BEFORE THE IOWA UTILITIES BOARD
DEPARTMENT OF COMMERCE
STATE OF IOWA

IN RE: INTERSTATE POWER AND LIGHT COMPANY	}	DOCKET NO. GCU-07-01

DIRECT TESTIMONY OF DR. NEIL E. HARL

Q: Please state your name and business address.

A: My name is Neil E. Harl. My address is 2821 Duff Avenue, Ames, Iowa 50010. My office is in the home, so that is my home address as well.

Q: By whom are you presently employed and in what capacity?

A: I am self-employed. On December 31, 2004, I retired from Iowa State University in Ames, Iowa, after 40 years on the faculty. My professional activities presently include conducting educational seminars for attorneys, CPAs and other professional groups; publishing legal and economic materials and updating various academic treatises and single volumes; consulting; serving as an expert witness; managing our 1,000 acre farming operation; and managing various other investments in four states.

Q: What is your educational background?

A: I received a Bachelor of Science Degree in Agriculture from Iowa State College in 1955, a Juris Doctor Degree from the University of Iowa in 1961 and a Doctor of Philosophy Degree in Economics from Iowa State University in 1964.

Q: Please describe your professional experience.

A: I served briefly as a County Youth Assistant in Washington County, Iowa, after graduating from Iowa State College on June 10, 1955. On August 12, 1955, I entered

active duty in the U.S. Army with the rank of Second Lieutenant, advancing to First Lieutenant in 1956. I was stationed at Ft. Sheridan, Illinois and worked with Nike surface-to-air guided missiles until being separated from active service on August 12, 1957. I continued for seven years in the U.S. Army Reserves in Ames and Cedar Rapids, Iowa, advancing to the rank of Captain with responsibilities as assistant fire direction officer in an artillery battalion, Division Artillery Survey Officer and Battery Commander. In mid-August 1957, I began work as field editor for Wallaces Farmer magazine in Des Moines, Iowa, continuing until September of 1958, whereupon I commenced law school at the University of Iowa and accepted a part-time position as Agricultural Economist with the U.S. Department of Agriculture in Iowa City and Ames, Iowa. Upon completion of my PhD in Economics in November 1963, I began work as an Associate Professor of Economics at Iowa State University, Ames, Iowa. I was promoted to full professor on July 1, 1967 and became a Charles F. Curtiss Distinguished Professor in Agriculture on May 27, 1976, a title which I still hold. I became an Emeritus Professor of Economics at Iowa State University on January 1, 2005, following my retirement from the ISU faculty on December 31, 2004. I also served briefly as an adjunct professor at the Drake University law school, where I taught a semester-length class in 2003, and at the University of Iowa, where I taught a semester course in 1982.

In addition, I have conducted more than 3,200 seminars for professional groups in 43 states and 17 foreign countries. I was responsible for forming and served as Director of the Center for International Agricultural Finance from 1990 through 2004, with educational activities involving free market economics, legal systems appropriate for a

market economy, and banking and finance in 33 countries transitioning to a market economy.

I am the author of 28 books, with the 29th is in advanced stages of publication, and more than 400 articles in professional journals and bulletins. My full curriculum vitae and list of professional publications is attached to this testimony as Appendix A.

Q: Do you have experience working with state or federal government agencies?

A: Yes. In 1967 I was appointed by the U.S. Treasury Department to a Farm Tax Task Force; in 1979 I was appointed by the U.S. Treasury Department to the Commissioner's Advisory Group, Internal Revenue Service, with service in 1979 and 1980; I was appointed to a Farm Structure Task Force in 1980 in the U.S. Department of Agriculture; in 1987 I was appointed to the Office of Technology Assessment Advisory Committee by Congressional appointment and served from 1988 through 1995, serving as chair of the group in 1993-1994; in 2000 I was appointed to the Advisory Committee on Agricultural Biotechnology (ACAB) in the U.S. Department of Agriculture, serving in 2001 and 2002; and in 2002 I was appointed as one of the nine members by Congressional appointment to the Commission on Payment Limitations in Agriculture, serving in 2003.

Q: Have you testified as an expert witness in prior Iowa or other state or federal utility regulatory proceedings?

A: I have testified as an expert witness in state and federal courts in approximately 50 cases but not in regulatory matters.

Q: On whose behalf are you testifying in this case?

A: I am testifying on behalf of the Joint Intervenors Community Energy Solutions, Iowa Environmental Council, Iowa Farmers Union, Iowa Physicians for Social Responsibility and Iowa Renewable Energy Association.

Q: What is the purpose of your testimony?

A: I was retained in this matter to offer my analysis of the potential demand for electric power from ethanol and other biofuels facilities in the current economic environment and the economic environment expected to develop in Iowa over the next several years and to focus attention on cost externalities associated with fossil fuel-powered electric generating facilities as a source of electricity for biofuels refineries.

Q: Please summarize the conclusions you have reached in your analysis:

A: My conclusions are as follows:

1. Present and future economic uncertainties in the biofuels sector call into question the alleged demand growth for IPL from existing and proposed biofuels facilities.
2. The future viability of ethanol and biodiesel facilities in IPL's service area is highly uncertain in the face of short-term market adjustments and competing fuel sources and technologies.
3. IPL's application to construct the proposed SGS-4 electric generating facility does not take into account all the relevant cost externalities that result from this type of electric generation.

Q: Are you sponsoring any exhibits as part of this filing?

A: Yes. I am sponsoring three exhibits: the IPL Response to Coalition Data Request No. 5, including **confidential Attachment A**, a biofuels spreadsheet showing existing and planned biofuels facilities in IPL's service territories [Exhibit ___ (NEH-1) Schedule A];

a recent publication by the International Monetary Fund, World Economic Outlook: Globalization and Inequality, published October 2007 [Exhibit ___ (NEH-1) Schedule B]; and a publication that I recently authored entitled, "Ethanol – Where Is It Headed?" to be included in the November 2007 issue of the AgLender magazine [Exhibit ___ (NEH-1) Schedule C].

1. Economic uncertainties in the biofuels sector call into question the alleged demand growth for IPL from existing and proposed biofuels facilities.

Q: How do existing and proposed biofuels facilities in IPL's service area relate to alleged demand growth for IPL?

A: It is my understanding that the generating capacity deficit alleged by IPL in the present application is driven heavily by existing and planned ethanol and biodiesel plants in the IPL service territories, particularly those expected to request electric power from IPL over the next several years. The IPL Response to Coalition Data Request No. 5 has provided some insight into such existing and proposed biofuels facilities in summary form as of September 30, 2007 [Exhibit ___ (NEH-1) Schedule A].

** **BEGIN CONFIDENTIAL MATERIAL****

****END CONFIDENTIAL MATERIAL****

Q: Can you describe the factors that have contributed to the current supply-demand imbalance in the biofuels sector?

A: The three major components of the supply-demand imbalance began to appear several months ago but received relatively little attention. Few anticipated the convergence of thee three problems and what they would mean to planned biofuels projects, especially ethanol and biodiesel, and to those facilities currently in operation.

The first problem – the rising cost of inputs – was attributable to the success of the ethanol industry, and to a lesser extent the biodiesel industry. Four years ago, in the early days of the ethanol boom, corn was selling for $1.85 to $2.00 per bushel in the areas with a wide basis such as in northwest Iowa. Currently, the spot market for corn is well over $3.00 per bushel with contracts for summer 2008 delivery above $4.00 per bushel. That increase in feedstock prices boosted the cost of production for ethanol producers. Indeed, success in the ethanol industry assured that this would happen. A rising demand for

ethanol means a rising demand for corn, which boosts corn prices. Higher corn prices mean increased cost of producing the end product, ethanol for blending with petroleum-based products. The rising demand for corn and the resulting higher corn prices has drawn land away from soybean production, and to a lesser degree from wheat production, with the result that all commodities tend to rise in price. It is understood that other factors have played a role in price behavior for wheat and soybeans in addition to competition for tillable land for corn. Undeniably, however, success in ethanol production and sales has sowed the seeds of economic travail for ethanol producers, unless demand grows proportionately. I will discuss the demand side of the equation later in my testimony.

The second factor has been the rising cost of construction for ethanol and other biofuels plants. Some of that increase appears to be the normal result of rapid growth of a relatively new industry with a limited number of firms capable of constructing an efficient operating plant and partly because of supply problems with some key components.

The third factor has been the plummeting price of ethanol in the markets. Ethanol was selling for close to $2.50 per gallon a couple of years ago. In the early autumn of 2007, the price dropped to the $1.50 per gallon range, with some recovery in the ethanol futures markets in mid-autumn of 2007 as the price of oil has risen to near $90 per barrel. Ethanol plants in operation and those under construction have, therefore, been caught in a three-way squeeze --- rising raw materials cost, unanticipated increases in construction costs and an unexpected decline in the price for the product. Quite clearly, the supply of ethanol got way out ahead of demand. The usual market response, where that happens, is for the low product price to cause reduced production, with the more inefficient firms

halting output entirely, until demand rises or supply drops enough to induce the idled firms to once again move into production.

Q: Can you describe the underlying causes of the supply-demand imbalance that you have outlined?

A: There are several reasons for the rather unusual (but certainly not unprecedented) supply-demand imbalance for the fledgling biofuels industry.

The first reason is the enormous popular, political and financial support enjoyed by ethanol and biofuels in recent years. Corn growers have promoted ethanol aggressively for several decades. Environmentalists have been supportive of ethanol, which is less toxic to the environment than the fuel additive MTBE. Rural areas saw in ethanol a boon to local economic development, with many areas of declining population eager to support any activity that would restore economic growth and produce rising per capita incomes in real terms. The general public was impressed by the argument that it was in the national interest to become more energy sufficient with less dependence on imported oil as an energy source. Congress, until very recently, heard little but plaudits from their constituents and responded with hefty subsidies and production mandates, requiring the blending of ethanol with petroleum fuels. Finally, potential investors willingly provided the funds needed to build approximately 130 ethanol plants nationally, which are now in operation, and to plan for an additional 85 to 90 plants, which are expected to move into production over the next year or two.

The second reason for the imbalance is that the policy process essentially insulated ethanol production from the full range of market forces with the result, not unexpected, that supply lost touch with demand. There was a belief held in some quarters that the

potential demand was so huge that overproduction was unlikely. Indeed, some investors apparently came to the conclusion that investment in ethanol plants posed little if any risk. It should be emphasized that currently there is not only over-production on a static basis, there is also the potential for a huge increase in ethanol-producing capacity from the 85 to 90 projects on the drawing boards and under construction.

2. <u>The future viability of ethanol and biodiesel facilities in IPL's service area is highly uncertain in the face of short-term market adjustments and competing fuel sources and technologies.</u>

Q: Given the supply-demand imbalance you have described, what can be expected in terms of short-range economic impacts for the biofuels sector?

A: The contours of the adjustment process are well-known when supply outpaces demand. While the market signals may have been ignored in the optimistic era leading up to the point of realization that too much ethanol was being produced for the original price levels of ethanol to be maintained, the market cannot be ignored when the cold, hard reality is that the only feasible solution is to slow the growth of ethanol production or work aggressively to boost demand. Unless an increase in demand occurs, further investment in new projects is chilled, some projects already planned are dropped and those already producing, as well as those too far down the road toward production, cinch up their collective economic belts and attempt to reduce costs and ride out the economic storm. The most dramatic economic impact is on new investment.

Projects already operating (and those too far along to be shelved) continue operating so long as the projects can cover their variable costs (those costs that vary with production and relate to output). At the point that variable costs cannot be covered, the firm may

ponder their options briefly but relatively soon can be expected to shutter the operation unless the owner or owners are willing to subsidize the operation or to endure a period of losses. The severity of the economic adjustment problem relates heavily to the proportion of plants under construction electing to move ahead into full production and the proportion of planned projects that continue down the road to full production. If the additional capacity added in the sector is large, the demand for corn could be boosted; if the adjustment process discourages the additional capacity from proceeding to full production, the demand for corn could decline. The dynamic of the adjustment process would be expected to have a dramatic effect on the demand for electric power from these facilities.

Another possibility, acting alone or in conjunction with market-generated efforts to curb supply, is that ethanol demand could be boosted. That possibility rests with the United States Congress (and the administration) in the form of increased production-and-use mandates for ethanol, with manufacturers of flex-fuel vehicles (which in turn depends upon consumer acceptance) and a more dramatic shift nationally and world-wide by consumers in favor of ethanol usage. The most likely relief on the demand side rests with the Congress. However, in contrast to 2005 when the last major energy bill was enacted into law and the political support for ethanol was strong, the lobbying pressure currently in opposition to additional subsidies and mandates for ethanol is substantial from those concerned about the effects of ethanol demand on food costs (from rising commodity prices), those with concerns about soil loss as more highly erodible land is drawn into production and concerns voiced by users of corn (and the other commodities that have

risen in tandem with corn prices) in their production processes as to rising commodity prices. Any proposed increases in mandates or subsidies will likely be resisted.

Regardless of how the adjustment is approached, it will take considerable time before the supply-demand balance is rectified – by the market if no other solution is implemented, or by government policy moves.

Q: Given the current supply-demand imbalance and short-term economic forecast, what can be expected in terms of long-range economic impacts for the biofuels sector?

The short-term problems outlined above do not spell doom for the ethanol industry. The adjustments will be painful, and the bulk of the brunt will be felt by those who have invested in or made commitments to ethanol and other biofuels projects, including those such as IPL that have invested in facilities to serve what was until recently viewed as a robustly growing industry. This is particularly the case where that investment decision was made on the basis of an expectation that the demand for electric power from planned biofuels facilities (and those under construction) would become a reality on a set time schedule. It should be noted that suppliers of electric power are not likely to be the only suppliers left with unused capacity, but that is the only industry at issue in this application. The long-term future of ethanol and some other biofuels depends upon three critically important factors –

The first factor is the future of U.S. energy policy. Right now, a sharp shift in energy policy away from energy self-sufficiency seems unlikely. However, we should be reminded that many of the energy policies and pilot projects put in place in the late 1970s after the energy crises of the early part of that decade were shelved by the new

administration in 1981. Energy policy in this country tends to be reflective of voter and consumer sentiment. If peace were to break out in the Middle East and harmony were to be restored throughout that part of the world (however unlikely that seems), U.S. energy policy could take an abrupt turn away from heavy emphasis on energy self-sufficiency.

The second long-term determinant of the future of ethanol is the matter of the economics of conversion of corn and other materials into ethanol. A report released in October of 2007 by the International Monetary Fund carries a worrisome message for corn-based ethanol. [Exhibit ___ (NEH-1) Schedule B]. That report, World Economic Outlook: Globalization and Inequality, provides a world-wide assessment of the state of the global economy and includes a segment on the economics of biofuels. Box 1.6, found at pages 48-50 of the report, states –

> Only Brazil ethanol derived from sugarcane is less costly to produce than gasoline (about 15 percent and, in energy equivalent terms, 25 percent less, respectively). Furthermore, sugarcane ethanol produces 91 percent fewer greenhouse gas emissions per kilometer traveled than gasoline.

The report also provides the estimated cost of production per liter in dollars (assuming $65 for a barrel of oil)--

Biofuel	Cost of production
Brazilian sugarcane ethanol	.23 to .29
Corn-based ethanol (U.S.)	.40
Ethanol from cellulosic waste	.71
Gasoline (U.S.)	.34

The report notes that blenders in the United States receive 51 cents per gallon of ethanol and $1 per gallon of biodiesel sold. Moreover, there is a 54 cent per gallon tariff on ethanol imports. The Energy Policy Act of 2005 set a goal of renewable fuels reaching 7.5 billion gallons by 2012 (about 10 percent of the total gasoline used). Legislation that would boost that figure to 35 billion gallons by 2022 is under consideration. In a world of free trade, the lesson to be learned is that, with few exceptions, the lowest cost source of any commodity ultimately prevails. The key question is which technology will produce the quality of energy needed, on a reliable basis and at the lowest cost to the user, and whether that technology will be ethanol.

The third determinant of the long run future of ethanol is what lies ahead in terms of technological developments. Never before have we had the economic incentive to produce energy alternatives as we have today. Some of the competing technologies are well known – wind energy, solar, hydrogen, hydrogen fuel cells, nuclear (for which there may well be a resurgence in the next few years), petroleum-based sources, coal converted to natural gas, and geothermal. But additional technologies could well emerge over the next few decades. All of the technologies, ethanol included, will be subjected to a least-cost test, taking all costs into account including the costs relating to environmental deterioration.

3. IPL's application to construct the proposed SGS-4 electric generating facility does not take into account all the relevant cost externalities that result from this type of electric generation.

Q: What are the cost externalities associated with IPL's application in this matter and what is your analysis of those externalities?

A: From a societal perspective, it has become vital to take into consideration the impact of energy use on the environment, including those costs not directly borne by the users of the energy or by the firms providing the energy in useable form. Increasingly, environmental law through direct regulation and through creating economic incentives of various types, is internalizing the "cost externalities" and requiring the users and those providing the energy, including firms generating electrical power, to bear the costs including the proxy costs for the external costs created by energy use. That was not the case a half-century ago. The result has been a more rational allocation of resources.

Even with a conservative estimate of the cost externalities associated with coal-fired generating facilities, it is abundantly clear that when all costs (including the sizeable cost externalities) are taken into account, alternative technologies are less costly to society in the long run. It is important in this proceeding for the decision makers to realize that the least cost technology to the firm generating the electricity is not the least cost for society. That is a vital point and one that favors alternatives such as IGCC which has been considered but rejected by IPL largely, it appears, on the basis of cost. Congress has recognized that a portion of the cost externalities logically should be borne by the public at large which is the undergirding principle for the credit provided by Section 48A of the Internal Revenue Code for qualified advanced coal projects. What is critically important is that the Iowa Utilities Board not approve a slightly lower cost technology with massive cost externalities that will almost certainly prove to be costly to society in the long run, probably well beyond the highest current estimates.

Q: Based on the analysis presented in your testimony, what conclusions have you reached regarding the Applicant's proposal to build a new coal-fired electric generating facility?

A: This proceeding, as noted above, represents a classic case of the societal interest versus the lowest cost technology as measured by the economic impacts taken into account by the generating firm. It is critically important for the decision to be made on the basis of which technology would best serve the human family over the useful life of the project. Even more fundamentally, it is the view of this witness that Alliant has failed to prove the need for a power plant of any type taking into account the fact that the additional demand posited from biofuels facilities has a low probability of materializing for all the reasons noted in this testimony. But if the decision is made to move forward with additional generating capacity, that decision should be conditioned on taking into account all costs to society, not merely the costs to the generating firm. Only then will the result be economically sound on a benefit-cost basis.

Q: Does this conclude your direct testimony?

A: Yes, it does.