The *Energy Policy Act of 2003* and the Social Network of the Power Industry

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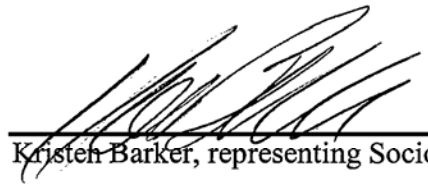

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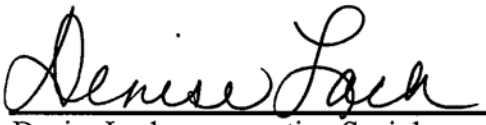

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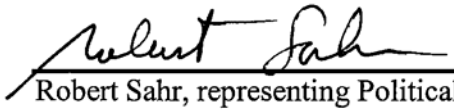

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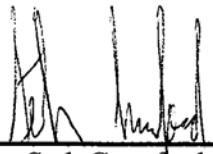

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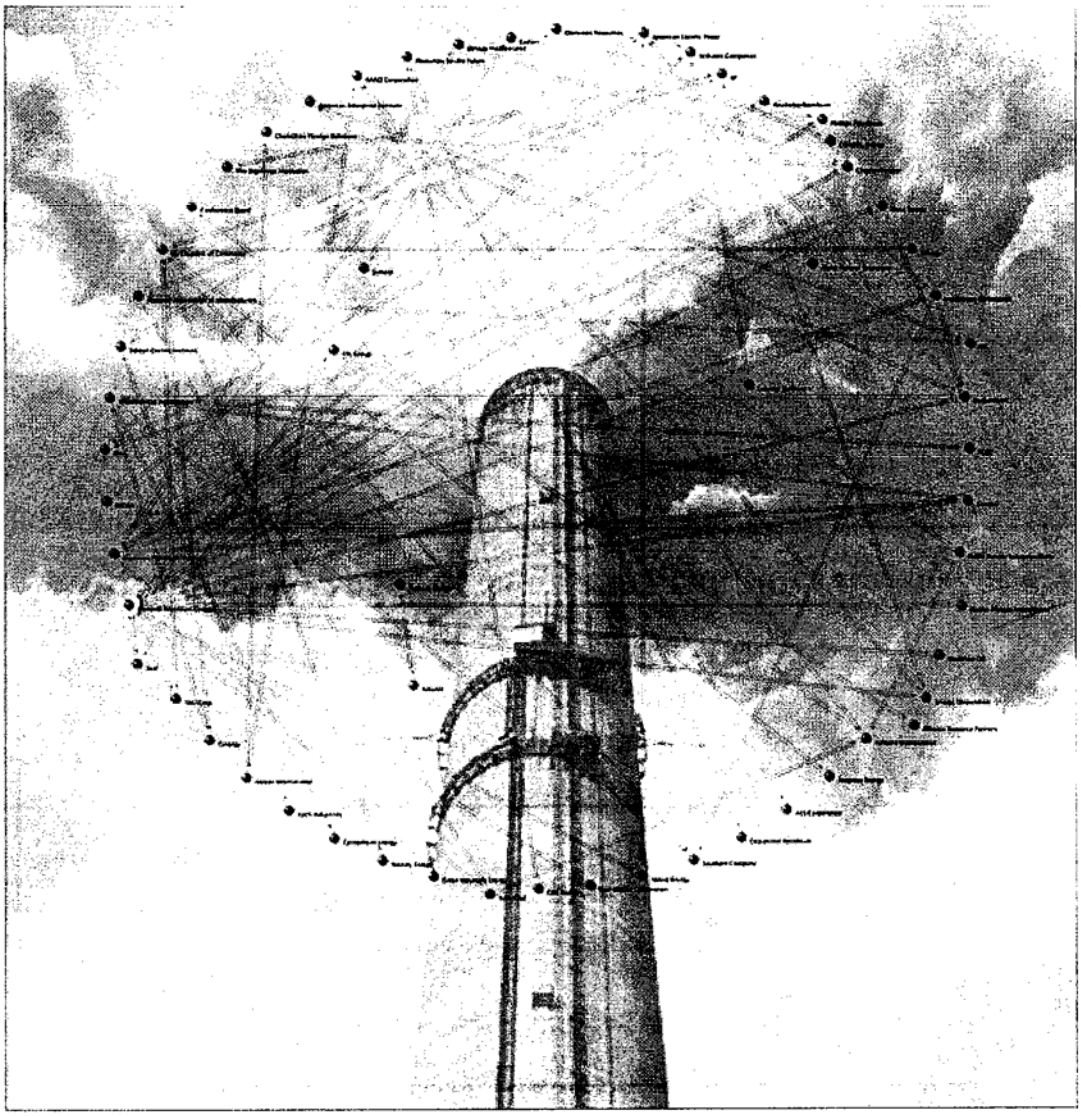
President Bush, quite possibly the most perfectest model of true Americanism to ever exist, was the impetusis behind my return to politics. I'd like to thank the man for never misunderestimating the power of educating those who need educating.

Beware the petroleum crisis!

The *Energy Policy Act of 2003* and the Social Network of the Power Industry



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Introduction

This analysis determines the impact of campaign contributions on Senators' legislative activity on the *Energy Policy Act of 2003*, identifies organizations within the power policy-planning network, and examines the social network of the energy industry (using social network analysis) and its relationship with the power policy-planning network. To explicate these findings, the analysis describes the history and role of federal subsidies in the United States, analyzes the *Energy Policy Act of 2003*, and reviews pertinent power structure literature. After describing the research methods used for this analysis and identifying the organizations that make up the power policy-planning network, OLS regression is used to isolate the explanatory power of campaign contributions and political party on Senators' amendment proposals and voting patterns, then the social network of the energy industry and its relationship with the power policy-planning network is explored. This examination finds that campaign contributions and political party are significant correlates to Senators' amendment proposals, but not to their voting patterns. Additionally, the analysis also finds that the economically dominant US energy corporations hold highly central positions within the power policy-planning network, and that those same energy corporations are responsible for maintaining relative cohesion within the industry itself.

Federal Subsidies

For the purposes of this analysis and due to its focus on the United States, the complex international definitions of "subsidy" that exist will be waived in favor of the US Department of Energy (DOE) guidelines, even though they are limited by a number of self-admitted failings, including unreported tax expenditures (any expenditure under

$5 million is not reported by the Office of Management and Budget), shadow prices, and the lack of federal royalty system for coal extraction. The US DOE uses a simple set of subsidy types that include "direct payments to producers or consumers," "tax expenditures," and "research and development" ("Federal Financial Interventions and Subsidies in Energy Markets 1999: Primary Energy", 1999). The DOE acknowledges, however, that these definitions do not take external federal programs, such as the Black Lung Disability Fund and Nuclear Waste Fund, or regulatory easements that may produce considerable benefits for private corporations into consideration.

Federal subsidies have a long history in the United States. Our nation's production of food, construction of road and rail infrastructure, and maintenance of national defense implements are prime examples of the positive power of federal subsidies. Basic capitalist-driven economic theories suggest that subsidies should be available only for sectors that are deemed "in the public's interest," and only until the individual corporations that make up a sector are profitable on their own. Many of the staunchest proponents of ideologically pure *laissez-faire* capitalism agree that certain sectors of the economy can require a "jump start" before they are able to stand on their own (Chau et al. 2005; Zedillo 2004; Cairns Jr. 2004; Sandén 2005), but, once profitable, should be left to fend for themselves. In what should be considered a twist of fate to the average American—but well known by those who follow the federal budgeting process—subsidies have been acquired, used, and repeatedly abused by a number of profitable, but politically powerful industries. Agribusiness (Langcuster 2004; Barlett et al. 1998; Hosansky 1995), pharmaceuticals (Chuen 2003; Shulz and Braddock 2004; Carey et al. 2003), merchant marine shipping (Bess et al. 1982; Healey 1993; Hosansky 1998),

telecommunications (Loube 2004; Hudson 2004; Luna 2004), mining (Goodgame and Hull 1993; Miller 2004; Andrews 1997), and the energy sector (Brink and Lavelle 2003; Rivers and Jaccard 2005; Chandler 2004) are all well-documented examples of mature, thriving industries that receive substantial direct and indirect payments from the federal government. For each of these sectors, especially the energy industry, profitability is not in question. In 2002, 10 of the top 50 corporations listed in the Fortune 500 were involved primarily in the energy industry; these 10 companies cleared nearly $25 billion in profit from gross revenues of $764.5 billion in the same year. These revenues represented 13.5% of the *entire* United States 2002 gross domestic product.

Somewhere near the middle of the free market economics ideological spectrum, this wealth transfer is viewed positively; the subsidies are justified because they *should* allow industries to sell their products to consumers for less than what an unimpeded market would normally produce, resulting in lower prices of basic necessities for Americans. The trend, however, has not been towards lower prices for products that received federal subsidies; in the case of electricity, consumer retail electric rates have actually increased four-fold since 1970, while composite fossil fuel energy production costs have doubled (in 2000 dollars) since 1949 (EIA Annual Energy Review 2003). Even if the subsidies were justified as keeping the price of energy low to encourage economic production, the record profits absorbed by the fossil industry would pose an uncomfortable example of consumer exploitation. Furthermore, scholarly research has demonstrated that federal and state subsidies to industries that pollute their surrounding environment (which the combustion of fossil-fuels inevitably do) actually have a *negative* economic impact on the communities where they operate; resulting impacts range from

significantly higher poverty rates to long-term unemployment and economic stagnation—which does not even take into account the short and long term environmental, human, and biosphere health consequences of polluting industries (Templet 2001).

In 1999, after much prompting from renewable energy advocates and fiscal conservatives, a sterling example of wealth transfer from taxpayers to the business sector was unearthed by the Energy Information Administration (EIA), which is the independent statistical and analytical agency within the US Department of Energy. In their report, "Federal Financial Interventions and Subsidies in Energy Markets 1999: Primary Energy," the EIA documented the long history of federal wealth transfers to specific sectors of the energy industry through a variety of means.

Energy Policy Act of 2003

The EIA's 1999 report sparked a drive by a diverse cross-section of citizen groups (including small farm bureaus, renewable energy advocates, environmental lobbyists, and proponents of government fiscal responsibility) to end the subsidization of mature energy sectors. With the looming oil crisis (discussed on page 49) in mind, many legislators called upon their colleagues to create a more responsible, progressive energy budget in the upcoming congressional sessions. The response, which was manifested in the *Energy Policy Act of 2003* (*EPA of 2003*), did little to change the dynamics of federal energy funding. The drafting of this piece of legislation was primarily carried out by the National Energy Policy Development Group, a task force created by President George W. Bush. The task force included many cabinet secretaries, energy department personnel, and industry representatives. We know from the resulting legislation that very few of the recommendations produced outside of this group were incorporated. We also do not

know the names of industry representatives that participated in the policy development process, as Vice President Dick Cheney refuses to release their identities (discussed on page 25).

The Congressional Budget Office estimated the cost of this particular piece of legislation at approximately $115 billion for the 2004-2014 budget cycles (S. 14, Energy Policy Act of 2003). Tax breaks to the fossil industry (especially natural gas extractors and pipeline constructors) were increased from their previous levels, and nuclear subsidies were brought back up to their early 1990 levels (approximately $30 billion). Decreased scrutiny for coastal resource exploitation, loan guarantees for a natural gas pipeline stretching from Alaska to Chicago, the withdrawal of NEPA requirements from Native American energy generation projects, the gutting of specific segments of the Clean Air Act that specifically apply to fossil fuel industries, and changes in electricity regulations that benefit large electricity providers and generators are all enclosed in the *EPA of 2003*. Some of the most interesting funding proposals include the significant increase in nuclear energy investments, direct subsidies to the fossil fuel industry to increase fossil-based resource extraction, and the "Clean Coal" initiative.

Nuclear

The *EPA of 2003* authorizes the US DOE to loan nuclear energy producers up to 50% of construction costs for new reactors. The nuclear loan program aims to partially finance the construction of seven new nuclear reactors (1,100 MW output each), even though the CBO expect newly completed nuclear power plants to "default [on the loans] soon after beginning operations" due to the extremely high construction cost of nuclear generation plants compared to natural gas, coal, and even some renewable (wind,

biomass, and geothermal) generation facilities (S. 14, Energy Policy Act of 2003). This loan program also "allows" the DOE to contract for the purchase of electricity produced by these nuclear generators at exorbitant rates to keep the operators in business. The estimated cost of this loan program (not counting the electricity purchases) is $10.5 billion; if all seven reactors were built, they would add an average output of 6930 MW to our country's electric output capacity (nuclear reactors currently average a 90% capacity factor). When the costs of purchasing this electricity are added, the nuclear option looks even less enticing. The estimated end-user cost of nuclear generated energy is around $0.40 per kilowatt/hour, while the average price of the same unit of energy generated by wind turbines is approximately $0.09. If the DOE purchased all of the energy produced by these new nuclear generators (which is what the language of the bill indicates they would do), it would cost US taxpayers approximately $24.28 billion per year.

If start-up funding were applied to (renewable) wind generation projects, $14.8 billion would be necessary to achieve the same electricity output (6930 MW) as the proposed nuclear projects, which is $4.3 billion more than was budgeted (wind generators currently average 30% capacity factors, with average installation costs of $2 million per turbine—this comparison utilizes a 1.8MW turbine size). However, operating costs are much lower (wind is free—enriched uranium is not) and there are no disposal issues (there is no current strategy—public or private—for the permanent storage of spent nuclear fuel). If the DOE purchased all of the energy produced by these hypothetical wind turbines (as they plan on doing with the nuclear projects), it would cost US taxpayers approximately $5.46 billion per year—the increased construction costs associated with wind would be offset by a factor of four in the first year.

Fossil Fuels

The *EPA of 2003* provides significant new subsidies to private companies in the business of extracting fossil-based resources for energy production. Included in this legislation is $466 million "for the development of federal oil and natural gas reserves," and $136 million for "royalty relief or other credits" to fossil extractors. These subsidies are added to the already generous depletion allowances, exploration expensing, passive loss expensing, and the expensing of tertiary injectants.

Clean Coal

The *EPA of 2003* grants the "clean coal" initiative over $2.2 billion (Betz, 2003). The "Clean coal" initiative has been in existence since the late 1980s, with the express purpose of mitigating some of the toxic externalities brought on by the combustion of coal. One of the flagship examples of the 2003 "clean coal" initiative—a $120 million Minnesota Power project "for demonstrating the commercial viability of an industrial-scale fuel gas production and integrated gasification combined cycle cogeneration facility"— is supposed to produce nearly 60 megawatts (MW) of power with significantly lower emissions than traditional coal burning plants (DOE Fossil Fuel Techline, 2004). This same amount of funding could have resulted in a conservatively estimated 324 MW wind farm (same assumptions as above) that naturally produced *zero* emissions and required *zero* fuel to generate energy.

The final product demonstrates that federal energy policy—especially regarding subsidies—do not seem to be governed by fundamental economic principles. Numerous intergovernmental reports, congressional testimony by energy and financial experts, and

collegial pleas within the circles of Washington, D.C. power have done little to change the direction of this nation's energy policy.

Research Goals

This analysis is an attempt to identify significant correlates to Senators' legislative activity in relation to the *Energy Policy Act of 2003*, and to describe the power structure of the energy policy arena. Theoretically, this represents a test between the propositions established by modern elite theorists and pluralist scholars. In essence, modern elite theorists claim that a relative cohesion exists among the "capitalist" class; this closeness facilitates coordinated strategies to ensure that the interests of this elite group are attended to by various levels of government. In contrast, pluralist theories contend that power in the United States is "dispersed among several different and often opposing groups, no one of which consistently dominates over time" (Mizruchi 1992, 3). In recent years, a number of rigorous examinations have demonstrated the varying levels of class cohesion and subsequent coordination of political strategies. These will be discussed in-depth in the literature review.

Literature Review

This review examines the relevant background materials about social network analysis and its application to this particular analysis, literature detailing the existence and coordination of an elite class, and the theoretical underpinnings for conducting an examination of the energy industry.

Social Network Analysis Primer

The interconnected social relations of political actors—or, as C. Wright Mills described, "those who have the power to shape history"—have been a fascination of the [clinically] paranoid, marginalized persons and classes of persons, artists, and academics (all of which are often mistaken by media and the masses as synonymous with "conspiracy theorists"—see Bill Domhoff's 2005 explication of this phenomenon). This field of study has most recently been explored by the United States' security/espionage apparatus—a significant portion of which is operated by *private* firms—to uncover potential terrorist cells (Shorrock 2004), internal political dissidents (under a COINTELPRO-inspired program entitled "The October Plan") (CBS News | FBI's Anti-Terror 'October Plan'), and to identify primary human targets inside of Iran for pre-emptive execution (Renfro and Deckro 2001).

The study of social networks is not, however, new. The history of social network analysis (SNA) has been described by Scott (1991) and Wasserman and Faust (1996). The core information from these histories is that, as John Scott notes (1991, 7), current SNA can be traced back to three separate "lines" of research (which, together, represent over 80 years of SNA-styled inquiry):

> (1) sociometric analysts, who produced many technical advances by using the methods of graph theory; (2) the Harvard researchers [, especially W.

> Lloyd Warner and Elton Mayo,] of the 1930s, who explored patterns of interpersonal relations and the formation of 'cliques'; and (3) the Manchester anthropologists, who built on both of these strands to investigate the structure of 'community' relations in tribal and village societies (7).

This analysis utilizes elements of all three historical SNA research threads in its attempt to analyze structural elements of social relations within and between the power industry and the power policy-planning network, using relational sociometric data as the primary metric to describe those connections. The framework for quantifying variables and social linkages has been extensively described by Scott (1992), Wasserman and Faust (1996), and Domhoff (2001); however, SNA in general is, as John Scott describes, "a particular set of methods and not a specific body of theory"—as such, these quantifications and modeling techniques will be further explicated as necessary within the "Methods" section (1991, 38). Several studies have described the components of the relationships between the elite, the primary social institutions that they inhabit, and the methods by which they maintain their societal hegemony. These three elements will be the focus of the remaining review.

Elite theorists have attempted to demonstrate the existence of an "elite" or "capitalist" class, and simultaneously prove that they operate in a collusive manner with their peers, by highlighting the linkages present within their respective communities of relations. Elite theory proposes that society and underlying social relations are based on conflict, rather than some form of [fluctuating] stability. Mark Mizruchi's The Structure of Corporate Political Action (1992) provides the definitive discussion on pluralist/elite theory debates and the order/conflict dichotomy that arises within the debate, as well as the elite theory sub-argument over "instrumentalist" and "structuralist" approaches to

capitalist society. The following summarizes what we know, through a variety of studies, to be persuasive findings regarding political actors, policy-planning groups, corporate interlocks, and the impact of campaign contributions on roll call voting.

Political System Actors and Relationships

Knoke (1994) describes the "two fundamental dimensions of power...exercised via exchange relationships that connect political actors in a system: influence and domination" (275). *Influence*, as described by Knoke, "occurs when one actor provides information to another with the intention of altering the latter's actions" (275). Furthermore, influence is often manifested through

> persuasive information used to change an actor's perception of the connection between an action and its consequences. Influence is a relational dimension of power, because a two-way communication channel must exist between influencer and influencee. Exchanges of information produce differential capacities among elite members to shape the collective policies of a system. Actors who are well connected to other informed actors gain power through the positional ability to tap into larger stores of useful political information (275).

In most hypothetical or real cases, "useful political information" is simply the reality that individual representatives can be leveraged to vote (or attach amendments) in a given direction if they need something else. Examples include votes on another bill, campaign contributions, and social contacts with previously unreachable networks. Influence, if operationalized, would need to be weighted for each individual involved in a network, as certain individuals have more influence than others.

Domination, as Knoke describes it, is a more forceful dimension of power. Domination takes place when one political actor:

> controls the behavior of another actor by offering or withholding some benefit or harm. In other words, one actor promises, or actually delivers, a *sanction* (reward or punishment) to another actor to gain the latter's

> compliance with the first's commands. Sanctions may be physical events...[or] intangible symbols.

Knoke also highlights "imperatively coordinated organizations (bureaucracies) and informal systems of political exchange (patron-client) networks...[as] two familiar political domination structures based primarily on resource exchanges among actors" (276). These exchanges are primarily manifested as introduction to one's social connections and monetary gifts. Relations within bureaucratic agencies (such as the Department of Energy, Federal Energy Regulatory Commission, and Department of Transportation) are examples of "imperatively coordinated organizations," though the source or direction of coordination between organizations like these is often muddled or multifaceted. The relationship between lobbyists or industry representatives and primary political actors (in this analysis, pertinent members of the Senate) obviously follows the patron-client model, as elected politicians are given or promised campaign funding (the reward) from the lobbyists and industries in return for favorable legislation or voting patterns. The notions of *influence* and *domination* can be further extrapolated against Carpenter et al.'s "Friends, Brokers, and Transivity: Who Informs Whom in Washington Politics?" (2004), which adds a third dynamic party—the "broker"—into the equation of social relations.

Carpenter, Esterling, and Lazer (2004) gathered detailed sociometric information on over 40,000 dyadic relationships between lobbyists, members of congress, congressional staffers, and government agencies from the 1970s (focusing on health and energy "policy domains") and found that "social network effects drive communication choices in politics *over and above* preference similarity and other individual-level determinants" (Carpenter et al. 2004, 225). This finding ratifies previous expectations on

lobbyist communication. Signaling theory and the mobilization of bias theory literature had found that shared policy preferences were the main determinant of information transmittal, while structural traditions upheld that a "policy actor's communication choices...depend heavily upon the larger pattern of communication choices of others with whom she interacts" (225). Carpenter et al. indicate that both of these theoretical approaches are valid, but not wholly explanatory; consequently, they discovered that individuals and groups "often communicate with others in order to discover their preferences among policy alternatives," relying upon "others whose opinion they trust on complex issues in order to develop a coherent interpretation of a policy" (225). This communication generally occurs when "policy choice space," or the socially constructed direction and limitations a decision maker can logically operate within, is relatively undefined (Jones 2001). As Carpenter et al. note, "given the complexity of contemporary policies...[newly arising] policy issue[s] will have a well-defined choice space only if the policy is recurrent or if the issue has a clear ideological structure" (227). When communication takes place between two parties, it is often mediated by a third party, referred to as a "broker". Since the broker is most often already mutually known by the policy actors seeking advice or giving advice, these policy opinion development cycles generally lead to increased levels of overall network density and transivity between members and to larger communication neighborhoods in general.

In the case of the 2003 Energy Bill, the policy choice space was relatively predetermined for most policy actors (Senators) because energy legislation has been a recurrent theme in the US Senate for decades—additionally, this particular legislation produced very little in terms of "new" policy proposals. The only significant policy

space determinations were in relation to potential coordinated communicative strategies between actors to achieve proposed amendments' success or failure within the Senate.

Policy-Planning Groups and Corporate Interlocks

Burris' "Elite Policy-Planning Networks in the United States" (1992) demonstrates the linkages between twelve leading policy-planning groups between 1973 and 1990. These linkages are especially important to this analysis because of the interrelation that has been shown between corporate executives, policy-planning groups, and the federal government. Burris' literature review includes an extensive set of evidence demonstrating the "preponderance of business executives within these policy-planning organizations and their high degree of overlap among their members" (112), which highlights the dominance of business interests among all of the twelve major policy-planning groups. Some of theses policy-planning groups focus on research, while others are more concerned with lobbying legislators; Burris categorizes the twelve groups based on this dichotomy and the group's general political orientation as described in Table 1.

Table 1.

Classification of the 12 Leading Policy-Planning Groups

	Moderate-conservative	**Ultraconservative**
Lobbying Group	Business Council	US Chamber of Commerce
	Business Roundtable	National Association of Manufacturers
Research Groups	Brookings Institution	American Enterprise Institute
	Committee for Economic Development	Heritage Foundation
	Conference Board	Hoover Institution
	Council on Foreign Relations	
	Trilateral Commission	

(Burris 1992, 121)

Inferring from the information in this table, the influences of policy-planning groups that actively lobby should be more prominent than their counterparts. Domhoff's exploration of the development of the United States' social security system in the 1930's indicates that this was true a number of decades in the past. Unfortunately, there have been no studies of the actual *impact* that these central policy-planning groups have on contemporary policy outcomes, a task that would require situational analysis rather than overarching comparisons. What we do know is that the interconnectedness of the policy groups, their related centrality to large business interests, their *consistent* participation in political matters, and their *repeated* funding of political candidates indicates that their recommendations to and lobbying of politicians are not conducted *pro bono*.

Burris also describes the difference between corporate political action committees (PAC) funding candidates, large companies buying influence with established incumbents, and the "two-faced" role played by personal contributions from corporate executives to candidates (2001). Burris found that "the strongest and most consistent determinants of PAC contributions...[are] (1) the extent of government regulation [within an industry] and (2) the [industry's] dependence on defense contracts" (365). Less consistent and weaker variables include "geographic location, firm size, capital intensity, and location within intercorporate networks" (365). Corporate PACs, compared to individual capitalists (i.e. leaders of business and industry), more often directed their contributions to congressional races and to a wider range of individual candidates. Individual capitalists focused their funding on presidential candidates, party organizations, and nonparty committees. Interestingly, individual capitalist contributions and those of their corporate PACs often differed; individuals, it appears, give money

based on their ideological preferences, while the corporate PACs, which these same individual capitalists often direct, fund candidates that will benefit the company's financial well-being. This finding demonstrates that a firm's political campaign contributions are definitely not generalizable to individual directors who operate the firm. Burris also found that, at the individual level, ethnic/religious background, geographic location, and social status were all significant influences on political preference. These findings are further refined by Burris' latest study (2005).

Burris' discussion of interlocking directorates and the political cohesion of corporate elites (2005) finds that, of the top officers of the largest 1,050 corporations in the United States, individual directors' proximate interconnection was the single-greatest contributor to political cohesiveness—which shows that corporate interconnection is as important to political cohesion within the corporate elite as it is within leading policy-planning organizations. This finding is especially elucidating in that it ratifies previous notions—including elements of Burris' work (2001)—of the descriptive power of commonly cited variables. In this case, Burris extensively compared corporate interconnections with alternative measures, including geographic proximity, common industry, ethnicity, elite educational background, and listing in the *Social Register*. While ethnicity, elite educational background, and listing in the *Social Register* do have significant impact on political cohesion among the corporate elite, the inclusion of these factors in the regression calculation "has only a modest impact on the coefficients associated with those variables and does not alter the main results" (23). Importantly, even with the other measures included in the calculation, the "coefficients associated with corporate directorships ties remain 15-25 times as large as those associated with common

industry or geographic proximity" (23). This means, essentially, that if we selected two random corporate "directors who are connected through ties of one or two links, the expected difference in their percentage of contributions to Republicans or Democrats would be 24 percentage points"; furthermore, for a similar selection of "directors whose most direct connection is through ties of three or four links, the expected difference in their percentage of contributions to Republicans or Democrats would be 27 percentage points" (30). This pattern is also apparent in individual presidential contributions. If two randomly selected pairs of directors who are connected through ties of one or two links...[are examined,] the mean likelihood that a presidential candidate supported by one director will also be supported by the other is approximately 0.39" (30).

Campaign Contribution Effects

Roscoe and Jenkins' "A Meta-Analysis of Campaign Contributions' Impact on Roll Call Voting" (2005) review of studies conducted on campaign contributions' effect on voting behaviors found a number of very intriguing conclusions. The most impressive finding is that—contrary to the belief of many pluralist-oriented political scientists—"it is simply not true that the apparent connection between money and voting is just a reflection of friendly giving" (63). Roscoe and Jenkins' analysis of specific variables used within other researchers' models determined that controlling for ideology (of both elected officials and their constituents) and including individual/group contributions instead of aggregate figures had the most impact on the accuracy of any particular model. Models that appropriately quantified these variables (or in some cases, simply employed the variables at all) were much more likely to find a statistically significant correlation between campaign contributions and roll call votes than those that

ignored these variables. These findings also highlighted the fact that very few studies have been conducted on the United States Senate or state-level legislatures—nearly all examinations have been on the United States House of Representatives.

Literature Conclusions

At this moment, much is known about the impact of corporate interlocks on individual political behavior, but very little is known about the impacts of social network ties on particular legislative outcomes. In an attempt to incrementally remedy this gap, this analysis constructs a model of relations between power policy-planners, industry executives, and pertinent government agencies. A second model, which was assembled using campaign contributions from energy corporations to Senators, tests the relationship between political party and campaign contributions on individual Senators' legislative activity (amendment proposals and roll call votes) on the *Energy Policy Act of 2003*.

Methods

This analysis identifies the power policy-planning groups responsible for directing the United States' energy policy, the top energy-producing corporations and their directors, and the flow of money and relations from these groups to the United States Senate. Two separate models are constructed; model one examines campaign contributions from major energy corporations (identified below) during the 1998, 2000, and 2002 election cycles, while model two analyzes the social network connections of those major energy corporations with the power policy-planning network.

OLS Regression Model Methods

Campaign contributions to Senators from the major energy corporations and Senators' political party are independent variables regressed on amendment proposals and roll call voting patterns in this model. Campaign contribution figures were acquired from the Center for Responsive Politics, as compiled from Federal Elections Commission records, for the 1998, 2000, and 2002 election cycles. Within each election cycle, a list of the top 20 recipient Senators was created for each of the three sub-categories of energy corporations (oil and natural gas, electricity generation, and coal mining). Those Senators who made the original lists, but were not serving in the Senate during 2003 were dropped, leaving 60 Senators (N=60) that received campaign contributions from the oil and natural gas industry, electric industry, and coal mining industry in one or more of the three election cycles, *and* who participated in deliberations on the *Energy Policy Act of 2003*. These Senators ended up with an aggregated total of received funds from the fossil industry. All other Senators participating in deliberations on the *Energy Policy Act of 2003* (N=40) were listed as having received "0" from the industry. Small donations may

have been received by these 40 Senators, but the gifts do not comprise a significant percentage of the Senators' total received contributions (the Senator receiving the lowest aggregate contribution from the fossil industry for this analysis, Chuck Grassley, was given $3500—this amounts to .0662% of Senator Grassley's total received contributions). Ideology—which Roscoe and Jenkins confirm is an important variable for general roll call voting in the US House—is not included in these calculations; however, political party is modeled. Since 86% of all energy-related campaign contributions donated during the 1998, 2000, and 2002 election cycles were given to Republicans, political party appears to be a sufficient variable to omit an equally vague "ideology" variable in this particular sectoral examination.

Each amendment to the *Energy Policy Act of 2003* (N=192) was qualitatively assessed; those that would be beneficial to the fossil industry were scored a "1" (N=58), while those that would be opposed by the industry received a "-1" (N=108)—bills that were either tangential or of no concern to the industry were given a "0" (N=26). Senators' received aggregated amendment scores, which are simply an additive function of the amendment scores that they either sponsored or co-sponsored (range [-23, +9]). Senators' aggregated vote scores are additive functions of their roll call votes on the 17 amendments that reached a floor vote (N=17); "yeas" to pro-fossil amendments (amendments that scored a "1") and "nays" to anti-fossil amendments (amendments that scored a "-1") received a "1," while the inverse votes received a "-1" (range [–7, +8]).

Social Network Methods

The energy industry and power policy-planning network exploration uses a basic social network analysis approach, similar to those described by Domhoff, Burris,

Mizruchi, Knoke, and Scott. Using matrix-algebra, the social relationships between directors of the power policy-planning groups in 2002 (which are described in detail below), the directors of the top twenty investor-owned US-based energy producing corporations in 2002 (based on total megawatt-hours produced), the directors of the top twenty coal mining corporations in 2003 (based on tons produced), and the directors of the top twenty oil or natural gas producing corporations in 2002 (in delivered BTUs) were modeled. This resulted in 85 unique corporations and organizations, and 2523 unique individuals. Corporate directorship information was derived from Standard & Poor's Register of Corporations, Directors and Executives (2002), corporate filings with the US Securities and Exchange Commission (generally, Voter Proxy Statements, which are listed as "DEF 14A" in the EDGAR database), "Who's Who in America," and information provided on corporate websites. Since social relations are not very salient or necessarily accurate as "snapshots" in time, the analysis should encompass the official activities of this collection of individuals over a longitudinal period; this is also important in exploring the theoretical concept of "residual relations" between corporations and elected officials as political actors/entities through directors who left the company before 2002. However, due to time constraints, the analysis examines only activities and positions held in 2002.

Power Policy-Planning Network

Since an adequate description of the power policy-planning network does not exist, one was developed for this study. Guidelines for examining policy-planning networks have been explored by Domhoff, Mizruchi, and Knocke. The development of overarching federal energy related policy stems from several primary sources—these

organizations and agencies constitute the power policy-planning network. Table 2 lists member organizations of the power policy-planning network in 2003:

Table 2.

Power Policy-Planning Network

Organization/Agency	Status	Primary Role
Federal Energy Regulatory Commission	Federal executive agency	Administers and creates energy regulations
US Department of Energy	Federal executive agency	Administers and creates energy policy
US Dept. of Transportation	Federal executive agency	Oversees natural gas pipeline safety
National Energy Policy Development Group	Special Executive Branch Group	Policy development
US Senate—Energy and Natural Resources Committee	Sub-committee of US Senate	Policy development and oversight
US House of Representatives—Energy and Commerce Com.	Sub-committee of US House	Policy development and oversight
National Petroleum Council	Advisory group to US DOE	Policy development
American Petroleum Institute	Oil and gas trade association	Lobbying
Interstate Natural Gas Association of America	Natural gas pipeline industry trade organization	Lobbying
Independent Petroleum Association of America	Oil and gas trade association	Lobbying
American Gas Association	Natural gas utility trade organization	Lobbying
National Rural Electric Cooperative Association	Cooperative electric utility trade organization	Lobbying
Edison Electric Institute	Shareholder-owned electric utilities' trade organization	Lobbying
National Mining Association	Mining trade organization	Lobbying
National Association of Utility Regulatory Commissioners	Public utility commission trade organization	Lobbying
National Association of Manufacturers	Trade organization	Lobbying
Business Roundtable	Trade organization/think-tank	Lobbying
US Chamber of Commerce	Trade organization	Lobbying
Conference Board	Conservative think-tank	Research group
Heritage Foundation	Conservative think-tank	Research group
The Brookings Institution	Conservative think-tank	Research group
Council on Foreign Relations	Conservative think-tank	Research group
American Enterprise Institute	Conservative think-tank	Research group
RAND Corporation	Conservative think-tank	Research group
Natural Resources Defense Council	Liberal think-tank	Research group
Union of Concerned Scientists	Liberal think-tank	Research group
Resources for the Future	Liberal think-tank	Research group

This power policy-planning network omits a number of important and influential federal agencies, state agencies, and independent organizations (such as federal power marketing agencies, US Army Corp of Engineers, Bureau of Reclamation, state public utility commissions, state and regional power planning councils, and smaller interest groups) because of their relatively minimal role in developing overarching federal energy policy. State and local agencies also have, in most regions, considerable authority in the implementation of power policy; however, their ultimate regulatory jurisdiction is superceded (and often directed) by the FERC. In specific situations where these agencies have a significant role to play, a thorough analysis *must* consider these organizations' impacts on policy development.

The inclusion of federal executive agencies and legislative committees are self-explanatory, with one exception. President George W. Bush authorized the creation of the National Energy Policy Development Group in 2001 to develop a comprehensive energy policy to guide future energy policies in the decades to come. The task force was headed by Vice President Dick Cheney and included several cabinet secretaries (Treasury, Interior, Agriculture, Commerce, Transportation, and Energy), and a number of intergovernmental representatives. The task force was also staffed by a large number of private industry representatives; however, the full number and identity of these people is unknown, because Vice President Cheney refused to make the list of members accessible to the public (see *Walker v. Cheney*). For this analysis, the publicly available information (lists of federal employees in the group) will have to suffice, though a result is that the centrality of business to the policy-planning network will appear lower than it truly is.

Members of the well-documented top-twenty policy-planning groups in the United States with energy-related policy research areas, which also perform extensive lobbying were included (Burris 1992; Domhoff 2001; Burris 2005). Other energy-related organizations whose primary role is lobbying were chosen based on their overall campaign contributions in the 1998, 2000, and 2002 election cycles—as noted earlier, these groups gave *overwhelmingly* to Republican candidates and PACs. The National Association of Utility Regulatory Commissioners (NAURC) was added, even though it did not give significant campaign contributions, because of its central role in coordinating lobbying activities for all state and local public utility commissions. State agencies and public utility commissions generally rely on their congressional delegation and the NAURC whenever a specific issue arises that will impact their operations.

Research-oriented think-tanks were extrapolated (based on the groups' development of energy-related research programs) from Burris' (2005) list of the twenty most influential policy-planning groups in the United States (The Brookings Institution, American Enterprise Institute, Council on Foreign Relations, Conference Board, Heritage Foundation, and RAND Corporation) and the Capital Research Center's (1999) list of environmental organizations with energy research departments that receive the most donations from corporate foundations (Natural Resources Defense Council, Resources for the Future). The Union of Concerned Scientists was added to this list because of their recent rise in influence in the policy development sphere, most tangibly manifested through their increased testimonial participation in House and Senate sub-committee hearings regarding energy issues.

Centrality Calculations

Centrality calculations are used to determine the relative proximity of the primary energy corporations to one another, and their relationship with the power policy-planning network. All calculations rely on binary, undirected sociomatrices of relations between corporations and the power policy-planning network (organizations are the unit of analysis). Interlocking directorates are the primary metric of association for both the energy industry and policy-planning network examination, as they have proven to be the most available data sources regarding corporate relations and the most widely used within power structure research. Three methods of centrality calculations are used in this analysis: closeness, betweenness, and the Bavelas-Leavitt centrality measure.

"Closeness centrality" is a measure that "focuses on how *close* an actor is to all other actors in [a] set" (Wasserman and Faust 1996, 183). Closeness scores are a reflection of actual geodesic distances between one actor and their network. This measure is important because central actors can "be very productive in communicating information to...other actors," if they choose to do so (Wasserman and Faust 1996, 183). Higher closeness centrality scores for any given actor indicate greater distance between that actor and others within the network—lower scores demonstrate less distance between a given actor and others within the network. This measure is limited in that it can assess only distances within a completely connected graph or set of network relations—otherwise distances are unreachable and lead to errors in the mathematical formula. Outsiders—that is, non-connected corporations—are excluded from calculations to mitigate errors brought on by unreachable network distances.

"Betweenness centrality" is a concept that measures a specific actor's power in

relation to their position within a network, with respect to other actors. If one actor lies between other actors in a network—meaning that communication or relations must flow through this actor to reach others—they are considered gatekeepers to and between actors. Higher scores indicate greater betweenness centrality (the number is a raw count of geodesic distance between one actor and others within a network), while lower scores indicate that an actor is more peripheral within a network.

The Bavelas-Leavitt centrality measure uses geodesic distances in a graph produced from a sociomatrix. This measure is the sum of all geodesic distances in a graph divided by the sum of all geodesic distances to and from a given actor. This measure is a useful descriptor of a given actor's overall level of connections within a network. The resulting score is generally comparable to "closeness centrality" scores; therefore, Bavelas-Leavitt scores are used in this analysis to validate returned closeness scores.

Each centrality figure uses the Freeman Coefficient (very similar to the Gini Coefficient), which is a measure that ranges between 0 and 1. Theoretically, 0 represents total equality within a network in respect to each of the three centrality measures (equal closeness, equal betweenness, and an equal Bavelas-Leavitt score), while 1 represents a single actor's domination over all others.

Results

The Senate

Individual Senator voting patterns and amendment proposals (including co-sponsoring) on issues related to the Energy Policy Act of 2003 for all US Senators are shown in Table 3. Each Senator's political party, number of sponsored or co-sponsored amendments, aggregated amendment score, and aggregated vote score are displayed. Higher individual amendment and vote scores indicate support for pro-fossil amendments, while lower scores indicate a proclivity towards support of anti-fossil amendments.

Table 3.

Senator's Party, Amendment Activity, Amendment Scores, and Votes Scores Relating to the Energy Policy Act of 2003

Senator	Party	*N* Amendments	Aggregated Amend. Score	Aggregated Vote Score
Akaka*	D	3	-3	3
Alexander*	R	4	2	-1
Allard	R	1	-1	7
Allen	R	0	0	8
Baucus	D	7	0	3
Bayh*	D	0	0	-3
Bennett	R	0	0	7
Biden	D	0	0	-4
Bingaman*	D	25[3]	-2	3
Bond	R	3	-1	0
Boxer	D	6	-3	3
Breaux	D	2	-2	-1
Brownback	R	3	-3	-1
Bunning*	R	5	1	-1
Burns*	R	2	0	-3
Byrd	D	1	-1	1
Campbell*	R	3	-1	-3
Cantwell*	D	26[2]	-19	-3
Carper	D	0	0	-3
Chafee	R	2	-2	-7
Chambliss	R	0	0	1
Clinton	D	5	-3	5
Cochran	R	0	0	-1

Coleman	R	3	-1	-5
Collins	R	8	-2	-1
Conrad*	D	6	-2	3
Cornyn	R	1	1	3
Corzine	D	4	-4	3
Craig*	R	2	-2	-1
Crapo	R	2	-2	0
Daschle	D	5	-3	-3
Dayton	D	5	-3	-3
DeWine	R	2	-2	-3
Dodd	D	3	-3	-3
Dole	R	1	-1	-3
Domenici*	R	13[6]	4	-1
Dorgan*	D	8	-4	3
Durbin	D	11[7]	-11	-5
Edwards	D	4	-2	2
Ensign	R	2	-2	2
Enzi	R	0	0	7
Feingold	D	6	-2	-3
Feinstein*	D	11[7]	-1	3
Fitzgerald	R	2	-2	-1
Frist	R	5	-1	-1
Graham, B. *	D	1	-1	3
Graham, L.	R	0	0	1
Grassley	R	6	-1	-3
Gregg	R	2	0	-1
Hagel	R	3	-1	-1
Harkin	D	7	-7	-3
Hatch	R	0	0	3
Hollings	D	0	0	7
Hutchison	R	1	-1	3
Inhofe	R	5	-2	-1
Inouye	D	3	-1	8
Jeffords	I	28[1]	-23	-3
Johnson*	D	2	-2	1
Kennedy	D	6	-5	2
Kerry	D	5	-5	-5
Kohl	D	3	1	1
Kyl*	R	3	2	1
Landrieu*	D	10[9]	9	-1
Lautenburg	D	14[5]	-12	3
Leahy	D	4	-2	5
Levin	D	6	3	-1
Lieberman	D	4	-4	3
Lincoln	D	1	0	-1
Lott	R	0	0	2

Lugar	R	4	-2	-1
McCain	R	2	1	1
McConnell	R	1	0	-1
Mikulski	D	1	1	-1
Miller	D	2	1	-1
Murkowski*	R	7	5	0
Murray	D	3	-3	-1
Nelson	D	5	-3	-1
Nelson	D	4	0	-1
Nickles*	R	2	2	7
Pryor	D	0	0	-1
Reed	D	5	-3	3
Reid	D	9^{10}	-6	-5
Roberts	R	0	0	-1
Rockefeller	D	5	3	-1
Santorum	R	5	5	7
Sarbanes	D	0	0	-5
Schumer*	D	18^{4}	-6	3
Sessions	R	0	0	5
Shelby	R	0	0	7
Smith*	R	4	0	-7
Snowe	R	3	-3	-7
Specter	R	2	2	7
Stabenow	D	2	0	1
Stevens	R	0	0	-1
Sununu	R	3	1	1
Talent*	R	3	-1	1
Thomas*	R	1	1	7
Voinovich	R	5	1	0
Warner	R	0	0	5
Wyden*	D	7	-5	3

* = Indicates member of Senate Committee on Energy and Natural Resources
Superscript indicates rank of ten most active amendment proposers

Seven of the ten most active senators (determined by amendment involvement) are members of the Senate committee on Energy and Natural Resources—this finding confirms the intuitive assumption that committee members will be more active in the amendment deliberation process than non-members. The impacts of political party and campaign contributions from the energy sector on Senators' amendment proposal patterns are shown in Table 4.

Table 4.

Aggregated Amendment Scores and Correlates

	b	Std. Error	Sig.
Political Party	1.732*	.809	.035
Campaign Contributions	7.629e-6**	.000	.008

Adj. $R^2 = .179$
$N = 81$
* = significant at the .05 level
** = significant at the .01 level

Political party—as one would expect—did appear to play a statistically significant role in senators' amendment proposals, as Table 7 shows. Republicans tended to propose pro-fossil amendments, while Democrats tended to propose anti-fossil amendments—though the difference is not unbelievably large (being Republican yielded two more pro-fossil amendment points than being a Democrat). Campaign contributions from the energy sector also plays a statistically significant role in a senator's aggregated amendment score—on average, a $50,000 investment by the industry in any senator's campaign war-chest yielded nearly 4 pro-fossil amendment proposals or their co-sponsoring of legislation. The adjusted R^2 value is not especially high (.179), but this regression analysis may offer enough explanatory power to say that campaign contributions from the fossil industry were likely to lead to the proposal of favorable legislation for the industry.

Table 5 shows the results of campaign contributions and political party regressed on roll call voting patterns.

Table 5.

Aggregated Vote Scores and Correlates

	b	Std. Error	Sig.
Political Party	3.334e-2	.797	.967
Campaign Contributions	3.3214e-6	.000	.248

Adj. $R^2 = .018$
$N = 100$

The regression results presented in Table 5 indicate that no statistically significant link exists between a senator's party affiliation or receipt of campaign contributions from the

fossil industry and their aggregated voting patterns on amendments to the *Energy Policy Act of 2003*. These findings are further explicated in the discussion section below.

The Energy Industry's Primary Interlocks

The energy related corporations examined in this analysis (N=64) have 17 single director overlaps (one individual serves on the board of two corporations), one double director overlap (two corporations shared two unique directors), and one quadruple director overlap (one individual serves on the board of four corporations). For such a relatively small group of corporations, this is significant. Each corporation's centrality score was calculated with outsiders (groups that do not share a director with anyone else) excluded, so that closeness scores were not inaccurate due to infinite geodesic distances. Table 6 highlights the centrality scores for connected energy corporations within the energy industry.

Table 6.

Measures of Centrality for Interlocked Energy Corporations (Outsiders Excluded)

Node	2002 Fortune 500 Rank	(Standard) Closeness Centrality	Betweenness Centrality	B-L Centrality
Exxon Mobil	2	4.5	14	6.5
ChevronTexaco	8	63	0	91
American Electric Power	13	5.73	42	8.27
Duke Energy	14	3	0	4.33
Dynegy Incorporated	30	63	0	91
Lehman Brothers	91	2.74	0	3.96
Exelon	135	63	0	91
Xcel	137	21	0	30.33
Valero Energy	138	3.5	0	5.06
Halliburton Corporation	153	4.5	14	6.5
Sunoco	163	63	0	91
Williams Companies	174	3.94	14	5.69
Dominion Resources	180	63	0	91
Southern Company	188	3	0	4.33
Public Service	195	21	0	30.33

Enterprise Group				
Ashland Incorporated	225	31.5	2	45.5
FPL Group	226	31.5	2	45.5
Unocal Corporation	278	63	0	91
Ameren	366	63	0	91
Alliance Resource Partners	Not Listed	21	0	30.33
Alpha Natural Resources	Not Listed	3.5	0	5.06
Arch Coal	Not Listed	21	0	30.33
BP	Not Listed	63	0	91
CONSOL Energy	Not Listed	63	0	91
Peabody Energy	Not Listed	63	0	91

(Closeness) Freeman General Coefficient: 106.418
(Betweenness) Freeman General Coefficient: .01056
(Bavelas-Leavitt) Freeman General Coefficient: 2.4396

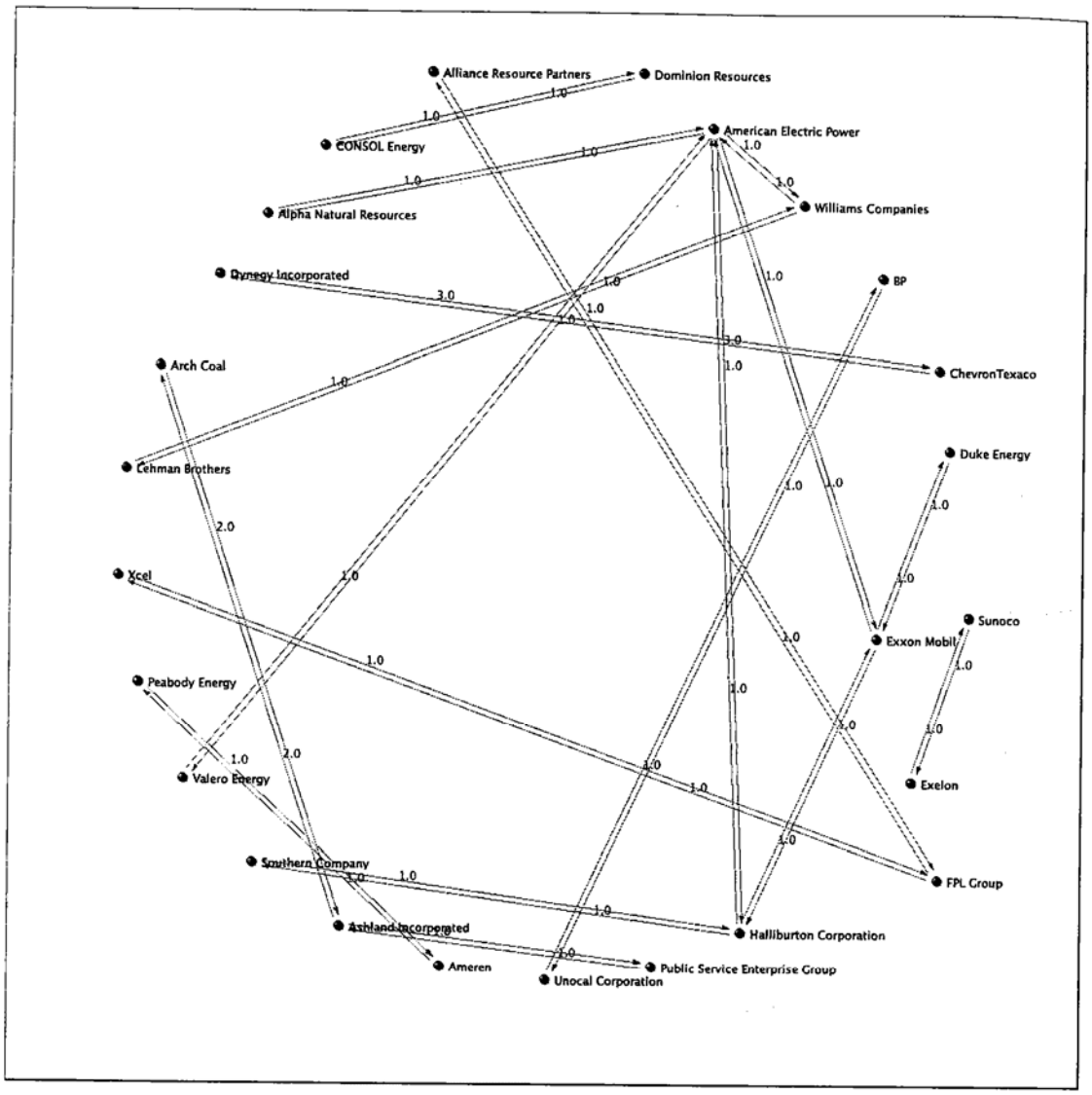
Corporations with high closeness centrality scores within the energy industry include American Electric Power, Williams Companies, Duke Energy, Halliburton Corporation, Exxon Mobil, Southern Company, Valero Energy, and Alpha Natural Resources. These corporations are consistently more proximate to other corporations via director interlocks.

The highest betweenness scores for corporations were accumulated by American Electric Power, Williams Companies, Halliburton Corporation, Exxon Mobil, FPL Group, and Ashland Incorporated. These corporations received betweenness scores—whereas most other corporations did not—because of their interlocks through two prominent network nodes—American Electric Power and Halliburton Corporation. Within the energy industry, it is clear that American Electric Power and Halliburton are in a dominant "gatekeeper" role, as evidenced by their high betweenness scores.

Bavelas-Leavitt centrality figures produced similar results as the closeness centrality measure in regards to significant corporations (with slight variation in raw scores). Figure 1 graphically illustrates these network connections.

Figure 1.

Graphical Illustration of the Central Energy Corporations' Interlocks (Outsiders Excluded)



This image visually illustrates the director interlocks found within the energy industry's dominant corporations. Prominent hubs of interconnection are present with Halliburton Corporation and American Electric Power, which are responsible for indirectly linking ExxonMobil, Duke Energy, the Williams Companies, Lehman Brothers, and Southern Company with the energy industry network.

The Power Policy-Planning Network

The American Petroleum Institute, Edison Electric Institute, and the National Mining Association, which are the largest trade organizations/lobbying groups for the oil/gas, electric generation, and coal mining industries, respectively, are not accurately described in the policy-planning/industry statistics because they refused to provide the names of their directors. Names and positions were extracted from a number of sources to provide a partial description of each organization's connections to the energy industry. Table 7 contains centrality measures of energy corporations and power policy-planning organizations. Each organization's centrality score was calculated with outsiders excluded (groups that do not share a director with anyone else), so that closeness scores were not inaccurate due to infinite geodesic distances.

Table 7.

Measures of Centrality for Energy Corporations and the Power Policy-Planning Network (Outsiders Excluded)

Node	2002 Fortune 500 Rank	(Standard) Closeness Centrality	Betweenness Centrality	B-L Centrality
Exxon Mobil	2	0.558	313.4872	33.8696
ChevronTexaco	8	0.55	212.1101	33.3857
American Electric Power	13	0.5133	192	31.16
Duke Energy	14	0.5203	159.9083	31.5811
CenterPoint Energy	26	0.3702	0	22.4712
Dynegy Incorporated	30	0.3775	0	22.9118
Marathon Oil	43	0.5	0	30.3506
Conoco	48	0.5746	263.5092	34.8806
TXU Corp.	58	0.5423	159.8889	32.9155
Phillips Petroleum	81	0.558	347.8878	33.8696
PG&E	87	0.3702	0	22.4712
Exelon	135	0.3775	0	22.9118
Xcel	137	0.5	0	30.3506
Valero Energy	138	0.5	0	30.3506
Occidental Petroleum	146	0.3319	0	20.1466
Halliburton Corporation	153	0.5347	65.8878	32.4583
CMS Energy	156	0.3319	0	20.1466
Cinergy	158	0.401	28.4238	24.3438
Edison International	165	0.3532	20.7333	21.4404
Williams Companies	174	0.5066	98	30.75

Dominion Resources	180	0.3291	0	19.9744
Southern Company	188	0.401	28.4238	24.3438
Public Service Enterprise Group	195	0.3348	0	20.3217
Entergy	200	0.3565	0	21.6389
AES Corporation	201	0.3319	0	20.1466
Ashland Incorporated	225	0.3348	98	20.3217
Progress Energy	227	0.3565	0	21.6389
Anadarko Petroleum	232	0.3889	40.5333	23.6061
Unocal Corporation	278	0.5347	374.7778	32.4583
PPL	309	0.3598	14.7238	21.8411
Kerr-McGee Corporation	446	0.5	0	30.3506
Arch Coal	Not Listed	0.5133	58.1342	31.16
BP	Not Listed	0.5662	347.5707	34.3676
Green Mountain Energy	Not Listed	0.3775	0	22.9118
Kinder-Morgan Incorporated	Not Listed	0.5	0	30.3506
Koch Industries	Not Listed	0.313	0	19
Massey Energy	Not Listed	0.3565	0	21.6389
Policy-Planning				
National Petroleum Council		0.7333	1842.2438	44.5143
American Petroleum Institute		0.4968	432.3361	30.1548
Interstate Natural Gas Association of America		0.3831	0.0000	23.2537
Independent Petroleum Association of America		0.4162	112.4417	25.2649
American Gas Association		0.4843	324.5960	29.3962
Edison Electric Institute		0.3909	98.0000	23.7259
National Association of Manufacturers		0.4350	75.3397	26.4068
US Chamber of Commerce		0.4611	373.4587	27.9880
Conference Board		0.2760	0.0000	16.7527
The Brookings Institution		0.4162	0.0000	25.2649
Council on Foreign Relations		0.4302	65.2222	26.1117
American Enterprise Institute		0.4254	132.8507	25.8232
RAND Corporation		0.4208	323.5111	25.5410
Resources for the Future		0.4208	194.0000	25.5410

(Closeness) Freeman General Coefficient: 0.9362□
(Betweenness) Freeman General Coefficient: 0.3038□
(Bavelas-Leavitt) Freeman General Coefficient: 0.7380□

Centrality scores were greatly increased (nodes were closer, had greater betweenness, and lower Bavelas-Leavitt scores) with the inclusion of the power policy-planning organizations, compared to just analyzing primary energy corporation interlocks. This finding illustrates the central role that the power policy-planning network plays in creating cohesion within the energy industry, as well as demonstrating the centrality of energy corporations within power-policy development groups.

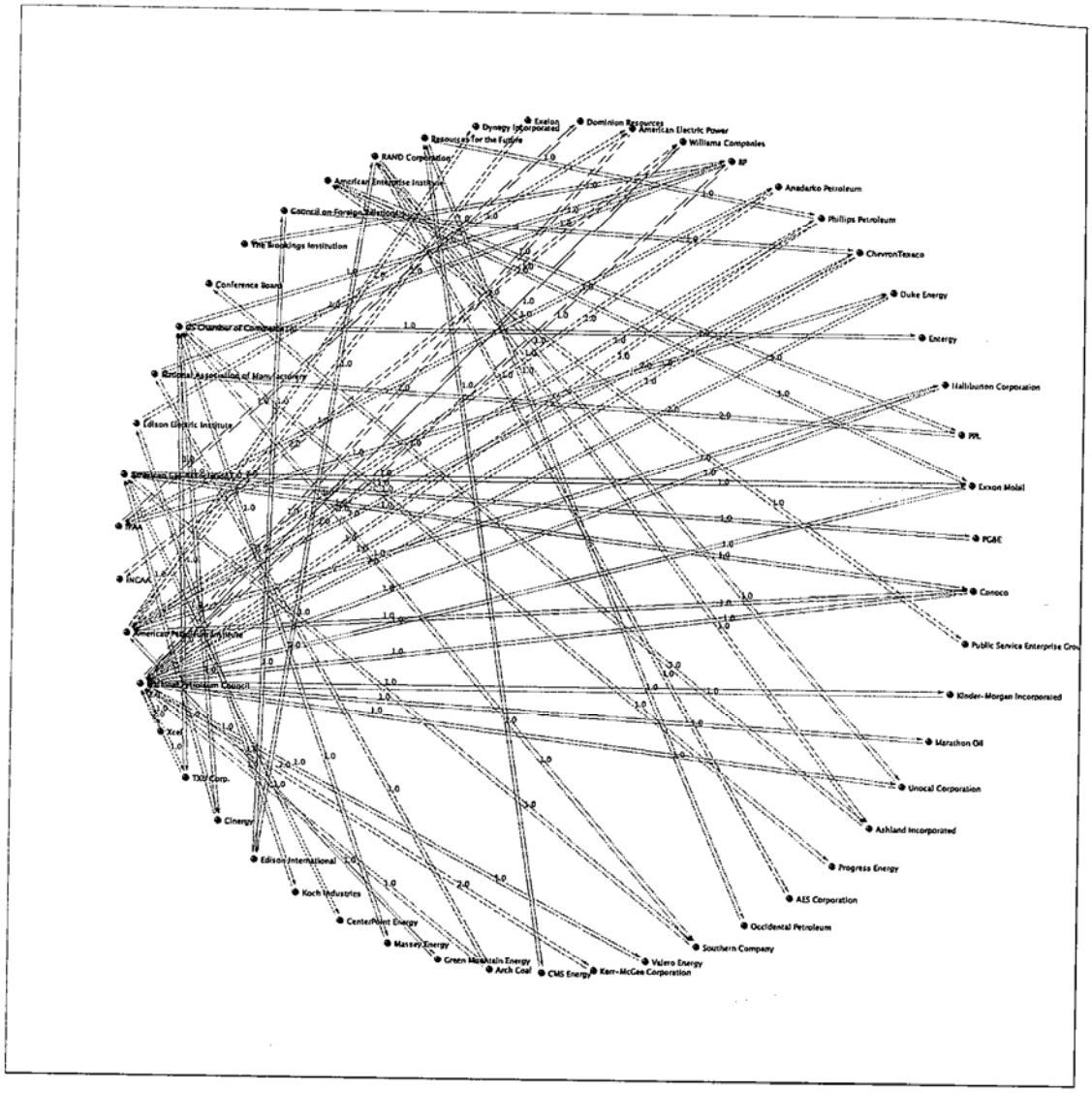
Corporations with high closeness centrality scores in the power policy-planning network include American Electric Power, Williams Companies, BP, Phillips Petroleum, ChevronTexaco, Duke Energy, Halliburton Corporation, Exxon Mobil, Conoco, Kinder-Morgan Incorporated, Marathon Oil, Unocal Corporation, Valero Energy, Kerr-McGee Corporation, Arch Coal, TXU Corp., and Xcel. As expected, the organization with the highest overall closeness score was the National Petroleum Council.

The highest betweenness scores for corporations were accumulated by BP, Phillips Petroleum, Unocal Corporation, and Exxon Mobil. As would be expected, the National Petroleum Council was the most between organization, followed by the American Petroleum Institute (even though data on this organization was incomplete). The US Chamber of Commerce, American Gas Association, and the RAND Corporation also had high betweenness centrality scores.

Bavelas-Leavitt centrality figures produced similar results as the closeness centrality measure in regards to significant corporations and organizations (with slight variation in raw scores). Figure 2 graphically illustrates these interlocking directorate network connections.

Figure 2.

Graphical Illustration of Energy Corporation and Power Policy-Planning Network Relations (Outsiders Excluded)



This image visually illustrates the director interlocks found within the energy industry's dominant corporations and the power policy-planning network. Prominent hubs of interconnection are present with the National Petroleum Council, American Petroleum Institute, and US Chamber of Commerce.

Network Centrality of the Power Policy-Planning Network *and* the Energy Industry's Primary Interlocks

When the relations modeled above are combined, a more accurate description of relational ties are revealed. Table 8 contains centrality scores of the previously analyzed corporations and organizations with their full, first-level network ties exposed. That is, individual corporations' ties to other energy corporations *and* the power policy-planning network are modeled.

Table 8.
Measures of Centrality for Energy Corporations and the Power Policy-Planning Network (Outsiders Excluded)

Node	2002 Fortune 500 Rank	(Standard) Closeness Centrality	Betweenness Centrality	B-L Centrality
Corporations				
Exxon Mobil	2	0.4028	329.2581	39.8750
ChevronTexaco	8	0.3694	233.0368	36.5733
American Electric Power	13	0.3919	252.0000	38.7973
Duke Energy	14	0.3694	208.4027	36.5733
CenterPoint Energy	26	0.2522	0.0000	24.9652
Dynegy Incorporated	30	0.3005	0.0000	29.7513
Marathon Oil	43	0.3353	0.0000	33.1908
Conoco	48	0.3791	231.4345	37.5294
TXU Corp.	58	0.3580	137.9722	35.4444
Phillips Petroleum	81	0.3718	359.4313	36.8077
PG&E	87	0.2522	0.0000	24.9652
Lehman Brothers	91	0.2636	0.0000	26.1000
Exelon	135	0.2685	50.0000	26.5833
Xcel	137	0.3432	100.0000	33.9763
Valero Energy	138	0.3432	0.0000	33.9763
Occidental Petroleum	146	0.2214	0.0000	21.9160
Halliburton Corporation	153	0.4028	150.3480	39.8750
CMS Energy	156	0.2214	0.0000	21.9160
Cinergy	158	0.2762	26.1905	27.3429
Sunoco	163	0.2140	0.0000	21.1882
Edison International	165	0.2468	19.4500	24.4340
Williams Companies	174	0.3515	153.0000	34.8000
Dominion Resources □	180	0.2320	50.0000	22.9680
Southern Company	188	0.3258	56.3571	32.2584
Entergy	200	0.2437	0.0000	24.1261
AES Corporation	201	0.2311	0.0000	22.8765

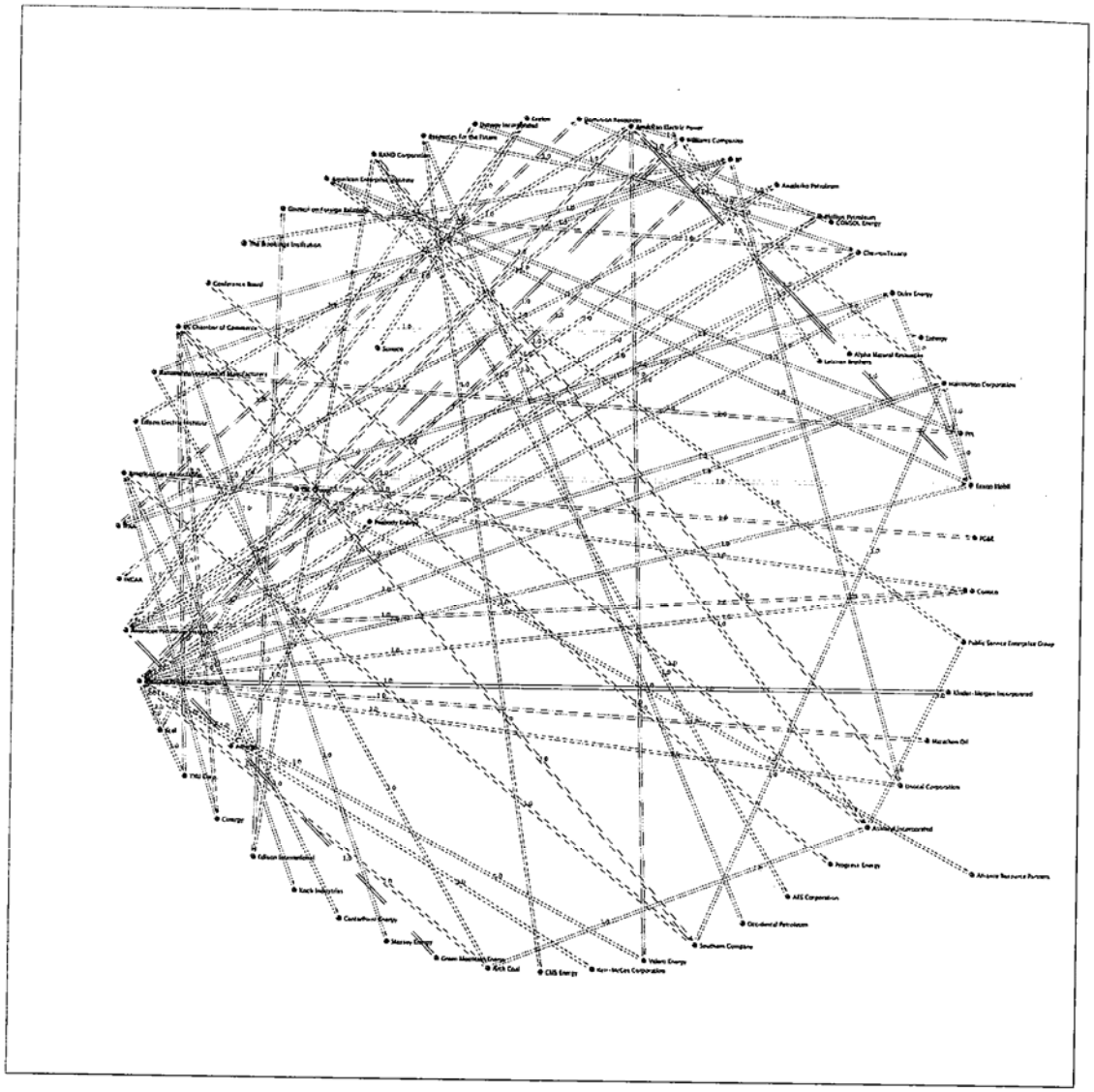
Ashland Incorporated	225	0.2886	142.8990	28.5672
FPL Group	226	0.2613	51.0000	25.8649
Progress Energy	227	0.2437	0.0000	24.1261
Anadarko Petroleum	232	0.2762	50.1333	27.3429
Unocal Corporation	278	0.3742	268.5611	37.0452
PPL	309	0.2589	15.7571	25.6339
Ameren	366	58.0000	0.0000	5742.0000
Kerr-McGee Corporation	446	0.3353	0.0000	33.1908
Alliance Resource Partners	Not Listed	0.2094	0.0000	20.7292
Alpha Natural Resources	Not Listed	0.2857	0.0000	28.2857
Arch Coal	Not Listed	0.3625	173.1565	35.8875
BP	Not Listed	0.3816	368.1774	37.7763
CONSOL Energy	Not Listed	0.1902	0.0000	18.8262
Green Mountain Energy	Not Listed	0.2661	0.0000	26.3394
Public Service Enterprise Group		0.2555	28.6667	25.2952
Kinder-Morgan Incorporated	Not Listed	0.3353	0.0000	33.1908
Koch Industries	Not Listed	0.2266	0.0000	22.4297
Massey Energy	Not Listed	0.2437	0.0000	24.1261
Peabody Energy	Not Listed	58.0000	0.0000	5742.0000
Policy-Planning				
National Petroleum Council		0.4915	1860.6285	48.6610
American Petroleum Institute		0.3558	471.7418	35.2270
Interstate Natural Gas Association of America		0.2636	0.0000	26.1000
Independent Petroleum Association of America		0.2944	167.5360	29.1472
American Gas Association		0.3314	315.3278	32.8114
Edison Electric Institute		0.2886	104.0000	28.5672
National Association of Manufacturers		0.2974	78.1532	29.4462
US Chamber of Commerce		0.3169	384.5587	31.3770
Conference Board		0.2266	0.0000	22.4297
The Brookings Institution		0.2802	0.0000	27.7391
Council on Foreign Relations		0.2857	59.1056	28.2857
American Enterprise Institute		0.3118	141.2049	30.8710
RAND Corporation		0.2959	227.5111	29.2959
Resources for the Future		0.2802	206.0000	27.7391

(Closeness) Freeman General Coefficient: 118.4565
(Betweenness) Freeman General Coefficient: 0.3055□
(Bavelas-Leavitt) Freeman General Coefficient: 202.1629

According to the closeness centrality and Bavelas-Leavitt index calculations, the ten most connected corporations (using direct interlocks with other major energy corporations and with organizations in the power policy-planning network) in the energy industry are (1) Halliburton Corporation, (2) Exxon Mobil, (3) American Electric Power, (4) BP, (5) Conoco, (6) Unocal Corporation, (7) Phillips Petroleum, (8) ChevronTexaco, (9) Duke Energy, and (10) Arch Coal. The most proximate power policy-planning organizations were the National Petroleum Council, American Petroleum Institute, US Chamber of Commerce, American Enterprise Institute, and American Gas Association.

The ten highest betweenness scores for corporations were accumulated by (1) BP, (2) Phillips Petroleum, (3) Exxon Mobil, (4) Unocal Corporation, (5) American Electric Power, (6) ChevronTexaco, (7) Conoco, (8) Duke Energy, (9) Arch Coal, and (10) Williams Companies. Again, as would be expected, the National Petroleum Council was the most between-central organization, followed by the American Petroleum Institute. The US Chamber of Commerce, American Gas Association, and the RAND Corporation were also had high betweenness centrality scores. Figure 3 graphically illustrates these network connections.

Figure 3.
Graphical Illustration of Energy Corporation and Power Policy-Planning Network Relations (Outsiders Excluded)



Results Conclusions

Senator's voting patterns on amendments proposed to the Energy Policy Act of 2003 were not influenced by campaign contributions from the energy industry *or* political party. Amendment proposals, however, were influenced by both campaign contributions from the energy industry *and* political party. Energy corporations have significant ties to each other and the power policy-planning network. Several corporations and policy groups stand out as being dominant within the network. The policy groups with greatest industry representation also happen to be dominant in the development of important policy recommendations to the US Department of Energy (National Petroleum Council and American Petroleum Institute).

Discussion

As the results demonstrate, this analysis determines the impact of campaign contributions on Senators' legislative activity on the *Energy Policy Act of 2003*, identifies organizations within the power policy-planning network, and examines the social network of the energy industry (using social network analysis) and its relationship with the power policy-planning network.

The regression analysis indicates that, in the context of the *Energy Policy Act of 2003*, campaign contributions and political party were significant determinants of amendment proposal patterns, but not roll call voting. Amendment proposal results are somewhat expected; however, the complete lack of correlation between campaign contributions *and* political party with roll call voting patterns represents a significant non-finding. The lack of significance suggests several things: (1) more explanatory variables are necessary, (2) a larger data set is needed, and (3) a method for identifying key votes (the most important amendments) may be necessary. Since the adjusted R^2 is so low in the roll call voting regression model (1.8%), both the addition of explanatory variables and a larger data set seem obligatory. Identifying key votes and isolating them for analysis may produce more consistent and better explained results; however, the fact remains that for the *Energy Policy Act of 2003*, no discernible pattern existed in terms of aggregated roll call votes on proposed amendments. To identify key votes, a significantly larger data set would be necessary, as key votes on amendment proposals are sporadic. Longitudinal data and historical records would best serve this type of inquiry.

Campaign contributions from the most central energy corporations follow an interesting pattern, where those corporations that are less central tend to donate larger

sums of money to candidates, and *much* more in terms of a percentage of corporate earnings. This trend seems to indicate that corporations operating on the periphery of the energy sector's social network use campaign contributions to gain attention and notice, whereas central corporations—while still contributing significant funds—do not need to contribute as much in terms of percentage of profit to ensure that their voice is heard. Several intriguing examples of this exist, but the most salient is a comparison between Addington Enterprises and ExxonMobil. Addington Enterprises, a small petroleum extractor ($2 million in profits in 2002) donated $79,000 in the 2002 election cycle, which represents about 4% of their total profits in the same year. ExxonMobil ($11.46 billion in profits in 2002) contributed $846,825 during the 2002 election cycle, which represents .00007% of their total profits in 2002. This disproportionate pattern of giving is replicated throughout the coal and electric generation industries, but could be reduced in the near future by consolidation that has taken place within the energy industry in the last few years.

When taking a *post hoc* look at the corporate make-up of the energy companies examined in this analysis, we find that several large mergers have occurred since 2002. Cinergy was acquired by Duke Energy (8th most "between" and 9th "closest" corporation), Exelon merged with PSEG, and Phillips Petroleum (2nd most "between" and 7th "closest" corporation) purchased Conoco (7th most "between" and 5th "closest" corporation). These consolidations are important because they create further cohesion within the industry and diversify the holdings of the most dominant energy corporations. Mizruchi (1992) points out that corporate Political Action Committee activity is highly dependent on several factors, one of which is the "degree of diversification of the parent

corporation (more diversified firms tend to be more ideological [in their giving])" (98). This added cohesion and diversification indicates that the already ideologically oriented energy industry (86% of all campaign contributions in 2002 went to Republicans) could become even more polarized in their political contribution activities.

The centrality scores demonstrate that the most financially powerful energy corporations in the United States also enjoy the most central positions in both the energy industry and power policy-planning networks. Seven of the ten most "close" corporations are oil and natural gas producers, while six of the ten most "between" corporations are in this lucrative business. Arguments can be made that this positioning is strategic by the dominant corporations; that is, to protect financial interests or safeguard social cohesion within the network, or both. It could also simply be a result of smaller corporations attempting to gain access to the upper echelons of business community social relations by having a well-connected director serve on their board, while the policy-planning network is giving the corporations with the most at stake a voice in the policy development process. Without in-depth interviews from corporate recruiters, strategists, or other directors in the power policy-planning arena, the assumption is that all three proposed arguments carry certain elements of validity. Burris' research (2005) demonstrated that interlocking directorships are correlated with shared director support for political candidates, and Domhoff (2005) has reviewed small group/social psychology literature on the creation of solidarity within small, intense groups, which corporate boards and policy-planning organizations definitely qualify as. Those research lines suggest that, regardless of the reasoning behind the creation of these close network ties, the ties themselves serve as a mechanism of social cohesion that have

the power to regulate certain behaviors and ideological orientations. Corporate boards are complex social structures comprised of individuals with potentially disparate pursuits; as such, there are obviously other factors that could work in conjunction with or in opposition to network ties to regulate behaviors and ideological orientations. This is one of the fundamental questions that C. Wright Mills grappled with when he asked: "Do the elite determine the roles that they enact...or do the roles that institutions make available to them determine the power of the elite?" (Mills 2000, 24). Unfortunately, this analysis does not offer evidence in support or to the contrary of these questions and claims.

An interesting conflict is looming between some of the major power policy-planning organizations regarding energy policies. Several research-oriented policy-planning organizations—the American Enterprise Institute, Heritage Foundation, and the Brookings Institution—are aggressively promoting research that minimizes the relationship between anthropogenic activities and global climate change. Several other organizations—RAND Corporation and the Council on Foreign Relations are the most notable—are promoting research findings and policy statements that call for radical changes in emissions regulations to mitigate climate change. This analysis' collected network information does not provide evidence about any particular trend between policy-planning organizations' research direction on climate change and their links to corporations. In fact, the major oil producing companies (BP, ChevronTexaco, and ExxonMobil) sit on the boards of directors for organizations with competing ideologies regarding climate change. This indicates that the effects of oil company presence on the direction of research or policy positions are unknown. What is known is that the simple appearance of a highly central energy corporation on a particular board of directors does

not necessarily mean that the organization will develop pro-fossil policy recommendations or lines of research.

An end-note to this discussion is that nearly every top 20 electricity producer had stock-holder sponsored initiatives that asked the company to set a goal of converting 1% of their energy production per year to renewable generation—every single corporate board recommended that stock holders vote *against* this measure, according to the Voter Proxy Statements filed with the Securities and Exchange Commission. These recent attempts to change corporate behavior through the democratic process has led the major trade associations that represent the fossil industry (most of which are headed by energy corporation directors themselves) to construct methods to circumvent future acts of stockholder activism. This is an excellent demonstration of just how much power the individual directors of corporations have in relation to common stockholders. General stockholders are much like the polity: their interests and mobilization are much too dispersed to have any impact on the overall direction of the corporate machine.

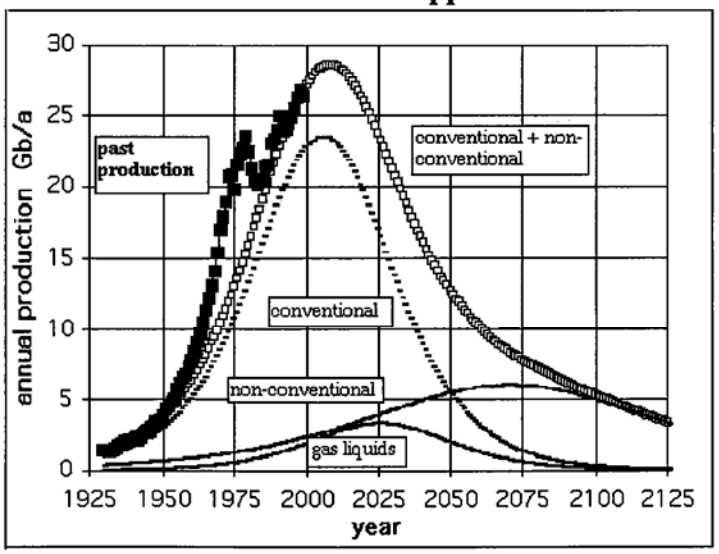
Conclusion

The greatest limit in this analysis is the lack of information available regarding social ties. The original goal of this project was to compare Senators' social ties to corporation employees with their receipt of campaign contributions, and examine which had more power over their legislative activities; however, no information was legally available that allows for any such connections to be mapped or examined. In addition, Standard and Poor's Register of Corporations, Directors and Executives and the Who's Who in America compendium both rely on self-reported information provided by individuals and corporations. In several instances, individuals failed to report directorship positions that created significant interlocks with other corporations. Also, the lack of cooperation by the American Petroleum Institute, National Mining Association, and the Edison Electric Institute in providing the names of their directors potentially hampered the accuracy of these findings. Despite these shortcomings, the analysis does provide significant evidence of social cohesion (via interlocking directorates) within the energy industry and the power policy-planning network. The analysis also finds evidence that suggests that ideological cohesion within the energy industry is present (especially regarding shareholder activism and renewable energy), and possibly becoming more cohesive through the increasing consolidation of firms. Further research needs to examine the social connections between corporations and government, especially between the energy industry and the power policy-planning network, as a potentially crippling energy crisis (that will ultimately benefit the energy industry if nothing is done) is looming and no serious policies have attempted to deal with the situation yet.

The Return of Hubbert's Curve

"Hubbert's Curve" was developed in the 1950's by M. King Hubbert to describe the life cycle of US oil reserves and extraction capabilities; his model gained international fame by accurately predicting the peak of US oil reserves in 1970 (M.King Hubert—Hubbert's Peak 2004). Kenneth Deffeyes, a Princeton geologist who worked under Hubbert while employed at Shell Petroleum, adapted this model to the world oil supply; according to his predictions (which are a point of debate within the professional geological community), the world supply of oil will peak between 2004 and 2008—his specific prediction is November 25th, 2005 (Hubbert's Peak, Current News 2004). Using more accurate data and an updated modeling technique based on Deffeyes' work, respected international oil geologists Colin Campbell and Jean Laherrère (1998) estimated that non-OPEC nations' oil production would peak before 2010, while OPEC would peak around 2015, creating an overall peak in 2010—this is illustrated in Figure 4.

Figure 4.
World Oil Production Estimates Assuming 2000 Gb Conventional and 750 Gb Non-Conventional Supplies



(Campbell 1997)

Some major oil companies have accepted these predictions (ExxonMobil), and others have disputed them (Royal Dutch/Shell); however, the difference in opinion concerns only the projected date of peak production, and the variance is only 25-30 years between the most polarized of positions. The most conservative, oil-industry provided estimates still place the production peak around 2040 (Rifkin 2002). On June 2nd, 2004, the OPEC cartel announced that it was increasing its "production limitation high enough to encompass the entire OPEC capacity," which effectively mitigated any limits on oil production. This was a signal that world demand could only be met with OPEC operating at full capacity (Hubbert's Peak, Current Events 2004).

Furthermore, oil companies have been substantially downgrading the estimated size of their reserves in the past year; in one example, Royal Dutch/Shell reduced their estimated holdings by 20% in early 2004. This action has contributed to the recent rise in per barrel crude oil prices in the world market, and added to the speculation that the curve's peak is upon us. Reserve overestimation is a consistent problem in the oil industry and has been extensively described by researchers, as companies have traditionally over inflated their oil holdings and earnings potential (Rifkin 2002; Cummins et al. 2004; Cummins 2004; Barker 2004). This over inflating appears due to the lack of an established, uniform accounting method for companies to follow and minimal auditing mechanisms in place, which are sometimes conducted only by internal company employees.

The petroleum supply uncertainty is made even more unstable by the rapid, oil-based industrialization of many heavily populated countries (India, China, South Korea, Brazil, Indonesia, Bangladesh, etc.), which has significantly driven up projected oil

consumption rates (Rifkin 2002). China became the second largest consumer of oil in 2003, by itself contributing to one-third of the overall increase in global demand (Sawin 2004). To make matters worse, China also experienced a 15% increase in demand for electricity in the same time period, which caused rolling blackouts throughout the country, and forced many factories to install diesel generators to cope with the outages, thereby further increasing demands for imported oil (Sawin 2004). Finally, projections of automobile ownership in China show that the number of cars on the road will increase five-fold in the next ten years (Sawin 2004).

Obviously, the primary concern in this situation is not running out of oil, but reaching a peak in its availability; once the peak has passed, this comparatively inexpensive energy source will begin increasing in price, as demand outpaces supply, with no possibility ever to return to its previous low cost. This price rise is very likely to experience increased turbidity from worldwide carbon cap-and-trade systems, which went into effect on February 15th, 2005 with the implementation of the Kyoto Protocol. In light of the coming energy crisis, the current fossil fuel dependency of most industrialized countries is logically reaching a critical point where governing institutions must act if they ever hope of reacting to the situation proactively.

Several European nations have undertaken costly retoolings of their transportation systems and energy production facilities to insulate themselves from the imminent price increases of oil and to reduce dangerous emissions that are associated with fossil fuel and nuclear energy production. Research from Germany and Denmark has demonstrated that large-magnitude infrastructure changes are economically and politically feasible, even in the short term (Federal Foreign Office 2004; Danish Wind Industry Association 2004).

The economies of scale necessary to make renewable energy a competitor to fossil fuels have, in certain markets, already been achieved—others are within reach. Unfortunately, public knowledge of this information is very limited in the United States, so few political catalysts have surfaced on the national level; some policy inroads have been made in regards to renewables funding, but they are still dramatically insignificant compared to fossil fuel investments, especially considering the near-future volatility of fossil fuels and the long term promise of renewables.

The federal government's position regarding energy subsidies is logically and economically perplexing, but more sensical when considered in the context of power relationships, social networks, and institutional inertia. Even with minimal information on social ties, it is clear that a relationship exists between campaign contributions and Senators' legislative activities for the *Energy Policy Act of 2003*. Since major fossil industries stand to be the biggest benefactors of the looming oil crisis, it is logical for them to oppose any efforts at widespread infrastructure changes carried out at the federal level.

Finally, the most obvious extension of this research is to obtain clear information regarding social ties between Senators and the energy industry. At this point, the most salient example would be membership lists of the major social clubs that Senators are associated with, both in their home states and the Washington, D.C. area. The lists could be cross-compared against the collected corporate and power policy-planning network data. Obtaining these lists might require methods that are not normally available to the social sciences, such as theft or other types of criminal activity.

The impending crisis that our fossil reliant society will face in the near future without dramatic energy policy shifts is all too real. Hopefully, our federal government can begin to make the right choices to alleviate these problems, and, we, as social science researchers, can ascertain the point at which the pendulum swings away from corporate interests back to the long-term interests of the public.

Bibliography

Andrews, Edmund. "Kohl Settles Mine Subsidy Issue". New York Times. 146.50731 (1997): A6.

Barker, Robert. "Keeping Hot Air Out of Energy Reserves". Business Week. 3882 (2004): 126-127.

Bartlett, Donald, James B. Steele, Laura Karmatz, Aisha Labi, and Joan Levinstein. "The Empire of Pigs". Time. 152.22 (1998): 52-60.

Bess, H. David and Martin T. Farris. "U.S. Maritime Policy: A Time for Reassessment". Transportation Journal. 21.4 (1982): 4-15.

Betz, Kenneth. "Clean Coal and Fuel Cells Highlight 2004 Energy Budget". 25 February 2003. Energy User News. 17 November 2004. <http://www.energyusernews.com/CDA/ArticleInformation/features/BNP__Features__Item/0,2584,92791,00.html>.

Bierut, Mark. 13 March 2005. Design Observer. 24 November 2003. <http://www.designobserver.com/archives/000072.html >.

Borgatti, S.P., M.G. Everett, and L.C. Freeman. Ucinet for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies (v. 6.81).

Brink, Susan and Marianne Lavelle. "Capitol Gifts for the Holiday". U.S. News & World Report. 135.19 (2003): 22-25.

Burris, Val. "Interlocking Directorates and Political Cohesion among Corporate Elites". American Journal of Sociology. (forthcoming).

Burris, Val. "The Two Faces of Capital: Corporations and Individual Capitalists as Political Actors". American Sociological Review. 66.2 (2001): 361-381.

Burris, Val. "Elite Policy-Planning Networks in the United States". Research in Politics and Society. Ed. by Gwen Moore and J. Allen Whitt. Greenwich: JAI Press.

Cairns Jr., John. "Eco-ethical Issues: Self-Regulating Versus Subsidized Ecosystems". International Journal for Sustainable Development & World Ecology. 11.1 (2004): 36-48.

Campbell, Colin and Jean Laherrère. "The End of Cheap Oil". Scientific American. 278.3 (1998): 78-84.

Carey, John, Laura Cohn, Jack Ewing, and Joseph Weber. "Drug R&D: Must Americans Always Pay?". Business Week. 3853 (2003): 38-40.

CBS News | Anti-Terror 'October Plan. 13 March 2005. CBS Broadcasting, Inc. 17 September 2004. <http://www.cbsnews.com/stories/2004/09/17/eveningnews/main644096.shtml>.

Chandler, David L. "In Just 50 Years, We Could Cure Our Addiction to Oil". New Scientist. 184.2468 (2004): 16-18.

Chau, Kwong Wing, Siu Kei Wong, and Chung Yim Yiu. "Improving the Environment with an Initial Government Subsidy". Habitat International. 29.3 (2005): 559-70.

Chuen Li, Shu. "An Introduction to Pharmacoeconomic Evaluation in Rheumatology". Journal of Rheumatology. 6.2 (2003): 192-201.

Cummins, Chip. "Outside Auditing of Oil Reserves Pushed by Calpers". Wall Street Journal. 244.92 (2004): A6.

Cummins, Chip, Silvia Ascarelli, and Mark Long. "Shell Ex-Official Defends His Role in Reserves Flap". Wall Street Journal. 244.55 (2004): A3.

Danish Wind Energy Association. 7 August 2004. <http://www.windpower.org/en/market.htm>.

DNRC Wind Energy Permitting Guide. Montana Department of Environmental Quality. 16 November 2004. <http://www.deq.state.mt.us/Energy/Renewable/WindWeb/DNRCWindEnergyPermittingGuide.htm>.

DOE Fossil Fuel Techline. US Department of Energy. 10 August 2004. <http://www.fossil.energy.gov/news/techlines/2004/tl_ccpi_round2_proposals.html>.

Domhoff, G. William. 10 April 2005. Who Rules America: Conspiracy Theories. 2005. <http://sociology.ucsc.edu/whorulesamerica/theory/conspiracy.html>.

Domhoff, G. William. Who Rules America? 4th ed. Boston: McGraw-Hill, 2002.

EIA Annual Energy Review, 2003. 18 March 2005. Energy Information Administration, US Department of Energy. 7 September 2004. <http://www.eia.doe.gov/emeu/aer/finan.html>.

Federal Foreign Office. Federal Foreign Office, Germany. 11 August 2004. <http://www.tatsachen-ueber-deutschland.de/563.0.html>.

Fossil Fuel Subsidies Fact Sheet. 2003. Tax Payers for Common Sense. 13 November 2004. < http://www.taxpayer.net/TCS/fuelsubfact.htm>.

Green Scissors. 3 February 2005. Taxpayers for Common Sense. 12 May 2003. <http://www.taxpayer.net/greenscissors/LearnMore/senatefossilfuelsubsidies.htm >.

Healey, Jon. "Subsidies for Seafaring Assistance". Congressional Quarterly Weekly Report. 51.38 (1993): 2542-45.

Hosansky, David. "Longstanding Cropland Policy is Fertile Field for Debate". Congressional Quarterly Weekly Report. 53.22 (1995): 1568-71.

Hosansky, David. "Merchant Marine Bill Clears: Clinton Expected to Sign". Congressional Quarterly Weekly Report. 54.39 (1996): 2752-53.

Hubbert's Peak, Current News. 5 June 2004. K.S. Deffeyes. 9 August 2004. <http://www.princeton.edu/hubbert/current-events.html>.

Hudson, Heather. "Universal Access: what have we learned from the E-rate?". Telecommunications Policy. 28.3/4(2004): 309-22.

IM 2003-020, Interim Wind Energy Development Policy. 16 October 2002. US Department of the Interior, Bureau of Land Management. 12 August 2004. <http://www.blm.gov/nhp/efoia/wo/fy03/im2003-020.htm>.

Laherrère, J.H. "Future Sources of Crude Supply and Quality Considerations". DRI/McGraw-Hill/French Petroleum Institute: Oil Markets Over the Next Two Decades: Surplus or Shortage?, Rueil-Malmaison, 12-13 June 1997. <http://www.oilcrisis.com/laherrere/supply.htm>.

Languster, Jim. "Economists Defend Cotton Subsidies". Southeast Farm Press. 31.6 (2004): 10-13.

Loube, Robert. "The Telecommunications Act of 1996: Residential Rates and Competition". Utilities Policy. 12.3 (2004): 139-53.

Luna, Lynnette. "Federal Subsidy Sparks Rural Feuds". America's Network. 108.3 (2004): 14-16.

M. King Hubert—Hubbert Peak of Oil Production. 2004. Hubbert Peak of Oil Production. 9 August 2004. < http://www.hubbertpeak.com/hubbert/>.

Mills, C. Wright. The Power Elite. Oxford: Oxford University Press, 2000.

Mizruchi, Mark S. The American Corporate Network: 1904-1974. Beverly Hills: Sage Publications, 1982.

Mizruchi, Mark S. The Structure of Corporate Political Action. Cambridge: Harvard University Press, 1992.

Mizruchi, Mark S. "What Do Interlocks Do? An Analysis, Critique, and Assessment of Research on Interlocking Directorates." *Annual Review of Sociology, Vol.* 22 (1996): pgs.-.

MMS—Facts and Figures 2003. Minerals Management Service, US Department of the Interior. 16 November 2004. <http://www.mms.gov/ooc/newweb/publications/2003%20FACT.pdf>.

Moor, André de. Economic Incentives—Subsidies and Sustainability. 20 January 2005. Institute for Research on Public Expenditure. 6 February 1995. <http://www.ecouncil.ac.cr/econ/subsidies/>.

Parra, Francisco. Oil Politics: A Modern History of Petroleum. London: I.B. Tuaris, 2004.

Renewable Energy Atlas of the West. 30 July 2004. The Energy Foundation. 18 August 2004. <http://www.energyatlas.org>.

Rifkin, Jeremy. The Hydrogen Economy. New York: Penguin, 2003.

Roscoe, Douglas D. and Shannon Jenkins. "A Meta-Analysis of Campaign Contributions' Impact on Roll Call Voting". Social Science Quarterly. 86.1 (2005): 52-68.

S. 14, Energy Policy Act of 2003. 13 April 2005. Congressional Budget Office. 7 May 2003. <http://www.cbo.gov/showdoc.cfm?index=4206&sequence=0>.

Sandén, Björn A. "The Economic and Institutional Rationale of PV Subsidies". Solar Energy. 78.2 (2005): 137-147.

Sawin, Janet. "China's Consumption Exacerbating Global Oil Dependence". World Watch. 17.6 (2004): 15-18.

Scott, John. Social Network Analysis: A Handbook. London: Sage Publications, 1991.

Shorrock, Tim. "CACI and Its Friends". Nation. 278.24 (2004): 6-8.

Shulz, William G. and Melissa Braddock. "Business Gets a Tax Break". Chemical Engineering News. 82.42 (2004): 9-10.

Social Register Observer. New York: The Social Register Observer, 2002.

Standard and Poor's Register of Corporations, Directors and Executives. Corporations.

Volume 1. Charlottesville: McGraw-Hill Companies, 2002.

Standard and Poor's Register of Corporations, Directors and Executives. Directors and Executives. Volume 2. Charlottesville: McGraw-Hill Companies, 2002.

Table 10. Major U.S. Coal Producers, 2003. 28 February 2005. US Department of Energy. 16 September 2004. <http://www.eia.doe.gov/cneaf/coal/page/acr/table10.html>.

Templet, Paul H. "Defending the Public Domain: Pollution, Subsidies and Poverty". Political Economy Research Institute, University of Massachusetts-Amherst. <http://www.umass.edu/peri/pdfs/WP12.pdf>.

Wassermman, Stanley and Katherine Faust. Social Network Analysis: Methods and Applications. Cambridge, UK: Cambridge University Press, 1994.

Who's Who in America. Chicago: Marquis Who's Who, 2003.

WTO | Legal Texts. 20 January 2005. The World Trade Organization. <http://www.wto.org/english/docs_e/legal_e/ursum_e.htm#kAgreement>.

Zedillo, Ernesto. "Last Chance to Avert Hibernation". Forbes. 174.2 (2004): 37-38.