subsidies show up as zero, despite their possibly being the prime driver of which energy technologies receive research or investment dollars. It is these potential distortions in marginal investment decisions that ultimately direct the country's future energy path.

  EIA does recognize that "[s]ome of the most significant subsidy provisions in EPACT 2005[1] concern nuclear power," but it notes that since "no nuclear power plants are expected to produce electricity before the middle of the next decade, this report provides no estimates for the value of these provisions" (EIA 2008: xii). This odd criterion is tantamount to saying that new subsidies are counted only if they apply to short-lead-time technologies such as most renewables. Instead, all future reports should include marginal assessments as well as the snapshot in order to provide a more accurate view of subsidy policy. For example, using a marginal approach, Metcalf (2009: 5) estimates that nuclear power generation faces an

[1] The Energy Policy Act of 2005.



effective tax rate on new facilities of *negative* 99.5 percent—making it by far the most heavily subsidized large-scale centralized electricity resource.[2]

3.3 EIA ignores large subsidies to the energy sector if other sectors also receive them

Perhaps the single largest limitation to EIA's work is its exclusion of many programs of which the energy sector is a large, or even the main, beneficiary. EIA omits all programs that it argues provide subsidies to multiple sectors of the economy rather than to the energy industries alone. EIA justifies such programs' exclusion on the basis of its research mandate, noting that

> "[s]ubsidies which arise from broad provisions in the Federal tax code are not considered to be 'energy specific.' Therefore, for example, economic impacts from accelerated depreciation and [the] tax exempt status for municipal entities are not analyzed. … Tax-free bonds used by municipal electric utilities are excluded because non-energy companies such as municipal water and sewer facilities can also use them. Similarly, accelerated depreciation used by investor-owned utilities is also excluded because of its use by non-energy companies" (EIA 2008: 4).

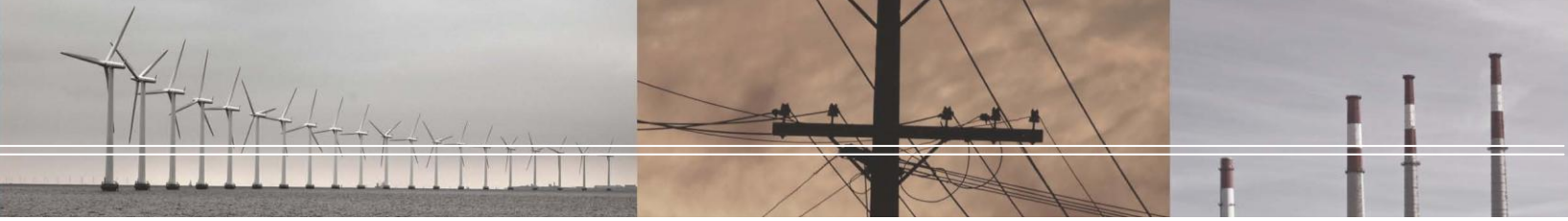
Although the line between a "broad provision" in the tax code and an "energy-specific" one can sometimes be murky, EIA has used inconsistent rules for making this distinction throughout its evaluation (see Section 4 for more detail) and has excluded provisions even of direct benefit to energy. For example, its report:

- Includes percentage depletion for energy even though many non-energy materials receive it. (Note also that EIA also has not properly allocated portions of these subsidies to coal and nuclear.)[3]

- Excludes tax-exempt interest on energy-related municipal bonds, even though a higher percentage of municipal bonds are used for energy-related purposes than of the private activity bonds (PABs) EIA does include. In fact, municipal bonds provide more than 10 times as much energy-related funding as PABs. (Both types of bonds also support a wide range of non-energy uses.)

[2] Metcalf found even higher negative tax rates for wind and solar thermal power (2009: 5). Wind energy proponents suggest that some consideration in the lifecycle of the industry would be warranted in comparing resources. They point out that early-stage nuclear reactors were even more heavily subsidized than wind is today (AWEA 2008).

[3] See tallies on pages 17 and 20 of EIA 2008.



- Includes a handful of accelerated depreciation provisions if they had been listed individually in the Treasury tax-expenditure budgets that the Administration relied on. Yet EIA excludes exactly the same type of support if the provision was listed only in JCT reports, or within the shortened asset-class lives for tax depreciation published by the IRS.

- Includes interest rate subsidies to federally owned power marketing administrations (PMAs), even though these enterprises also provide irrigation and flood control services, but excludes other related subsidies to PMAs (such as their tax exemption) and tax breaks to municipally owned energy services.

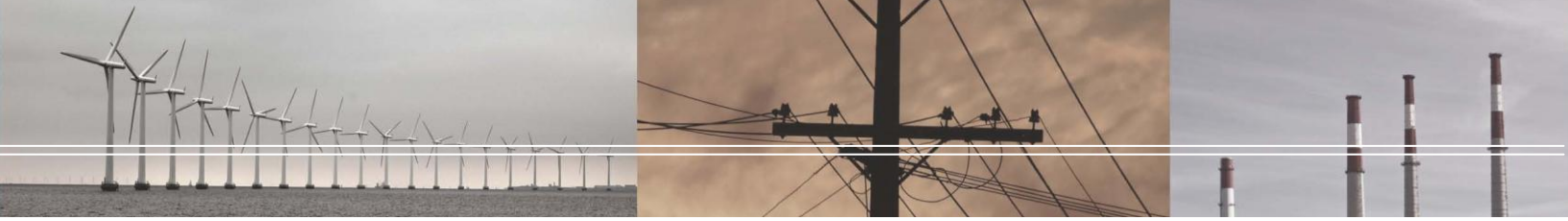
3.4 EIA excludes many subsidy types

EIA has eliminated entire classes of subsidies from its discussion. Often these exclusions are explained away in a sentence or a footnote, and sometimes in not very persuasive ways. Because every fuel cycle is different, and subsidies have often been tailored at different times to help specific industries, certain types of programs may constitute the largest subsidy form for one fuel while being unimportant for others. Without a systematic review of support policies, the relative degree of subsidies reported for specific fuels becomes more a function of the scope of the research mandate than of the actual subsidies in place. This is a major deficit in the EIA analysis, as the following eight categories illustrate:

- **Insurance and oversight: health, safety, and accident risks.** Federal involvement in coal-mine health and safety, and in black lung disease compensation, is longstanding. So too with oversight of the nuclear industry via the Nuclear Regulatory Commission. Some of this spending is supported by user fees on the coal and nuclear industries; some of it is not. EIA does not comprehensively catalog all of these areas or systematically quantify their net expenditures.

  Similarly, EIA ignores government indemnification or subsidized insurance coverage benefiting a variety of energy-related activities. For example, it excludes caps on accident risk at nuclear power plants via the Price-Anderson Act on the grounds that it is "regulatory" (EIA 2008: 3). However, the liability cap is specific and unique to nuclear energy (meeting the "energy-specific" mandate), implemented by statute, and confers special benefits to a narrow class of recipients in much the same manner as a special tax break would. It is also an important benefit, as industry leaders have stated that they could not operate without it.[4] Insurance subsidies are also relevant to oil spills, agriculture (for biomass feedstocks), and catastrophic failure of

[4] For example, Jeff Benjamin, Exelon's vice president of licensing and regulatory affairs, testified that his firm supported renewal of Price-Anderson "both to continue the operation of our current fleet of nuclear plants with contractor support and to provide an essential prerequisite to the potential construction of new nuclear plants" (Benjamin 2003).



hydroelectric facilities; and they are increasingly important in contemplating large carbon capture and sequestration projects (for coal).

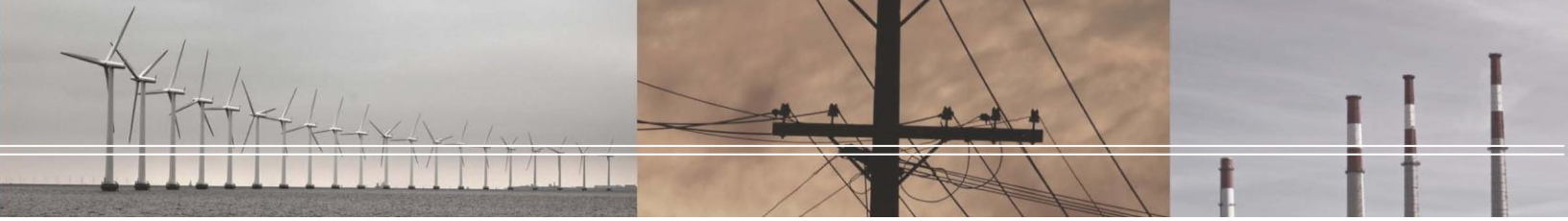
- **Purchase requirements and border protection (tariffs)**. EIA has excluded minimum purchase requirements for liquid biofuels and renewable electricity, as well as tariff protection for ethanol from its purview, arguing that these are regulatory rather than "direct interventions" (EIA 2008: 3). It is true that both provisions do not transfer resources directly from taxpayers to producers. However, the purchase requirements can increase consumer costs and cause pricing distortions. They are an increasingly important element of federal energy policy, particularly in the area of liquid biofuels.

- **Bulk energy transport.** Because bulk energy commodities such as coal, petroleum, and ethanol are sensitive to shipping costs, government subsidies to bulk shipping can create inter-fuel distortions. Waterborne transit in the United States has traditionally been subsidized through tax-exempt bonds for infrastructure; through construction and maintenance of inland waterways, ports, and harbors by the U.S. Army Corps of Engineers; and through maintenance of coastal shipping by the U.S. Coast Guard and the Maritime Administration. Although energy is not the only beneficiary of this subsidy, coal and oil comprised more than half of all tonnage shipped in inland and coastal U.S. waters during 2006. On a ton-mile basis (which reflects the intensity of use of government-built and -maintained infrastructure better than total tons), coal and oil still comprised 36 percent of total inland shipping and 78 percent of coastal shipping (U.S. Army Corps 2008). Historically, users have not paid the full cost of these systems, giving rise to subsidies for bulk users such as coal and oil.

- **Energy security.** Energy is a strategic commodity with many attributes that make disruption a real possibility. They include unstable suppliers, supply chokepoints, and high ancillary damages from an attack (such as at a nuclear plant). Because the economic and military costs of disruption can be so high, governments around the world routinely invest in various ways to reduce this risk.

  Energy security subsidies are barely mentioned in EIA's current report, and mentioned but dismissed in earlier ones.[5] Certainly, some defense-related expenditures on energy security—defending Persian Gulf oil-shipping lanes, for

[5] On Persian Gulf shipping, EIA noted that "In addition to the technical question of what proportion of U.S. national security expenditures ought to be attributed to this [oil defense] mission, it is an exercise in judgment as to whether the expenditures confer a financial benefit to U.S. energy producers or consumers, and whether the level of defense expenditures bears any functional relationship to domestic energy prices" (EIA 1999: 49). In response to this uncertainty, EIA has effectively judged the value to be zero in its published analysis.

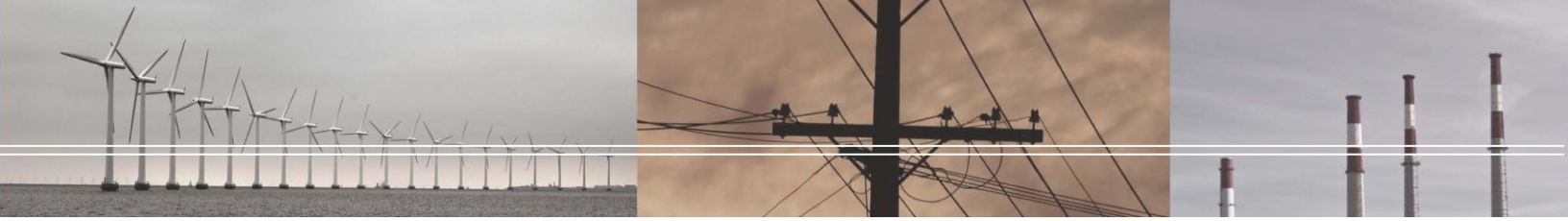


example—are challenging to estimate. But others, such as proper costing of the Strategic Petroleum Reserve or of the aid that was formerly earmarked for defending pipelines in Colombia, are fairly straightforward. Similarly, spending through homeland security-related accounts to defend core domestic-energy assets deserves much greater scrutiny. The energy resources that benefit most from energy security subsidies are oil, nuclear power, and, to a lesser extent natural gas. In general, renewable resources (other than, perhaps, large dams) require and receive no special protection.

- **Export credit subsidies**. The energy sector has long been a major focus of export credit agencies and multilateral development banks, institutions funded in part or in whole by the federal government. The support has come through subsidized loans, loan guarantees, and insurance. The Export Import Bank of the United States, for example, shows $12.4 billion in total exposure to the energy sector its 2009 Annual report, more than 18% of its portfolio. Support is not evenly distributed across energy options: nearly two-thirds of Eximbank's exposure is for oil and gas (Eximbank 2009: 58). The World Bank, of which the US is a major funder, is also illustrative. Commitments to energy projects (active plus pending) approach $50 billion according to the Bank's project database (World Bank 2010). While EIA did recognize that export financing at preferential rates constitutes a subsidy (EIA 2000: 3), none of its subsidy reports have systematically evaluated the scope or magnitude of these supports.

- **Corporate form (international, tax-exempt status, pass-through formats).** Corporations continually explore organizational forms and processes that enable them to reduce or eliminate their taxes while still providing the operational flexibility and control needed for their core functions. Some corporate forms facilitating the elimination of taxes at the corporate level, such as partnerships and Sub-S corporations, are quite old. Others, such as limited liability companies, master limited partnerships, and publicly traded partnerships, are newer. Transfer pricing among divisions in multinational firms is another approach that has been long tried. These corporate forms and approaches do benefit multiple economic sectors. However, core attributes of some parts of the energy industry—large size; global reach, with divisions in multiple countries; and fees and royalties on extraction of resources that can be retitled as taxes—mean that the energy sector has an easier time than most in exploiting the tax-reducing strategies and forms. With regard to approaches that facilitate reduced tax burdens on international operations, oil, natural gas, and coal are the primary beneficiaries.

- **Terms of access**. The financial terms at which federally owned mineral resources are offered to the market are important, given that roughly 35 percent of U.S. oil and

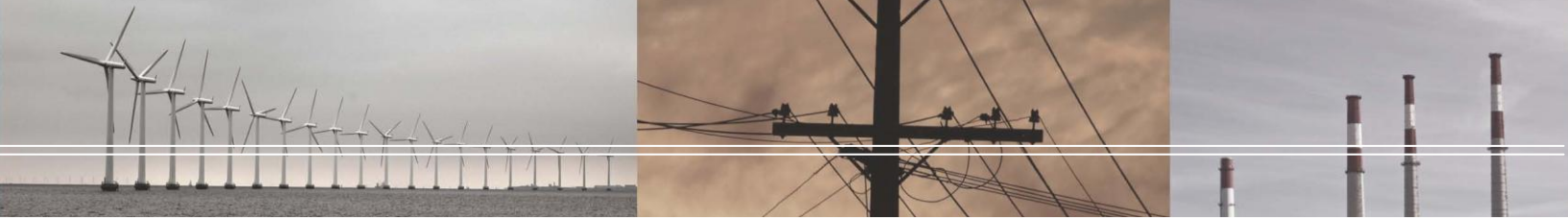


gas production is from federal or Native American lands (EIA 2008: 13). EIA does note that "[t]o the extent that the Federal government is forgoing revenues by not 'optimizing' royalty payments, the Federal government may be providing a subsidy similar to a tax expenditure" (EIA 2008: 13). In describing why favorable lease terms are excluded from the report, EIA states that estimating these losses is "dependent on forecasting future oil and gas prices and production" and that any losses in royalty terms should in theory "be offset by higher bids for leases." These types of forecasting issues apply to projecting uptake of many subsidies. Percentage depletion, for example, requires assumptions both on prices and production. Further, existing leases have some structural problems that shift resource rents from the taxpayer to private firms through what appear to be omissions in the contracts, rather than through tradeoffs between upfront bids and royalties. The exclusion of leasing issues is of primary relevance to oil and gas subsidy values, with lesser effects on coal and nuclear power (via uranium extraction from public lands).

- **Energy-related trust funds**. Federal trust funds have been instituted to deal with a wide array of energy-related issues. They include environmental problems and accidents (oil spills, leaking tanks, nuclear site decontamination); long-term management problems (nuclear waste repository); health issues (black lung); and the construction and maintenance of ancillary infrastructure (highways, airports, inland waterways, ports). Some of the funds are backward-looking (to clean up past messes); others are forward-looking (to build new infrastructure or pool risks).

  EIA dismisses this entire class of issues, noting that "[s]ince trust funds are funded by user fees, they are not included in the analysis" (EIA 2008: 4). This description is not useful: many programs EIA did include receive some user-fee funding—federal power marketing administrations, after all, actually charge something for the power they sell. In any case, the key issue is whether the fees collected are sufficient to meet the needs they are collected for. For trust funds, the period of performance to assess fee adequacy is not a single budget cycle but many years. Although EIA does acknowledge the importance of these instruments, it has not properly evaluated fund-related subsidies in its reports.[6] The main beneficiaries of long-term shortages in trust funds—shortages effectively covered by taxpayers—are coal, oil, and nuclear power.

[6] The clearest discussion of trust funds in the 2008 report is relegated to a footnote in its appendix: "In addition to the direct expenditures, tax expenditures, R&D expenditures, and government support for Federal electricity discussed in the body of this report, the Federal government intervenes in energy markets through its sponsorship of trust funds, which are related to energy production. These funds are intended to be self supporting. However, the Federal government faces potential risks in the event that these funds should face revenue shortfalls" (EIA 2008: 201, note 275). Earlier reports were more direct, noting that the "the potential liabilities from under-accrued trust funds can be large" (EIA 1999: 38), but that "no specific estimate of their subsidy element is presented because of the difficulty in estimating the potential future liability to the Federal government" (EIA 1999: vii).



3.5 EIA time trends distorted by changing decision rules over time

Another challenge is that the decision rules on what to include and how to value it have changed over the course of EIA's three subsidy studies. As the examples below illustrate, these changes are sometimes substantial, making comparisons across studies difficult.

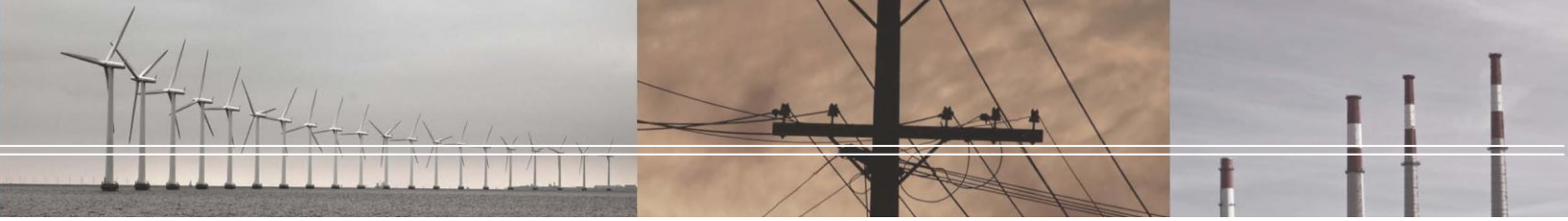
- **No outlay equivalent**. EIA's first two studies used an "outlay equivalent" measure of tax subsidies. This metric scales up revenue loss values to reflect the fact that many (though not all) tax-subsidy benefits are themselves exempt from taxation and hence are more valuable to recipients. Where this occurs, the outlay equivalent measure is often more than 30 percent higher than the revenue loss measure. Because tax expenditures comprised more than 60 percent ($10.4 billion) of EIA's total subsidy estimate for 2007, incorporating outlay equivalent values as was done in the past studies would have added billions to the 2008 EIA study's total. Ironically, this technical adjustment would have added a larger increment to the estimates in EIA's 2008 report than did most of the individual programs EIA actually quantified.

- **Inclusion of some public power**. All three of EIA's subsidy studies have included a detailed and useful analysis of subsidies to public power. These sections have generally described the multiple approaches one could reasonably use to estimate the subsidy value, and they then generated the associated numbers. Strangely, however, in EIA's first two reports these carefully reported values were not actually included in the subsidy estimates. In 2000, EIA wrote that "[t]he total estimate of $2.2 billion for Federal subsidies to energy transformation and end use does not include estimates of support provided through Federal electricity supply programs, because of the uncertainties associated with the estimation methodologies" (EIA 2000: xii). In that report, EIA's *lowest* estimate (derived from the method of interest rate subsidies only and using their lowest cost of funds) was still $325 million, 15 percent of the total the Administration reported for all subsidies to all fuels. EIA's high-end value ($2.1 billion, assuming higher market interest rates) would have nearly doubled its reported total subsidies and greatly shifted recipient fuel shares as well (EIA 2000: xv).[7]

  By 2008, it appears that these estimation problems were solved, as EIA included at least a portion of the support for public power (interest rate subsidies) for the first time.

- **Excise fund offsets**. As noted above, significant problems remain in EIA's treatment of energy-related trust funds. A number of these funds are expected to run

[7] Values are shown in 1998 dollars, so they do not match corresponding items in Table 1.



long-term deficits, and the annualized adjustments needed to achieve long-term solvency are properly considered operating subsidies today.[8] EIA's first subsidy analysis, however, made a different error: deducting from net subsidies to oil $3.1 billion (1992 $) in motor-fuel excise fees that went into the general fund rather than the Highway Trust Fund. This adjustment rendered negative EIA's estimate for total subsidies to oil (i.e., the fuel had a net tax). EIA did not balance this deduction by including very large annual transfers *into* the Highway Trust Fund from general funds, often in the form of earmarked pilot or demonstration projects. The result was an inappropriately low value for subsidies to oil.[9]

- **Inconsistent approaches in allocating particular subsidies to constituent fuels.** In some cases, subsidies may benefit more than one fuel, and decision rules are needed to fairly assess what portion should be allocated to each. The multibillion-dollar Low Income Home Energy Assistance Program (LIHEAP) is a good example of the challenges EIA has had with this issue. In the most recent analysis, it did not allocate $2.2 billion in LIHEAP support by fuels, stating that "[n]o program information is available to determine the portion of the expenditure directed to the affected fuels, which included distillate fuel, natural gas, coal, and electricity" (EIA 2008: 107). Yet in 2000, EIA was able to prorate LIHEAP spending based on the fuel source used in the residences of recipients (EIA 2000: 9). Similarly, while EIA has argued that subsidies to multiple sectors could not be prorated to energy, its analysis routinely allocates tax expenditures between electricity production and fuels (EIA 2008: 100). In another example, $1.2 billion in subsidies to transmission and distribution were not allocated by fuel (EIA 2008: 105), though within the public power sector EIA developed an allocation routine that applied the net book value by type of generation asset to assign subsidies to specific energy resources (EIA 2008: 101). While allocation decisions are sometimes complicated, they can be done in an analytical and thoughtful manner. Consistent and transparent allocation approaches are needed to ensure accurate results.

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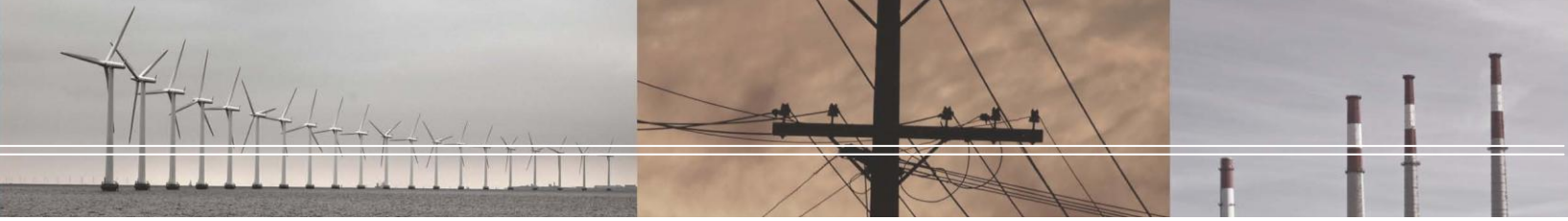
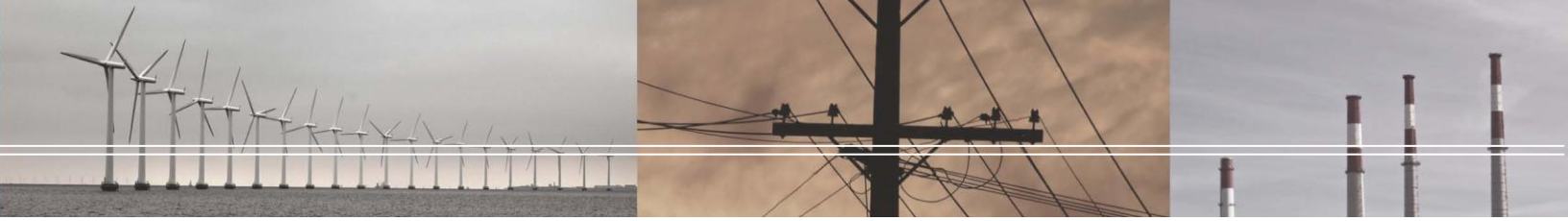
[8] The subsidy implications of trust fund shortfalls vary somewhat, based on the purpose of the fund. Underaccruals for future costs—such as in building a waste repository or in capitalizing an insurance pool for accidents—are clear subsidies to current operations. The undercollection of fees to remediate for past environmental damages is more complicated, as the problems are to some degree sunk costs. Dismissing these fund shortfalls from the subsidy tally is not straightforward. Firms that caused the historic damage may remain in business; or responsibility may have shifted to a successor firm that is not living up to its requirements as the new owner. In either case, there would be close matching between the cause of damage and the source of remediation funding. In addition, price signals may be made more accurate by retaining fees at the sector level (even if not by the exact firm), as opposed to unloading them on the general taxpayer.

[9] In setting the boundaries for subsidy analysis, this author has normally included transport infrastructure only if it is heavily used to move bulk energy commodities and excluded infrastructure that is merely related to energy markets because vehicles using the infrastructure burn fossil fuels. Once EIA violated this boundary in its analysis, however, it needed to apply consistent rules in calculating subsidy offsets. Specifically, it could not credit oil with excise fees diverted from roads to the general fund, without also treating transfers from the general fund to build road capacity as an additional source of subsidy to oil. In addition, in the unlikely case that a net diversion of excise taxes to the general fund remained, this should not have been ascribed 100 percent to oil, but rather prorated based on the share of total highway ton-miles used to move petroleum fuels.



- **Accelerated depreciation of capital.** EIA's 1992 analysis discussed accelerated depreciation as a subsidy (EIA 1992: 21), but it included only the expensing allowances for certain oil- and gas-related investments. EIA's 1999 analysis (EIA 1999: 74, note 105) for the first time discussed accelerated depreciation for energy-related capital contained in the IRS asset-life tables for solar energy equipment, but any associated tax expenditure amount seemed not to be included. In fact, EIA's mandate explicitly excluded accelerated depreciation schedules for investor-owned utilities on the grounds of "their use by non-energy companies" (EIA 2000: iii). Yet the 2008 analysis includes a handful of accelerated depreciation provisions that are listed individually in the Treasury tax-expenditure budget. In truth, a review of asset-class tables back to the early 1990s would have indicated a large number of energy-specific asset classes that could be depreciated more quickly than their service lives; all should have been included.



4. Understanding the Limitations of EIA's Analysis

Building on the preceding section's general overview of the limitations in EIA's subsidy assessments, we now examine these problems in greater detail and illustrate how severely they have skewed EIA's reported results.

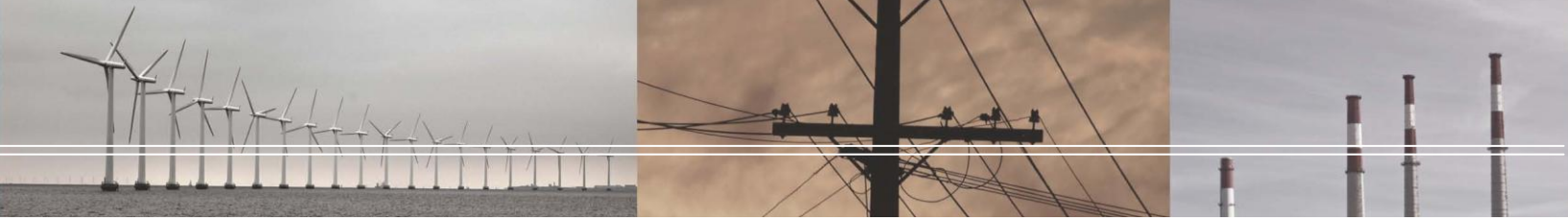
4.1 Point estimates understate subsidies: The example of EIA's tax expenditure sources

EIA restricted its tax expenditure estimates to those generated by the U.S. Treasury Department. Only when Treasury did not estimate specific provisions did EIA supplement the analysis with data from the Joint Committee on Taxation. This approach enabled EIA to bypass an awkward reality: estimates for the same tax subsidy by the two institutions can differ by hundreds of millions of dollars. In addition, EIA also relied exclusively on Treasury's *revenue loss* projections, even though EIA reported the higher *outlay equivalent* values in earlier work (EIA 2008: 2) and could have calculated them manually for its recent study as well.[10]

EIA discusses in a footnote its decision to use JCT data sparingly:

> "The use of JCT estimates was limited to certain tax expenditures directed at the electric utility industry in EPACT2005 that were not itemized by the Treasury Department in the FY2007 budget documents. … Other than the exception noted, EIA relied on the Treasury Department estimates and determined that a comparison of Treasury Department and JCT tax expenditure estimates would not be appropriate because, according [to] the JCT, they are not 'necessarily comparable.' The methods and assumptions used by the Treasury Department differ from those used by the JCT. For example, the JCT uses an economic forecast by the Congressional Budget Office, whereas the Treasury Department relies on the Administration's economic forecast" (EIA 2008: 4).

[10] Revenue loss metrics estimate how much revenue the U.S. Treasury foregoes through selective tax subsidies. Outlay equivalent values are higher, in recognition of the fact that many tax breaks are themselves tax-exempt to recipients and therefore worth more. The outlay equivalent estimates the level of taxable funding to a recipient that would generate the same after-tax value. The U.S. Treasury discontinued reporting these values on the grounds that they were "often the same as the normal tax expenditure estimates, and the criteria for applying the concepts as to when they should differ were often judgmental and hard to apply consistently across time and across tax expenditures" (OMB 2007: 286). However, conversations this author has had with people who had been on Treasury staff at the time of this decision indicated that the calculations were fairly rote and could be replicated easily by outside researchers, and that outlay equivalent reports were discontinued mainly to reduce the size of the tax expenditure report.



Nowhere does EIA claim that the JCT's estimates are inaccurate or unreliable, only that some of the assumptions differ.

Table 3 provides insights into how EIA's decision to ignore the JCT tax expenditure estimates affected its 2008 subsidy tallies. The average of a five-year estimate window was used to help smooth out the impacts of policy changes or assumptions on the pattern of subsidy uptake over time. Key insights from this comparison are that:

- JCT subsidy estimates in the energy area tend to be higher than the Treasury's, sometimes substantially so. In the aggregate, including a high estimate based on JCT revenue loss values for the subset of provisions shown would have boosted EIA's aggregate subsidies by more than 30 percent—a net increase of $5.3 billion. Total subsidy shifts (increases plus decreases) were $7.2 billion.

- The variance between JCT and Treasury estimates differed across fuels. Values for oil and gas would have more than doubled EIA's published estimates; those for nuclear power would have increased estimates by two-thirds; and those for coal and efficiency by roughly half. Ethanol would actually have declined (at least based on the excise tax credit value), as JCT pegged it at a lower cost than did the Treasury.

- EIA's reported results are extremely sensitive to shifts in even a single tax-expenditure line item. For example, a simple change, such as incorporating the JCT estimate for expensing of oil and gas development costs as part of a range estimate for this provision, would raise the reported subsidy value for these fuels by more than 50 percent.

Given the enormous amount of money that tax expenditures entail, estimating them should be done with the same level of transparency and rigor as is required for regulatory impact assessments.[11] Absent that structural change, any subsidy evaluation would be well served by using a range rather than a point value, in recognition of the uncertainty of estimates.

[11] Koplow and Dernbach (2001) provide a more detailed look at the differences between required oversight in the analysis of regulatory proposals and the lack of requirements on the fiscal side.

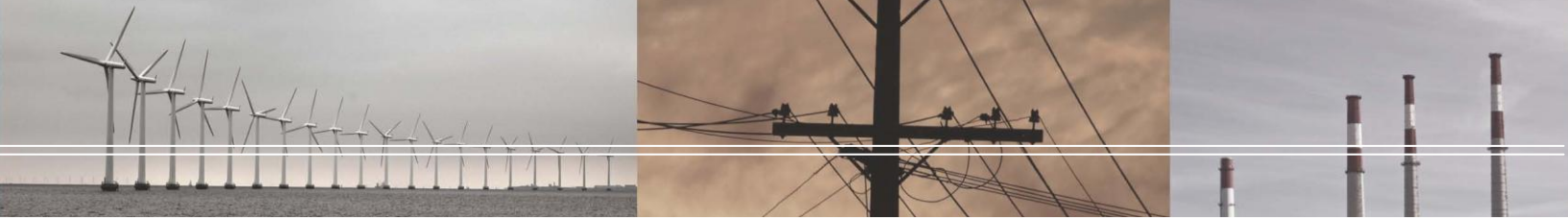


Table 3. Subsidy Sensitivity of Treasury Point Estimates: A Comparison of Selected Tax Expenditure Provisions ($Millions)

	Revenue Loss Estimates 2008-12		*Estimate Variance*		Annual Variance, % of EIA Estimate for Fuel
	Treasury (Used by EIA) (Note 1)	JCT (Note 2)	Total for 2008-12 (Note 3)	Average Annual (Note 3)	
Coal and Refined Coal					**3,302**
Credit for producing fuels from a non-conventional source (Note 4)	1,480	600	(880)	(176)	-5.3%
Credits, clean coal facilities	685	800	115	23	0.7%
Expensing exploration and development, other fuels (Note 5)	80	300	3,107	621	18.8%
Excess, % over cost depletion - other fuels (Note 5)	507	800	1,200	240	7.3%
Special rules for mining reclamation reserves	NE	200	200	680	31.6%
Exclusion of special benefits to disabled coal miners	200	200	-	-	0.0%
					53.1%
Efficiency					**926**
Credit for energy efficient. improvements to existing homes	150	2,100	1,950	390	42.1%
Tax credits for hybrid vehicles, deduction for	150	900	750	150	16.2%
Exclusion of utility conservation subsidies	570	100	(470)	(94)	-10.2%
					48.2%
Non-ethanol renewables					**1,712**
Production tax credit, non-ethanol renewables	4,840	6,550	1,710	342	20.0%
Accelerated depreciation, non-ethanol renewables	NE	500	500	100	5.8%
					25.8%
Ethanol					**3,163**
Volumetric Ethanol Excise Tax Credit	17,100	13,600	(3,500)	(700)	-22.1%
Electric - general					**1,235**
Tax exempt PABs, energy-related	150	600	450	90	7.3%
10-year: smart electric distribution	NE	100	100	20	1.6%
15 year: electric transmission property	NE	600	600	120	9.7%
					18.6%

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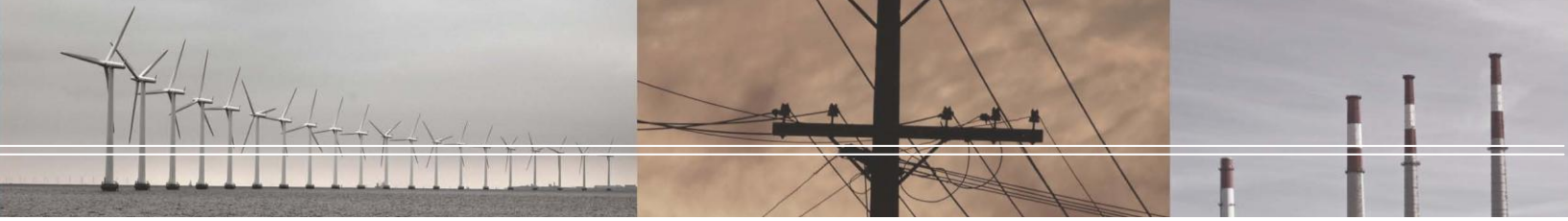


Table 3, continued

	Revenue Loss Estimates 2008-12		*Estimate Variance*		Annual Variance, % of EIA Estimate for Fuel
	Treasury (Used by EIA) (Note 1)	JCT (Note 2)	Total for 2008-12 (Note 3)	Average Annual (Note 3)	
Oil and Gas					**2,149**
Amortization of geological, geophysical expenses, oil and gas production	100	1,300	1,200	240	11.2%
Expensing exploration and development, oil and gas (Note 5)	*1,830*	7,200	5,590	1,118	52.0%
Excess, % over cost depletion - oil and gas (Note 5)	*3,993*	7,100	3,400	680	31.6%
Accelerated depreciation: 15 year: natural gas distribution lines	510	600	90	18	0.8%
Accelerated depreciation: 50% expensing, equipment to refine liquid fuels	750	3,800	3,050	610	28.4%
					124.1%
Nuclear Power					**1,267**
Special tax rate for nuclear decommissioning reserve funds	NE	4,200	4,200	840	66.3%
Cumulative variance, net				5,312	32.0%
Cumulative variance, absolute value				7,252	

Notes

NE = Not estimated.

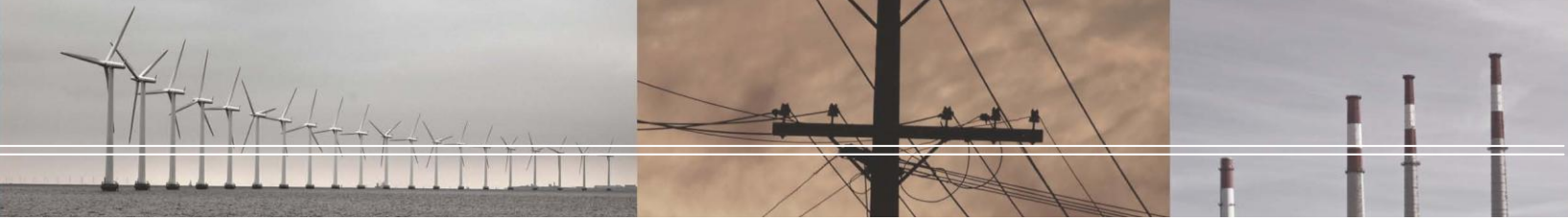
(1) OMB (2008).

(2) JCT (2008a).

(3) Variance values compare JCT values for specific tax expenditure line items to estimes for the same time range from the U.S. Treasury published in the 2009 Budget. A five-year window was used to reduce the sensitivity of the the comparisons to single-year changes in policy or assumed expiration dates.

(4) Provision primarily benefits refined coal, though small portion may also support oil and gas, and biomass.

(5) Treasury estimates only a combined total; coal values were imputed (shown in italics) assuming the same proportion of the total was attributable to coal as in the JCT estimates. Uranium may also receive a small portion of the subsidies attributed here to coal. EIA recognized coal as a beneficiary in the text, but did not include any allocation to the fuel in its data tables.



4.2 Large subsidies to capital formation via tax-exempt bonding and accelerated depreciation are omitted

Many energy technologies and projects are capital-intensive, requiring billions of dollars in investments and years of planning and construction before revenues start coming in. The longer the delay between construction start and finish, and the larger the cost of the plant, the greater the financial risk of things going wrong. Cost overruns are a common challenge, but changes in market conditions during the interim are perhaps even more important. A nuclear power plant started in 2008 in the midst of very high power prices, for example, would have faced bleak economic prospects were its survival to hang on the prices now prevailing.

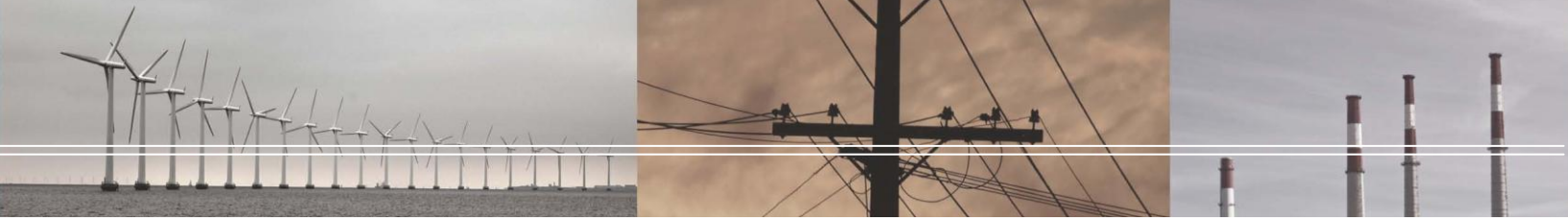
Technologies such as nuclear power or clean coal have many risk factors (high cost, unproven plant designs, regulatory risks, and long construction periods) and consequently face high hurdle rates in capital markets, which drive down their viability. Capital markets therefore seek to reduce these risks by favoring smaller-scale and modular technologies that can be deployed more quickly.

The normal market processes that require higher financing costs for riskier projects especially during the early commercialization phases of new technologies, help reduce the waste of societal resources on big risky bets when less risky options are available. Proper pricing of capital also helps steer investors and consumers to reduced energy consumption through efficiency improvements. Too often, however, federal energy policy works to mask these capital market signals by subsidizing capital infrastructure or by shifting investment risks—especially the largest ones—onto the taxpayer.

Many techniques are being used to subsidize capital formation in high-risk portions of the energy industry. They include production tax credits, accelerated depreciation, tax-exempt bonds, delay-risk insurance for new nuclear units, and increasingly large federal loan guarantees. None are well captured in EIA's 2008 analysis. This section examines, for illustrative purposes, the problems with EIA's treatment of just two of these issues: accelerated depreciation and tax-exempt bonding.

4.2.1 Accelerated depreciation of capital

Standard U.S. accounting conventions match the service life of a multiyear asset with its depreciation. However, more rapid write-off of asset costs from taxable income provides a larger reduction in near-term taxable income. *Expensing* is merely a variant of accelerated



depreciation, in that 100 percent of the capital asset can be deducted from taxes in the year it was purchased.[12]

Arguments that accelerated depreciation does not constitute a subsidy because it is generally available throughout the economy gloss over the important fact that special rules for each asset class generate differing levels of tax expenditure support. These variations create different degrees of subsidization across industries. More generally, the accelerated write-off of capital creates disincentives for approaches, such as modifying demand behavior, that ration capital. This is not a small issue. A quick review of the Internal Revenue Service's *Publication 946: How to Depreciate Property* finds at least 23 separate asset classes related to energy capital, nearly all of which provide statutorily approved accelerated depreciation periods.

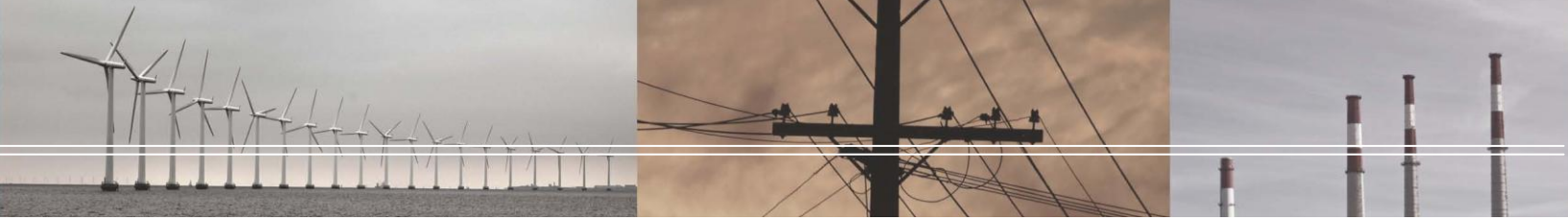
EIA has in fact included the subsidy value of some accelerated depreciation and expensing provisions in its estimates,[13] but the Administration's treatment of the issue is inconsistent. Generally, it has captured provisions that are laid out in specific line items in the tax expenditure budget prepared by the Treasury Department. While this marks an improvement from the older studies, the 2008 report still misses the core fact that there are special rules for all sorts of energy-related asset classes. The revenue losses may be bundled into Treasury's broader cross-sector summary of accelerated depreciation tax benefits, but the core elements of specific energy-related asset classifications, and of the accelerated write-off of investment cost from taxable income, apply equally.

By omitting the accelerated depreciation benefits for large-scale energy-related infrastructure covered in these classifications but not listed singly in Treasury tax expenditure reports, EIA understates energy subsidies by many billions of dollars per year.

EIA's inclusion of a tax expenditure titled "natural gas distribution lines treated as 15-year property" provides a useful window into the challenges of trying to include some energy-related capital classes while excluding others. This change, which EIA notes reduced the depreciation period from 20 to 15 years, was enacted in the Energy Policy Act of 2005. However, that same law "also clarified the depreciation of natural-gas gathering" pipelines to seven years (Metcalf 2009: 8), a change that did not make it onto EIA's list. Similarly, asset class 46.0 appears to offer a 15-year recovery period to a much wider array of pipeline assets, including trunk lines and related storage facilities, that carry "petroleum, gas, and other

[12] Expensing of capital assets is distinct from the normal practice of expensing inputs with a service life of less than one year such as labor or fuel.

[13] Examples include expensing of exploration and development costs, tertiary injectants, and equipment used in refining liquid fuels; and accelerated depreciation of geological and geophysical expenditures, natural gas distribution pipelines, certain pollution-control expenditures, and electric transmission property (EIA 2008: 14).



products" (IRS 2007: 103). Yet these assets also appear to be missing from EIA's fossil energy-related totals.

The subsidy from accelerated depreciation is driven by three main factors. First, the shorter the asset life for tax purposes relative to its actual service life, the larger the subsidy. Second, the more accelerated the depreciation method allowed (e.g., double-declining balance rather than single), the larger the subsidy. Third, the greater the amount of new infrastructure investment for a particular form of energy, the larger the resultant aggregate subsidy to a sector.

Biofuels provide a practical example. Highly accelerated depreciation periods (either as asset class 49.5 ["waste reduction and resource recovery plants" with seven-year write-off] or the even more favorable special class for biomass property with a five-year write-off), combined with the use of the 200-percent declining balance method, ensure that the bulk of write-offs are heavily front-loaded. Finally, a surge of plant construction in recent years has contributed to large revenue losses. Accelerated depreciation benefits were estimated at nearly $850 million in 2008 for liquid biofuels alone (Koplow 2007a: 19).

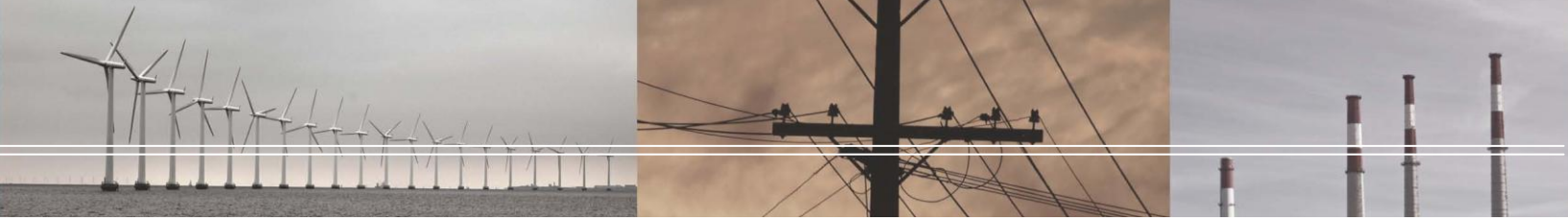
4.2.2 Tax-exempt bonds

Bonds are heavily used in the energy sector to finance plant construction. Special rules allow the interest on certain bonds to be exempt from taxation when paid to investors, and because investors seek to optimize after-tax returns, they are willing to earn less interest on tax-exempt instruments than on conventional bonds. This reduces borrowing costs, though it also reduces tax revenues to the Treasury. Because bonds are issued for multiple years, Treasury losses will be the sum of taxes foregone over multiple years of bond issues.[14]

Two main tax-exempt bond instruments are of concern. Private activity bonds (PABs) allow private firms to benefit from tax-exempt bonds if their enterprise meets a social need—e.g., a hospital or landfill. Municipal bonds are issued by state and local governments or utility districts for "public purposes."

EIA did define a tax-exempt bond issued for private energy-related purposes as conferring a subsidy, even though this practice violates EIA's guideline of being energy-specific (non-energy uses such as airports, hospitals, and qualified mortgage bonds dominate PAB issuance volume). EIA restricted its analysis to a handful of PAB categories: certain electric or gas facilities, district heating or cooling, and environmental improvements at hydroelectric facilities. While data were not sufficient to examine all bonds outstanding in these use-of-

[14] Ideally, multi-year tax expenditures would be converted into present values, to incorporate the time value of the benefits. However, the standard reporting by both Treasury and JCT generally presents nominal values in each year of the period of analysis.



proceeds categories, examining new issues in 2006 is instructive. The bonds included in EIA's data totaled less than $150 million in issuance (see Table 4), equal to only 0.2 percent of PABs for all uses issued that year. In contrast, the total value of solid-waste PABs—a category ignored by EIA but one that is actually used frequently by energy facilities, such as for waste-to-energy plants and even ethanol production facilities—was $2.5 billion.

EIA excluded municipal bonds entirely, on the grounds that they are available to any public purpose rather than specifically authorized for energy-related purposes. The difference is one of semantics, however. The electric power and gas works use-of-proceeds categories alone accounted for nearly $25 billion in new issuances that year, more than 6 percent of a much larger bond pool than that of the PABs. Energy-related bonds not counted by EIA (energy-related municipal bonds plus solid waste PABs) were 11 times the magnitude of the issues that EIA did count. Table 4 illustrates a single year of new bonds issued, though total tax subsidies to borrowers flow from the sum of all tax-exempt bonds that remain outstanding in a particular year. Thus it is easy to surmise that EIA has ignored hundreds of billions of dollars in energy-related tax-exempt debt.

Table 4. EIA Treatment of Tax-Exempt Debt Excludes Majority of Energy-Related Beneficiaries

	Energy-Related New Money Issues in 2006 *($millions)*	**Percent of Total Issuance** *(by $ value)*
Included in EIA subsidy calculation		
Private activity bonds (Note 1)		
Electricity or gas	128	0.2%
District heating or cooling	20	0.0%
Hydroelectric environmental facilities (Note 2)	Withheld	
Total bond pool in EIA-included categories	148	
Excluded from EIA subsidy calculation		
Private activity bonds		
Solid waste disposal (Note 3)	2,560	4.0%
Municipal tax-exempt debt (Note 4)		
Electric power	12,897	3.3%
Pollution control	6,207	1.6%
Solid waste	1,663	0.4%
Gas works	10,742	2.8%
Combined utilities (includes some energy)	1,051	0.3%
Total energy-related bond pool excluded by EIA	35,120	

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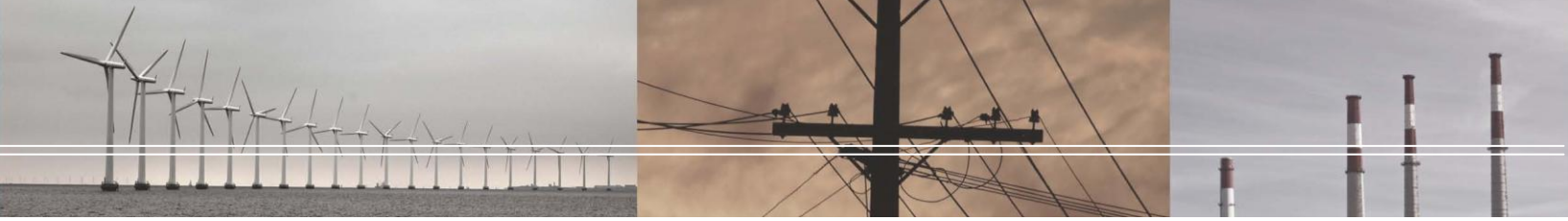


Table 4, continued

	Energy-Related New Money Issues in 2006 *($millions)*	Percent of Total Issuance *(by $ value)*
Total issuances in 2006		
Private activity bonds, all use of proceeds	63,286	
Municipal tax-exempt debt, all use of proceeds	388,559	
Total tax-exempt debt, excluding federal facilities	451,845	
EIA "Energy-specific" test		
Energy share of issuance		
EIA-included energy-related PABs/total PABs	0.2%	
Maximum energy-related new money (including solid waste PABs)	2,856	
Energy-related tax-exempt municipal debt/total municipal debt	8.4%	
Maximum energy-related new money (including solid waste munis)	32,560	
Energy-related municipal bonds as a multiple of energy-related PABs	11x	
Non-energy allowable use of proceeds		
Non-energy PAB use of proceeds groupings	18	
Non-energy municipal tax-exempt debt use of proceeds groupings	44	

Notes

(1) IRS (2008a).

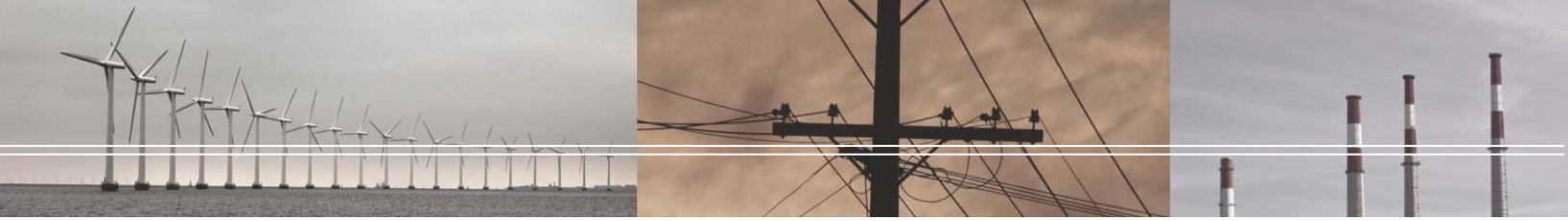
(2) Although data for a single year were withheld to avoid disclosing the recipients, the multiyear totals indicate that the effect on average issuances was negligible.

(3) Tax-exempt solid waste bonds were not treated as a subsidized class within EIA's 2008 analysis, even though they were private activity bonds. Despite the title of the use-of-proceeds class, energy does benefit directly through them, either through landfill-gas capture and reuse, waste-to-energy plants, and increasingly large issues associated with portions of ethanol production facilities. The latter were declared eligible in a private letter ruling issued by the U.S. Internal Revenue Service (IRS 2002).

(4) GAO (2008c).

4.3 Leasing and terms of access

Low-cost access to energy minerals on public lands can artificially reduce the production costs of specific forms of energy—primarily oil, gas, shale oil, coal, and uranium. Whereas a private landholder would have an incentive to maximize the value of resources leased, a variety of public laws or incentives may transfer extraction and production rights for less than their fair market value. For example, a survey that ranked government share or



revenues (or "take") associated with oil and gas extraction around the world placed the deepwater of the Gulf of Mexico among the lowest in the world (93rd among the 104 oil and gas systems evaluated) (GAO 2008d: 6). This figure is all the more striking given the low political risk that U.S. extraction operations face, a factor that should allow higher value capture by the host government.

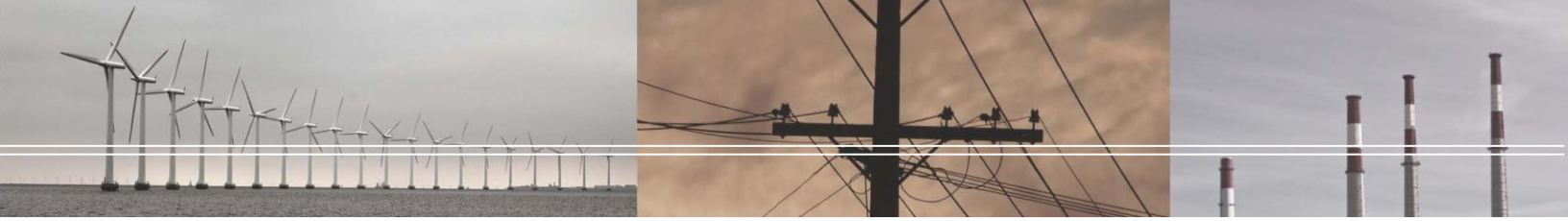
EIA acknowledges that below-market royalties may contain an element of subsidization (EIA 2008: 13), but it argues that they are hard to estimate because they require projections of fuel production and price levels—and in any case that they should be offset via higher bid prices. While royalty losses are more complicated to estimate than cash transfers, so too are many of the subsidy programs that EIA *does* include. For example, projections both of fuel production levels and prices are needed to develop projections of percentage depletion allowances. Similarly, while there may be some interplay between bid prices and royalty rates, it is unlikely to be one-to-one. In fact, bid and bonus payments are much higher-risk for the bidder than gain sharing over the life of the contract (in effect what royalties are) because they are fixed payments based on uncertain projections of resource endowments and associated market values.

Four important subsidies to energy access are:

- **Missing royalty payments.** Under the 1995 Deep Water Royalty Relief Act, offshore leases in the Gulf of Mexico awarded between 1996 and 2000 provided subsidized royalties. The goal was ostensibly to offset higher extraction costs. Price thresholds were set so that if oil prices rose, making the higher extraction costs irrelevant, royalties would again be paid. Unfortunately, the Department of the Interior (DOI) "forgot" to include price thresholds for leases awarded in 1998 and 1999. This mistake was estimated to have cost the Treasury $1 billion/year (FOE 2008: 6). Moreover, DOI lost a case involving whether the price thresholds were legal at all, on the grounds that Congress intended that there be volumetric caps only. GAO estimates that the cumulative revenue loss will be $22–$53 billion. (GAO 2008f).[15] DOI contended that if the court's ruling stood, this would perhaps amount "to one of the biggest giveaways of federal resources by Congress in modern history" (Porretto 2009). The Supreme Court rejected DOI's appeal in October 2009.

  This discussion illustrates two important general issues. First, every energy technology has a supply curve in which some applications are economic only in periods of high prices, in high-cost markets, or after additional R&D. Federal policy

[15] The trade press reported in January 2009 that falling market prices for oil would reduce the scale of lost royalties to around $6–10 billion (Porretto 2009). Though oil prices fell by a bit more than half between their peak in 2008 and this article (they are much higher now), it is not clear why royalty-loss estimates should fall by about a factor of four.



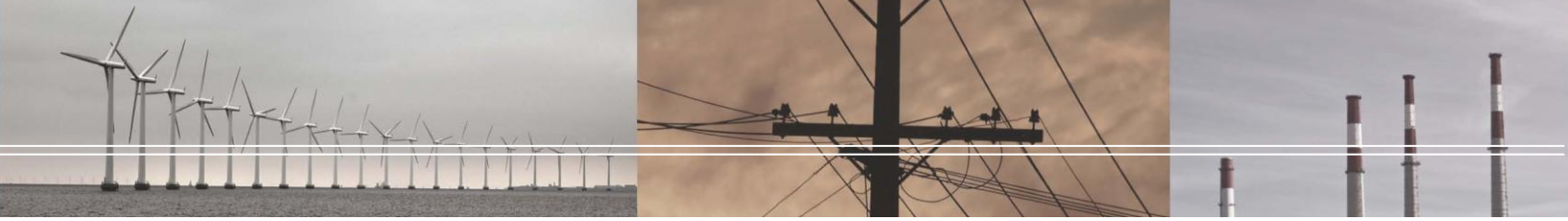
that subsidizes access to high-cost conventional energy resources may inadvertently undermine the transition to more sustainable resources in other market segments. Second, there were significant problems with basic contractual issues (missing royalty payments), as well as a lack of clarity with regard to how price caps should be set. These illustrate government's challenges in trying to manage complex operations and set policy parameters that flexibly adapt to changes in the marketplace. Such mistakes are likely to reappear in some of the government's newest complex energy endeavors, such as the large loan guarantee programs under EPACT 2005 or its even more aggressive Clean Energy Deployment Administration, which establishes a massive federal energy lending facility.

- **Inadequate collection of royalties due.** Royalties due from oil and gas leases on federal lands could often be paid in two forms: cash ("royalty in value") or actual fuel deliveries (royalties "in kind"). Both approaches have had their problems:

    - Litigation on underpayment of cash royalties has gone on for years. The government has argued that integrated oil producers would adjust transfer prices on extracted fuels in order to reduce the value on which royalty payments were calculated. Transfer price mechanisms are a decades-long issue in the oil and gas sector, covering international operations as well.

    - Problems with transfer prices are avoided with in-kind royalties, as payments are a percentage of fuel volume. However, there have been problems with proper auditing of the payments, as well as with government management of the fuel resources. For example, GAO questions a number of the claims made by the Minerals Management Service that royalty-in-kind collections are above what they would have received in cash (GAO 2008e). In addition, poor administrative controls and numerous corruption and conflict-of-interest investigations (Kravitz and Flaherty 2008) suggest that revenues were probably not fully realized.

- **Other royalty-relief provisions for oil and gas.** A number of smaller royalty-based subsidies were also introduced in the Energy Policy Act of 2005. They included reduced royalties to marginal producers, deep wells in shallow waters of the Outer Continental Shelf, deepwater wells in the Gulf of Mexico, offshore production in Alaska, methane gas hydrates in the Outer Continental Shelf and Alaska, and enhanced oil and natural gas production. For each of these resources, proponents have argued that additional subsidization (often in the form of reduced royalty payments) is needed because the resources are harder to access than conventional oil and gas. However, royalty reductions are relevant only to federally owned extractive resources, and as such they bias energy selection away from resources with very low



or no fuel costs (such as wind and solar). In addition, royalty relief has not been adjusted when energy prices have risen. In fact, GAO reported that royalty modifications are often done "on an ad hoc basis with consequences that could amount to billions of dollars in foregone revenue" (GAO 2008d: 1).

- **Royalty-free extraction of hard-rock minerals.** Governed by the antiquated Mining Law of 1872, hard-rock minerals—including uranium—can be extracted from federal lands royalty-free with a claims-patenting cost of $5 per acre or less.[16] These rules subsidize the extraction of uranium, thereby underwriting nuclear power costs. As uranium mines can often cause environmental problems, the provisions also indirectly encourage land and water degradation. Energy-related losses were not large until recently, given the low market prices for uranium. However, sharply rising ore prices through 2008 caused uranium-mining claims on public lands to increase tenfold, to more than 43,000, between 2004 and 2005 (Pasternak 2008).

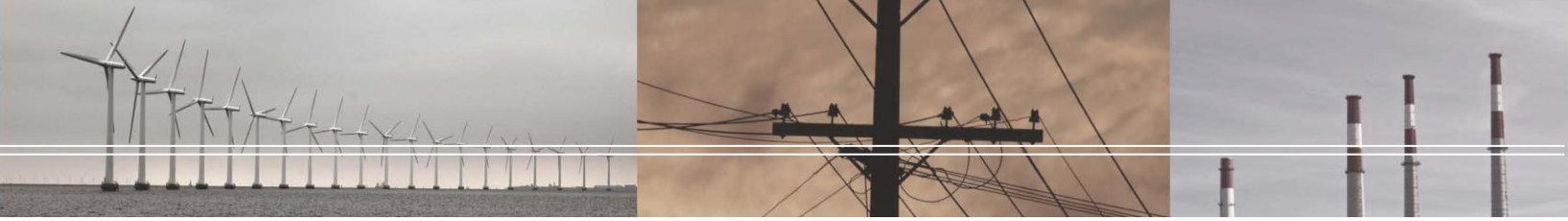
4.4 Corporate form and tax burden

Rules governing the taxation of multinational enterprises are complex. Nevertheless, tax-minimization strategies to exploit a number of tax subsidies have long been applied by U.S firms operating abroad, and by foreign-controlled firms operating in the United States. These rules have been of particular benefit to multinational energy producers.[17] Congressional testimony in the early 1970s discussed how international oil companies used a variety of tax-shifting approaches, including transfer pricing to tanker subsidiaries incorporated in low-tax countries such as Panama and Liberia, to defer their U.S. tax burden or eliminate it almost entirely (Jenkins 1975). Unfortunately, the many strategies used by the large energy producers are not discussed at all within the EIA analyses.

While many of the tax strategies are applied by industries in multiple sectors (and therefore not "energy-specific" by EIA's definition), energy firms have a number of characteristics that make the available tax subsidies particularly valuable to them. First, some energy firms—primarily in the oil and gas sector—are among the largest corporate entities in the world. Their scale and geographic coverage makes it easier for them to avoid tax burdens, often through "artificial non-arm's-length transfer prices," which shift recognition of profits to lower-taxed activities or regions. Because many U.S. rules do not tax foreign income until it

[16] Claims patenting converts public land to private land in return for a very small fee. Under the 1872 law, patenting gives the new owner rights to all aspects of land ownership, not just the hard-rock minerals. Congress placed a moratorium on patenting in 1994, which it has renewed annually ever since—though it has not yet eliminated the practice entirely (Horwitt 2009).

[17] Gramlich and Wheeler (2003), for example, document the complex organizational and transfer approaches used by Chevron and Texaco to reduce their U.S. tax burden from Indonesian operations. The authors estimate that these strategies enabled the firms to reduce their U.S. state and federal taxes by more than $9 billion between 1964 and 2002.



is "repatriated" to the United States (most U.S. income is taxed when it is earned), these firms have also been able to exploit very long deferrals in tax payments.

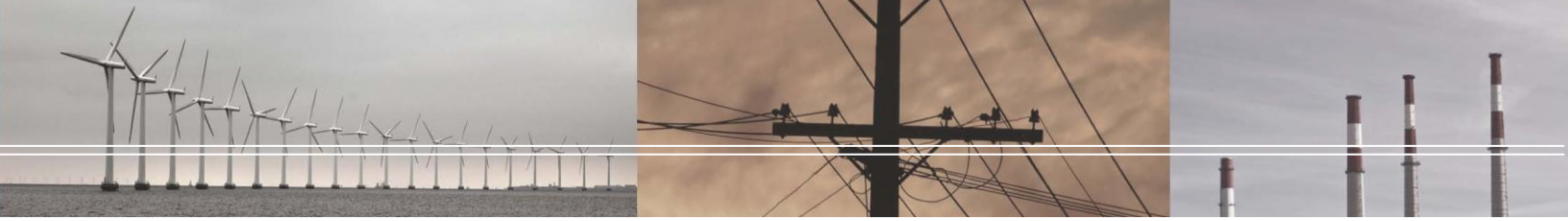
Second, extractive industries are obliged to make a separate class of resource-related payments to host governments, normally in the form of royalties, resource rents, or severance taxes. Because these payments are treated as tax *deductions* rather than full credits from U.S. tax bills, energy firms have sometimes reclassified them as foreign taxes, exploiting international agreements barring double taxation in order to reduce their U.S. taxes.

Foreign-owned firms operating in the United States use similar strategies. According to a recent GAO analysis of Internal Revenue Service data:

> "FCDCs [Foreign Controlled Domestic Corporations] reported lower tax liabilities than USCCs [United States Controlled Corporations] by most measures shown in this report. A greater percentage of large FCDCs reported no tax liability in a given year from 1998 through 2005, and large FCDCs were more likely to report no tax liability over multiple years than large USCCs (GAO 2008b: 3).

In both of these areas, the Internal Revenue Service has attempted to address the problem. Section 482 of the tax code allows the IRS to allocate income among related companies if it determines that the transfer prices used in the tax filing were not accurate (GAO 2008b: 4). The issue of tax shifting or long deferral for U.S.-owned foreign operations has been attacked by Subpart F rules of the tax code, first adopted in 1962. These rules, which include special provisions related to oil and gas income, do seem to have reduced some of the tax revenue losses (Singmaster 2007). However, challenges clearly remain. The JCT has estimated that further restrictions on the improper use of the foreign tax credits would boost tax revenues from the oil and gas sector by roughly $3 billion over a five-year period (FOE 2008, based on JCT 2008b). Other estimates of this subsidy have been substantially higher (Koplow and Martin 1998: 2–6; ELI 2009: 7).

Although a single year of filings is not definitive, Table 5, based on the IRS's analysis of foreign tax credit (FTC) filings for 2003, is instructive. While all industries evaluated claimed FTCs equal to roughly 33 percent of their U.S. income tax burden, the figures in oil and gas extraction, and in petroleum trade, were at least 50 percent (last column in Table 5). The petroleum and coal products manufacturing sector was claiming tax offsets close to 70 percent of the U.S. taxes due. The specific rules governing claims by the oil and gas sector do seem to have worked to some degree, however: oil claims are lower than those for coal and metal ore, where FTC claims have approached 90 percent of their tax burden. Overall, however, substantial tax subsidy benefits seem to continue to accrue to the energy sector from the rules governing taxation of foreign-source income. It is certainly notable that



although energy-related segments represent roughly 15 percent of the foreign-source income subject to U.S. tax (U.S. income tax before credits in Table 5), they represent nearly 30 percent of the total FTC claims.

Table 5. Foreign Tax Credit Claims by Industry, 2003

Industry	Income subject to U.S. tax *($millions)*	U.S. income tax before credits *($millions)*	U.S. gross rate	FTC claimed *($millions)*	FTC as a share of taxable income	FTC as a share of U.S. income tax
All industries	424,500	149,244	35.2%	49,963	11.8%	33.5%
Oil and gas extraction	3,297	1,159	35.2%	580	17.6%	50.0%
Coal mining and metal ore mining	1,238	455	36.8%	406	32.8%	89.2%
Support activities for mining	898	314	35.0%	26	2.9%	8.3%
Utilities	1,346	471	35.0%	54	4.0%	11.5%
Petroleum and coal products manufacturing	55,698	19,523	35.1%	13,455	24.2%	68.9%
Wholesale trade—petroleum and petroleum products	1,047	366	35.0%	189	18.1%	51.6%
Total, energy-related	63,524	22,288		14,710		
*Energy-related/total**	15.0%	14.9%		29.4%	23.2%	66.0%
Primary metal manufacturing	1,194	429	35.9%	380	31.8%	88.6%

Incremental U.S. taxes if the FTC claims from energy sectors were to equal the average of all industries:	
U.S. income tax before credits, energy-related	22,288
FTC claims at 66-percent rate	14,710
FTC claims at 33.5-percent rate	7,461
Estimated incremental tax payment	7,249

*Weighted averages.

Sources: Singmaster (2007), Earth Track calculations.

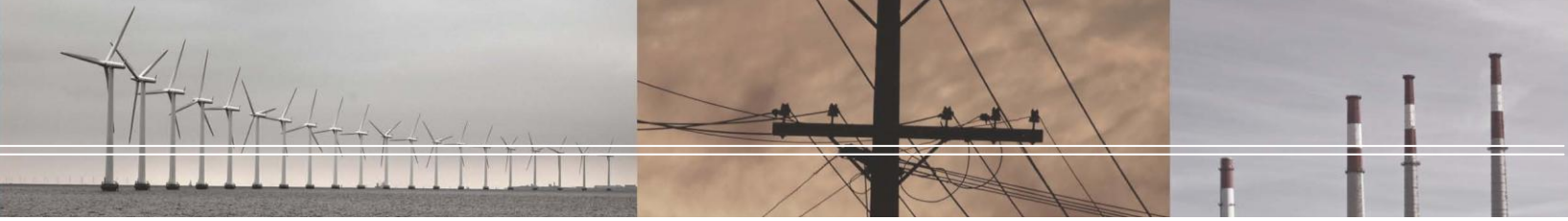


Table 6 examines data on the use of "pass-through structures"—which include corporate forms such as limited-liability corporations (LLCs) that enable firms to "pass through" income to owners without paying corporate income taxes—for energy operations within the United States. There are some indications that the energy sector is making higher-than-average use of these structures, thereby reducing its tax burden. For example, most partnerships in the energy extraction and bulk energy transport sectors averaged more partners than is the norm across all industries. The pipeline transportation segment in particular averaged more than 2,600 partners per entity (based on IRS data), versus the economy-wide average of only six. This difference probably indicates the use of pass-through entities that are syndicated either through publically traded partnerships or private equity markets.

Other data sets suggest that the majority of assets held in the mining, utility, pipeline, and petroleum and coal products manufacturing sectors are in corporate forms rather than in partnerships (CBO 2006: 38). Government data-collection efforts do not always differentiate between the newer corporate forms, however. Thus, additional research would be needed to determine whether some of the firms classified as corporate by the Congressional Budget Office (CBO) are really pass-through structures such as LLCs that, despite being called "corporations" nonetheless eliminate corporate-level tax exposure.

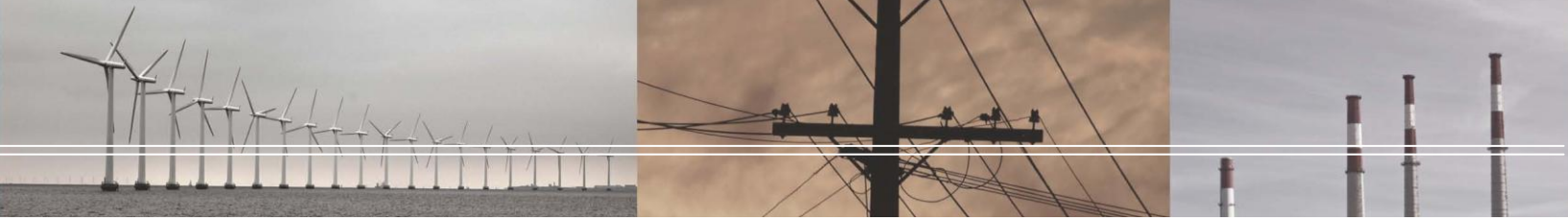
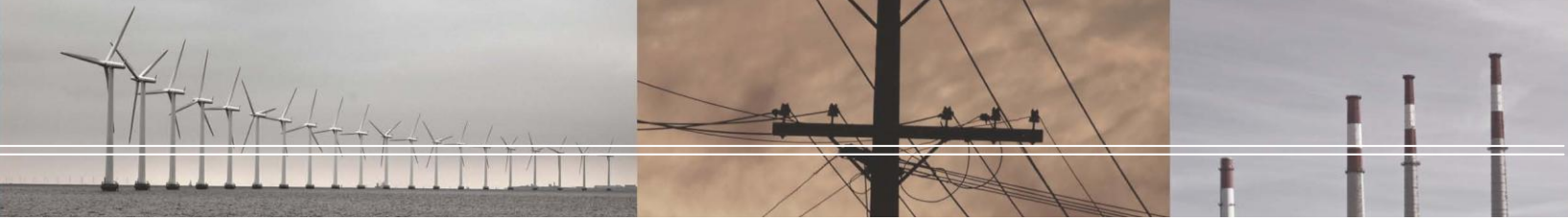


Table 6. Energy Sector Use of Organization Forms Exempt from Corporate Taxation

Industry Sector	Number of Partner-ships	Number of Partners	Avg. Partners per Partner-ship	% Share of Partners	Assets ($mils)	% By Assets	Total Net Income ($mils)	% by Net Income
All industries	2,947,116	16,727,803	6	100.0%	17,146,275	100.0%	666,719	100.0%
Oil and gas extraction	26,999	611,350	23	3.7%	199,889	1.2%	42,211	6.3%
Other mining	3,975	96,385	24	0.6%	21,386	0.1%	2,130	0.3%
Support activities for mining	3,727	21,630	6	0.1%	7,619	0.0%	1,567	0.2%
Utilities	2,924	84,157	29	0.5%	201,728	1.2%	9,158	1.4%
Utility system construction	1,646	4,491	3	0.0%	1,942	0.0%	431	0.1%
Petroleum and coal products manufacturing	335	42,211	126	0.3%	134,456	0.8%	18,837	2.8%
Pipeline transportation	388	1,035,825	2,670	6.2%	109,426	0.6%	4,231	0.6%
Total	39,994	1,896,049	47	11.3%	676,446	3.9%	78,565	11.8%
Transportation equipment manufacturing	1,198	3,804	3	0.0%	40,532	0.2%	3,314	0.5%
Motor vehicle and parts dealers	15,946	40,726	3	0.2%	35,473	0.2%	789	0.1%
Gasoline stations	7,683	19,658	3	0.1%	12,908	0.1%	409	0.1%
Automotive repair and maintenance	20,979	52,950	3	0.3%	4,620	0.0%	426	0.1%
Total vehicle construction and refueling	45,806	117,138	3	0.7%	93,533	0.5%	4,938	0.7%

Source: Earth Track calculations based on IRS (2008b).



4.5 Public power

On a theoretical basis, EIA's discussion on how to evaluate subsidies to public power is mostly on target. For example, it notes that "[o]ver the long term, IOUs [investor-owned utilities] must earn a sufficient return on invested capital to satisfy their shareholders. … If sales of services provided by government-owned assets provide a below-market return on assets, a preferential benefit is being conferred on customers" (EIA 2008: 209). EIA also recognizes that subsidized debt costs are part of a more complicated set of subsidies:

> "There are also two notable distinctions between the IOUs and the Federal utilities. One, is Federal utilities are not subject to paying Federal taxes; the other is that Federal utilities do not have to raise equity, as they are entirely debt-financed. The return on asset calculation addresses these issues in part by comparing a Federal utility rates [sic] of return (net operating income over plant and equipment) with an IOU rate of return prior to taxation and payments of dividends (again net operating income over plant and equipment)" (EIA 2008: 210).

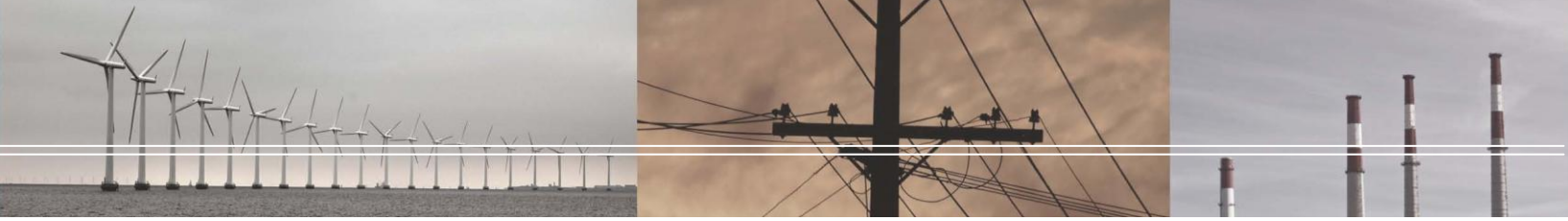
Even with respect to how credit subsidies distort market choice, EIA notes that the opportunity cost of these implicit guarantees can be high even if the direct cost from defaults is not. It quotes a 1985 report of the Congressional Budget Office:

> "The implicit guarantee of GSE [government-sponsored enterprise] debt has never required a cash outlay by the Federal government. The subsidy that never leads to a cash payment may appear not to be 'real'—that is, not costly. The implicit guarantee of GSE debt is costly in terms of alternatives that must be necessarily, if unconsciously, given up by the economy" (EIA 2008: 62-63).[18]

The subsidy estimates themselves are far less inclusive. Although EIA did estimate subsidies using a return-on-asset approach, it did so on a pre-tax basis (investors are concerned with after-tax returns). Similarly, EIA did not integrate the tax-exemption of the utilities in their estimates, nor the benefits from favorable loan-repayment structures.

Finally, by focusing only on a handful of federal facilities (four PMAs, TVA, and Rural Utility Service energy loans), EIA's estimates included no valuation of the large subsidies that flow to municipally or cooperatively owned energy infrastructure throughout the country.

[18] The report cited is CBO's Government-Sponsored Enterprises and Their Implicit Government Subsidy: The Case of Sallie Mae, December 1985.



Although lower than they should be, these alternative metrics were nonetheless four times (at least $1.6 billion) higher than the credit-subsidy value EIA actually included in its totals (see Table 7). The stated reason for excluding these alternative metrics from the reported tallies was that "[d]ue to data limitations, these measures of support were not deemed to be as accurate as the interest support" (EIA 2008: 204). Given that no values at all for public power were included in prior studies, there may have been other factors behind the exclusion as well.

Table 7. EIA Tallies Include Low-end Subsidies to Public Power Only ($Millions)

	BPA	Small PMAs	TVA	RUS	Total
Credit subsidies (shaded values reported in EIA tallies)					
Bond rating "A" (note 1)	138	77	88	305	608
Bond rating Baa	181	92	160	380	813
Alternative subsidy benchmarks (quantified by EIA but not included in subsidy tallies)					
Underpricing of services (note 2)	1,617	1,596	(421)	not est.	2,792
Pre-tax return on capital (note 3)	693	512	1,141	not est.	2,346

Notes

(1) EIA estimated credit subsidies using a variety of credit qualities, but it chose the "A" rating as the best proxy for the federal power facilities being evaluated.

(2) EIA estimated that TVA was selling at rates slightly above alternative providers, at least during the year analyzed, generating a negative value

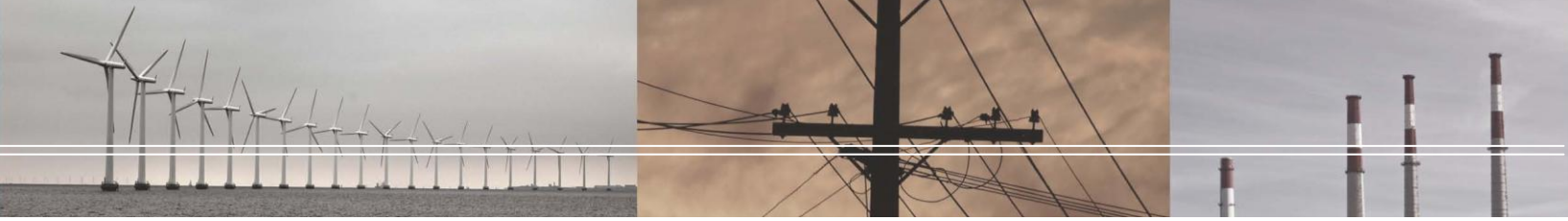
(3) This value included return on deferred assets, mimicking what would have happened for a private regulated utility. Implied support to meet IOU after-tax returns would be 30–40 percent higher.

Key: BPA = Bonneville Power Administration; TVA = Tennessee Valley Authority; RUS = Rural Utility Service of the U.S. Department of Agriculture; Smaller Power Marketing Administrations include the Western Area Power Administration, the Southeastern Power Administration, and the Southwestern Power Administration.

Source: EIA (2008)

4.6 Energy transport and security

Energy moves in enormous quantities both within the United States and around the world. Whether in the form of pipelines, shipping channels, bulk terminals, or transmission hubs, the delivery system is full of potential choke points that are often difficult to make secure. One of the big advantages of smaller-scale decentralized energy resources is that they can more closely collocate supply and demand and can create a more diversified and robust source of supplies. Meanwhile, although governments still have an interest in trying to avoid energy choke points, they should do so transparently, with user charges that are passed back



through to consumers. Otherwise, subsidies may actually extend our reliance on energy sources with poor security and transport profiles.

In both the transport and security areas, policies historically have *not* been transparent. Costs of bulk energy transport have long been subsidized through a variety of policies; and energy security costs have often not even been tallied, let alone integrated into transparent user fees. Neither of these important issues was addressed in a satisfactory manner in the EIA analysis.

4.6.1 Bulk energy transport

Coal and oil have been among the largest users of the nation's inland-waterway and coastal shipping services. In the late 1980s, they made up close to 60 percent of domestic-shipping and over 50 percent of ocean borne-shipping volume (Koplow 1993a). The ratios remain quite similar nearly 20 years later (see Table 8), with coal and oil accounting for more than 50 percent of the tonnage moving through our water transit systems.

To the extent that user fees on shippers do not cover their share of the costs of building and maintaining this infrastructure, the markets for coal and oil (and, to a lesser extent, for ethanol and LNG) benefit. None of these issues is discussed in the EIA report. Historically, however, the portion of subsidies to bulk water transport benefiting the energy sector was well above $1 billion per year (Koplow 1993a).

A number of subsidies are relevant to bulk water transport. Tax-exempt bond issues, including both public purpose and private activity bonds, are used to finance seaports, harbors, locks, and wharves. Much of the actual work on the inland waterways is conducted by the U.S. Army Corps of Engineers. As was the case with public power operations such as the Bonneville Power Administration, the Army Corps does not set rates sufficient to earn a profit or a return on invested assets, and it does not pay taxes on any surplus. In addition, it is not always fully reimbursed by system users for the work it undertakes to maintain and improve the nation's waterways. In the coastal regions so heavily used by oil tankers, services of the Maritime Administration and the U.S. Coast Guard are important in regulating traffic and safety. Historically, user fees in these areas have not covered the cost of the services provided either.

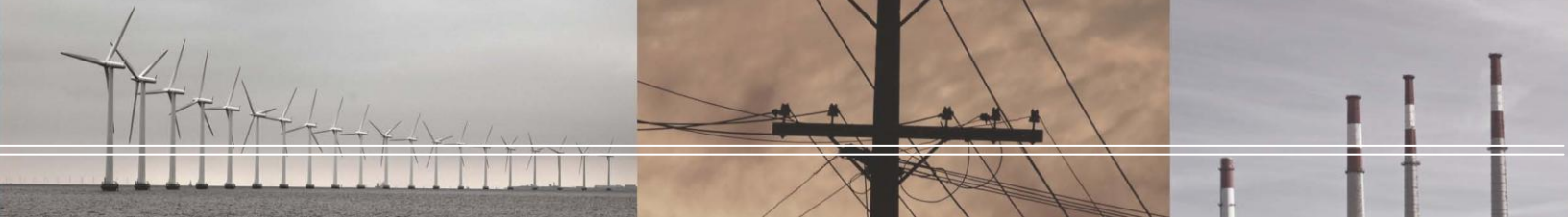


Table 8. Energy Commodities Account for Over Half of the Tonnage in Waterborne Commerce

Commodity	All Tonnage	Coastal	Inland	All Tonnage	Coastal	Inland
	Million Short Tons			*Billion Short Ton-Miles*		
All commodities	2,588	1,767	821	562.0	227.0	335.0
Energy commodities						
Coal	318	91	220	79.0	6.0	73.0
Crude Oil	595	562	33	64.0	60.0	4.0
Oil products	527	346	180	149.0	111.0	38.0
Benzene and toluene	12	2.6	8.8	2.0	0.5	1.5
Alcohols	25	17	8	5.0	1.0	4.0
Totals						
Coal share	12.3%	5.1%	26.8%	14.1%	2.6%	21.8%
Oil share	43.8%	51.5%	27.0%	38.3%	75.6%	13.0%
Ethanol share	1.0%	1.0%	1.0%	0.9%	0.4%	1.2%
Total energy share	57.1%	57.6%	54.8%	53.2%	78.6%	36.0%

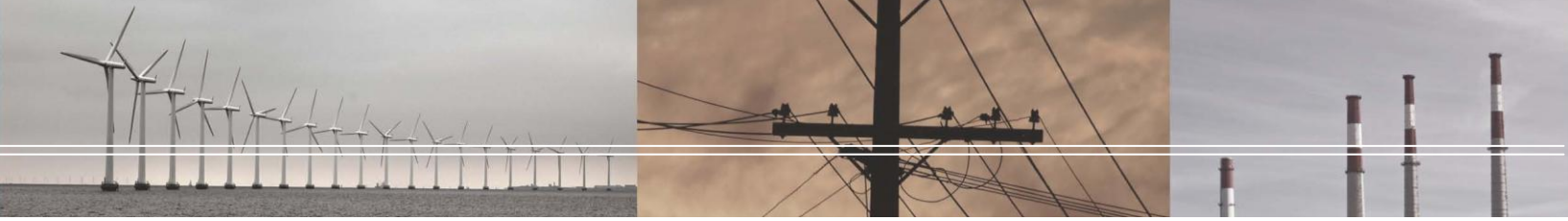
Source: U.S. Army Corps of Engineers (2008)

4.6.2 Energy security

The risk of supply disruptions is prevalent in markets well beyond those of the oil sector. Normal market responses include demanding a higher price to reflect the higher risks of a vulnerable supply; investing in approaches, such as diversification, new exploration, stockpiling, and policing, to make the supply less risky; and developing substitute materials and ways to use limited supplies more efficiently (Koplow and Martin 1998).

Price signals are important in identifying where these vulnerabilities lie, as well as in identifying the most attractive alternative strategies. Subsidies work in the opposite direction, masking supply vulnerabilities and reducing the returns to individuals and firms that invest in solutions.

Subsidies to energy security are most visible in the form of military infrastructure deployed in key oil-supplying regions of the world, where part of its stated purpose is to help protect supply routes; and in oil-stockpiling operations such as the Strategic Petroleum Reserve. In detailed work by this author in the late 1990s, these two services accounted for the two largest subsidies to oil, totaling $12–28 billion per year (in 1995$) (Koplow and Martin 1998).



Other authors have attributed higher shares of the Persian Gulf military force structure in the oil mission, and hence have calculated subsidy values as much as an order of magnitude higher (Copulos 2003).[19]

While disagreement may remain over whether these subsidies should be recovered from oil markets, much more should be done to value and report the cost of these energy security expenditures in more consistent ways. The Strategic Petroleum Reserve (SPR) provides a useful example of the problem.

As of February 4, 2009, the SPR held 704 million barrels of oil at an average acquisition cost of $28.42/barrel (SPR 2009). The gross investment, before accrued interest, was $20 billion in oil inventory alone. Normally, a business would need working capital to finance this inventory, for which it would incur a cost of funds. But SPR accounting assumes this money is free, even though the United States is running a deficit and the Treasury is incurring higher interest charges because funds are tied up in oil stockpiles. Even assuming that past interest charges are written off, and applying interest rates that are among the lowest in the past century (0.52 percent on one-year Treasury bills, 3.88 percent on the more appropriate longer-term debt needed to finance a long-term stockpile as of January 2009), the debt service on this oil inventory would cost the SPR between $100 and $775 million per year.[20]

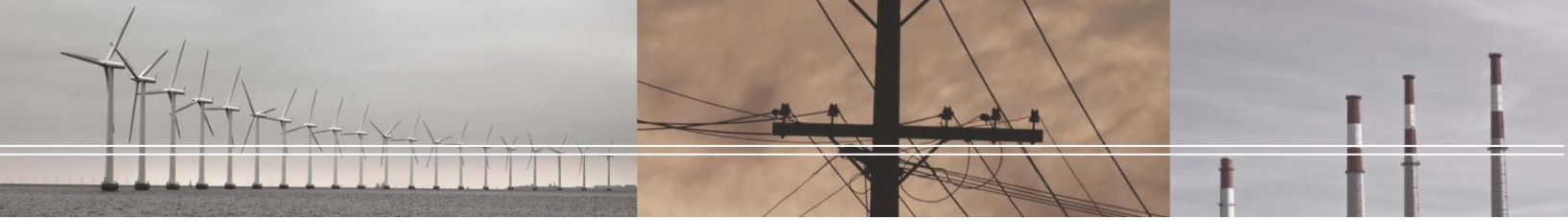
In contrast, SPR appropriations for FY2008 were only $187 million (DOE 2008), meaning that the budget would need to more than quintuple just to break even. More accurate subsidy assessments that reflected a mixed cost of financing based on when the inventories were purchased, and that compounded interest on stockpiles not paid in the past (as would happen with one's credit card or mortgage), would result in subsidies to oil via SPR in the billions of dollars per year.

In addition to oil stockpiling and defense of Persian Gulf oil-shipping lanes, there are a number of less visible supports that the federal government provides in order to make particular forms of energy secure. These supports include contingency planning and surveillance for key domestic energy assets such as major pipelines and nuclear power plants; military protection of oil installations abroad; and increasingly complex monitoring efforts to prevent civilian nuclear-energy programs from seeding nuclear weapons proliferation.

Transparency in all of these areas is lacking. A few years ago, the United States provided hundreds of millions of dollars in support to help protect the Cano Limon pipeline in Colombia (Forero 2002). While this program seems to have ended, it is difficult to tell where

[19] A summary of the various oil-security studies as of 2004 can be found in RMI (2004).

[20] The range reflects the difference between using short-term or longer-term financing rates. Because the stockpile is intended as a long-term supply buffer, a longer-term rate is more appropriate than financing it with rolling short-term money.



else the government may be engaged in similar projects abroad, although press reports indicate that every combatant command has a number of energy-protection missions. It is likely that government expenditures in some of these areas are both prudent and efficient, given the high economic costs of energy supply disruptions. Nonetheless, in most cases they should be funded via user fees rather than taxpayer subsidies.

4.7 Accident risk and environmental cleanup

If an energy source creates significant accident risks, requires long-term site management, or generates environmental problems that must be remediated, the associated costs should be reflected in the price of the resultant energy. As with energy security, this pricing differentiation is necessary for investment to be directed toward, and for innovation to occur in, energy sources with fewer of these liabilities. But as has also been the case with energy security, government intervention in the areas of accident risk and site cleanup too often subsidizes the problematic attributes instead, thereby muting the market's tendency to diversify supply or invest more heavily to reduce emissions or minimize risks.

EIA just touches on these issues. The report acknowledges, for example, that the Price-Anderson caps on nuclear accident liability do reduce nuclear operating costs; it includes special tax benefits for payments to disabled coal miners as a subsidy to coal in its accounting; and it discusses collections in the federal Nuclear Waste Fund—though without weighing in on their long-term adequacy to address the challenge for which they are being collected. As with a number of other areas in the EIA analysis, some subsidies that are excluded are quite similar to ones that are included.

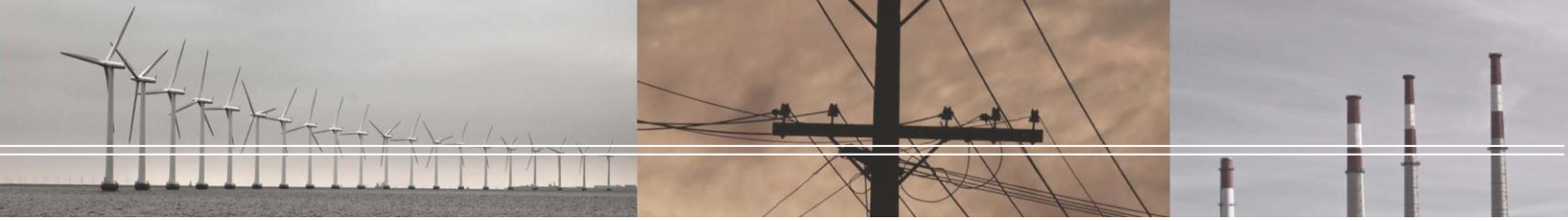
4.7.1 Oil and gas

Government caps on oil spill liability and government-assisted cleanup of polluted or abandoned extraction sites provide risk-related subsidies to fossil fuels. EIA's analysis does not discuss these programs.

4.7.2 Nuclear power

A variety of programs in these areas are not quantified by EIA, and some are not even mentioned.

- *Industry oversight.* Domestic oversight of the nuclear power industry by the Nuclear Regulatory Commission historically did not recover all of its pertinent costs via user fees. This has changed in recent years, though more than $70 million/year in costs attributed to homeland security still are not paid for by fees. More analysis would be needed to determine whether any portion of these exclusions constitute a *de facto*



subsidy to civilian power. U.S. contributions to the International Atomic Energy Agency, in part to stem proliferation risks abroad associated with civilian power-related activities, would fall into this same category.

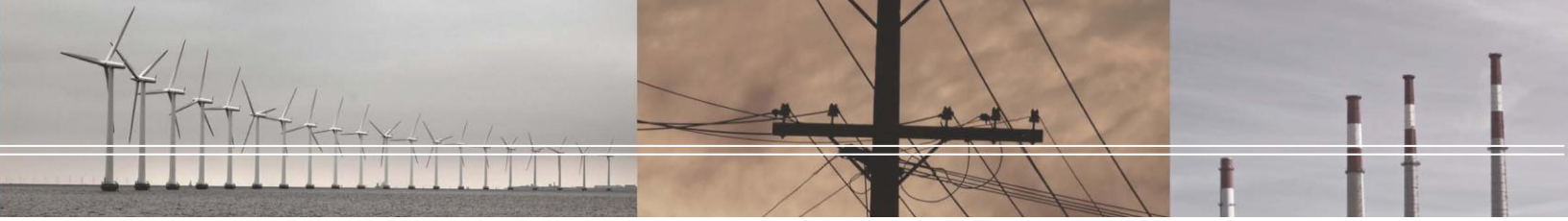
- *Accident liability.* The Price-Anderson Act's caps on liability for off-site damages to people and property from nuclear accidents have not risen by more than the inflation rate since their inception, and they have lower limits on per-plant coverage than what the utilities routinely purchase for on-site damage and business-interruption coverage.[21] On this issue, EIA notes that "[t]here is an implied subsidy in the form of reduced insurance premiums per operating unit which reduces the operating costs of commercial nuclear power plants. … Price-Anderson coverage could become more critical with the significant increase in potential radioactive waste shipments which can be anticipated in both the near- and long-term horizon" (EIA 2008: 198). But EIA assumes zero subsidy, does not discuss the role of proper price signals even when there is no accident (which would encourage appropriate investments in risk mitigation), and does not acknowledge potential complications in coverage due to federal intervention in terrorism-risk insurance. Price-Anderson caps apply not only to reactors, but to fuel cycle and research facilities, contractors, and transporters as well.

- *Waste management and remediation.* In the areas of waste management and remediation, EIA notes that the Nuclear Waste Fund had a balance of $28 billion in 2007 (EIA 2008: 194), but it does not assess the fund's long-term adequacy or the growing issues involving payment to firms for their on-site waste storage until a federal facility opens. Similarly, although EIA does cite GAO estimates of fund shortfalls amounting to $3.5–5.7 billion by 2044 (EIA 2008: 201), it does not include them in its subsidy calculations.

4.7.3 Coal and coal-mine safety and oversight

- *Worker protection.* EIA's analysis in this area includes two tax breaks—the exemption for disability payments to miners, and another break regarding the purchase of advanced mine-safety equipment. Large payments to black lung victims, either through the Social Security Administration or through shortfalls in the Black Lung Trust fund, are not included.

[21] While the pool of available coverage has grown (due to growth in the number of reactors), the required policy limits for each specific reactor have not (Koplow 2009a).



- *Mine safety.* Potential net shortfalls in user-fee financing of various federal mine-safety efforts, such as the activities of the Mine Safety and Health Administration, are not addressed.

- *Mine closure.* Large unmet needs to address remediation of abandoned coal mines throughout the country are also excluded.

- *Carbon capture and sequestration (CCS).* In this rising challenge for the coal industry, the federal government has stepped in with an array of supports—none of which are reflected in EIA's data. These supports include tax credits for sequestration, a growing federal R&D effort, and a potential shifting of large portions of the liability for the failure of CCS projects from operators to taxpayers.

4.7.4 Renewable energy

Liability coverage for catastrophic dam failures is fragmented and poorly characterized. Moreover, these policies do not seem adequate to match the possible damages of a significant accident—a growing concern, given the age of many of the dams and their obvious potential as terrorism targets. There is no explicit program that shifts these risks onto federal taxpayers, though federal payments for a wide array of disasters suggest federal intervention would be likely. The issue should be discussed in future EIA subsidy reports.

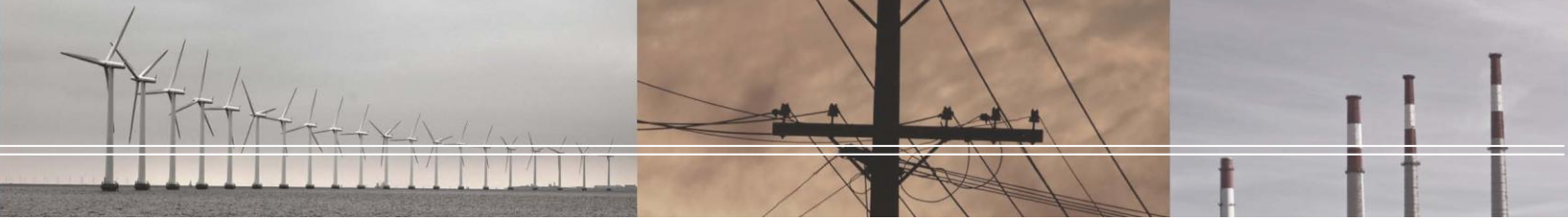
Also missing from EIA discussion is federal crop insurance. This program is increasingly relevant to the energy sector, generating pass-through subsidies to biofuel crops. Roughly 30 percent of the nation's corn crop is used to make ethanol, for example.[22] In fact, crop failures are one of the most important energy-security risks to the increased use of liquid biofuels.

Finally, end-of-life decommissioning may be needed for some renewable energy infrastructure such as large windmills and solar arrays. The problem is inadequately characterized at present, so its significance in terms of potential public liability is not known.

4.8 Minimum purchase requirements and border protection (tariffs)

EIA also excludes transfers created through regulatory interventions such as minimum purchase requirements and tariffs. Minimum purchase requirements stipulate quantity targets for specific energy resources that must be consumed in the market, even at a price premium. Border protection encompasses financial or other restrictions on the flow of fuels or energy

[22] For the 2008/2009 growing year, 30.2% of US production went to ethanol production. Excluding exports, ethanol markets absorbed nearly 36% of domestic consumption (FAPRI, 2009: 2).



services between countries, most commonly import tariffs While these instruments often operate by shifting market equilibrium prices (allowing higher prices for specified fuels or providers) rather than through government spending, they are increasingly important in some fuel sectors.

For example, minimum purchase requirements are already important in the liquid biofuels arena, through Renewable Fuel Standards (RFS). Rising mandates in this area could generate subsidies to beneficiary fuels in the tens of billions of dollars per year in the near future (Koplow 2009b). Tariff protection for domestic ethanol against Brazilian imports has also been important.

Like the RFS for liquid fuels, renewable electricity standards (RES, also sometimes known as renewable portfolio standards, RPS) for electricity stipulate minimum purchase requirements for specific forms of electricity. RES requirements exist in many states, and are likely to emerge at the federal level in the near future. While the resultant subsidy from RES' varies by the size of the purchase requirement and the eligible sources, the aggregate value of resultant transfers is likely to be many billions of dollars per year.[23]

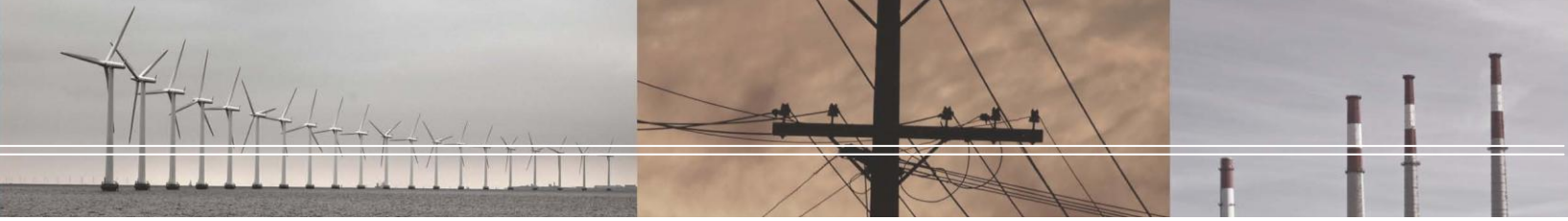
This is a financially important and evolving area of energy subsidy that needs to be integrated into future EIA subsidy assessments in a detailed and comprehensive manner. Relevant issues to address include: what fuels or activities are eligible under the rules, integration of sustainability metrics into production methods, trading between emerging federal systems and existing regional or state programs, generation of renewable-energy credits, and the interaction of these credits with parallel systems in the transport sector.

4.9 Export credit subsidies

While EIA did recognize that export financing at preferential rates constitutes a subsidy in its 2000 subsidy report (EIA 2000: 3), none of its reports have evaluated the scope or magnitude of these supports. This is an important oversight. The energy sector has long been a major focus of subsidized finance through export credit agencies (ECAs) and multilateral development banks (MDBs) funded by the US government. The form of this support has included subsidized loans, loan guarantees, and insurance.

Throughout the 1980s, for example, energy-related funding comprised more than 30 percent of the Export Import Bank of the United States' (Eximbank) portfolio (Koplow, 1993a).

[23] In a detailed review of the impact of renewable portfolio standards on pricing, Fischer (2010) notes that rising prices on mandated fuels can be offset in some circumstances by declining natural gas prices as fuel demand in the electricity sector shifts. She notes, however, that "both the analytical and numerical modeling suggest that rate reductions are only likely at lower RPS shares. At higher RPS shares, in contrast, the implicit tax quickly dominates and electricity prices increase rapidly." Note that even at low RPS shares where aggregate cost impacts may be small, shifts in relative prices of different energy resources will remain.



Although lower today, Eximbank still had $12.4 billion in total exposure to the energy sector in 2009, comprising more than 18% of its portfolio. Nearly two-thirds of its energy finance activities related to oil and gas (Eximbank 2009: 58). Present commitments to energy projects (active and planned) by the World Bank, of which the US is a major funder, approach $40 billion in loans and grants according to the Bank's project database (World Bank 2010).[24] Financial support even in recent years has largely supported fossil fuels over other energy resources (Mainhardt-Gibbs, 2009). In addition, there have been recent efforts to expand the ability to use export credit agencies to support nuclear power sales abroad (DOS 2008, OECD 2009).

Subsidies through ECAs and MDBs are common, though the details vary by deal structure and recipient country. Nonetheless, the support is generally recognized to bolster domestic industry by facilitating increased exports, often to financially risky parts of the world. The mixture of energy resources supported by preferential rates can also create distortions in energy markets. Careful review of ECAs and MDBs should be integrated into future EIA work on energy subsidies.

4.10 Energy R&D

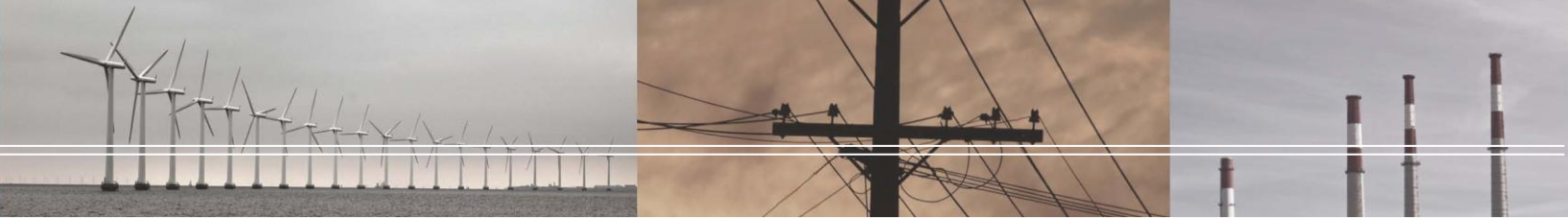
EIA attempts to track government spending on energy-related R&D. However, some of the data contained in one part of the report do not match what is presented in another, or the data are unclear in the first place. For example:

- Fusion energy research is discussed and quantified in the report. However, it is difficult to tell if this funding is included in the tallies for support to nuclear power or not. Fusion spending should be recognized as a subsidy, though preferably separated from support for nuclear fission.

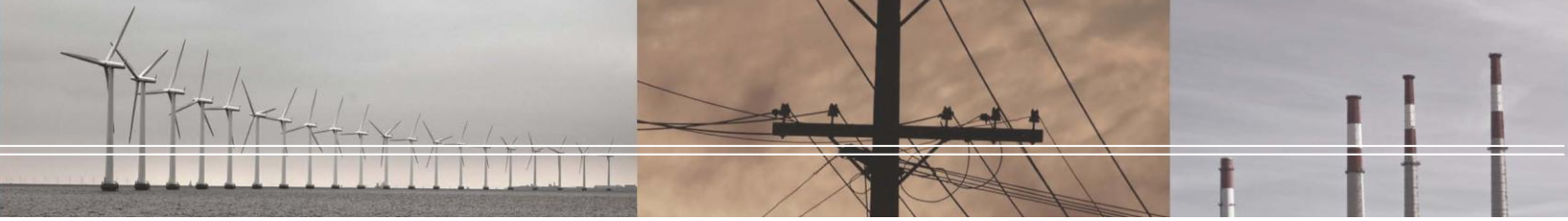
- EIA's summary for 2007 (EIA 2008: 40) gives $2.27 billion in R&D expenditures. However, Table 13 (EIA 2008: 43) presents the total as $2.82 billion, a difference of nearly $600 million. There may be a logical explanation for this difference, but it is not mentioned in the text.

- Any DOE characterization of research as basic is taken at face value, and only applied research is considered a subsidy to energy. While it is useful to differentiate between the two areas (the distortionary effects of basic research on inter-fuel competition are much less because findings are usually many years away from

[24] Historical support by the World Bank for the energy sector was equally large, comprising roughly 15% of total lending during the 1970s and 1980s. World Bank lending comprised roughly 7% of developing country total energy capital during the 1980s, a figure even more striking because it does not count the co-funding that the World Bank involvement made available (Koplow 1993a).



commercial applications), some evaluation of spending in both areas is warranted in order to identify any large items that are perhaps more applied than they first appear to be.



5. Summary and Policy Recommendations

Timely and accurate information on U.S. energy subsidies is critical. Subsidy reform is increasingly viewed as a central element to any plan addressing climate change. Yet new federal programs will boost subsidies to levels expected to reach hundreds of billions of dollars per year by 2030, sometimes in ways that exacerbate climate problems. Whether government intervention involves biofuels mandates, CCS tax breaks, potential carbon-credit allocations, or multibillion-dollar loan guarantees to specific industrial facilities, its scale is of growing importance both in terms of fiscal cost and the general functioning of energy market systems.

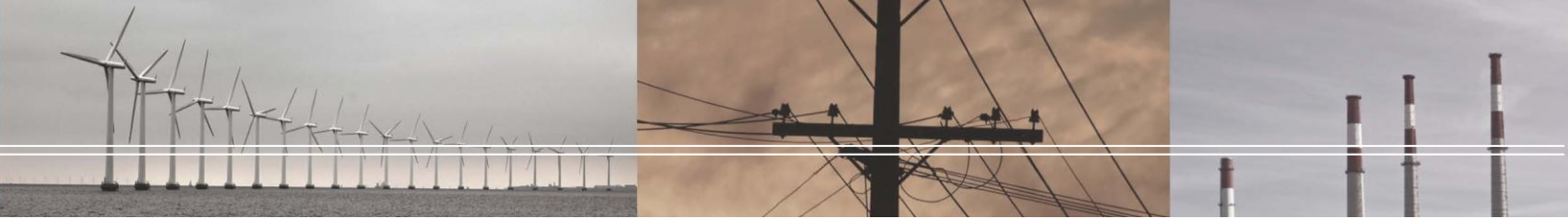
EIA's past work has come up short in accurately and systematically tracking these subsidies, with considerable effect. Correcting any one of the deficits outlined in this report would result in material changes, both in EIA's estimates of aggregate subsidy values and of the relative distribution across fuels. Correcting *all* of the deficits would result in subsidy figures dramatically different from what EIA reported in any of its past studies on this topic.

This is not just a problem of historical accuracy. Many of the limitations in EIA's past work—especially with respect to accurate measurement of minimum purchase requirements, credit support, and liability caps—pertain to exactly the types of support being ramped up in recent energy legislation. As such, the distortions in results from these problems are growing in their impact, not diminishing. If EIA is to be relied on as an important guide to energy subsidies, much work is needed. Its results should be a reflection of actual policies in place rather than an artifact of the Administration's nominal scope of work.

If EIA is to remain tasked with tracking federal subsidies, its work must be more systematic across subsidy types and show enhanced transparency. Analyses should be produced according to a regular, preannounced schedule. These improvements will ensure more representative results and allow the Administration not only to staff the project more consistently but also to invest in screening and valuation tools over time.

EIA should have the freedom to scope its research task as needed. Congressional directives for at least the past two studies have been highly prescriptive— specifically listing policies, such as accelerated depreciation, that could not be included in the subsidy totals. Such strictures eroded EIA's analytic independence and reduced the value of the resulting work. EIA staff have acknowledged that these limitations sometimes led to exclusion of policies, particularly in their more recent studies.

Any restrictions placed on the types of sources EIA is allowed to use should be made public. EIA's 2008 report did not contain a single citation for NGO work on subsidies, even though NGOs have been active in the field for decades and actually built up the



estimation methodologies in some areas. If Congress or DOE is placing restrictions on sources, this policy needs to be made public so that it can be challenged as necessary. Research quality is normally better if a variety of sources can be used.

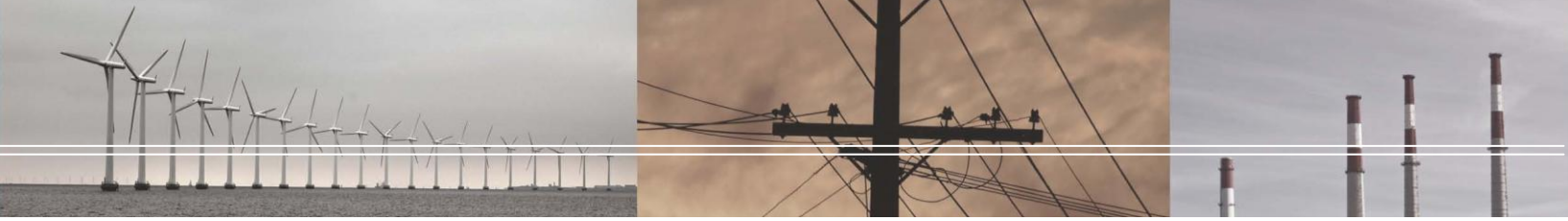
EIA should use range estimates rather than point estimates for the majority of subsidy transfers that are not simply cash payments. Tax, credit, insurance, and minimum purchase requirements are all examples of policies that provide substantial subsidies to the energy industry but that also require a complex process of estimation to quantify. When EIA oversimplifies—as in including only single measurement values in its totals for subsidies to federal power marketing administrations; or in using only Treasury estimates of tax-expenditure losses even when the Joint Committee on Taxation's estimates for the same provision were hundreds of millions of dollars higher—it creates a significant problem.

Such point estimates convey artificial precision, understate subsidy totals, and skew the reported fuel-by-fuel subsidy mix by billions of dollars. Adding JCT estimates to the subset of tax subsidies that EIA included in the past would by itself have extended reported subsidies by more than 30 percent, or some $5.3 billion per year. The largest percentage increases in subsidy value from this adjustment would flow to oil and gas (124 percent higher), nuclear power (66 percent higher), and coal (53 percent higher). Total subsidy shifts (increases plus decreases) were $7.2 billion.

Where the range is excessively wide, EIA should engage the key data sources (especially if they are both federal agencies) to address the cause of the large variation and, if possible, adjust it accordingly.

EIA must do a much better job of evaluating subsidy impacts on new investment. EIA has adopted a "snapshot" approach, which measures subsidies at a single time. While this is a useful metric, is it not useful to apply as the *only* metric of subsidy magnitude. In the past five years, scores of new and very large subsidies have been enacted, of particular benefit to new coal and nuclear plants, but because these facilities have not yet come online, EIA has pegged the subsidies at zero. As a result, these programs' enormous influence on the economics of new energy investments was entirely missed in EIA's work. Every future report should contain not only a snapshot subsidy estimate but also a marginal analysis of the impact of subsidies on the levelized cost of new investments. Both the California Energy Commission and the Congressional Research Service have used this approach, as has EIA in some of its other activities.

EIA needs to evaluate long-term actuarial balance, not short-term cash surpluses, when assessing whether particular trust funds provide subsidies. Many trust funds cover very long-term care issues (e.g., nuclear waste) or must accrue surplus funds to cover



anticipated longer-term losses. In the past, EIA has too quickly concluded that excess cash in a trust fund indicated no subsidies. Trust funds warranting more careful reconciliation are those addressing nuclear waste, nuclear-site decommissioning, and general revenues used to bolster activities normally funded by motor fuel excise and inland waterway use taxes.

Where EIA has changed important decision rules across studies, past estimates need to be recalibrated so as to ensure accurate time trends. For example, EIA reported tax losses in its earlier two studies using an "outlay equivalent" metric that evaluated the after-tax benefit of the tax subsidies. This practice was discontinued in 2008, depressing reported tax subsidies by 20–30 percent as a result. Similarly, some public power subsidies were evaluated but not included in subsidy totals in earlier EIA work due to stated measurement problems. The 2008 report finally included at least a low-end subsidy value for the provisions, but it did not adjust tallies from earlier studies upward to reflect this change. Use of an inconsistent baseline skews both the time trend and the reported results by billions of dollars.

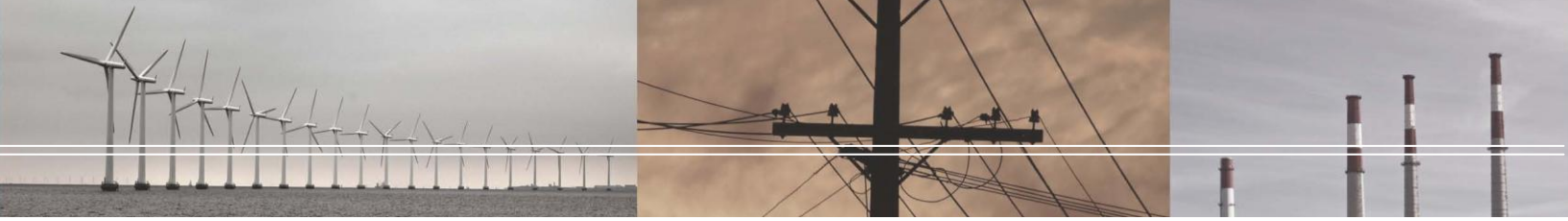
In its future reports, EIA should adopt a more systematic review of subsidies to the energy sector. Current work omits far too many programs that provide the sector with large and directed subsidies. EIA's rules for inclusion are sometimes arbitrary or inconsistently applied. In addition, because some types of subsidies are very important to one fuel and not at all to others, the Administration's decisions to exclude entire classes of subsidies can dramatically skew reported inter-fuel numbers. Future work must reflect a much better effort to characterize and quantify subsidies related to:

- Insurance and administrative oversight of market activities, particularly caps or indemnification for nuclear accidents, dam failure, and, increasingly, CCS schemes.

- Minimum purchase requirements and associated tariff protections, with Renewable Fuel Standards and the potential introduction of federal Renewable Portfolio Standards being of particular importance.

- Credit subsidies, which need to be evaluated well beyond their direct cost to Treasury in order to incorporate a better risk-rated assessment. It should especially capture how the subsidies reduce private-sector borrowing costs for selected energy technologies—often at the expense of smaller-scale and less politically connected alternatives.

- Subsidies to bulk energy transport and to energy security, including inland waterways and coastal shipping; oil stockpiling and infrastructure contingency planning and defense; and defense of key foreign energy choke points, such as those in the Persian Gulf.

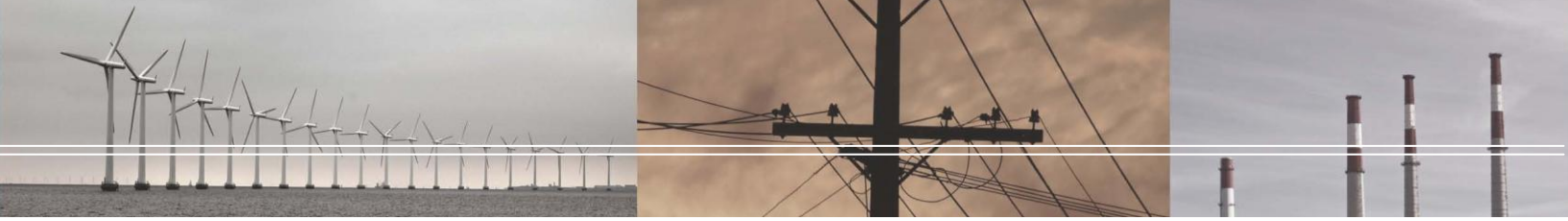


- Subsidies to energy through U.S.-government funded export credit agencies and multilateral development banks.

- Government-owned energy-related enterprises, including both production facilities and service providers such as the Army Corp of Engineers. In addition to including operating losses and interest-rate subsidies, EIA subsidy values need to properly incorporate return on taxpayer capital and tax exemptions for the services provided (particularly when assessing how the enterprises impede alternatives).

- Capital depreciation and bond issuance. EIA needs to include subsidies to capital depreciation and provide a more systematic integration of the use of tax-exempt bonding by energy providers.

EIA should not lump all supposedly renewable technologies into a single category. The approach, dominated by large subsidies to corn ethanol, presents an inaccurate pattern of actual support across fuels. Future work should do a better job of segmenting out beneficiary energy forms.



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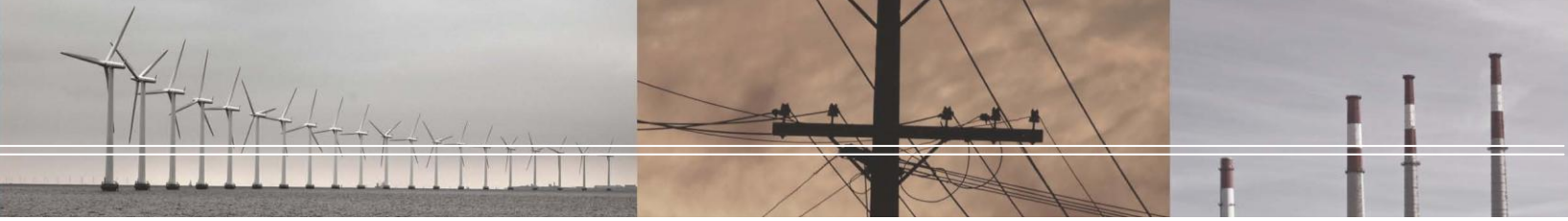

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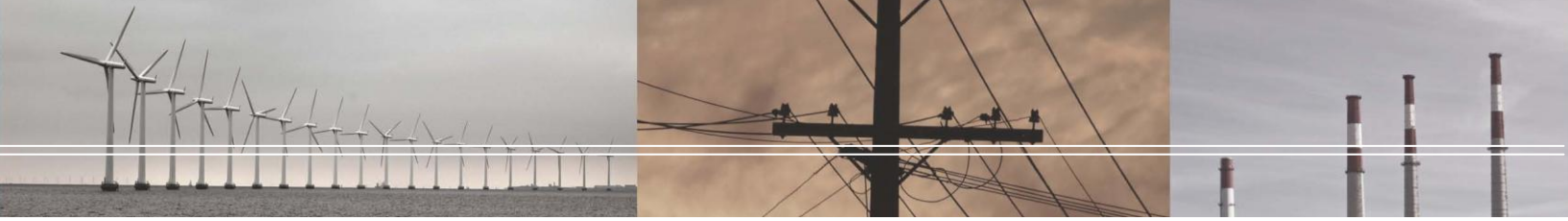

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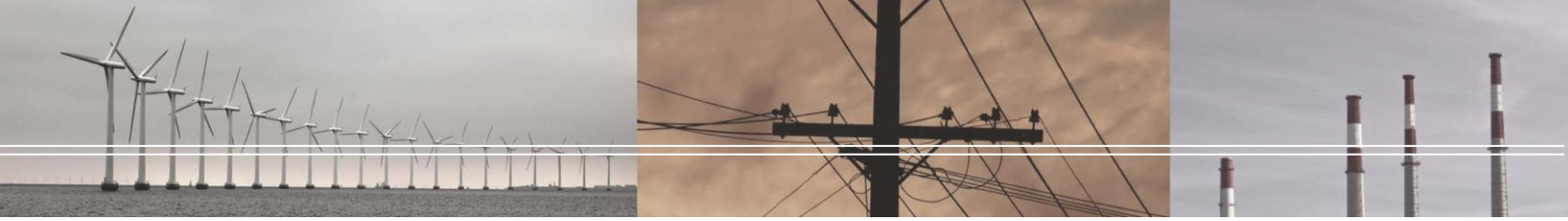

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