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Attitude, Money, or Administration? Barriers to Clean Energy

Expansions in Kankakee, Illinois

Adrienne Martin

Capstone

May 21, 2009

Introduction

The world faces an unprecedented level of environmental degradation. The United States, considered one of the main culprits of unsustainable resource consumption and the main manufacturer of the unsustainable “American” lifestyle, is experiencing a political, environmental and economic movement to re-habituate unsustainable resource consumption to encourage more conservative and sustainable growth. Since President Obama’s inauguration, mandates and incentives for clean energy programs have proliferated along with a mandate for behavioral change. American citizens and businesses, politicians argue, must change their unsustainable, excessive, individualistic, and wasteful lifestyles. This paper examines the current unsustainable behaviors of U.S. industries and current incentives for clean energy and contends that clean energy programs for industry must be delivered more effectively to meet Illinois Renewable Energy Portfolio Standards. In 2007, Governor Rod Blagojevich signed Public Act 095-0481 named the Illinois Power Agency Act (http://www.pewclimate.org/what_s_being_done/in_the_states/rps.cfm, <http://www.ilga.gov/legislation/publicacts/95/PDF/095-0481.pdf>). The Illinois Power Agency Act created the Renewable Portfolio Standard (RPS) to require utility companies in Illinois to generate 25 percent of their power from renewable energy sources such as wind, solar, and biomass by 2025 (<http://www.ilga.gov/legislation/publicacts/95/PDF/095-0481.pdf>). As one of the 33 states to mandate a renewable energy standard, Illinois’ 25 percent rates as a moderate comparison with the portfolios of aggressive states such as California, Maine, Massachusetts, and New York (<http://www.pewclimate.org/sites/default/modules/usmap/pdf.php?file=5907>). The legislation mandates Illinois utilities produce seventy-five percent of renewable energy from wind power (Ibid). Currently, governmental agencies and utilities, such as Department of Commerce and Economic Opportunity and ComEd, offer clean energy programs and incentives to help industries lessen their negative environmental impact; however, current administration of energy programs reveals an administrative incapacity to effectuate change. In addition to current programs, industrial re-habitation will require action on the part of local economic development agencies to quickly respond to interest in clean energy expansions. This

paper provides a potential funding strategy and public administration design working with county government that may prove the quickest way to provide assistance to sustainability projects in the community. Research based on interviews with local industries show that industries are interested in energy efficiency expansions and clean energy markets and would accept financial assistance from local economic development agencies in achieving these goals.

Statement of the Research Question

The central focus of this research addresses the laggard response of industry to become part of the clean energy economy. Business and industry, especially energy-intensive industries, have been slow to change their methods of production and expand their product line to clean energy technologies, which fails to make sense environmentally and economically. According to a report entitled “Global, Regional, and National CO₂ Emissions” by the Department of Energy’s Carbon Dioxide Information Analysis Center (CDIAC), 321 billion tons of carbon have been released into the earth’s atmosphere since 1751 with half of these emissions accumulating since the mid 1970s and peaking in 2005 (Marland 2008). The United States is documented as of 2004 as contributing 22 percent of global emissions with 85 percent of its emissions coming from fossil fuels (DOE). Controlling for electricity generation and distributing it among all sectors, the U.S. Environmental Protection Agency reported that the industrial sector produces the largest share of greenhouse gas emissions (EPA Inventory 2006). The International Energy Agency reports that the manufacturing industry consumes almost one third of the world’s energy and is responsible for 36 percent of carbon dioxide emissions (IEA 2007). Despite the U.S. commitment to reducing national emissions by 36 percent by 2030 (DOE), the Department of Energy projects global carbon dioxide emissions will increase annually by 1.8 percent until 2030 (DOE). To meet this minimal goal, the U.S. faces the monumental task of making industry cleaner. Failing to reduce emissions jeopardizes public health and environmental quality as well as productivity and revenue (SEDAC pamphlet). The “Energy Information Administration,” within the Department of Energy, projects an increase in the cost of crude oil, liquid fuels, natural gas, and electricity for the United States until at least

2030 (EIA2 www.eia.doe.gov/oiaf/forecasting.html). The Smart Energy Design Center (SEDAC) asserts that the rise in non-renewable energy costs has resulted in increased demand coupled with increased production costs (SEDAC pamphlet). Energy costs have increased overall operational costs for companies, and will only continue to increase; and a large part of the solution, SEDAC asserts, is energy efficiency and renewable energy (Ibid). If new money is to be made on clean energy technologies, why are manufacturing companies maintaining the same dirty energy product line? When all indicators suggest increased independence, security, and prosperity with clean energy, why are industries slow to change?

This research seeks to identify sources to explain this seeming indifference of industry in the midst of a scramble to save the planet and the U.S. economy. Rapid and sweeping efforts are needed to counteract environmental degradation and economic recession where the largest and most needed change must take place: industry. Although this research cannot directly explain industry's inaction, this research seeks to determine whether the failure of industry to act is explained by attitude or financial constraint. If attitude inhibits industry from becoming cleaner energy users and environmental stewards, education is needed. If financial constraints explain industry's laggard response, financial and administrative assistance is needed. A combination of the two might also prove a possibility. Several questions surrounding clean energy expansions such as awareness, cost, knowledge of incentives, willingness to invest time and energy, familiarity of state agencies, and experience with agencies providing energy program incentives, may identify causes of inaction and barriers to clean energy expansions. Questions relating to the slow response of industry include whether businesses are interested in expanding, interested in clean energy expansions, aware of the benefits of increased energy efficiency, and have knowledge of technologies and incentives. By identifying a specific company's barrier for clean energy, economic development agencies, governmental agencies, and communities may determine how to proceed on the basis of material or ideational solutions.

Material circumstances such as environmental health and cost-benefits may serve as motivator for clean energy, but ideational solutions such as increasing buy-in to the importance of environmental care,

integrating clean energy sources, and valuation of the environment may also behoove society. Looking at clean energy expansions from the perspective of industry may provide insight into perceived inaction and may reveal inadequate public administration as part of the problem. If this research finds a perception of inadequate administration, a local administrative catalyst may be needed to efficiently deliver clean energy incentives.

The significance of this research lies in its potential impact on the environment, economy, national security, and public administration. Identifying why businesses have been slow to change their business practices and production methods for a clean energy economy remains critical for reducing emissions, reversing environmental degradation, becoming more competitive and profitable, and keeping public administration responsive and relevant. Politically, increasing energy independence and clean energy will reduce the United States' dependence on foreign oil and fossil fuels, which may improve international relations and increase national security. Energy became a critical issue in international relations when the United States reached its peak oil production in 1979 and the U.S. began importing oil for industrial use (Friedman 2008, Yergin 1982). Friedman recounts Secretary of State Condoleezza Rice's testimony to the Senate Foreign Relations Committee on April 5, 2006 on how energy politics, and specifically petropolitics, had changed her job (Friedman 2008). She said:

I can tell you that nothing has really taken me aback more as secretary of state than the way that the politics of energy is—I will use the word warping—diplomacy around the world. It has given extraordinary power to some states that are using the power in not very good ways for the international system, states that would otherwise have very little power. It is sending some states that are growing very rapidly in an all-out search for energy—states like China, states like India—that is really sending them out into parts of the world where they've not been seen before. (105).

Friedman adds that China's scramble for energy led China to tolerate the authoritarian government in Sudan, despite the Sudan's government "murderous policy of repression in Darfur" (Friedman 2008).

Friedman asserts that the U.S.' dependence on oil from Saudi Arabia has inhibited American officials to confront Saudi Arabia about the support some religious organizations give to suicide bombers (Ibid).

Friedman blames the U.S.'s importation of oil from the Middle East as the cause for the hostility Middle Eastern countries have expressed for the West, which he believes has fueled anti-Americanism and

funded acts of terrorism against the United States (Ibid).

Friedman argues that after the United States extracted the last from its oil reserves, the country became dependent upon countries supplying the country with oil and hesitant to confront these countries when constraints on democratic freedom turned into oppressive regimes (Friedman 2008). Countries such as Saudi Arabia gained vast amounts of wealth and Saudi Arabia has imposed many constraints on arts and culture as well as funding extremist Islamic schools (Friedman 2008). Comparing the trajectories of oil-rich countries that amassed much wealth without first establishing democratic institutions such as Bahrain, Nigeria, and Iran, Friedman uncovered an inverse relationship between the price of crude oil and political and economic freedom (Friedman 2008). After comparing freedom with crude oil, he states the First Law of Petropolitics: “In oil-rich states, the price of oil and the pace of freedom tend to move in opposite directions” (Friedman 2008, 96). In other words, the higher crude oil prices, the more that free speech, press, elections, rule of law, etc. atrophy (Friedman 2008). The lower the price of oil, the sooner oil-supplying countries will establish institutions of transparency, liberalism, legality, and entrepreneurship (Friedman 2008). Reducing demand of foreign oil and decreasing the price of oil has the potential to transform oppressive oil-rich regimes, some of which have expressed hostility to the United States, into freer, more collaborative countries (Friedman 2008). Energy independence and environmental leadership might help to promote an image of the United States as a more self-aware country actively involved to improve environmental quality, reduce violent extremism, and help uplift impoverished areas of the world.

Energy independence will also increase the security of energy supplies the United States needs for commercial, industrial, and residential needs (International Energy Agency (IEA 2009). According to the International Energy Agency, patterns of energy use and supply are economically, environmentally and socially unsustainable (IEA2 2009). IEA projects that by 2050, energy-related carbon dioxide emissions will double by 2050 and demand for oil will only increase (IEA2 2009). IEA projects that primary energy demand and carbon dioxide emissions will both increase by 1.6 percent each year over the next twenty-five years which results in a forty-five percent increase by the year 2030 when compared to

2006 measurements (IEA2 2009, 3). These trends elicit concern over the security of energy supplies in coming years and require urgent action to conserve supplies for future use (IEA2 2009). This agency produced its report for the global community, to warn all countries about the impending energy crisis and finite availability of energy supplies; and by IEA's urging energy self-sufficiency, the unstated concern over the potential international conflict over scarce energy supplies underlies the plea to invest in energy independence. The strain accompanying an international race for energy supplies may put importing countries at a disadvantage and at the mercy of an unregulated supplier (Friedman 2008). This source of tension could be eased by reducing the strain on existing energy supplies. The report urges widespread investment and deployment of "energy efficiency, many types of renewable energy, carbon capture and storage, nuclear power and new transport technologies" to meet greenhouse gas emission goals (IEA2 2009, 2). If countries fail to invest with commitment to these alternatives in the short-term, countries may be faced with "sub-optimal" technologies in the long-term (IEA2 2009, 2).

With so much at stake and so much to gain, what is holding back industry from responding quickly? Environmental Protection Agency regulations, policies, and mandates have greatly helped make industries more sustainable, but the transformation of production will require buy-in from industries. In many reports, the humans working in industry have been overlooked and companies have been reified into human-less calculating corporations. Reified as "industry," corporate headquarters and facility operations decide how to conduct business beyond regulatory requirements. But it is people in corporate management and people in facility operations exert influence on decisions large and small about whether and how a company becomes more sustainable including the company's strategy, policy, investments, technology, energy management, and business practices that can be considered as more or less sustainable. This research seeks to determine at least one critical factor for why industry seems so unmoved by the societal plea for companies to become more environmentally conscious and energy efficient. By identifying barriers that inhibit companies from increasing their energy efficiency and improving their energy management, this research asks plant managers a series of questions regarding their energy costs, interest in clean energy expansion, and knowledge of clean energy programs. If these

barriers can be identified and overcome, this research will have contributed to improved environmental health, U.S. economic competitiveness, environmental administration, and increased national security.

Conceptual Framework

The two most important phenomena in this study include the level of awareness of the benefits of clean energy and the administrative effectiveness of clean energy incentives. These two components are crucial for overcoming barriers to a cleaner energy economy. In this paper, clean energy will include energy efficiency and renewable energy sources such as solar, wind, biomass, and geothermal energy sources. The U.S. Department of Energy states that a single definition of energy efficiency is lacking, but defines energy efficiency as energy intensity, which is "...the ratio of energy consumption to some measure of demand for energy services..." (EIA1 www.eia.doe.gov/emeu/efficiency/definition.htm). The Bureau of the Census, defines energy efficiency as "...energy use per unit of output in manufacturing" (Yergin 1982, 67). According to this definition, energy intensity may include engineering efficiency which "is the amount of useful work output that a process or a piece of equipment performs with a unit of energy input" as well as industrial structure, which would encourage lighter, less energy intensive products over heavy processing (Ibid; U.S. Congress 1993, 2). Lighter energy-intensity industries such as fabricating finished goods require much less energy than heavy-manufacturing industries that process raw materials and petrochemicals (U.S. Congress 1993). Therefore, becoming less energy-intense would require more energy-efficient equipment and processes as well as a shift in processing capacity (U.S. Congress 1993). Complete elimination, or even reduction, of heavy processing industries is unlikely so energy intensity will typically mean improving the engineering efficiency of industry equipment and processes. Another clean energy facility expansion could include increased independence from the energy grid. Installation of solar panels, geothermal heating and cooling, wind power, recycled energy and several additional technologies would be categorized as a clean energy expansion.

Similar to lightening industrial capacity, industries may also complete a clean energy expansion by producing technologies used for harnessing and distributing clean and renewable energy. Limitless opportunities for such expansions exist; several economic reports from Duke University's Center on

Globalization, Governance & Competitiveness and the Delta Institute have broken clean energy technologies into their components with the goal to identify market niches in clean energy technology for American manufacturers. The Renewable Energy Policy Project (REPP) broke a wind turbine into twenty components, identifying major components and component firms in Illinois (Sterzinger 2004). From these reports, companies could identify markets for these components and either slightly modify or expand their current product line. For example, a company producing air filters may find an opportunity to produce all-natural truck exhaust filters required by the Clean Air Act for diesel trucks. The Clean Air Act, first passed in 1970, and amended in 1990, continues to be incrementally amended by Congress (Rosenbaum 2005). Although Congress generally legislates by successive incrementalism, Congress made little progress on environmental policy by taking an incremental and local approach on environmental issues until Congress' repeated failures led them to boldly pass the Clean Air Act (Rosenbaum 2005). Although the Clean Air Act has reduced automobile emissions and lead levels in gasoline by 90 percent and 75 percent respectively, since 1970, population growth and a 62 percent increase in the number of vehicles from 1970 to 2000, has offset the benefits of this regulation (Rosenbaum 2005).

Several assumptions underlie this research. First, this research assumes that all plant managers acknowledge global warming as a scientifically legitimate phenomenon. Since most contradictory research on global warming has either been refuted or discredited, most Americans acknowledge global warming and recognize human activity as one of its causes. This paper assumes plant managers likewise acknowledge the legitimacy of and human cause of global warming. Second, this paper assumes that plant managers will possess accurate and detailed knowledge of the company's expansion plans. Plant managers, who collaborate with economic development agencies on workforce training and business expansions, typically know the business strategy and expansion plan, especially for the facility she manages. Although the plant manager is not the legal representative of the company, this paper assumes the plant manager can speak for the company. Fourth, this paper assumes that non-renewable energy costs will continue to rise and will jeopardize current levels of production unless cleaner, less expensive energy sources are incorporated. Fifth, this paper assumes that energy efficient technologies will ultimately prove

cost-effective for industry; however, several reports challenge this assumption. Sixth, this paper assumes plant managers and industry in general makes decisions based on the company's bottom-line cost model rather than triple-bottom line model. These two models of cost evaluation correspond to their concepts of community; the bottom-line model perceives community through the traditional model of community: as three unrelated spheres of economy, environment, and society (<http://www.sustainablemeasures.com/Sustainability/index.html>). Figure 1 illustrates the traditional model of community. The triple-bottom line model is designed to result in sustainable decisions by evaluating decisions based on the total cost including the cost to community, society, and environment in contrast to the business bottom-line analysis that considers cost within the frame of reference of the company and its budget, omitting consideration of potential externalities of social and environmental costs (Hart). The likelihood therefore of each company completing a clean energy expansion will depend upon the benefit to each company's budget.

Figure 1: Traditional Model of Community

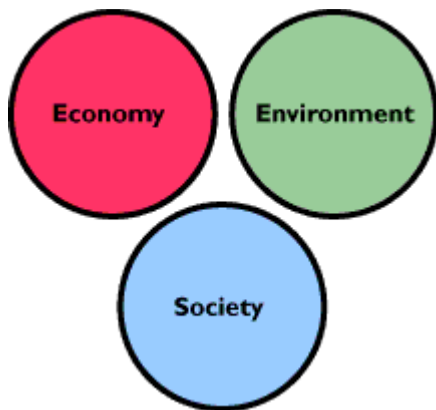


Figure 2: Sustainable Community (Weak)

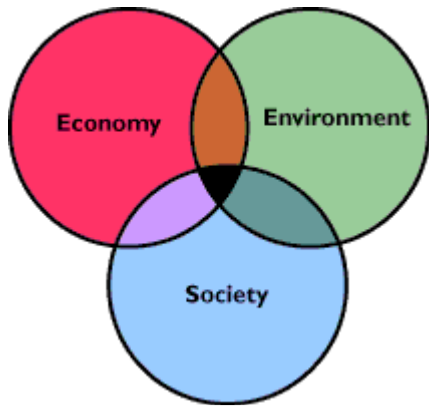


Figure 3: Sustainable Community (Strong)

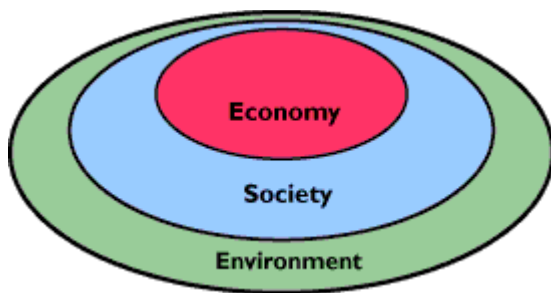


Image Source: Maureen Hart. "Sustainable Measures."

Figure 1 and 2: <http://www.sustainablemeasures.com/Sustainability/index.html>

Figure 3: <http://www.sustainablemeasures.com/Sustainability/ABetterView.html>

Delimitations

This study is bound by location, time, representativeness of industry, access to company representatives, and the receptivity of its subjects. First, this research is confined to Kankakee County and the industries located therein in a moment in time. This research will only partially reflect Kankakee County's industrial base and may not be reflective of the industrial base of other communities. This research will not be representative of Kankakee County's industrial base because this research will target plant managers of energy-intensive industries such as food, book, and chemical manufacturers, logistics companies, and hospitals. Only plant managers from Kankakee County companies will be selected to respond and therefore the data collected from these interviews will reflect the sentiments and extrapolations of plant managers, not the official company statement. Plant managers may report answers

but this does not mean the company will commit to a clean energy expansion. This boundary was necessary for this research because plant managers are more accessible and in most cases more knowledgeable than corporate CEOs about their regional facilities. Despite their greater accessibility compared to CEOs, plant managers are still difficult to reach and recruitment will be largely dependent upon the plant manager's schedule and receptivity. Receptivity of plant managers will largely depend on each plant manager's background, personality, and environmental concern.

Collection of Data

This research collected data through interviews with plant managers and environmental engineers from eleven companies in Kankakee County. Interviews contained twenty-six questions about their company's energy costs, their company's interest in clean energy expansions, and their knowledge of clean energy incentives for industry. Interviews were selected for data collection because this research seeks to identify at least one common barrier that inhibits Kankakee County industries from becoming more energy efficient and/or incorporating a clean energy technology into their product lines. The connection between energy costs and productivity may be conceptualized from a production standpoint.

The Department of Commerce and Economic Opportunity (DCEO) links economic development benefits to energy efficiency and renewable energy (http://www.commerce.state.il.us/dceo/Bureaus/Energy_Recycling/). So much so, that DCEO created the Bureau of Energy and Recycling to provide programs and services to demonstrate this link (Ibid). The website reads: "Further, Bureau programs will demonstrate that economic development, sustainable energy, recycling practices, and environmental protection go hand in hand" (Ibid). No data source validates this claim; however it might be reasonable to assume this relationship could have been determined by research studies conducted by the State of Illinois with data from ComEd on energy savings. Studies on the relationship between energy and economy started in the 1970s when energy prices spiked and the United States experienced a recession (Yergin 1982). From the 1974-1975 economic recession when labor productivity decreased and energy costs rose, analysts such as Robert Dohner

recognized the importance of energy costs in the production process (Yergin 1982). As an input of production, the amount of energy used and the energy's corresponding price becomes an input as any other factor in production. Changes in energy prices will change production decisions affecting other inputs of production (Yergin 1982). As energy prices rise, as they did from 1974-1979, producers reduced other factors in production to pay for more expensive energy (Yergin 1982). Robert Dohner in "The Bedeviled American Economy," explains the extended use of non-energy factors of production within the context of higher energy prices and the drop of productivity in this way:

The greater use of these other factors lowers their productivity (output per unit of input). For example, oil tankers now travel at lower speeds to save fuel, thereby substituting labor (crew days) and capital services (ship days) for energy. At the same time, this reduces measured labor and capital productivity in shipping (ton miles per crew day, etc.). To the extent that producers generally could substitute labor for energy, they would lower measured labor productivity (Yergin 1982, 66).

Higher energy costs, he argues, also depress investment (Yergin 1982). "Higher energy bills reduce the income available to distribute to labor and capital..." which results in less productive labor and capital (Yergin 1982, 67). Reduced returns on capital, such as structures and equipment, will lower future capital investment; higher energy costs would then weaken investment and economic growth (Yergin 1982). And as energy costs rise, as multiple sources project they will do at least until 2030, the sooner a company becomes clean, the more the company will save in the long-term (and short-term in most cases) (<http://www.eia.doe.gov/oiaf/aeo/economic.html>, SEDAC handout).

The amount of investment depends upon the mutual reliance of capital and energy in production—if energy and capital couple to mechanize labor, then higher energy prices will jeopardize capital growth; however, if energy and capital are unrelated in production, then higher energy costs may stimulate capital growth (Yergin 1982). For industries that create labor by combining energy and capital into production (human and machine) rising energy costs compromise their economic growth. Although the labor drop in 1974 that inspired the connection between energy and labor has been contested, no other connection has been able to account for the fall of productivity (Yergin 1982). The drops in productivity observed in the United States in 1974 and 1979 were also observed in other Organization for Economic Cooperation and Development (OECD) countries (Yergin 1982). Since the U.S. reached its domestic peak

oil production in the 1970s, energy prices have remained in the hands of foreign regulators, leaving energy prices subject to the determination and interests of foreign providers (Yergin 1982). Slowed economic growth, increased unemployment rates, and reduced output reflected the cuts taken by industries to substitute for their increased energy costs—and although higher energy costs were not the only factor to slow investment in industry, higher energy costs were still an important factor, as Dale Jorgenson demonstrated in his study (Yergin 1982, Hudson 1979).

As technology has ubiquitously infiltrated all industrial sectors, manufacturing sectors create intimate links between capital and energy. Manufacturing facilities contain numerous pieces of equipment for mechanized labor: employees operate power systems, processes that transform raw and input materials into products, and supply chain logistics that meet the needs of their customers (Gannon 2009). The efficiency of their equipment affects its true cost as reflected in its ratio of input to output, its connection to the productivity of their employees, and the capital available for future investment (Yergin 1982). If a facility uses old equipment that requires an input of one hundred percent and generates an output of eighty percent, that facility is losing twenty percent of its input. The inefficient equipment diverts twenty percent output with money that companies could invest in creative projects instead of investing funds for maintenance and increased input. Inefficient equipment also requires more work out of employees, which might result in more quickly tired and worn bodies. Rising energy costs as an increased factor of production requires facility managers to substitute other factors of production to input more expensive energy into equipment that outputs only a percentage of the energy put into it. As energy costs have drastically fluctuated over the last year, with energy prices reaching \$1.78 per therm for natural gas¹ and an estimated electric cost with a range of \$100 to \$800 per MW, depending on load and usage (ComEd: www.icc.illinois.gov/downloads/public/edocket/207716.pdf), companies have had to divert funds from other sources to pay for rising energy costs. Companies located in an older and inefficiently designed and furnished facilities will experience even higher energy bills. This redirection of capital to energy bills will

¹ A representative from Nicor Gas reported this all-time high at the January 2009 Economic Alliance of Kankakee County meeting.

subtract funds from other budget areas, profit-generating projects first, to maintain operations. Reductions in labor, equipment, and supply may decrease. Budget constraints will restrict growth opportunities and delay company plans for capital expansion. Plant managers and engineers will notice the rising energy costs and constraints with capital to increase capacity. Energy costs, as an important factor in production, may induce great strain on a business during a time of rising energy prices and inefficient facilities.

Interviews with plant managers and engineers serve as the method of data collection. Plant managers, oftentimes better than corporate management, know monthly energy costs and constraints because their position as plant manager requires them to pay energy bills, work with the local energy distributors, and manipulate physical conditions within the facility based on principles of economical energy management to optimize cost-effectiveness and productivity. Plant managers work with constrained budgets (as almost all interviewees offered) and the interviews provide several advantages. Depending on the company, the plant manager has a level of authority on energy management. Clean energy expansions are needed in all industries for environmental and economic reasons. Greater energy efficiency in facilities will reduce emissions, production waste, and energy investment. Clean energy market expansions will increase the company's capacity to meet a market demand in favor of clean energy. Both energy efficiency and product line expansions could increase the companies' productive capacity and lead them to a potentially profitable market. If multiple companies commit to clean energy expansions, the local economy and community could enjoy an overall improved quality of life. Therefore, collecting information on each company's level of interest and awareness based on questions of energy cost, openness to clean energy expansions, and knowledge of incentives is the most direct and time-efficient method for understanding clean energy issues for industry. Interview questions elicited various answers depending upon the presence of closed and open-ended interview questions. Interviews allowed a definite set of questions to be answered that the researcher believes will best indicate each company's general outlook on clean energy. The interviews worked best with the studied population and research subjects because the limited methodology of interviews required the least amount of time, invasion of privacy, and greater willingness to participate on the part of the plant manager.

This research was designed to study Kankakee County industries. To represent industry, eleven companies mostly from energy-intensive industries such as manufacturing and wholesale and distribution, were selected to complete the interviews. To represent each company, plant managers of these facilities completed the interviews as the subjects. Although not the legal representatives of the corporation, plant managers had the knowledge required to adequately answer the interview questions due to their constant supervision of energy management. All of the interviews were conducted in Kankakee County at either the Economic Alliance of Kankakee County via phone or on-site at a company's facility. If the interview was completed by phone, both the interviewer and interviewee conducted the interviews in their respective offices. Five interviews were completed over the phone. One interview was completed through email at the request of the plant manager and five interviews were completed in-person at the company's facility. The overall setting is a work environment, sometimes quiet, sometimes buzzing with activity. With phone interviews, both the interviewer and plant manager participated comfortably as each conducted the interview in their usual work setting. However, these interviews overall resulted in a less engaging but more efficient interview. In contrast, the interviews completed in-person sometimes lasted over an hour despite efforts to adhere to the 25 minute limit. The interview duration was capped by the researcher's supervisor, who warned that plant managers may not agree to the interview if the time exceeded twenty-five minutes. He advised the researcher to adhere to a twenty-five minute interview for recruitment and adhere to the time limit while allowing time for elaboration if the plant manager offered it. The researcher's supervisor, the President of Economic Alliance of Kankakee County and the Kankakee Planning Director had lived in Kankakee for his entire life and knew many of the plant managers and their time constraints through his work in planning and economic development. The researcher then set the interview duration time to twenty-five minutes. The interviewer's attempts to move quickly through the interview, without curtness, were lost at times on a garrulous plant manager. Since the researcher felt she properly conveyed her respect for their time, she appreciated the additional information provided by an interviewee. If interviews were completed on-site, the interviewer conducted interviews in an office setting.

Data collection occurred from April 21, 2009 to May 7, 2009. Eleven interviews were conducted during this time after which results were reviewed and analyzed. Completing at least ten interviews during this short time span allows researchers to capture a snapshot of barriers and needs of local companies in a quickly changing market environment. With a rapid market, and political, and regulatory changes occurring for industry, waiting too long to interview companies may result in outdated results and inadequate response. For expediency, interviews were completed according to opportunity, although researchers targeted more energy-intensive companies first under the assumption that the most energy-intensive industries will report the highest expenses and the greatest need. Less energy-intensive companies were expected to share similar albeit less urgent concerns with energy-intensive companies.

In addition to interviewees, plant managers served as key informants, especially when they proffered additional information not asked by the interviewer. Although interview questions may have adequately covered the company's approach toward clean energy, a plant manager may have revealed more or less depending upon her comfort level and trust of the interviewer. The researcher of this research project, who works with a local economic development agency, had previously met a few of the plant managers and benefitted from the established reputation her economic development agency enjoys with local plant managers. This relationship may have resulted in increased participation from companies and additional information not covered by the interview questions. However, a couple of companies only participated because the researcher was conducting this research for a university project.

This research project ultimately sought to explain why Kankakee County companies have been slow to complete clean energy expansions. Interviews were designed to measure local companies' levels of interest in and awareness of clean energy expansions, knowledge of incentives, and familiarity with agencies administering incentives, assuming that this would have helped to confirm whether these factors contribute to their slowness to change. Interest in and awareness of clean energy expansions, knowledge of incentives, and familiarity with agencies administering incentives may not have measured each company's likelihood or openness to clean energy expansions. These indicators may not have fully addressed the causes of inaction. Despite these intentions, problems of external validity may compromise

the credibility of this research. First, this research used interviews as the sole method of data collection. A failure to triangulate by using several data collection methods weakens the accuracy of the resulting analysis by limiting the factors and sources of information (Golafshani 2003). Consequently, this restriction might have contributed to a limited analysis. Interviews may not have been the best data collection method for answering this research question; perhaps a combination of participant-observation approaches, key informant interviews, and experimental instruments would have provided greater credibility to this research.

Before conducting these interviews, the researcher reviewed the questions and asked a local economic developer, who often collaborates with local plant managers, to review the interview questions. After explaining the research question and the desired information to the economic developer, he reviewed the interview questions and suggested a few extra questions and phrasing revisions that would increase the chances of obtaining the desired information. The interview questions are provided below, as shown in Figure 4.

Figure 4

Clean Energy Expansion Interview Questions

1. What is your primary source of energy?
a. Electricity
b. Natural Gas
2. Please rate the quality of service and distribution. For example, how quickly does your utility respond when you experience an energy outage?
a. 1 Very Poor
b. 2 Poor
c. 3 Satisfactory
d. 4 More than Satisfactory
e. Comment
3. Please indicate your percentage of energy usage. Electrical plus Natural Gas = 100%. For example, if your energy distribution is evenly divided, write 50/50, 65/45, etc. Please indicate the dominant energy?
4. What is your most energy-intensive product/process?
5. When is your peak time of energy consumption? (Season and time of day)?
6. What is a rough estimate of your average peak energy costs?

7. Are energy costs barriers to growth?
8. Are you interested in lowering your energy costs? Additional comment.
9. Do you have a company policy on clean energy and efficiency? Is so, what is it? If not, has your company had any discussions on this subject?
10. Would you be interested in incorporating a source of renewable energy into your energy consumption? Please explain your answer.
11. Please rank your interest in the following (Likert):
a. Lowering energy costs
b. Increasing energy efficiency
c. Incorporating renewable energy source into production such as solar, wind, biomass
d. Selling excess energy to electric grid
12. Do you consider energy efficiency and utilization of renewable energy sources as option for increased productivity?
13. Are you planning any projects to increase your energy efficiency or reduce your energy costs? Why or why not?
14. If so, how much are you planning to invest?
15. In the next five years, how likely are you to have a sustainability expansion?
16. What do you consider your biggest barrier in becoming more energy efficient/lowering your energy costs?
17. Prioritize the following in terms of your company's priority? What is your main motivation for energy efficiency? Please rank each item. 1 = Least Important; 7 = Most Important.
a. Reduce Carbon Footprint
b. Return on Investment (ROI)
c. Advocate renewable energies
d. Reduce dependency on fossil fuels
e. Lower energy costs

f. Respond to customer demand
g. Other
18. Are your customers demanding more increased environmental responsibility from you?
19. How inclined are you to invite an energy consultant to audit your facility and provide suggestions for increased energy efficiency?
20. How interested are you in increasing your product line for clean energy technology markets?
21. If you are interested in contributing to a clean energy market, where do you think you might fit in?
22. Are you aware of the energy efficiency and renewable energy expansion assistance available to businesses provided by Department of Commerce and Economic Opportunity?
23. How likely are you to request funding from Department of Commerce and Economic Opportunity for energy expansion projects?
24. If incentives were available, would you invest in an energy expansion?
25. Would you prefer tax credits, grants, rebates, or other forms of assistance?
26. What amount of funding would enable your company to complete a clean energy expansion?

The plant managers of eleven companies in Kankakee County, Illinois participated in the interviews. The researcher called over thirty companies, mostly from general manufacturing (NAICS 31-33) and collected interviews based on her returned inquiries. Sample size depended upon the election of the plant manager who decided to participate based on his schedule and interest. Therefore, interview collection was opportunistic and indiscriminate. Most of the companies contained less than 300 employees and reported to corporate management in another location in the United States.

Analysis of Data

This research hoped to interview plant managers from more or less energy-intensive manufacturing and wholesale and distribution facilities. These industries were targeted because these

facilities were very likely to operate in facilities dating from the 1950s when manufacturing was booming in Kankakee (David 1984). Requiring equipment to transform and distribute materials, these companies are major energy-consumers relative to service sector industries. Clean energy expansion requiring capital investment in equipment upgrades would increase the security of that facility in Kankakee, which would increase Kankakee's capacity in goods-producing sectors (ides.state.il.us). Interviews were conducted with eleven companies in Kankakee County. Interviewees included plant managers and environmental engineers from the following companies: Baker & Taylor, Belson Steel Center & Scrap, Cigna Healthcare, J.R. Short Milling Company, Ken Hayes Industrial Park, Momence Meat Packing (Johnsonville Sausage), Nucor Steel, Rohm & Haas, Sears Logistics, Sun Chemical Corporation, and Zip-Pak. The participating companies represent the following industries respectively: book wholesale and distribution, steel and industrial material recycling, health claim processing, flour and corn milling, industrial property management, meat packaging and processing, steel production, chemical product production, retail distribution, petrochemical processing and manufacturing, and plastic resin packaging production. At least seven of these companies are considered manufacturing facilities and two are distribution/wholesale. Although these companies fail to wholly represent every industry, these companies provide a sample of some of Kankakee County's larger employers and energy-intensive industries.

This paper analyzes the interview responses by framing them in the context of the research questions, presenting general comments and themes, and highlighting some idiosyncratic responses that may provide additional insight. This research project hoped to answer several questions such as: What can explain industry's laggard response to clean energy expansions? Do industries perceive energy costs as barriers to growth? What do they consider as barriers for becoming more energy efficient? To what extent are they aware of the connection between energy and productivity? To what extent are they interested and knowledgeable about incentives for clean energy expansions? How does the company's bureaucracy and organizational structure affect decisions on energy management? How effective are ComEd and DCEO in

educating and delivering its energy saving programs and incentives? How do municipalities and economic development agencies help or hinder companies from becoming cleaner and more efficient?

From these interviews, industry's laggard response to clean energy transformations seems to be consistent with the surrounding research questions of interest: (1) cost, and (2) awareness of energy issues and incentives. First, all of the companies reported massive energy costs, with ten out of eleven companies reporting electric energy consumption dominant to natural gas (with exceptions for the winter months). Belson Steel reported paying \$10,000 monthly for electric and natural gas, Baker & Taylor reported \$65,000 monthly for electric and \$15,000 monthly for natural gas, Sun Chemical reported paying \$100,000/year for natural gas and \$650,000/year for electricity, Sears Logistics reported paying \$1.8 million/year for electric and natural gas, J.R. Short Milling reported \$2.5 million a month for electric and \$750,000 a month for natural gas, and the owner of Ken Hayes Industrial Park, which houses several small manufacturers responded "Outrageous," and added that he often paid tens of thousands of dollars for individual vacancies. The other companies either responded that they did not know or provided an incomplete calculation. In all cases, electricity was reported as the dominant energy source and cost.

After asking for a rough estimate of the facility's average peak energy costs, interviewees were asked if energy costs were a barrier to growth. To this, two companies, Rohm & Haas and Momence Meat Packing responded in the affirmative. Rohm & Haas' engineer reported that energy costs have been a barrier to growth because they hire additional employees to remain competitive with facilities because Illinois has higher energy costs than other states. Momence Meat Packing's manager responded "Always." He added that rising energy costs are also opportunities to incorporate renewable energy sources because the pay-off is greater. The manager of Ken Hayes Industrial Park initially responded that energy costs were a barrier for business in Kankakee but later retracted his answer and said "No," because "a good operator (him) passes it (the cost) on" for the tenant company to absorb. As an operator of the industrial park and the chairman of a private economic development organization, he stated that attracting companies was very difficult because energy costs are comparatively higher in Illinois than in other states, citing Ohio and China as competitors. Higher energy costs, as a criterion companies consider in

site-selection, inhibits economic development in Illinois because higher energy costs deter companies from locating in Illinois. From an economic developer's perspective, admitting higher energy costs makes Illinois appear less competitive in the site-selection process, however, two companies, namely Rohm & Haas and Momence Meat Packing consider high and rising energy costs as both a barrier to growth and an opportunity. As an opportunity, investments in more efficient technology provide greater energy and price savings. J. R. Short Milling responded that "Energy is a factor, but not a barrier," however, the company recently canceled a facility expansion supposedly due to energy costs (Van Mill 2009)². Zip-Pak, Nucor Steel, Belson Scrap Recycling, Sun Chemical, Sears Logistics, Baker & Taylor, and Cigna all rejected energy costs as barriers to growth. With the exception of Nucor Steel, the companies reported that their energy usage was a small portion of their production because they were less energy-intensive. Nucor Steel, however, stated that energy costs are not barriers to growth but rather reduced sales inhibited growth. The economic downturn has reduced sales and demand so steel operations have therefore reduced production by 45 percent. Baker & Taylor reported that energy costs were not barriers to growth because they have just completed an expansion and are planning another one. The plant manager has also incorporated energy efficient lighting and insulation into these projects.

Energy costs appear to be an important, albeit underestimated, factor in production for these companies; however, only one company, Rohm & Haas, reported in the affirmative to the question asking whether their company has a company policy on clean energy and efficiency. Rohm & Haas, a signatory of "Responsible Care®" has committed itself to sustainability and emissions reductions.

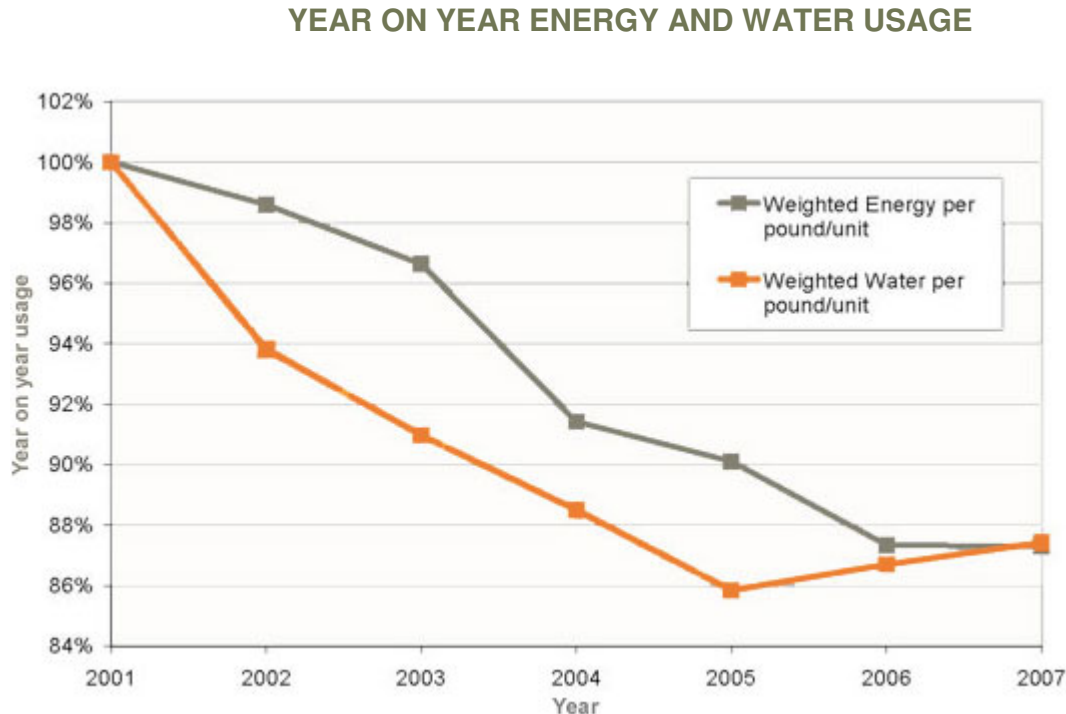
Responsible Care® is the chemical industry's global voluntary initiative under which companies, through their national associations, work together to continuously improve their health, safety, and environmental performance, and to communicate with stakeholders about their products and processes. (responsiblecare.org)

Recognized by the United Nations Environmental Programme (UNEP) as a significant contribution from the chemical industry on sustainable development, Responsible Care® sets standards for continuous

² The JR Short Milling decision about the expansion cancellation came from an economic developer from JR Short Milling's community, who told the researcher's supervisor. There is no formal documentation or public statement regarding the company's plans, but informally, the company told my supervisor they were expanding. The company has since cancelled its expansion, but its plans to expand, its cancellation, and reasons for the cancellation were never made public.

improvements in safety, environmental care, and profitability with the future generation in mind (www.responsiblecare.org/page.asp?p=6406&l=1, www.responsiblecare.org/page.asp?p=6407&l=1). In 2007, Rohm & Haas won the Responsible Care® Energy Efficiency Award for projects at their Houston and Philadelphia Plants (<http://www.rohmhaas.com/SDreport/enviromental-results.asp>). In 2007, through “operational changes and targeted investment,” the company reduced its water usage by twenty percent (Ibid). Figure 5 shows a graph of their drastic energy and water reduction. Rohm & Haas also produces an annual Sustainability Report that states its commitment to sustainability, society, and the environment (<http://www.rohmhaas.com/SDreport/long-term-vision-for-sustainability.asp>). Taking a comprehensive, or “systems” approach, Rohm & Haas has committed itself to a long-term sustainability vision containing Six Commitments for Sustainability: “Our People, Innovation for Tomorrow, Smart Solutions, Raw Materials for the Future, Partners for Change, Responsible Operations” (Ibid). The Six Commitments for Sustainability provide for healthy, fulfilling relationships with each other, contributions for new technology for sustainability, sustainability technology for their customers, respect for nature’s limits, open collaboration, and a positive presence in the community (Ibid).

Figure 5: Rohm & Haas' Reduction of Energy and Water Usage over a Duration of Six Years



Source: <http://www.rohmhaas.com/SDreport/enviromental-results.asp>

Two other plant managers, namely Cigna and Momen Meat Packing vaguely referred to “green initiatives” and the plant manager from Sears stated that “corporate probably has a policy, but am unsure of anything, but knows the company meets all regulations to stay out of trouble.” Otherwise, the interviewees could not remember details about the “green initiatives.” The plant manager from Zip-Pak responded that Zip-Pak does not have a formal policy, but its parent company, Illinois Tool Works, probably does, although he was not aware of it. Baker & Taylor, Nucor Steel, J.R. Short Milling, and Sun Chemical all reported that their company had no “formal” policy on energy, but were either in “discussions” or used a general energy reduction principle in practice. Belson Steel and Ken Hayes Industrial Park reported no policy. Facility managers underestimating the impact of energy costs to growth and the company lacking a formal company policy on clean energy was reinforced by the few in number who answered that they considered energy efficiency and utilization of renewable energy sources

as an option for increased productivity. Five companies including J.R. Short Milling, Momence Meat Packing, Baker & Taylor, Rohm & Haas, and Sun Chemical responded they consider clean energy expansions as an option for increased productivity. Interviewees from Sears Logistics and Zip-Pak both responded that they had not made that connection.

In response to the question asking what the plant manager considered as the biggest barrier in becoming more energy efficient/lowering energy costs, nine out of the eleven companies identified the high costs associated with clean energy expansions. Among the responses, at least three managers mentioned the lack of funding available to undertake and plan for expansions, three managers cited the importance of a quick payback for a quick Return on Investment (ROI), and four cited the lack of affordable technology. The manager from Baker & Taylor, who has recently completed a clean energy expansion at his facility, stated that including the costs for the new technology in the budget, even with the rebates and tax credits, created a struggle for approval from “management” because in his words: “...they don’t understand energy savings potential. They act like energy is a mystery.” According to the plant manager, corporate management is too distanced from energy issues to understand his constant concern with increasing energy efficiency. Corporate management loved to listen and talk about sales, but “shut off” when energy discussions arose. However, after he was able to show a \$15,000 lighting rebate and a one year ROI, management approved the clean energy expansion. Return on Investment was the factor most frequently cited by all of the managers and all of the companies provided a payback period of no longer than 12-24 months. The facility engineer from Rohm & Haas stated that he does not have the resources to run cost and implementation analyses to determine a possible expansion because their manufacturing company is so lean that he lacks the staff to invest any resources.

Like Rohm & Haas, most manufacturing companies abide by principles of lean manufacturing, which minimizes superfluous production inputs. The consequences of lean manufacturing, which most manufacturing facilities implement, operate with minimum staff levels, which have left many facility managers strapped for time, resources, and staff to research technologies, run cost-benefit analyses, and implement the technologies. Sears, Rohm & Haas, and Ken Hayes Industrial Park reported a lack of time

and resources required for the time, energy, and resource investment needed to collect the necessary information for a clean energy expansion. In addition to lean manufacturing, the economic recession has imposed an increased strain on industry, forcing them to reduce production. Even if the plant manager takes the time and resources to put together a project, the project may not gain approval. For example, at Zip-Pak, the engineer proposed a \$16,000 recycling program with a three month payback, but its parent company, Illinois Tool Works, refused to act on it, as it has with all projects. The engineer from Zip-Pak speculated that the company is in survival mode and might start taking projects when the recession abates. Belson Scrap, of which the manager does not consider energy costs a barrier, protested to the current political support of clean energy by stating that “renewable energy is not the solution to the economic recession. We need to increase our use of oil and should reduce our dependence on foreign oil by drilling in the U.S. reserves, but environmentalists have blocked domestic drilling—for aesthetic reasons.”

The two companies that did not cite cost as a barrier for clean energy expansions suggested that education, awareness, and available technology were factors. Cigna cited education and awareness, as needed to change their white-collar workers’ wasteful energy habits. The Nucor plant manager initially stated that he could not think of anything because the money Nucor needs to melt steel comes from sales. Then he added Nucor is always looking for programs and improvements, but the “technology is not there to make their production less energy-intensive.” All of the managers, at some point during the interview, stated that a clean energy expansion must at least maintain or decrease energy costs or create surplus savings for them to buy into a project; their analysis and their budget must convince them that clean energy is profitable to their company. Environmentalism had no place in these businesses if they found no profit in it, even if the plant manager insinuated personal concern for the environment.

Multiple factors determine the likelihood of clean energy expansions in Kankakee, IL such as level of awareness on energy and productivity, levels of decision-making, lack of corporate knowledge and understanding of energy issues, energy issues endemic to Illinois, economic motivation for clean energy expansions. Of the eleven companies, nine stated that they are planning clean energy expansions, spanning from lighting projects to process upgrades. Project budgets ranged from \$20,000 to \$1.5 million

per project. Baker & Taylor, Sears, Ken Hayes, Momen Meat Packing, and Rohm & Haas managers considered these clean energy expansions as a continuous process of maintenance, improvement, and evaluation. Since researchers assumed that cost would be the determinant factor in clean energy expansion, the interview also sought to assess the level of awareness and interest of incentives and outside assistance for clean energy expansions. Asked if they were aware of the energy efficiency and renewable energy expansion assistance available to businesses, Sun Chemical and Nucor Steel managers responded in the affirmative, four managers responded they knew “a little” about incentives, and five managers reported no knowledge of available incentives. When asked how likely they are to request funding assistance from ComEd or a program for a clean energy expansion, ten out of the eleven responded that they would be very likely with a few qualifying their answer with contingency about project and incentive applicability. Only one company, Rohm & Haas, expressed no interest in funding assistance. When asked to explain, the engineer stated “We are already 40 percent more efficient today and no government or outside entity knows our business to help.” Energy management is an internal business decision and they “...are looking for a Return on Investment, not assistance...” because energy expansions are much like product line expansions, for which they would never ask for financial assistance.

For increased energy efficiency, managers expressed varying degrees of interest and openness for inviting an outside energy auditor. First, while eight managers expressed an interest in having outside energy auditors come to their facility to conduct an energy audit, the managers expressed reservations about the level of knowledge and credibility of external energy auditors. One manager compared energy auditors to insurance agents, two others believed that energy auditors provide no information the plant manager does not already know. Two other companies have their engineers conduct energy audits continuously and have no need of an outside auditor. The manager from Nucor Steel stated that he would be “somewhat interested” only if the other agency really knew their business and unique production process to “make more than topical recommendations.” For improvements in production processes, managers expressed great reservations about inviting an external agency, especially one ignorant of their

business. However, managers of manufacturing facilities might show increased interest in an industry-specific energy expert to provide recommendations on efficient technology and processes.

The last two questions of the interview asked the plant managers what type of assistance (tax credits, grants, or rebates) would they prefer and what amount of funding would enable their company to complete a clean energy expansion. To these questions, plant managers preferred grants and rebates equally over tax credits. In response to what amount of funding would enable their company to complete a clean energy expansion, amounts ranged from \$3,000 to \$4.5 million with \$500,000 being quoted twice. Two managers cited percentages for projects, namely twenty percent and fifty percent. Three managers could not provide an estimate.

While conducting these interviews, the researcher realized that she needed to further clarify energy efficiency as energy conservation. Due to their highly technical energy management, facility managers and engineers often defined energy efficiency as energy density. This created a miscommunication between the participant and the researcher until the researcher realized that the plant managers were also concerned with the actual energy output of renewable energies such as wind, solar, geothermal compared to the energy density of petroleum and other non-renewable energy sources. When the researcher asked one plant manager about his interest in a wind turbine, he replied that he does not know about the comparative output of a wind turbine compared to the efficiency of nuclear. He rhetorically asked: "I mean, I don't know. Does one ounce of petroleum equal a day worth of wind from a wind turbine?" From interviews thereon, the researcher prepared herself to clarify her question and discuss energy densities in case the plant manager held a fixation with energy density. Three plant managers expressed doubt about the viability of renewable energies due to their potentially inferior energy densities. To stay on track of time and to maintain her integrity as the interviewer, the researcher recorded the plant managers' responses with minimal exchange regarding this issue.

Sun Chemical serves as a good case study for the administrative dimensions of an attempt to complete a clean energy expansion. The sequence of events starts in the winter of 2009 and terminates in the spring of 2009. The sequence of events must be recounted by a local economic developer who worked

among the four entities involved in this clean energy attempt: the City of Kankakee, Department of Commerce and Economic Opportunity, Economic Alliance of Kankakee County, and Sun Chemical. The plant manager involved in this clean energy expansion has since relocated to another Sun Chemical facility and was unable to respond to the researcher's inquiries so the account set forth comes from the economic developer working with the company. The following case describes a failed attempt of a company to invest millions in a clean energy expansion, but fell through due to several gaps in inter-agency collaboration.

The plant manager at Sun Chemical contacted the president of the Economic Alliance of Kankakee County to discuss company plans to expand their Kankakee facility. If the president of the Economic Alliance could incorporate a sustainability component such as a wind turbine, LEED® certification, solar panels, etc. the company would be more likely to expand their facility in Kankakee instead of relocating to Charlotte, North Carolina. The company was very interested in LEED ® certifying a new 10,000 square foot office building and incorporating a renewable energy source into their energy consumption for their 60,000 square foot facility. The company also wanted to donate land to the city for a fire department station. The president of the Economic Alliance contacted the mayor of the City of Kankakee to discuss how the City of Kankakee could encourage this expansion by annexing some of the company's land and receive funding from DCEO for either a wind turbine or solar panel farm. Attempting to incorporate funds from DCEO to help the City of Kankakee with this project, the president of the Economic Alliance contacted his friend in charge of regional economic development for assistance on the sustainability component and to ask what programs were available for a project like this. The DCEO economic developer laconically replied "That's not my job" to the president. DCEO then forwarded the message to his colleague in the Bureau of Energy & Recycling who responded with vague information and uncommitted guidance. The president of the Economic Alliance mailed a letter outlining the incentives Kankakee County, the City of Kankakee, and the State of Illinois could offer without full knowledge of DCEO's level of commitment to this potential expansion, which would secure Sun Chemical's commitment in Kankakee and bring in extra jobs and income.

Providing the incentive letter to Sun Chemical in a timely manner was a critical element in actualizing this capital (and clean energy) expansion. The president of the Economic Alliance promised the plant manager an incentive letter with clean energy project options within three weeks. The Economic Alliance explored the feasibility of a solar panel farm, wind turbine, and green roofs. The City of Kankakee and Economic Alliance suggested the City annex Sun Chemical's land for either a solar panel farm or wind turbine and receive funds from DCEO to pay for the feasibility study and the project. To be determined by Economic Alliance and the City of Kankakee as to which technology would prove more feasible and profitable, Sun Chemical waited for the incentive package from Economic Alliance. After reviewing the project with a solar panel consultant, the City of Kankakee and Economic Alliance evaluated a wind turbine as the better option. The wind turbine would generate electricity for the company and this offer, coupled with their inclusion into the Enterprise Zone, which would exempt Sun Chemical from in-state sales taxes and incrementally integrate the company into property tax payments, presented a competitive option to North Carolina. However, DCEO failed to return phone calls, answer questions, and continued to delay meetings for realizing these options. The project kept getting pushed back due to DCEO's lack of involvement and North Carolina started looking like a better site for Sun Chemical's expansion. The City of Kankakee and Economic Alliance partnered well together to respond at Sun Chemical's pace, but the State's slowness and seeming disinterest broke the project's momentum and likelihood. The project is still unresolved, but the opportunity is considered lost.

Sun Chemical was interested in partnering with the City of Kankakee and Economic Alliance of Kankakee County to become more sustainable, to the extent of the City annexing part of its land and channeling funds from DCEO's Bureau of Energy and Recycling to subsidize the company's investment. Eight other companies expressed an interest in receiving funds from the DCEO for clean energy expansions. In principle, ten out of the eleven companies responded that they would be interested in receiving funds from DCEO for a clean energy expansion. A few responded they would be very interested. Corporate-level decision making manifested as a reservation two plant managers had as was the appropriateness of project funding. Only Rohm & Haas and Belson Steel expressed disinterest in

assistance from DCEO. The manager from Belson Steel expressed great disapproval of the political propaganda on renewable energies stating that “renewable energy is not the solution to the economic recession,” and that the U.S. should decrease its dependence on foreign oil by drilling in U.S. reserves. The U.S. should have a combination of nuclear, oil, and renewable energies, not just one and thinks “Obama should stop giving money away” for renewable energy. His sentiments contradictory as were his actions and words, because his business is already providing recycled steel to wind turbine manufacturers. Rohm & Haas expressed extreme disinterest, by responding that they were “not likely at all” to request funding from DCEO because energy management decisions are like any other internal business decision. This finding is significant because as a public agency, partnering with DCEO or receiving funds from them suggests an unexpected openness to work with public agencies on private business matters.

This research project sought to determine what the barriers were that inhibit industry from improving their environmental impact and increasing their profits by improving their energy management. Although this paper would have liked to have determined whether an attitudinal reluctance or financial constraints inhibited them, interview questions were not designed to measure this except marginally. However, the interviews revealed that considerations of cost, and specifically return on investment, always overrode other motivations for pursuing clean energy expansions, even when the most environmentally committed companies considered clean energy upgrades. Outside of the industry context, this shows that both attitudinal and material incentives are needed to motivate companies to complete clean energy expansions—that cost cannot remain the only determinant when environmental and economic crises threaten human livelihood and that although “emotional” decisions should be minimized, clean energy expansions can pay off increasingly in the longer-term, as energy prices rise, as well as the short-term, but the risk associated with clean energy expansions requires some intellectual buy-in at all levels of decision-making. Environmentally-friendly decisions entail risk, as do other business decisions, but refusing to pursue or undergo clean energy expansions because of the initial cost will always inhibit industry from becoming cleaner, more efficient, and more profitable, *ceteris paribus*. Although inclinations for environmentalism cannot be inculcated, increasing intellectual buy-in for clean energy

may be the only resort when clean energy expansion suits the personal interests of the plant manager. Otherwise, cost will always serve as an excuse for environmental irresponsibility.

As intellectual buy-in is lacking for nine of the eleven companies, material circumstances inhibit all of the companies interviewed from completing clean energy expansions. Cost and time are constraints for plant managers in researching technologies and programs, running analyses, and proving the cost-effectiveness in their budget. As plant managers indicated, ComEd takes more or less time to inform companies about ComEd's energy saving programs and incentives and no companies had knowledge of programs and incentives outside of ComEd, except to a minimal extent in two cases. Where ComEd leaves a gap, DCEO may extend the funds its shares with ComEd to reach more businesses. Plant managers demonstrate limited knowledge about available programs, partnership possibilities, and incentives available for clean energy expansions. Eight of the eleven companies expressed no resistance to receiving state funds for clean energy assistance, and were likely to request funding, assuming they had the knowledge and project, if funding were available. When asked what amount of funding would enable their company to complete a clean energy expansion, responses ranged from a couple of thousand to a few million. When prompted, plant managers agreed to percentages from ten to fifty percent of the project cost.

Plant managers seemed to possess an interest in lowering energy costs but feel a strong cost constraint that overpowers any other motivation for clean energy. Facility managers expressed varying levels of authority within their company and only three plant managers expressed complete deference to corporate management; however, in all cases, plant managers have the ability to present clean energy projects to corporate for its approval in making that facility more competitive. Research demonstrates an interest in clean energy expansions and an interest in additional assistance in completing clean energy expansions. This information is useful for understanding the concerns and limitations of plant managers that explain their laggardly response in the midst of environmental and economic urgency and a swarm of clean energy programs. This research helped determine some of the needs companies have for investing in clean energy expansions and how to increase the number of clean energy expansions. Making clean

energy projects easier for facility managers by making information more accessible, more cost-effective, accessible, and less time consuming would be welcome. An agency that determines and proffers appropriate clean energy projects and programs to companies might enable more facilities to complete clean energy expansions.

Literature Review

The demand that industries as well as all Americans operate in a more sustainable manner may have been voiced bottom-up social justice and advocacy groups, but the administrative capacity for these lifestyle changes has come from top-down administrators. President Obama campaigned on a platform of change, including a change in energy politics, that

America can be the 21st century clean energy leader by harnessing the power of alternative and renewable energy, ending our addiction to foreign oil, addressing the global climate crisis, and creating millions of new jobs that cannot be shipped overseas (<http://www.barackobama.com/issues/>).

Obama's energy politics sharply contrasts to the energy politics of the Bush Administration. However, the United States already had a record of hoarding special privileges for economic expansion at the expense of the environment. In 1992, the U.S. refused to sign the Biodiversity Treaty at the 1992 United Nations Conference on Environment and Development, also known as the Earth Summit, which would protect ecosystems (Janda 2008). President George H.W. Bush refused to sign it because he thought it imposed limits to U.S. property rights in biotechnology (Janda 2008). Similarly, the U.S. refused to sign the Kyoto Protocol, in which signatories pledged to reduce their greenhouse gas emissions by five percent of their 1990 levels by the year 2012, in 1997 because it would hinder economic development by putting the U.S. at a competitive disadvantage against industrializing countries with no environmental regulations (Janda 2008). This assertion of sovereignty—or double standard as developing countries might perceive it—elicited criticism from industrializing countries (Janda 2008).

Upon assuming office, President Obama quickly signed the American Recovery and Reinvestment Act (ARRA) to pump \$787 billion into the U.S. economy (EDD: <http://www.calmis.ca.gov/htmlfile/e-newsletter/e-news-2009-04.asp>). ARRA provides funds for energy efficiency and renewable energies; as an investment in the future, the ARRA is designed to

- Revive the renewable energy industry and provide the capital over the next three years to eventually double domestic renewable energy capacity;
- Undertake the largest weatherization program in history by modernizing 75 percent of federal building space and more than one million homes (ARRA: <http://www.recovery.gov/?q=content/act>).

Steven Chu, U.S. Secretary of Energy, reported \$786.5 million to invest in biofuels research and commercialization as an effort to use “American investment and ingenuity—and resources grown right here at home...” to “lead the way toward a new green energy economy”

(<http://www.energy.gov/news2009/7375.htm>). Dr. Chu enjoys a new status unlike any of predecessors at heading the Department of Energy (DOE) (Rosenbaum 2005). According to Rosenbaum, the DOE, “despite its size and importance...has been a stepchild of the executive branch” (Rosenbaum 2005, 93).

In addition to its jurisdiction of regulations and energy programs, the DOE will invest for research, and have stimulus funds to invest in its priorities:

- (1) promotion of civilian nuclear power activities, (2) regulation of military nuclear facilities and radioactive wastes, (3) administration of the federal government’s research and development programs in energy production and conservation, (4) regulation of price controls for domestic petroleum and natural gas, and (5) administration of federal research and development grants for commercial synthetic fuels production in the United States (Rosenbaum 2005, 93).

The president’s mandate to increase investment in clean energy with the accompanying funding trickling down to state, local, and nonprofit agencies, in addition to a public tracking system in place for accountability of funds jumpstarted the administration toward a more sustainable economy.

Rosenbaum highlights the importance of presidential persuasion on environmental policy and states that “whatever course the White House sets, the president will be at center stage of environmental policy making (Rosenbaum 2005, 10). Rosenbaum considers environmental quality as “...a political creation, as much a product of politics as it is of science or regulation,” that is shaped by political contexts (Rosenbaum 2005, 7). He reviews past presidential (dis)inclinations since 1970 starting with President Nixon’s response to environmental outcries about environmental degradation that created the Environmental Protection Agency (EPA) and thus began “environmentalism’s political ascension” (Rosenbaum 2005, 7). The 1970s, known as the Environmental Decade, were foundational to national environmental policies and institutions (Rosenbaum 2005). The Reagan Administration halted environmental activism and redirected reform toward regulatory relief (Rosenbaum 2005). Throughout

his terms, Reagan believed regulatory relief from environmental standards would boost economic production, albeit at the expense of environmental health (Rosenbaum 2005). Rosenbaum states that the environmental movement condemned Reagan's administration as the "most environmentally hostile in a half century and the president's regulatory reform as the cutting edge of a massive administrative assault on the institutional foundations of federal environmental law" (Rosenbaum 2005, 7).

President George H.W. Bush's failed to deliver on his promise to be the 'environmental president;' however, his administration was more active and supportive of environmentalism and restored some of the resources depleted by the Reagan administration (Rosenbaum 2005, 8). H.W. Bush's devotion to environmentalism appears to have been partial and reactive, with an aversion to confronting global environmentalism (Rosenbaum 2005). President Bill Clinton established himself as a committed and active executive on environmental matters and participated in re-strategizing the environmentalist movement's goals as well as reviving environmental regulations and agencies (Rosenbaum 2005). Unfortunately, despite President Clinton's legislative efforts to intensify national and international commitment to the environment, the Republican-controlled Congress obstructed most of his efforts (Rosenbaum 2005). President George W. Bush began his administration on a confrontational basis with the environmental movement due to his connections with businesspeople in energy production and natural resource consumption (Rosenbaum 2005). One of the most memorable confrontations of the Bush administration may have been the White House's back and forth with the Environmental Protection Agency's report on climate change which the Bush administration altered to communicate humankind's role in climate change as dubious (Rosenbaum 2005). Regardless of the president's environmental inclinations, they depended on Congress to either thwart or accelerate their environmental agendas (Rosenbaum 2005). The political astuteness of a politician appears a critical factor in getting legislation passed, as presidents and representatives know alike (Rosenbaum 2005).

The role of politics in environmental policy-making is obvious. With its already politically-charged context, the economics of policy decisions further complicates policy formulation and implementation (Rosenbaum 2004). Regulatory economics has fueled embittered debate among

environmentalists, economists, politicians, and interest groups since the first Earth Day in 1970 (Rosenbaum 2005). Debates over the economic rationality of environmental regulations has led many environmentalists and economists to question the appropriateness of evaluating environmental policy through Benefit-Cost Analysis (BCA), which regulatory initiatives are reduced to their net benefits and costs and compared (Rosenbaum 2005). If benefits exceed costs, the initiative appears more attractive (Rosenbaum 2005). Agencies prefer BCA because it facilitates easy comparisons among different policies (Rosenbaum 2005). Indeed, many policies provide great returns such as the Clean Air Act, which the EPA calculated that the benefits overwhelmed the costs by four hundred percent (Rosenbaum 2005). However, more cost-sensitive measures have been taken as some ‘cost-oblivious’ laws such as the Occupational Safety and Health Act have disregarded the cost (Rosenbaum 2005). Opponents of BCA doubt the appropriateness of purely economic evaluations and doubt the accuracy of calculations since the value and impact of environmental, somatic, and aesthetic factors cannot be assigned a value (Rosenbaum 2005).

Another option “command and control,” also called “standards and enforcement,” imposes regulations through direct government intervention for compliance (Rosenbaum 2005). Policy develops through five phases: goals, criteria, quality standards, emission standards, and enforcement (Rosenbaum 2005). Broad and vague goals on environmental quality lead to environmental-quality standards which prescribe permissible emission to polluters to follow—if the emitter fails to conform or meet these standards, various enforcement actions or litigation may ensue (Rosenbaum 2005). Opponents to command and control assert that less direct and more economically-enticing solutions may be more effective; economists prefer solutions that appeal to the regulated’s economic self-interest (Rosenbaum 2005). Industry, always lobbying to exempt themselves from regulations may show less resistance to environmental measures if it may benefit them (Rosenbaum 2005). Economists suggest taking regulations to the market to provide an economic incentive to operate in a more environmentally-friendly way. Economic incentives used in environmental regulations include: pollution charges and taxes, input or

output taxes and charges, subsidies, deposit-refund systems, marketable permits, reporting requirements, liability, and voluntary programs (Rosenbaum 2005).

Cap and trade, created as a provision to the 1990 amendments to the Clean Air Act, establishes a mandatory limit on emission and allots each emission source a level of emission allowance (based on individual emissions), and allows the emitter to bank, sell, or rollover unused emission allowances (Rosenbaum 2005). Emitters can choose how to reduce their emissions and meet the cap through their own method, which might provide overall economic benefits since most companies will find an innovative solution. Weighing a cap and trade policy in Congress, President Obama, pragmatic environmentalists, and some business interest groups have endorsed the regulation (Broder 2009). Opponents believe either President Obama has compromised his ability to make sweeping environmental change or is threatening economic stabilization (Broder 2009). Opponents argue that emission allowances will be bought and sold like any other commodity in the marketplace, except forbiddingly for political support (Broder 2009).

President Obama, who has voiced his approval of cap and trade emissions, has already accomplished much in office for the environment, economy, and energy. Initially criticized for overemphasizing ideals, he has shown his capacity for substance. Often classified as “charismatic,” Max Weber would not classify President Obama as a “charismatic leader” despite the economic, political, and perhaps spiritual emergencies that might have contributed to his election. Obama’s legitimacy of rule, unlike the independent and internal legitimacy of a charismatic leader, is reliant on the will of “the people,” who on Election Day legitimized his mandate for change (Runciman 1978). He has mandated change in public agencies and government bodies to adapt to the new conditions. Bureaucracy, “as a structure of ‘the everyday’” is adapting to the changing needs of the material context of the clean energy economy to deliver funds and services to conserve energy and expand renewable energy (Runciman 1978, 226). Weber, who in his work “Bureaucracy,” wrote that bureaucracy became necessary as “...civilization evolved from the primitive and mystical to the rational and complex” (Stillman 2005, 51). Based on legal-rational authority, bureaucracy manifested as institutional forms to perform operational functions

necessary to maintain order and control in modern society (Stillman 2005). Writing prolifically about the historical development of bureaucracy, he believed that bureaucratic institutions grew out of the need of princes to extend their dominion through “rationalized administrative techniques,” in which rationalization entailed a division of work distinguished by specific skill-sets (Stillman 2005). Bureaucracy evolved to execute the actions needed to achieve the goals of society including building infrastructure, service provision, revenue collection, etc. (Stillman 2005). As President Obama has maneuvered to translate political ideals into concrete policies, implementation has proved itself difficult. Formulating a command and control process for energy-efficient technology, Congress set a vague goal to, as Rosenbaum repeats, ‘press technology,’ and set emission standards to coerce industry to incorporate technologies that are unavailable (Rosenbaum 2005, 156). Goals and ideals serve a great purpose for guiding legislation, but the key to resolve energy and economic issues lies in effectively implementing great ideas. The IEA recognizes the delicate balance between policy and market solutions for stimulating demand for energy-efficient technologies. Numerous entities from the federal government to grassroots movements recognize the need for all-levels of government to create policies to stimulate demand in all areas of human activity such as housing, zoning, economic development, etc. to enable a massive deployment of clean energy solutions (IEA, 2007).

The mandate from President Obama is not the only mandate from the top that is encouraging clean energy expansion. Arshad Mansoor, the vice president of Power Delivery and Utilization for the Electric Power Institute, argues that the movement toward clean energy is at least partially driven by the electricity industry because, in his words, “While the retail cost of electricity is increasing faster than ever, the electricity industry is being challenged to deliver even more power while making sure that less and less carbon is being emitted into the environment” (Mansoor 2008, 72). Electric companies, he argues, should retool for energy efficiency from its generation to distribution, because as the electric industry is the single largest consumer of electricity (they consume up to 15 percent of their electricity), the industry can identify numerous opportunities throughout their generation and delivery chain to become more efficient—through power plant stations, which incurs an average loss of eight to ten

percent, transmission losses of two to three percent, losses in consumer delivery of five to six percent, and consumer demand (Mansoor 2008). His company is allocating \$2 billion dollars a year for state and utility administered energy-efficiency programs for residential, commercial, and industrial facilities (Mansoor 2008). He states that to effect powerful change, electricity providers need to focus on energy efficiency as an industry to produce a systemic solution to reduce inefficiencies (Mansoor 2008). He ends with this statement: “With industry know-how and an enabling regulatory policy, we can begin to implement those strategies across the electricity value chain” (Mansoor 2008).

The national political top-down mandate for clean energy and the electric utility mandate for clean energy both admit to a systemic change and administrative reorganization. The two have in common a need for concerted efforts and interconnection; John Gaus, recognized the need and tendency of administrative officials to take an ecological approach to administration, where administrative interrelationships of administrative bodies and responsiveness to the environment reflect the needs of the recipients (Gaus in Stillman 2005). President Obama has responded with a “politics of change” that adapts to the administrative needs of the economic and energy crises and provides that government agencies work smoothly together toward a common goal with utmost transparency, particularly if receiving stimulus funds. Likewise, electric utilities banded together to identify solutions to transform its generation, transmission, and delivery chain into a more efficient one.

As stated earlier in this paper, the United States will not eliminate energy-intensive industries. Even as the United States transitioned from a manufacturing economy to a service and now to an information and technology economy, manufacturing facilities remain (North Star Economics 2008). Maintaining productive capacity will remain important for the United States in reducing its importing and maintaining a level of self-sufficiency (blue-greenalliance.org). Instead, as the Apollo Alliance suggests, in a report by AFL-CIO:

...retooling the nation’s energy systems will require a new and improved manufacturing sector to produce durable equipment like advanced heating and cooling systems, biofuel refinery boilers, next-generation cars and trucks, efficient transmission lines, wind towers and turbines and solar panels (Gannon 2008).

Since the elimination of industry is unlikely, the federal government, states, and organizations such as the International Energy Agency, American Council for an Energy-Efficient Economy have produced publications and programs to help industries become cleaner and more efficient. Energy efficiency does not stay in a vacuum. Policies, regulation, and mandates are needed to which may not always be cost-effective, but companies must conform to meet U.S. EPA standards of sanitation, public health, and emissions as well as the standards for their industry. Policy also has a place in stimulating demand for energy-efficient technology. The International Energy Agency (IEA) provides this model for striking the proper balance among policy, demand, and cost-effectiveness for the implementation energy efficient technology in encouraging economic growth.

In IEA's report entitled "Ensuring Green Growth in a Time of Economic Crisis: The Role of Energy Technology," IEA reports that energy efficiency is the cheapest and quickest way to reduce carbon dioxide emissions and will delay the need for new energy supply equipment, allowing the technology to phase out (IEA 2007). IEA calculates that energy efficiency will reduce emissions by 36 percent and that if government policies enable consumers to overcome barriers to energy efficiency by reducing costs and investing in research and development through tax incentives, subsidies, and regulations, initial government investment and deployment of new technologies, the push of technology may combine with the pull of the market to reach consumers at reduced costs (IEA 2007). Government policies that intervene in this way have the potential to strike the proper balance that will lead to massive deployment of clean energy technologies and reduced costs (IEA 2007).

Earlier this paper stated that although industries have polluted, jeopardized public health, reduced biodiversity, created excessive waste and hazardous waste, imbued consumer products with chemicals, demonstrated a high level of apathy for social and environmental issues, lied about environmental efforts, and funded researchers to refute global warming, society will never eliminate these industries. However, this is a reification of industry again, and the human interactions, or lack thereof, may explain social and environmental deterioration. A social analysis may better provide a perspective of the system of human relations that have led to this moment.

A Perspective through Critical Theory—Return to the Lifeworld

The United States is experiencing a ‘moment of truth’ for a 500 year ‘project of modernity’ (Brulle 2000). Three hundred years of capital expansion made possible by the extraction of non-renewable energy sources to power human production have manifested in a phenomenon Thomas Friedman calls “global weirding” (Friedman 2008). Scientific measurements such as green house gas emissions, global temperatures, meteorological patterns, and public health pandemics illustrate the effects of production. Since the first Earth Day in 1970, environmentalists have cited overpopulation, technology, human selfishness, greed, religion, capitalism, etc. as the causes of environmental degradation (Brulle 2000). While environmentalists were appropriately looking to human causes of environmental degradation, ecologists stopped short of seeing the systemic social processes that social scientists now identify as root causes of environmental degradation (Brulle 2000). Andrew Dobson in “Critical theory and Green politics” echoed Jurgen Habermas when he stated that to correct relations between humans and the environment, humans must correct relations among each other first” (Brulle 2000).

Critical theory, as a theory concerned with human emancipation, may provide a framework for understanding the energy and economic crises facing the United States. Critical theory aims to increase understanding of modern society to create a more rational and moral society (Brulle 2000). Clean energy expansions appear to be a rational and moral solution to the economic and environmental crises the United States faces today. Economically rational and morally responsible, reducing emissions, waste, and green house gases will improve the environment, reduce energy costs, and reduce exploitation of people and resources. Viewing responses from industry through the vantage point of critical theory may assist in evaluating the rationality of industry’s action to reduce their environmental impact.

Robert Brulle in “Agency, Democracy, and Nature: The U.S. Environmental Movement from a Critical Theory Perspective,” blames the modernization process as the culprit of environmental degradation (Brulle 2000). Drawing from Jürgen Habermas’ critique of modernity, Brulle identifies a myriad of social ills in modern society. As alienation, consumerism, pathological individualism,

market/state contradictions, and administrative power decoupled from the life of each community member directly led to environmental degradation, industrialization has been a primary cause of environmental degradation (Brulle 2000). Habermas' analysis on modernity has much to lend for understanding the current economic and energy crisis facing the United States as well as some of the contradictions revealed in this research. Modernity, defined as a certain level of achievement of societal rationalization, supposedly brought about the end of superstition and dogmatism with the unfortunate byproducts of alienation and anomie; however, industrial behavior motivated by a belief in a limitless supply of natural resources on a finite planet to limitlessly capital expansion fails to demonstrate rationality on the part of industry (Brulle 2000, Habermas 1984). Further, failure to incorporate clean energy into production to maintain and even increase production despite rising energy costs demonstrates a lack of rationality.

In "The Theory of Communicative Action," Jurgen Habermas examines the meaning of the expression "rational" (Habermas 1984). He suggests most people believe "rational" carries a close relationship between rationality and knowledge and qualifies rationality as not just the possession of knowledge, but "...how speaking and acting subjects *acquire and use knowledge*" (Habermas 1984, 8). Linguistically, knowledge is explicitly expressed; in goal-directed actions, knowledge is expressed implicitly through a demonstration of ability (Habermas 1984). Since knowledge can be expressed explicitly and implicitly, Habermas asserts that persons and actions embody knowledge and can be evaluated as being more or less rational (Ibid). The reliability of knowledge partly determines the truth of an assertion and the success of an action (Habermas 1984). The rationality of an assertion relies upon the speaker's satisfying "...the conditions necessary to achieve the illocutionary goal of reaching an understanding about something in the world with at least one other participant in communication;" the rationality of a goal-oriented action depends upon the actor satisfying "...the conditions necessary for realizing his intention to intervene successfully in the world" (1984, 11). For this research, assuming the plant manager holds reliable knowledge about the company's plans for clean energy expansions at its Kankakee facility, rationality may be evaluated on the basis of whether the company completes a clean

energy expansion as dependent upon the response of the plant manager. In this application, rationality will be determined on the basis of teleological action, the ability of the company to complete a clean energy expansion (to effectuate change) under the condition that the plant manager responded in the affirmative to questions thirteen through fifteen which ask about their company's plans for a clean energy expansion within the next five years or less. This research cannot evaluate the rationality of the intended actions until five years have passed and clean energy expansions have or have not been completed.

If the plant manager responded that the company plans to invest in a clean energy expansion and completes a clean energy expansion, the plant manager acted rationally, as did the company. The responses the plant manager provided for this research are then meaningful since rational expression indicates a company action relevant to the objective world (Habermas 1984). If the plant manager responded that the company plans to invest in a clean energy expansion and fails to complete a clean energy expansion, whether the company and/or company may be considered rational requires further analysis. The plant manager and company have failed to act rationally if they have not effectuated the change they intended. As a result, the plant manager and company have not acted rationally. The plant manager and company may redeem their rationality if they are able to express reasons for their failure to effectuate their clean energy expansion. However, if the plant manager stated plans for a clean energy expansion and no clean energy expansion manifests by the end five years, one of several possibilities may accurately reflect the disconnect. The interview and company failed to provide the conditions necessary to allow the plant manager to express the necessary conditions to provide a truth statement or teleological action. The plant manager, as a normatively-regulated agent, could also have responded to the interview questions that would only be meaningful in reference to his company. However, if the plant manager reported a commitment to the environment and a clean energy expansion and actions fail to effectuate change, the likelihood of irrationality increases.

Failing to incorporate clean energy into production may in some cases reveal a history of irrational decision-making. Some plant managers reported that energy costs were not a barrier to growth when their responses indicate high energy costs and a general interest in lowering their energy costs.

Also, although not a question on the interview, nine out of the eleven plant managers commented about their limited budget. Rising energy costs may seem to plant managers as an unavoidable expense over which they exert no control. However, plant managers are not powerless against rising energy costs and can greatly reduce their energy bills. Their perception that energy costs are a factor but not a barrier to growth, could indicate these plant managers perceive themselves as powerless to control their energy management (effectuate change) despite rising energy costs and their stated interest in improved energy management. The facility manager at Baker & Taylor perhaps articulated an irrational tendency of industry tellingly while explaining how difficult it was to convince corporate to budget in clean energy expansions because "...they (corporate) don't understand energy savings potential. They act like energy is a mystery." He added that corporate loves to talk about sales and customers, but corporate leaders shut off when discussing energy management. If energy seems like a mystical quality to some companies, eluding corporate understanding, decision-making within industry (the system) seems non-rational in some cases. Habermas comments on these extreme cases: "Anyone who is so privatistic in his attitudes and evaluations that they cannot be explained and rendered plausible by appeal to standards of evaluation is not behaving rationally" (1984, 19). Habermas also classifies "anyone who systematically deceives himself about himself behaves irrationally;" and plant managers who report high energy costs and deny interest in cost-effective energy management and believe energy costs are not costly, this person is irrational. Likewise, if plant managers say there is no environmental crisis because this would require the industry act appropriately by either going out of business or completely retooling all of their dirty and non-renewable processes, and believed this, this person may be systematically distorted and therefore irrational. If corporate cannot undertake projects, understand, or discuss issues of energy management, Habermas may classify Baker & Taylor's corporate employees as irrational. Even as Habermas evaluates rationality on the basis of whether the subject acts/communicates rationally *in general* the historical and extreme pattern of industry's failure to more effectively control and improve their energy management casts doubt on the western belief that industry always makes rational decisions.

Existing research on energy efficiency in industry is becoming available. A few organizations such as the International Energy Agency, the Department of Energy, and American Council for an Energy-Efficient Economy are just a few organizations to produce publications on clean energy in industry. To look at clean energy expansion in industry, the interviews took a systems approach by framing energy issues through industry's perspective. A report by IEA, entitled "Tracking Industrial Energy Efficiency and CO₂ Emissions: In Support of the G8 Plan of Action," strives to improve energy efficiency in industry based on research that indicates that nearly one-third of energy demand and emissions come from industry—specifically chemical, petrochemical, iron and steel, aluminum, paper, and cement manufacturing industries (IEA 2007). IEA states that "...improving energy efficiency is the single most important step toward achieving the three goals of energy policy: security of supply, environmental protection and economic growth (IEA 2007, 3). IEA reports that while energy efficiency has improved over the last twenty years, manufacturing industries could reduce their emissions and energy consumption by one-third if companies invested in the most efficient technologies worldwide (IEA 2007). IEA acknowledges that such technologies might not be the most cost-effective in the short or medium term, but this effort is a means in itself (IEA 2007). In contrast to the information disseminated by the Smart Energy Design Assistance Center (SEDAC), a report by the International Energy Agency acknowledges that increasing energy efficiency may not always provide most economic benefit; however, SEDAC reports on data from the residential, business, and industrial sector and may not provide the most accurate data on industry (IEA 2007). IEA's report focuses solely on industry and has taken a sector approach in their research, but states that a systems approach is needed to address the needs of industry in total (IEA 2007). Tracking energy consumption and emissions, IEA proposes that

In all countries, government and industry partnerships, incentives, and awareness programmes should be pursued to harvest the widespread opportunities for efficiency improvements. New plants and the retrofit and refurbishment of existing industrial facilities should be encouraged. 21

From the research finding that companies consider Return on Investment the dominant factor on clean energy expansions, IEA recognizes that industries will need financial assistance from all possible sources in a systemic, concerted effort for clean energy.

The failure of industry to respond to quickly retool their facilities and become environmental stewards by integrating clean energy into their practices of energy management has continued to incur environmental and social damage. However, even though companies would enjoy positive media, a better environment, greater energy stability, and returns on their retooling through savings on energy and incentives (if they so apply for tax credits, rebates, etc), responding to the alarms urging them to quickly change may appear to them as “emotional” decisions that would run them out of business. Newspapers and social commentary constantly remind readers of the financial collapse, staggering unemployment rate, and environmental degradation occurring globally; industry has cut production and lost competitive edge in the United States. One finding of this research suggests that industry needs both material and ideational incentives to become more sustainable. To combat the lack of rationality found in industrial behavior, behavioral economists are trying to change behavior rather than neo-classical economists trying to justify their behavior.

In “Nudge: Improving Decisions about Health, Wealth, and Happiness,” Thaler and Sunstein argue that libertarian paternalism through choice architecture can encourage better choice-making (Thaler and Sunstein, 2008). Before proffering solutions to better choice-making, Thaler and Sunstein argue that inertia and blank can be identified as two major sources of inaction to change, even when the options include more rational, or better choices (Thaler and Sunstein 2008). Inertia appears to be a major cause of inaction on two levels: inertia as the momentum of unsustainable production and inertia as resistance to new action. First, industrial production has accustomed itself to the current methods of production of extraction, consumption, waste, and disposal and second, not taking action to renovate an industrial facility or expand to a new product because it is easier. To make funding more readily available, the application process simpler, and clean energy expansions easier, Economic Alliance of Kankakee County has drafted a concept paper to the Department of Commerce and Economic Opportunity to award Economic Alliance, a nonprofit agency, funds to assist industry in completing clean energy expansions.

Proposal to Department of Commerce and Economic Opportunity

I. Current State of Funding

In Illinois, local governments, businesses, and residents can find tax credits, rebates, incentives, loans and grants through the Illinois Department of Commerce and Economic Opportunity, their utility provider (Ameren or ComEd), and the federal government. Several agencies such as the Smart Energy Design Assistance Center (SEDAC), the Interstate Renewable Energy Council (IREC), and the Clean Energy Foundation list and advertise the incentives for energy audits, energy efficiency, solar technologies, geothermal, combined heat and power systems, wind turbines, etc. The existing application process collects individual applications from the agency's area of jurisdiction. An invigorated motivation to seek funding may result in an unmanageable volume of applications, resulting in slower, unclear, and unresponsive application processing which has thus far proven discouraging to businesses and municipalities seeking to implement sustainable technologies. Businesses and municipalities express discouragement at the time investment is required to collect information, apply for assistance when much of the time their return on investments has been fruitless.

Specifically, the Department of Commerce and Economic Opportunity (DCEO) offers several programs to reward Illinois residents for energy efficiency and renewable energy. Under Public Act 95-0481, DCEO Bureau of Energy and Recycling, with Ameren and ComEd, established the Illinois Renewable Energy Efficiency Portfolio with the first-year budget of \$50 million dollars in 2008 (http://illinoisbiz.biz/dceo/Bureaus/Energy_Recycling/). According to DCEO, funding will double after the second year and triple for the third year (Ibid). DCEO stated their investment in public sector entities whereas Ameren and ComEd will focus on industrial, commercial, and residential sectors (Ibid). Programs include Public Sector Electric Efficiency Program, Standard and Custom Incentive Program, Standard Incentive Program, Custom Incentive Program, and New Construction Program (Ibid). DCEO also provides the policy legislation, program guidelines and applications, and a list of energy auditors and consultants to meet initial application needs.

Despite DCEO's organized and clear web site, the current application process could be greatly improved. If Illinois would like to become a driver in sustainability by realizing more energy efficiency projects on a statewide level, the application process, response, and delivery must become more efficient

and accessible to applicants and DCEO. If demand for funds and applications increase as the Obama Administration intends, DCEO could become overwhelmed by the volume of processing applications from all over the state. Moreover, the time investment DCEO spends on determining the feasibility of each individual project and processing each application could be greatly reduced if the application process were localized to a county's planning department, which maintains an intimate knowledge of business and municipalities in the county. Planning departments, by virtue of their function, are already part of the approval process since the department must also approve project specifications and allow the proper zoning, permitting, and coding. Authorizing an intermediary economic development agency connected to the county planning department would incorporate the county planning department earlier in the process. By granting such an intermediary, DCEO could serve a greater number of individuals through a central local economic development intermediary instead of centralizing a high volume of individual applications.

A troubling aspect of the current system of energy efficiency and renewable energy programs is the exclusion of local economic development agencies to deliver information and assistance to industries interested in renewable energy and energy efficiency. Although many economic development agencies have responded to such projects with great innovation through public-private collaborations, local economic development agencies should also have access and authority to directly fund sustainability initiatives. Economic development agencies have a renewed role to play in the energy economy to reduce risks and project costs by motivating industries to implement more energy efficient practices with quick and ample funding. Economic development agencies can create public policies that stimulate green job creation and more sustainable industrial practices. Economic development agencies may be the most effective agency to encourage habit reformation. Increased energy efficiency in industry and/or a market expansion into a clean energy market could reduce strain on economic development agencies by increasing competitiveness. By becoming more energy efficient, companies can maintain and possibly increase their production in the midst of rising energy costs. With reduced and stabilized energy costs, industries will be less likely to reduce employment or wages (Ross 1992).

In Kankakee County, a business interested in a clean energy program can search online for federal or state tax rebates or credits, call Illinois Department of Commerce and Economic Opportunity (DCEO), or contact ComEd or other energy provider, if applicable. Local governments search online and can apply for clean energy programs through DCEO or Illinois Clean Energy Community Foundation. Local governments have an expanded role to play in the context of local economic development and can provide great benefits to resident companies. Local governments, which depend on economic growth, engage in economic development because their success is closely tied to economic success (Cox and Mair 1988). Local governments will be judged on what the municipality can deliver to improve the quality in the region and have a vested interest in helping businesses succeed (Cox and Mair 1988). The local dependence that has developed since the United States experienced a restructuring of the economy that de-industrialized some areas has territorialized economic development (Cox and Mair 1988). The territorialization and competition among localities that accompanies local dependence has also fostered solidarity within communities (Cox and Mair 1988). Political contentions have shifted from within communities to among communities (Cox and Mair 1988).

Businesses not only have a stake in their local communities, but entirely depend upon the land, labor, infrastructure and energy they need to produce; companies also develop relationships and build trust with local government officials, their customers and suppliers that may help them optimize their investments and returns in the local community (Cox and Mair 1988). Firms can grasp a sense of predictability and stability by fostering these relationships (Cox and Mair 1988). If the firm has only one facility, the dependence of that company is entirely dependent upon its local community; however, if the firm has multiple sites, the firm enjoys greater autonomy (Cox and Mair 1988).

Firms try to enhance their value-flow through their locality (Cox and Mair 1988). Firms often try to involve the state in enhancing their value-flow through its locality through various means such as tax abatements, zoning changes, utility extensions, infrastructure projects, and urban development (Cox and Mair 1988). State agencies, also dependent (on their tax base) make partial decisions and fund allocations (Cox and Mair 1988). With federal cut-backs of state funding, many local public-private alliances

materialized to fill the void left by state involvement economic development (Cox and Mair 1988). With an increase in state funding that DCEO received from ComEd surcharges, equaling \$100 million in 2009³, state agencies can resume increased involvement in economic development. However, DCEO has minimally increased staff levels to review and approve applications with strained outreach. With lots of money, minimal staff, and limited outreach, an additional agency to help with outreach might extend their clean energy programs.

Study: Kankakee County Filling the Administrative Gap with a Countywide Division of Sustainability

Kankakee County, with 24 percent of its industrial base in manufacturing and warehousing (IDES 2008), has started to explore the profitability of clean energy savings and technologies. 110,000 people reside in Kankakee County, IL and organize into over twenty municipalities (U.S. Census, 2005-2007). In 2003, the median household income was \$42,002 and the per capita income was \$26,462 (IL Workforce Information Center). In March 2009, the civilian labor force included 54,198 people with 6,457 unemployed individuals, leaving an unemployment rate of 11.9 percent (Workforce Information Center, Employment). Self-branded as a “manufacturing community,” Kankakee takes pride in its industry while trying to dust itself off from the deep recession it suffered when multiple manufacturing facilities left in the late seventies and eighties (David 1984). Despite current manufacturing job loss and shifting focus, and its growing healthcare sector (Workforce Information Center, Healthcare), manufacturing will remain a vital element of Kankakee’s industrial base. Investing in helping Kankakee County’s manufacturers becoming more sustainable has the potential to pay great dividends: according to the National Association of Manufacturing, each dollar invested in manufacturing goods creates \$1.43 of activity in the local economy and twice the multiplier for services (Gannon 2009). Growth in the manufacturing sector, which will most likely occur through energy efficiency and clean energy, will also directly uplift the backward and forward linkages connected to the manufacturing sector (Gannon 2009). If manufacturers can localize

³ ComEd and DCEO share revenue from ComEd’s surcharge, which funds clean energy programs. Information obtained via phone with DCEO.

their relationships with suppliers and provide locally, their transportation and distribution costs should decrease significantly, allowing extra funds for capital investment.

With the Obama Administration passing the American Renewal and Reinvestment Act in early 2009 and providing stimulus funds for weatherization, clean energy, “green” jobs, i.e. employment that preserves or enhances environmental quality (Center for American Progress, Apollo Alliance) will provide the most promising channel for economic growth. A great opportunity to lower unemployment and revitalize manufacturing exists in manufacturing and assembling renewable energy technologies such as wind, solar, geothermal, biomass generation and “smart grid” renovations (Gannon 2009). Such opportunities can be found by identifying manufactured products in the clean energy sector and breaking these products into their components (Gannon 2009). For example, solar products require storage batteries, semiconductors, plastics materials, etc.; geothermal units include power boilers, pipes, pumps, air and gas compressors, iron and steel pipes (Gannon 2009). Kankakee County has numerous producers of these materials and opportunities to transform the supply chain into a more sustainable one.

Understandably concerned with the current economic recession and entrenched in traditional production methods that emit pollution and waste, industries in the county are preoccupied with preserving jobs instead of the environment and have consequently been slow to implement more energy efficient practices. However, with increasing awareness of the economic benefits of becoming more energy efficient, businesses and local governments have started proposing building renovations and implementing renewable energy technologies. Such initiatives from industry have been slower-coming from industry due to short-term investment calculations, perception of inconvenience and delayed return on investment, lack of information, and general reluctance. Despite the great return on investments businesses may experience after investing in energy efficiency and renewable energy technology, initial cost and time investment seeking incentives discourage initiatives. For example, a company renovation of their facility may cost hundreds of thousands of dollars to install new lighting, heating, and electricity, but after the initial cost of these technologies, the company’s energy expenses will remain fixed at a minimal cost (Ross 1992; SEDAC handout). According to recent research on eleven of Kankakee County

companies, Even though non-renewable energy prices will continue to rise, business-as-usual dominates over investments in energy innovation.

Economic development agencies have a renewed role to play in the energy economy to reduce risks and project costs by enticing industries to implement more energy efficient practices with quick and ample funding. Economic development agencies can create public policies that stimulate green job creation and more sustainable industrial practices. Economic development agencies may be the most effective agency to encourage habit reformation. The Blue Green Alliance, in a publication entitled “Illinois’ Road to Energy Independence: Building on Job Growth in Renewable Energy Component Manufacturing,” summarizes a report by the Renewable Energy Policy Project (REPP) that analyzed the demand for components of renewable energy technologies state-by-state (Blue Green Alliance 2007). These reports showed how a national program for the development of renewable technologies would strengthen each state’s economy (www.repp.org). REPP and the Center for Renewable Energy and Sustainable Technology (CREST) administer a national program to stimulate demand for renewable energy technology components that will first be administered at the national and state levels, to eventually be administered at the county level (Blue Green Alliance 2007). The report ranks Kankakee County as eight from the top in deriving benefits from this program. The report states Kankakee County has sixteen firms and the total money generated and jobs created from wind, solar, geothermal, and biomass totals \$177 million with 1,023 jobs (Blue Green Alliance 2007, 2).

REPP expects counties to have the capacity to administer these programs. Economic development agencies such as Economic Alliance of Kankakee County, which work with the county planning agency would be an established agency with access to county staff and data. The only county-level public-private economic development agency, Economic Alliance is staffed through the county and is audited by the State of Illinois. In turn, investing in the energy economy and energy efficiency in business benefits local economic development agencies because energy efficient businesses will become more competitive and reinvest their energy savings into business expansion without needing as much assistance from economic development agencies.

I. Proposed Solution

This section suggests that an intermediate agency to finance sustainability projects could increase the efficiency of energy efficiency and renewable energy programs on the state-level in Illinois. From a research project on clean energy expansions in industry, Economic Alliance of Kankakee County found clean energy expansions in progress and significant interest on the part of industries to receive incentives for clean energy expansions. From this research, Economic Alliance found that many energy-intensive companies were unaware of ComEd's incentive programs and other clean energy programs. A central countywide economic development agency tied to the Kankakee County Planning Department could increase sustainability projects in the county and result in a more efficient funding mechanism by reducing the application volume of awarding agencies, determining project eligibility with greater familiarity, responding more quickly to business needs, strengthening local leadership and expertise, strengthening community collaboration, increasing county-level autonomy, and creating jobs in the county.

The Economic Alliance of Kankakee County, a central economic development agency, has received multiple requests for financial incentives and assistance in implementing sustainability technologies including solar panel farms, wind turbines, vegetative roof covers, etc. The Economic Alliance of Kankakee County, is 501 c (6) public/private collaboration with a fourteen member board composed of seven county board members and seven private developers. The Economic Alliance serves as a point of contact for businesses interested in expanding in or locating to the county and provides information and economic incentives to encourage economic growth (<http://www.kankakeecountyed.org/>). The Alliance has collaborated with partners from community and industry to enjoy many successes including saving over 200 jobs, establishing and extending the Enterprise Zone, providing a microloan program to small business owners, publishing economic and community data on the county, and using new technologies such as GIS and Location One to examine economic development possibilities. One crucial partner for the Economic Alliance has been the

Kankakee County Planning Department, which has provided data, staff and technology support, project development, mapping, zoning, permitting, etc. The combination of economic development and county planning has the potential to have a powerful impact on energy efficiency and renewable energies in the industrial sector. If funded through the DCEO, ComEd and the State of Illinois can help Kankakee County industries more easily complete clean energy expansions.

Economic Alliance would expand the services of ComEd and DCEO by extending them to companies in Kankakee County. Economic Alliance would not replace either agencies or usurp their programs, but would better administer these programs because the sole mission of the Alliance is to maintain in constant contact with industries as a source of support so that companies may thrive in Kankakee County. As opposed to a federal or state-level agency, a Division of Sustainability, administered through Economic Alliance would administer clean energy programs more effectively because its jurisdiction is smaller than federal and state agencies and therefore would more intimately know its customers, properties, and policies than a larger-level agencies. A county-level agency would also have greater accountability and perhaps subject to greater criticism due to its native administration. The Division of Sustainability would formulate local policies in the context of federal and state policies and abide by all preconditions determined by the State for the Division. However, the Division of Sustainability would formulate its policy goals based on a county-wide sustainability strategic planning session, research and data collection, and the strategic goals and strategies of the Business Retention & Expansion Program of the Economic Alliance.

Abiding by the strategic goals of Economic Alliance and its Business Retention & Expansion Program will remain a high priority of the Division of Sustainability. Like the Business Retention & Expansion Program, the Division of Sustainability would exist to retain industries in and attract industries to Kankakee with a strategy to increase their competitiveness and investment in Kankakee through improved energy management.

Protection of Human Participants

This research project abided by all federal and university regulations to ensure the protection of human participants from harm. First, researchers submitted the proposed project, methodology, and interview questions to Illinois State University's Institutional Review Board (IRB) which required investigators to explore all potential sources of risk to the participants by answering questions regarding the participant groups, the data collection activity, participant recruitment, and data use. IRB required researchers to create scripts to ensure that all risks accompanying participation were properly and uniformly communicated. Researchers obtained informed consent from all participants before participation and took action to minimize the risks of participation. The two dominant concerns regarding the protection of human participants for this research included issues of confidentiality and the reporting of data.

Confidentiality, rather than anonymity, exposed the participant to greater risk. Since each company makes the identity of its plant manager public information, maintaining the confidentiality of their responses remained of vital importance. To minimize the risk of plant managers worrying that their responses may affect their employment status, researchers informed participants their participation was completely voluntary and their identities would remain confidential. Participants were assured their identities would not be made known to their supervisors or employers. Each participant was reminded that her participation as completely voluntary and she did not have to answer any question she did not wish to. Confidentiality had two different levels of confidentiality: the participant could agree to share their interviews with Economic Alliance of Kankakee County, which would incorporate these files into their company profiles as part of its Business Retention & Expansion Program. With the Economic Alliance, company information remains confidential. If a company reports a clean energy expansion, Economic Alliance would not release any information until the company released the information to the general public. Participants could choose to keep interview responses solely with Illinois State University researchers.

Limitations

A limitation to this research involves the amount of knowledge, support, and personal investment each plant manager has for environmental health will affect their openness toward clean energy expansions and this research project and poses a risk of “green washing.” Green washing, defined by Source Watch as

...the unjustified appropriation of environmental virtue by a company, an industry, a government, a politician or even a non-government organization to create a pro-environmental image, sell a product or a policy, or to try and rehabilitate their standing with the public and decision makers after being embroiled in controversy (<http://www.sourcewatch.org/index.php?title=Greenwashing>)

The political climate poses a risk of plant managers responding with empty affirmation of clean energy expansions. Green washing may occur due to the political presence coupled with low buy-in, top-down enforcement from the company’s CEO, environmental apathy or political resentment. Answers obtained from subjects uncommitted to environmental quality may resort to empty statements of support with little intention to expand, thereby repressing their true sentiments. As the current political agenda against nonrenewable energy sources came with the new Obama administration, plant managers may be more likely to green wash or show resistance to this research project. Green washing may limit the researchers’ ability to discern the interest, commitment and barriers to clean energy expansions.

Green washing may be partly motivated by distrust. A few of the companies expressed a level of distrust of inquiries about energy usage and economic development agencies. Some companies conveyed a wariness of outsiders and agreed to participate if they could respond to plant managers through e-mail. Researchers still obtained responses to the questions, but e-mail served as a filter to shield the company from open exchange with the researcher or to review the interview ahead of time. The additional information gained by conversation during in-person interviews was lost through this mode of communication. However, without e-mail a few of the companies may not have agreed to participate, whether motivated by distrust or lack of time.

Time was a significant limitation to this research project. The estimated interview time of twenty-five minutes was required so as not to deter plant managers from participating. Interviews could have lasted much longer and the interviewer would have liked to have probed more deeply into certain

responses. Most interview responses contained many contradicting statements and the interviewer would have liked to have challenged the interviewee about his self-refuting answers and possible disingenuousness. However, instead of disingenuousness, it is possible that inconsistencies and contradictions surrounding commitment to environmental care can be accounted for by an interchangeability of the person and the plant manager regarding such a personal matter as the environment. Plant managers could have responded from a personal perspective on questions about environmental care instead of his company's perspective, indicating an intrusion of the lifeworld into the system perspective. This confusion and ambivalence toward expressing apathy toward the environment might have been motivated by guilt, discomfort, or personal values.

The interview questions posed a third limitation to this research. The researcher wanted to determine whether industry's laggardly response was attitudinal (apathetic to environmental degradation) or due to material constraints (as indicated by lack of knowledge or financial ability); however, working with industry outside of this research project, the researcher's supervisor requested she omit questions regarding plant manager's attitudes about environmentalism. Concerned that those questions may make the plant manager feel uncomfortable or "set-up" because most of companies in Kankakee County have demonstrated a lack of environmental stewardship, the researcher omitted questions about awareness and concern of environmental issues and replaced them with energy usage-related questions. Time also posed a significant barrier to obtaining information that might provide insight into attitudinal motivations for clean energy expansions.

A fourth limitation of this study recognizes the sensitivity of plant managers and their protectiveness of information. Most plant managers were extremely concerned about the confidentiality of their responses. Although the plant managers were assured their information would not be publicly disclosed, a few companies asked for reassurance several times. In general, plant managers were not eager to participate or share information about their company and at times conveyed a fierce protectiveness. As confidentiality can be appreciated, refusing the release of their information and wariness of outsiders inhibits deeper analyses and dissemination of research on clean energy in industry.

Contributions

This research contributes to the emerging research on energy efficiency and renewable energy in industry. Unlike most of the research available, this research makes a local and human connection, albeit to a limited extent, to identify the human and systemic factors that inhibit the transformation to a clean energy economy. As much research occurs on the national and global level, this research took place in Kankakee County, a mostly rural county of 110,000 inhabitants, with the aim to provide a realistic solution to help industries in Kankakee County reduce their negative environmental impact. In addition to the information collected from plant managers on energy costs and barriers to energy efficiency, this research proposes a model for other counties to emulate for distributing incentives for clean energy expansions in industry.

Future Research

This research project sought to collect information on industrial plans for clean energy expansions in Kankakee County as well as to identify common barriers facing companies considering clean energy expansions. Eleven distinct companies were interviewed, mostly from the manufacturing sector, to capture the most-energy intensive industries. While this research unearthed many commonalities among a few industries, industry-specific research logically follows from this study. Future research should distinctly study industry according to its six-digit North American Industry Classification System (NAICS) code to identify the needs endemic to each industry. For example, rather than surveying a few companies in the general manufacturing sector, classified as NAICS 31-33, a researcher may conduct a study with only petrochemical manufacturers, classified as NAICS 325110 (<http://www.naics.com/naics31-33.htm>). Researchers should also be knowledgeable of each industry with detailed knowledge of its production methods and processes to ask more specific questions and determine the most effective incentives for clean energy expansions. Further, future research studies should be longitudinal. This project was completed over a short period of time and includes no component of following up with companies to determine whether the company completed the clean energy expansion. A longitudinal study may more effectively determine the alignment of a company's commitment to and

completion of a clean energy expansion. Future research may also consider triangulating with additional data collection methods such as participant-observation, inside-participant observer to obtain a more holistic perspective.

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