CASE NUMBER:

99-449

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CASE NUMBER:

99-449

Index for Case: 1999-00449 AS OF : 05/23/02

The Union Light Heat & Power Co

Integrated Resource Plan

Regular

IN THE MATTER OF THE 1999 ELECTRIC LONG-TERM FORECAST REPORT OF THE UNION LIGHT, HEAT AND POWER COMPANY

SEQ NBR		Date	Remarks
1		11/01/99	Application.
2		11/04/99	Acknowledgement letter.
3	(M)	11/15/99	MOTION TO INTERVENE NOTICE OF FILING & CERTIFICATE OF SERVICE (E BLACKFORD AG)
4		11/18/99	Letter granting petition for conf. filed 11/1/99 by ULH&P.
5	(M)	11/18/99	MOTION FOR LEAVE TO INTERVENE (KY NATURAL RESOURCES)
6		11/23/99	Order granting motion for full intervention filed by the Attorney General.
7		11/24/99	Order granting motion of the NREPC to intervene.
8		11/30/99	Order setting forth the procedural schedule to be followed in this case.
9	(M)	01/05/00	FIRST REQ FOR INFORMATION TO THE UNION LIGHT HEAT & POWER CO (NATURAL RESOURCES & ENVIROMENTAL PRO)
10		01/07/00	Staff Data Request; response due 2/8/2000.
11	(M)	01/07/00	INITIAL REQUEST FOR INFORMATION (AG E BLACKFORD)
12	(M)	02/03/00	RESPONSE TO PSC STAFF REQ FOR INFORMATION (JOHN FINNIGAN CINERGY)
13	(M)	02/04/00	RESPONSE TO AG INITIAL REQ FOR INFORMATION (JOHN FINNIGAN CINERGY)
14	(M)	02/08/00	RESPONSE TO KY DIVISION OF ENERGY REQ FOR INFORMATION (JOHN FINNIGAN CINERGY)
15		02/29/00	Commission Staff's Request for Info to ULH&P; response due 3/21/2000.
16	(M)	02/29/00	SUPPLEMENTAL REQ FOR INFORMATION (E BLACKFORD AG)
17	(M)	03/22/00	RESPONSE TO PSC STAFF SUPP REQ FOR INFORMATION (JOHN FINNIGAN CINERGY)
18	(M)	03/29/00	PETITION FOR CONFIDENTIALITY (JOHN FINNIGAN CINERGY)
19		04/06/00	Letter granting petition for conf. filed 3/29 by ULH&P.
20		04/28/00	IC memo sent to parties; comments, if any, due 5/8/2000.
21	(M)	05/01/00	COMMENTS RELATED TO 99 RESOURCE PLAN OF ULH&P (KY DIVISION OF ENERGY)
22	(M)	05/01/00	COMMENTS OF AG TO 99 IRP (AG E BLACKFORD)
23	(M)	05/19/00	REPLY COMMENTS OF ULH&P TO THE AG/KDEC (JOHN FINNIGAN/ULH&P)
24		07/17/00	Commission Staff Report mailed to parties.
25		07/21/00	Final Order approving Commission Staff's review of ULH&P's 1999 IRP.
26		11/01/00	First reminder letter to parties of record re: renewal/extension of contract.
27	(M)	12/08/00	RESPONSE TO DATA REQUESTS SET FORTH BY COMMISSION'S ORDER 6/14/99 (MARK OVERSTREET/EAST KY POWER COOP)
28	(M)	01/08/01	NOTICE REGARDING STATUS FOR FULL REQ POWER CONTRACT (JOHN FINNIGAN CINERGY)
29	(M)	01/09/01	NOTICE OF STATUS OF FULL REQUIREMENTS POWER CONTRACT (JOHN FINNIGAN CINERGY)

Cinergy Corp.
139 East Fourth Street
Rm 25 AT II
P.O. Box 960
Cincinnati, OH 45201-0960
Tel 513.287.3601
Fax 513.287.3810
jfinnigan@cinergy.com

John J. Finnigan, Jr.
Senior Counsel

CINERGY.

VIA REGULAR U. S. FIRST CLASS MAIL

January 5, 2001

Thomas M. Dorman
Executive Director
Public Service Commission
211 Sower Boulevard
P. O. Box 615
Frankfort, KY 40602

RECEIVED
JAN 09 2001
PUBLIC SERVICE COMMISSION

Re: Case No. 99-449
In the Matter of: A REVIEW PURSUANT TO 807 KAR 5:058 OF THE 1999 INTEGRATED RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY

Dear Executive Director Dorman:

Pursuant to Staff Report in the above captioned cause, The Union Light, Heat and Power Company herewith submits an original and 15 copies of its Notice of Status of Full Requirements Power Contract with The Cincinnati Gas & Electricity Company

Please date stamp and return the extra 2 copies in the enclosed self-addressed envelope.

If you have any questions, please contact me at 513-287-3601.

Very truly yours,

John J. Finnigan

John J. Finnigan, Jr.
Senior Counsel

Enclosures

JJF/nlb

RECEIVED
JAN 09 2001
PUBLIC SERVICE COMMISSION

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058 OF THE 1999 INTEGRATED RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY	))))	CASE NO. 99-449

NOTICE OF THE UNION LIGHT, HEAT AND POWER COMPANY REGARDING STATUS OF FULL REQUIREMENTS POWER CONTRACT WITH THE CINCINNATI GAS & ELECTRICITY COMPANY

In the Staff Report on The Union Light, Heat and Power Company's (ULH&P) Integrated Resource Plan filing, ULH&P was requested to file an update on the status of the renewal/extension of its full requirements wholesale power purchase contract with The Cincinnati Gas & Electricity Company.

Notice was sent to all interested parties in December, 2000 that the contract will expire in 2001. ULH&P is currently in negotiations with the interested parties regarding a new wholesale contract.

Respectfully submitted,

John J. Finnigan, Jr. (86657)
107 Brent Spence Square
Covington, Kentucky 41011
(513) 287-3601
Attorney for The Union Light,
Heat and Power Company

CERTIFICATE OF SERVICE

I hereby certify that the foregoing filing was sent by ordinary mail, postage prepaid, to the following parties of record, on this 5th day of January, 2001.

Hon. Elizabeth E. Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, Kentucky 40601

Mr. John Stapleton
Director of Energy
Natural Resources and
Environmental Protection
663 Teton Trail
Frankfort, Kentucky 40601

Iris Skidmore
Ronald P. Mills
Office of Legal Services
Fifth Floor, Capital Plaza Tower
Frankfort, Kentucky 40601

John J. Finnigan, Jr.

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John J. Finnigan, Jr.
Senior Counsel

CINERGY®

VIA FIRST CLASS U.S. MAIL

RECEIVED
JAN 08 2001
PUBLIC SERVICE COMMISSION

January 5, 2001

Jack Kaninberg
Public Service Commission of Kentucky
211 Sower Boulevard
P. O. Box 615
Frankfort, Kentucky 40602-0615

Re: In the Matter of: A Review Pursuant to 807 KAR 5:058 of the 1999 Integrated Resource Plan of The Union Light, Heat and Power Company Case No. 99-449

Enclosed is a copy of The Union Light, Heat and Power Company's Notice regarding Status of Full Requirements Power Contract with The Cincinnati Gas & Electricity Company in the above captioned case.

Very truly yours,

John J Finnigan (nlb)

John J. Finnigan
Senior Counsel

JJF/nlb

Enclosure

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058 OF THE 1999 INTEGRATED RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY	))))	CASE NO. 99-449

NOTICE OF THE UNION LIGHT, HEAT AND POWER COMPANY REGARDING STATUS OF FULL REQUIREMENTS POWER CONTRACT WITH THE CINCINNATI GAS & ELECTRICITY COMPANY

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Respectfully submitted,

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107 Brent Spence Square
Covington, Kentucky 41011
(513) 287-3601
Attorney for The Union Light,
Heat and Power Company

CERTIFICATE OF SERVICE

I hereby certify that the foregoing filing was sent by ordinary mail, postage prepaid, to the following parties of record, on this 5th day of January, 2001.

Hon. Elizabeth E. Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, Kentucky 40601

Mr. John Stapleton
Director of Energy
Natural Resources and
Environmental Protection
663 Teton Trail
Frankfort, Kentucky 40601

Iris Skidmore
Ronald P. Mills
Office of Legal Services
Fifth Floor, Capital Plaza Tower
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John J. Finnigan, Jr.

Paul E. Patton Governor

Ronald B. McCloud, Secretary
Public Protection and Regulation
Cabinet

Thomas M. Dorman
Executive Director
Public Service Commission

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Martin J. Huelsmann
Chairman

Edward J. Holmes
Vice Chairman

Gary Gillis
Commissioner

November 1, 2000

Honorable Elizabeth Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, KY 40601

Mr. John Stapleton
Director of Energy
Natural Resources and Environmental Protection
663 Teton Trail
Frankfort, KY 40601

Honorable John J. Finnegan, Jr.
Senior Counsel
Cinergy Corp.
139 East Fourth Street
Rm. 25 AT II, P.O. Box 960
Cincinnati, OH 45201-0960

Honorable Iris Skidmore
Honorable Ronald P. Mills
Office of Legal Services
Fifth Floor
Capital Plaza Tower
Frankfort, KY 40601

Re: Case No. 1999-449
The Union Light Heat & Power Company
FIRST REMINDER LETTER

Dear Ms. Blackford and Gentlemen::

Please file an update with the Commission Staff on the status of the renewal/extension of ULH&P's full requirements power contract with CG&E. The due date for the update was October 19, 2000. Please make this filing referencing the case number 1999-499, not later than 15 days from the date of this letter.

If you have questions concerning this letter, please contact Jack Kaninberg at 564-3940, extension 453. Otherwise, please mail the required filing to Thomas M. Dorman, Executive Director, Public Service Commission, 211 Sower Blvd., Post Office Box 615, Frankfort, Kentucky 40602-0615.

Sincerely,

Stephanie J. Bell

Stephanie Bell
Secretary to the Commission

SB/lc

COMMONWEALTH OF KENTUCKY
PUBLIC SERVICE COMMISSION
211 SOWER BOULEVARD
POST OFFICE BOX 615
FRANKFORT, KY. 40602
(502) 564-3940

CERTIFICATE OF SERVICE

RE: Case No. 1999-449
THE UNION LIGHT, HEAT AND POWER COMPANY

I, Stephanie Bell, Secretary of the Public Service Commission, hereby certify that the enclosed attested copy of the Commission's Order in the above case was served upon the following by U.S. Mail on July 21, 2000.

See attached parties of record.

Stephanie Bell

Secretary of the Commission

SB/lc
Enclosure

Honorable John J. Finnigan,
Senior Counsel
Cinergy Corp.
139 East Fourth Street
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Cincinnati, OH. 45201 0960

Honorable Elizabeth E. Blackford
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Honorable Iris Skidmore
Honorable Ronald P. Mills
Office of Legal Services
Fifth Floor
Capital Plaza Tower
Frankfort, KY. 40601

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAAR 5:058 OF)
THE 1999 INTEGRATED RESOURCE PLAN OF) CASE NO. 99-449
THE UNION LIGHT, HEAT AND POWER COMPANY)

ORDER

The Commission initiated this proceeding in order that its Staff might conduct a review of the 1999 integrated resource plan ("IRP") submitted by The Union Light, Heat and Power Company ("UHL&P") pursuant to 807 KAR 5:058. Intervening in this case were the Attorney General's Utility and Rate Intervention Division and the Natural Resources and Environmental Protection Cabinet, Division of Energy.

Pursuant to 807 KAR 5:058, Section 12, the Commission Staff has issued a report on its review of ULH&P's 1999 IRP. Issuance of this report concluded the Staff's review of ULH&P's 1999 IRP.

IT IS THEREFORE ORDERED that this case is closed and removed from the Commission's docket.

Done at Frankfort, Kentucky, this 21st day of July, 2000.

By the Commission

ATTEST:

Wm H. Bowker

Deputy Executive Director

Paul E. Patton, Governor

Ronald B. McCloud, Secretary
Public Protection and
Regulation Cabinet

Martin J. Huelsmann
Executive Director
Public Service Commission

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B. J. Helton
Chairman

Edward J. Holmes
Vice Chairman

Gary W. Gillis
Commissioner

July 17, 2000

Honorable Elizabeth E. Blackford
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Rate Intervention Division
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Director of Energy
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Environmental Protection
Frankfort, Kentucky 40601

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Senior Counsel
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P. O. Box 960
Cincinnati, Ohio 45201-0960

Honorable Iris Skidmore
Honorable Ronald P. Mills
Counsel for Natural Resources
and Environmental Protection
Office of Legal Services, 5th Floor
Capital Plaza Tower
Frankfort, Kentucky 40601

RE: Case No. 99-449
The Union Light, Heat & Power Company

Dear Ms. Blackford and Gentlemen:

Attached is a copy of the Commission Staff Report on the Integrated Resource Plan of The Union Light, Heat and Power Company ("ULH&P") which has been filed into the record of the above-referenced case. This report, prepared pursuant to 807 KAR 5:058, Section 12(3), summarizes the Staff's review of ULH&P's integrated resource plan filing and related information.

Sincerely,

Martin J. Huelsmann
Executive Director

Attachment

Paul E. Patton, Governor

Ronald B. McCloud, Secretary
Public Protection and
Regulation Cabinet

Martin J. Huelsmann
Executive Director
Public Service Commission

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B. J. Helton
Chairman

Edward J. Holmes
Vice Chairman

Gary W. Gillis
Commissioner

MEMORANDUM

FILED
JUL 17 2000
PUBLIC SERVICE COMMISSION

TO: Main Case File
Case No. 99-449

FROM: Case No. 99-449 Team

DATE: July 14, 2000

SUBJECT: Commission Staff Report

Attached for filing in this case is the Commission Staff Report on the Integrated Resource Plan of The Union Light, Heat and Power Company ("ULH&P"). This report, prepared pursuant to 807 KAR 5:058,Section 12(3), summarizes the Staff's review of ULH&P's integrated resource plan.

cc: Parties of Record

Kentucky Public Service Commission

Staff Report

On the

Integrated Resource Plan Report

Of The Union Light, Heat & Power Company

Case No. 99-449

July 2000

Section 1

INTRODUCTION

In 1990, the Kentucky Public Service Commission ("Commission") established an integrated resource planning (IRP) process to provide for regular review by the Commission Staff of the long-range resource plans of the six major electric utilities under its jurisdiction. The Commission's goal in establishing the IRP process was to ensure that all reasonable options for the future supply of electricity were being examined and pursued, and that ratepayers were being provided a reliable supply of electricity at the lowest possible cost.

The Union Light, Heat & Power Company ("ULH&P") submitted its 1999 IRP entitled Cinergy 1999 Integrated Resource Plan to the Commission on November 1, 1999. ULH&P is a wholly owned subsidiary of the Cincinnati Gas and Electric Company ("CG&E") which provides electric and gas service to approximately 119,000 customers in the Northern Kentucky area contiguous to the Southwestern Ohio area served by CG&E. ULH&P owns an electric transmission and distribution system in several communities in Northern Kentucky, but it does not own any electricity generating units. Cinergy is the holding company which was formed upon the merger of CG&E with Indiana's largest electric utility, PSI Energy, Inc.

The report submitted by ULH&P provided its plan to meet customers' requirements over the period 1999-2019. Because ULH&P is part of an integrated electric utility system, the IRP also described the resource planning process and resulting plan of the Cinergy system. Information specific to ULH&P is provided where available.

The purpose of this report is to review and evaluate ULH&P's IRP in accordance with the requirements of 807 KAR 5:058, Section 12(3), which requires the Commission Staff to issue a report summarizing its review of each IRP filing and offer suggestions and recommendations to be considered in subsequent filings. Staff recognizes that resource planning is an ongoing and dynamic process. Thus, this review has been designed to offer suggestions to ULH&P on how to improve its plan in the future. Specifically, the Staff's goals are to ensure that:

- All resource options are adequately and fairly evaluated;
- Critical data, assumptions and methodologies for all aspects of the plan are adequately documented and are reasonable; and
- The selected plan represents the least-cost, least risk plan for the ultimate customers served by Kentucky Power, recognizing the need to achieve a balance between the interests of ratepayers and shareholders.

The report also has an incremental component, noting any significant changes from ULH&P's most recent filing in October 1993.

The reliability constraints utilized for the Cinergy IRP are those currently approved by the Public Utilities Commission of Ohio ("PUCO"), the Indiana Utility Regulatory Commission ("IURC"), and the Kentucky Commission. These constraints entail a minimum reserve margin of 17%, an annual loss of load hours of less than 175, and an expected unserved energy of less than 0.18%.

Based on forecasted annual growth rates of 1.4% for the summer peak and 1.3% for the winter peak over the 1999-2019 forecast period, the Cinergy system will require new resource additions for most years of the forecast period. The supply side resources consist of purchases for 1999-2002, a combination of purchases and combustion turbines ("CTs") in 2003, and a number of CTs in 2004-2006. From 2009 to 2014, the plan contains 800 megawatts ("MW") of fuel cell capacity. In 2011, 378 MW of combined cycle capacity is projected, and from 2015 to 2018, one CT each year is projected to be added. However, as of the IRP's filing date, Cinergy had not yet contracted for the purchases shown in the plan for the summers of 2000-2003, and stated that decisions as to the actual types of purchases to be made will depend upon the relative prices of the alternatives available at that time. Moreover, Cinergy stated that various uncertainties related to its regulatory and competitive environments suggest that smaller purchases than those suggested in the IRP may be required. For similar reasons, the CTs projected to be needed beginning in 2003 will continue to be studied to determine whether the need is of the magnitude presently indicated, and to determine the most economical ways of serving whatever need exists.

The remainder of this report is organized as follows:

- Section 2, Load Forecasting, provides a review of Cinergy's projected load requirements and load forecasting methodology.
- Section 3, Demand-Side Management (DSM), summarizes Cinergy's evaluation of DSM opportunities.
- Section 4, Supply Side Resource Assessment, focuses on supply side resources available to meet Cinergy's requirements.
- Section 5, Integration and Plan Optimization, discusses Cinergy's assessment of supply and demand-side options into a resource plan.

Section 2

LOAD FORECASTING

INTRODUCTION

This section reviews the forecast of future electricity requirements as summarized in Cinergy's 1999 IRP filing. This forecast includes future growth in peak demand levels in MW and electric energy requirements in gigawatt hours ("GWh"). In addition, this chapter compares the results of the 1999 forecast and the results from the previous IRP filed in 1993.

A bottom-up approach is used to prepare the electric load forecast of the Cinergy operating companies' franchised service territories. The Cinergy system forecast is the sum of the individual forecasts for the territories of CG&E (which includes ULH&P) and PSI Energy, Inc.

FORECAST METHODOLOGY

The general framework of the Cinergy System Electric Energy and Peak Load Forecast involves a national economic forecast, a service area economic forecast, and the electric load forecast. The national economic forecast of the nation's prospective growth involves numerous factors including population, employment, industrial production, inflation, wage rates, and income. This forecast for both CG&E and PSI is obtained from Data Resources, Inc., a national economic consulting firm.

The service area economic forecast is developed from the national economic forecast in conjunction with local economic data and a service area economic model. Likewise, the service area economic forecast is used with the energy and peak models to produce the electric load forecast. For CG&E, the service area economic forecast is prepared using a series of econometric equations to project future levels of employment, income, industrial production, and wage rates. These equations plus an age-cohort model of population growth comprise the Service Area Economic Model ("SAEM"). The SAEM relies on national data, a national economic forecast, and historical local economic data.

There are four major sectors to the SAEM: employment, income, wages and prices, and population. With the models from each of these four sectors, local forecasts are developed for income, industrial production by Standard Industrial Classifications ("SIC"), inflation, wage rate, population, and employment by SIC. This information serves as input into the energy and peak load forecast models.

ELECTRIC ENERGY AND PEAK LOAD FORECAST

Sales forecasts are prepared for the residential, commercial, industrial, government or other public authority, street lighting, and wholesale energy sectors, as well as three other minor categories. Once these separate components have been projected, the projection of total electricity sales can be produced, as well as the forecast of total CG&E system sendout or net energy. After the system sendout forecast is completed, the peak load forecast is prepared.

CG&E's forecasts of summer and winter peak demands are developed using econometric models. Previous forecasting models using monthly peak load data over several years employed a constant relationship between loads and weather, but further research by CG&E in that area has indicated that the relationship between load and weather is not necessarily constant. Therefore, only days when the temperature equaled or exceeded 90 degrees would be considered for inclusion in a summer peak model, and only days when the temperature was at or below 10 degrees would be considered for inclusion in the winter peak model. The two peak equations are estimated separately for the respective seasonal periods, and peak load forecasts are produced based upon specific assumptions regarding the weather conditions typically expected to cause a peak.

The ULH&P sales forecast is developed by allocating percentages of the total CG&E system forecast for each customer group. The ULH&P peak load forecast is developed in a similar fashion by allocating a share from the CG&E total. Historical percentages and judgment are used to develop the sales and peak demand allocations, although the ULH&P peak is also adjusted for the growth in total energy use relative to the growth for the CG&E total.

FORECAST RESULTS

For the entire Cinergy service area, Residential use for the twenty-year forecast period is projected to increase an average of 1.2 percent per year, while Commercial use and Industrial use are projected to increase 1.0 percent and 2.1 percent, respectively. These projections omit the implementation of any new DSM programs or incremental DSM impacts, although inclusion of DSM impacts does not substantially change the forecast. The summation of these forecast changes in each sector results in a growth rate forecast of 1.4 percent for Net Energy for Load.

For ULH&P, the projected growth rate in net energy is higher than that of Cinergy, averaging a 1.8 percent increase over the period 1999-2019. This includes projected annual Residential MWh growth of 1.5 percent, Commercial MWh growth of 1.5 percent, and Industrial MWh growth of 2.6 percent.

For peak loads, the forecasted growth in summer peak demand for the Cinergy system is 1.4 percent, while the forecasted growth for winter peak demand is 1.3 percent. For ULH&P, the summer peak is projected to grow at an annual rate of 1.7 percent to 2019, while the winter peak is projected to grow at an annual rate of 1.5 percent to 2019.

DISCUSSION OF REASONABLENESS

As was done in its 1993 IRP, the Company in its 1999 IRP has provided a thorough, well-documented discussion of the load forecasting process. In the Commission Staff's 1995 Staff Report, the following recommendations were made relative to the Company's forecasting process:

- Additional discussion and support of key forecasting assumptions is required, in particular projections of appliance efficiencies and saturation levels.
- ULH&P should discuss the sectoral results of the 1993 load forecasting process vis-à-vis the historical, weather normalized sales experience over the 1987 to 1992 period.
- ULH&P should discuss the changes in key forecast results (e.g., electric space heat saturation levels) from the prior IRP filing vis-à-vis changes in key drivers (e.g., relative fuel prices and fuel price growth rates).
- ULH&P should discuss the use of the electricity demand uncertainty analysis in its resource planning process.
- ULH&P should report on the status of end-use research and modeling efforts including the schedule for implementation.

In its 1999 IRP, ULH&P responded to these and all of the other recommendations from the 1995 Staff Report by noting that "the passage of time along with the progress made both within the Collaborative, and as detailed in the courtesy copies forwarded to the Commission, render the majority of the specific comments and recommendations outlined in the May 1995 Staff Report moot or no longer pertinent." Under the circumstances, including the passage of time which has witnessed the creation of Cinergy and the enactment of a Kentucky DSM statute, and the introduction of customer choice in Ohio, ULH&P's lack of specific responses to the 1995 recommendations is acceptable.

Relative to the 1999 IRP, Staff recommends the following:

- ULH&P should prepare an analysis comparing actual demand and energy levels with its forecasted levels for the years included in this forecast, for which actual results will be available at the time of its next IRP.
- ULH&P should identify and discuss any changes in its load forecasting process resulting from the introduction of customer choice in Ohio for CG&E.

Section 3

DEMAND-SIDE MANAGEMENT

INTRODUCTION

This section summarizes the DSM assessment included in the Company's 1999 IRP. ULH&P's DSM activities are predominantly determined by a DSM Collaborative which includes representation from the Office of the Kentucky Attorney General ("AG"), the Kentucky Division of Energy ("KDOE"), and other interested parties. Because the AG and the KDOE have intervened in this case and have filed comments with regards to ULH&P's DSM activities, their DSM-related comments will be addressed in this section of the report.

DEMAND-SIDE MANAGEMENT ACTIVITIES AND EVALUATION

According to ULH&P, it has begun to take steps to address industry competition by shifting its DSM activities from ratepayer-subsidized DSM programs to market-based, customer-driven energy-efficiency related products and services. The IRP states that the DSM Collaborative has focused on innovative, low-cost approaches to influence the market, such as educational programs and collaborations with groups such as homebuilders' associations.

ULH&P, the AG, and the Northern Kentucky Community Action Commission, with the consensus of the Kentucky Collaborative, filed a request with the PSC in October 1998 for the continued funding of the following programs in Case No. 95-312:

- Residential Conservation and Energy Education – This program focuses on customers that meet the income qualification levels for LIHEAP funding to help those customers reduce their energy consumption and energy costs. It provides direct installation of weatherization and energy-efficiency measures and educates income-qualified customers about opportunities to reduce energy consumption and energy costs.

- Residential Energy Conservation Rates – This program provides LIHEAP-eligible customers with greater incentives to conserve energy by rewarding reduced usage with a modified energy charge, but no customer charge.

- Residential Home Energy House Call – This program includes a home energy survey, a comprehensive energy audit and review, bill disaggregation, and measurement of cost-saving installation opportunities.

- Residential Comprehensive Energy Education Program – This program has provided unbiased educational information on all energy sources, with an emphasis on the efficient use of energy. It targets school-age children and their teachers in an attempt to foster the adoption of a lifelong conservation philosophy.

- Residential New Construction/Renovation Program – This program is a low-cost approach to build awareness of energy efficiency potential in new construction, and to encourage investment in energy efficiency in the new home and renovation market in Northern Kentucky. Its two major elements are an energy-efficient home contest and informational activities for area builders and trade allies.

On November 23, 1998, the PSC approved the proposed DSM Riders, which were implemented in the first billing cycle of January 1999.

On December 2, 1999, ULH&P on behalf of the Collaborative filed a Joint Application for Commission approval of DSM programs and riders. That application proposed to continue four of the five above-mentioned programs through the year 2001, but not the Residential Energy Conservation Rates Program. ULH&P also proposed to implement a DSM research and development program called Program Development Funds, and to discontinue the residential decoupling mechanism that had been approved for the initial three-year DSM pilot program. On June 29, 2000, the Commission issued an Order approving the continuation of the proposed DSM programs through 2001. However, the Commission in its Order expressed concerns about improving the cost-effectiveness and cost-effectiveness measurement of ULH&P's DSM programs, and Ordered that ULH&P shall discontinue or modify any DSM program that is not cost-effective or does not produce other benefits to ULH&P and its ratepayers.

PROGRAM SCREENING APPROACH

The Cinergy System uses DSManager, a proprietary software package developed by Electric Power Research Institute ("EPRI"), for screening demand-side management programs. DSManager takes the net present values of streams of financial costs associated with DSM and balances these costs against the net present values of annual static "avoided cost" electric system benefits, which are calculated from changes in the end-use load shapes for the demand-side program technology. The resulting benefit/cost ratios, or tests, provide a summary of the program impacts.

DSManager uses a static marginal analysis approach that is based on the current load forecast, capacity over time, available fuel costs, and other currently available utility specific information that are input into the model. The model then uses this information to calculate the projected benefits and costs of a particular DSM program. DSM options that were considered for inclusion in the IRP and that passed the screening process then become candidates for selection as future cost-effective resource options in the integration process.

INTERVENOR COMMENTS

The KDOE provided extensive comments relative to ULH&P's DSM efforts. While acknowledging the Company's initial efforts to reduce market barriers to conservation and its increasing use of innovative tariffs to send proper pricing signals, the KDOE recommended that the energy and demand impacts of ULH&P's DSM activities should be quantitatively estimated and included in the IRP. (The AG made a similar suggestion in stating that the Company needs to remove built-in biases against DSM and renewable resources; ULH&P responded that its DSM offerings are educational and/or informational in nature, and are not included as resources in the IRP because their impacts are very difficult to quantify.) The KDOE also made the following specific DSM-related recommendations to ULH&P:

- Use Local Integrated Resource Planning.
- Initiate a Comprehensive Market Transformation Program in the New Commercial Construction Sector.
- Promote Cogeneration and Other Distributed Generation.
- Support Statewide and Regional Market Transformation Initiatives.
- Launch a Kentucky Design Initiative.

The KDOE concluded its comments by suggesting that ULH&P focus on total resource cost analysis to identify new energy service offerings, shared savings arrangements, or market transformation initiatives with large savings potential.

In response to the KDOE's comments, ULH&P stated that much of the KDOE's discussion and recommendations are outside the scope of the IRP, and that many of their suggestions might be more effectively addressed in a policy debate during development of restructuring legislation or in development of regulations and programs to address state policy goals and objectives. ULH&P also noted that many of the KDOE's specific recommendations might not result in programs whose impacts could be forecast with sufficient certainty to consider them as resources in the IRP.

Relative to the KDOE's recommendation that the inclusion of quantitative impacts of ULH&P's DSM activities is appropriate, the Company responded that the IRP does in fact include 103 MW of such customer tariffs as "Energy Options." ULH&P further noted that its tariff options are relatively new and that they could not be forecast with enough certainty to treat them as a resource in the 1999 IRP, but that the adoption of energy efficiency will be recognized in demand forecasts over time.

ULH&P also noted that its IRP reflects rather than dictates the DSM implemented because of the collaborative process established in Kentucky. Relative to KDOE recommendations for other energy efficiency programs, such as joining forces with an architectural and engineering firm to sell house designs, ULH&P noted that this would not be a regulated business and suggested that such nonregulated line-of-business recommendations are inappropriate.

Finally, with regards to KDOE's advocacy of Local Integrated Resource Planning ("LIRP"), ULH&P responded that it would entertain the idea of utilizing load reduction to reduce transmission and distribution expansion costs, but that it should not be a required planning method. ULH&P maintained that LIRP success stories generally involve a single area readily identified where a load change will defer a major project and result in significant savings, but that its Northern Kentucky network is highly integrated such that local areas are not readily identified. ULH&P also pointed out that events beyond the Company's borders will impact its transmission and distribution investment, and that therefore LIRP should not be used as an end to itself.

DISCUSSION OF REASONABLENESS

In its report on ULH&P's 1993 IRP, Staff made the following recommendations relative to DSM:

- ULH&P should document how options are evaluated in the initial stages of the DSM analysis, including criteria used to eliminate options from further consideration.
- At each stage of DSM screening, ULH&P should specifically outline what criteria were used to eliminate or pass each DSM measure to the next stage of the screening process.
- ULH&P should include the preliminary findings of its DSM program evaluations in its next filing.
- ULH&P should discuss the potential value and use of target-area planning approach in its service territory.
- ULH&P should document the progress of implementing cost-effective DSM programs in Kentucky and indicate plans for cost-recovery of those programs.

As noted in the second section of this report, Staff accepts the Company's position that the passage of time has rendered these recommendations moot.

Relative to ULH&P's next IRP filing, Staff has the following recommendations:

- The Commission's concerns as expressed in its most recent Order approving the continuation of ULH&P's DSM programs should be reflected in that filing.
- ULH&P should provide greater discussion in its next filing regarding its consideration of LIRP-related concepts in its service territory.

Section 4

SUPPLY-SIDE RESOURCE ASSESSMENT

INTRODUCTION

This section summarizes and reviews the Company's evaluation of supply-side resources, including discussion of its acid rain compliance planning. ULH&P purchases all of its energy requirements from CG&E, and thus no specific supply-side resources are attributable to ULH&P. Therefore, the IRP submitted by ULH&P reflects the requirements of the integrated, system-wide planning of the Cinergy system.

EXISTING CAPACITY AND RESOURCE MIX

According to Cinergy, its "supply-side resources" encompass a wide variety of options. These options include existing generating units on its system; repowering or refurbishing options for these units; existing or potential purchases from other utilities, Independent Power Producers ("IPPs"), and cogenerators; and new utility-built generating units. Cinergy's evaluation of these options considers technical feasibility, fuel availability and price, length of the contract or life of the resource, construction or implementation lead time, capital cost, O&M cost, reliability, and environmental effects.

CG&E has a total installed net summer generation capability of 5,082 MW, which includes 4,184 MW of coal-fired steam capacity and 898 MW of CT peaking capacity. The coal-fired capacity is composed of eighteen units located at seven stations. Eight of the CTs are oil-fired and ten are natural gas-fired, including the six newest units at the Woodsdale Generating Station (83 MW each), which are natural gas-fired with propane as a backup fuel. Seven of the coal-fired units are jointly owned with Columbus Southern Power Company and the Dayton Power and Light Company ("DP&L"). Four of the coal-fired units are jointly owned with DP&L.

PSI has a total installed net summer generation capability of 5,882 MW excluding the ownership interests of Indiana Municipal Power Agency (156 MW) and Wabash Valley Power Association (156 MW) in Gibson Generating Station Unit No. 5. This capacity consists of 5,535 MW of coal-fired, syngas-fired, or oil-fired steam capacity; 302 MW of peaking capacity, and 45 MW of hydroelectric capacity.

Relative to purchased power agreements, CG&E had an 8-year agreement starting in 1987 with East Kentucky Power Cooperative ("EKPC") for 150 MW of seasonal capacity exchange, also referred to as diversity power. Under this agreement, CG&E supplied EKPC with 150 MW of power in the months of December, January, and February and EKPC supplied CG&E with a like amount in the months of June, july, and August. This agreement worked well for both parties and was extended to March 31, 1997. Subsequently, a separate 3-year agreement for 50 MW of diversity power covering April 1, 1997 through March 31, 2000 was signed. Then, in March 1997, a separate 2-year diversity power agreement covering April 1, 1997 through March 31, 1999 was signed.

Cinergy Power Marketing & Trading has numerous contracts to buy and sell power, but these transactions do not obligate Cinergy to either build generation or take the power to supply jurisdictional customers. Therefore, the capacity associated with these contracts has not been included in the expansion plan modeling.

SUPPLY-SIDE SCREENING METHODOLOGY

A list of over one hundred supply-side resources was developed as potential alternatives for the IRP process, followed by a screening process to determine which of these resources were the most viable and cost-effective. The first step in the screening process was a technical screening of the technologies to eliminate those that are not feasible in the Cinergy service areas. Nuclear and geothermal resources were eliminated, the former because of current regulatory/political/environmental concerns, and the latter because there are no suitable geothermal sources in this area. Further technical screening involved determining which technologies to consider within each of two time periods: 1999-2008 and 2009-2019. Only technologies whose Technical Development Rating was either Mature or Commercial were considered available for service between 1999 and 2008.

The next step in the screening process was to economically screen the specific technologies within each general technology class against each other to determine the "Best in Class." The ten general technology classes were:

- Pulverized Coal
- Fluidized Bed
- Integrated Coal Gasification Combined Cycle
- Combined Cycle
- Simple Cycle Combustion Turbines
- Fuel Cells
- Wind
- Solar
- Other Renewables
- Storage

The specific technologies within each class were adjusted to reflect representative capital, labor, and fuel costs for Cinergy's service territory. These adjusted technologies were then screened using relative dollar per kilowatt-year versus capacity factor screening curves. The initial screening within each general class used software to reduce the number of technologies to a manageable number. The final screening of specific survivors within a class, and across the general classes, used a spreadsheet-based screening curve model developed by Cinergy that is more thorough in its treatment of sulfur dioxide allowance costs and can compare more technologies on the same graph.

Both screening curve analysis models calculate the fixed costs associated with owning and maintaining a technology type over its lifetime and compute a levelized fixed $/kW-year value, which represents the cost of operating the technology at a zero capacity factor or not at all. Then the variable costs, such as fuel, variable O&M, and emissions costs associated with operating the technology at 100% capacity factor over its lifetime are calculated and the present worth is computed back to the start year. This levelized ratio is added to the levelized fixed $/kW-year value to arrive at a total owning and operating value at 100% utilization in $/kW-year. A straight line drawn to connect the two points represents the technology's screening curve. This process is repeated for each supply technology to be screened resulting in a family of curves, the lower envelope of which represents the least costly supply options for various capacity factors or unit utilizations. Lines that become part of the envelope only at very high capacity factors of 95%+, or not at all, probably will not be part of the least-cost solution and can therefore be eliminated from the analysis.

The "Best-in-Class technologies that survived the above screening process within each technological category were then screened against each other, or across all classes, to develop the final supply-side alternatives to be carried into the integration model. The resultant final screening curve for 1999-2008 showed that two sets of CTs and Combined Cycle units made up the lower envelope of the final curve. The curve for the 2009-2019 period showed that the CT, the Combined Cycle, and Solid Oxide Fuel Cells made up the lower envelope of the final curve over their respective capacity factor ranges.

As a result of the screening process, the following supply technologies were selected to be utilized as candidate supply-side resources in computer runs:

- 171.7 MW Frame 7F CT units with inlet cooling for the 1999-2003 time period.
- 230 MW generic new site CT units with inlet cooling for the 2004-2019 time period.
- 262.6 MW Frame 7F Combined Cycle units with inlet cooling for the 1999-2019 time period.
- 400 MW generic Combined Cycle units with inlet cooling for the 2004-2019 time period.
- 25 MW Fuel Cells for the 2009-2019 time period.

The summer ratings for these units are 164.8 MW, 214.2 MW, 256 MW, 378.3 MW, and 25 MW, respectively.

COMPLIANCE PLANNING

According to Cinergy's IRP, the purpose of its compliance planning process is to develop an integrated resource/compliance plan, or strategy, that meets the future resource needs of Cinergy while at the same time meeting the requirements of the Clean Air Act in a reliable and economic manner. Title IV of the Clean Air Act

Amendments of 1990 added provisions to achieve increased reductions in sulfur dioxide and nitrogen oxide emissions in two phases. Phase I began January 1, 1995 and continued through December 31, 1999. Phase II began January 1, 2000 and continues indefinitely, and therefore the 1999 IRP focused primarily on Phase II compliance. However, the Company noted that coal and emission allowance prices projected for the balance of Phase I (at the time of the IRP's preparation) supported continuation of the strategies previously developed and approved by the Cinergy Operating Companies in the early and mid-1990s.

The Phase II sulfur dioxide planning involved three phases: a technical feasibility screening of compliance options, an economic screening of compliance options, and integration of the options passing through the screenings into the resource plan. According to the Company, it considered a wide range of alternatives including the use of higher sulfur coals and scrubber technologies as well as fuel switching to lower sulfur coal. The compliance alternatives surviving the screening process included Powder River Basin (i.e. extremely low-sulfur) Coal, Midwestern Medium Sulfur Coal, and Northern Appalachian Medium Sulfur Coal ("NAMSC") at several PSI units. At the CG&E units, fuel switches to NAMSC and Central Appalachian Low Sulfur Coals ("CALSC") were included in the integration process. However, the IRP noted that additional test burns were still needed to verify the cost and performance characteristics of units burning low-sulfur coal. In addition, issues regarding the joint ownership of several Cinergy units needed to be considered, and therefore the IRP noted that the results of this analysis should be considered preliminary.

Relative to nitrous oxide emissions, the IRP noted some uncertainty regarding the necessary level of reductions and timing for compliance. Specifically, the U.S. Court of Appeals in May of 1999 stayed indefinitely the implementation of the Environmental Protection Agency's ("EPA") State Implementation Plan ("SIP") Call pending the Court's resolution of the various other NOx emission and ozone-related regulatory and litigation activities. However, the Company noted that it is still prudent to be prepared to cost-effectively meet EPA's emission reduction goals, given that the EPA's previous compliance date would have been extremely difficult to meet while still retaining system reliability. According to Cinergy, it considered a large number of potential NOx reduction projects, including various Combustion Controls and post-Combustion Controls. The compliance plan that was developed assumes that allowance trading will be permitted across the entire Cinergy system, that trading will comprise a relatively small amount of overall compliance due to the stringency of EPA's NOx SIP Call and the lack of a fluid market, and that compliance will be accomplished on-system. However, the plan is structured to utilize trading should allowance prices fall below the highest marginal cost reduction projects.

Because much of Cinergy's compliance plan was considered to be confidential, it is described herein in general terms only.

DISCUSSION OF REASONABLENESS

In its report on ULH&P's 1993 IRP, Staff made the following recommendations relative to ULH&P's supply-side resource assessment process:

- ULH&P should identify significant changes in the underlying assumptions for supply-side resources in future filings and describe the basis for these changes.
- ULH&P should discuss the plans for generating units which are near the end of their planned operating lives including the current condition of the units and required maintenance for an extended operating life.
- ULH&P should discuss the uncertainty surrounding key supply-side assumptions.

As noted in the second section of this report, Staff accepts ULH&P's position that the passage of time has rendered these recommendations moot.

With regards to acid rain compliance planning, Staff made the following recommendations as a result of ULH&P's 1993 IRP:

- ULH&P should update the status of CG&E's Phase II Acid Rain Compliance Plan in the next IRP filing, and indicate the status of the merged systems' planning and its impact on compliance decisions. Detailed studies, such as those provided in 1993, should be provided as available.
- Future Phase II analyses should address the potential for additional compliance options as discussed above, including options which differ from Phase I compliance decisions.
- The next IRP filing should address Staff's concerns regarding the probabilities used in the sensitivity analysis.

As noted in the second section of this report, Staff accepts ULH&P's position that the passage of time has rendered these recommendations moot.

Relative to ULH&P/CG&E's supply-side resources and environmental compliance planning, Staff makes the following recommendations:

- In conjunction with CG&E's next IRP update to the Ohio PUC, provide an update of ULH&P's 1999 IRP to the Kentucky Commission Staff.
- In ULH&P's next IRP, provide the Company's current plan for meeting the May 2003 requirements contained in EPA's NOx SIP Call.

Section 5

INTEGRATION AND PLAN OPTIMIZATION

INTRODUCTION

Once the individual screening processes for demand-side, supply-side, and emission compliance options reduced the universe of options to a manageable number, the final step was to integrate the options. This section will describe that process and the resulting Integrated Resource Plan for Cinergy.

RESOURCE INTEGRATION PROCESS

The computer model used by Cinergy to perform the final integration process was PROSCREEN II, which has been used by CG&E and PSI for several years. In addition, the PROMOD IV MODEL was used to calculate generating unit capacity factors used in the preliminary screening of environmental compliance options.

As configured at Cinergy, the PROSCREEN II model consists of three modules: the Load Forecast Adjustment ("LFA"), Generation and Fuels ("GAF"), and PROVIEW. The LFA module is a tool for storing and processing load forecasts and incorporating the impacts of DSM programs. These load forecasts, in conjunction with existing unit data such as availability, heat rate, fuel prices, and emission rates, are then used by the GAF module to simulate electric production system operation. The GAF module then provides essential inputs to the PROVIEW automatic expansion planning module. PROVIEW then uses a dynamic programming optimization procedure coupled with end effects analysis to select expansion plans based on Present Value Total Cost ("PVTC"). The module calculates the cost and reliability effects of modifying the load with DSM or supply-side resources, and its modeling of emission-related constraints enables users to integrate environmental compliance strategies as well.

In each year, combinations of alternatives which meet pre-defined reliability and expansion criteria are evaluated and saved as states containing potential alternatives for the year. Cinergy's criteria for resource planning are a minimum reserve margin of 17%, a maximum loss of load hours of 175, and a maximum unserved energy of 0.18%. By comparing the PVTC of the various plans generated by the model, Cinergy was able to evaluate the relative economics of different resource combinations.

Another model used by Cinergy is the Energy Market Forecasting ("EMF") model, a proprietary model developed for Cinergy whose primary purpose is to forecast regional electric energy prices in a liquid, efficient electricity market. Presently, the EMF model projects prices on a monthly basis for the East Central Area Reliability Coordination Agreement ("ECAR") and the Mid-America Interconnected Network ("MAIN") regions of the United States.

Once the DSM, supply-side, and compliance screening processes were completed, two DSM and several supply-side options were modeled in PROVIEW. The integration analysis was performed over the period 1999-2008 with infinite end-effects, which enabled the immediate focus to be placed on the first five years while also ensuring that longer-term economics were considered as well. After the plan was selected, the first ten years were fixed and PROVIEW was re-run for the 2009-2019 period.

Because the most important period of the plan is the first five years (i.e. 1999-2003), when some near-term decisions will need to be made, five years was chosen as the cut-off for determining which of the numerous plans produced by PROVIEW were significantly different. During these years, the main differences concerned the selection of different types of purchases, DSM, CTs, and Combined Cycles ("CCs"). The four plans of interest were known as the Least Cost Plan, the 2002 CT Plan, the No DSM Plan, and the 1st CC Plan.

RESOURCE PLAN RESULTS

The Least Cost Plan had the lowest PVTC at $24,307,116. It contains the DSM bundle and supply-side resources consisting of summer purchases for 2000-2003 and CTs in 2003-2005. No new resources were required for 2006-2009. The 2002 CT Plan is identical to the Least Cost Plan through 2001 and from 2004-2008, and it contains the DSM bundle. It differs from the Least Cost Plan because in 2002, two CTs are added, and its PVTC was $24,308,622. The first plan without DSM was identical to the Least Cost Plan because the amount of DSM is relatively small, and its PVTC was $24,316,464. The 1st CC Plan is identical to the Least Cost Plan through 2001, and it contains the DSM bundle. It adds one CC unit in 2002 and two such units in 2003, which reduce the size of the purchases required in those years. It adds 10 CTs in 2004 and two more in 2005. Its PVTC was $24,358,836. For all of these plans, the dominant reliability constraint was the minimum reserve margin, meaning that the resource additions contained in the plans were necessitated by the reserve margin dropping below the minimum.

A number of possible business threats were identified that could have large impacts on the stakeholders over the modeling period. These threats were changes in technology; changes in relative fuel prices; increased environmental regulation or rules; and lower levels of service area load. The methodology regarding the sensitivity analysis in Cinergy's IRP performed more sensitivity analysis at the screening stage and less at the integration stage, although the "lower level of service area load" was addressed as a sensitivity at the integration stage. This is of particular interest because of the passage of customer choice legislation in Ohio, although that legislation had not been enacted into law at the time the IRP analysis was begun.

Based upon both the quantitative and qualitative results of the screening analyses, sensitivity analyses, and environmental considerations, the Least Cost Plan under Base Case conditions was selected to be the 1999 IRP. In both the Base Case and the sensitivity, a plan showing purchases through 2001 had the lowest PVTC. Under Base Case conditions, the plan with purchases in 2002 and CTs in 2003 was slightly less costly than the plan with CTs in 2002, while in the Lower Load Sensitivity, the plan with CTs in 2002 was slightly less costly than the plan with CTs in 2003. Based on these results, Cinergy stated that it will continue to investigate the economics of purchases versus CTs as updated information is available with regard to purchase prices and CT prices.

This plan contains the DSM bundle, while the supply-side resources consist of purchases for 2000-2002, a combination of purchases and CTs in 2003, and a number of CTs in 2004-2006. From 2009-2014, the plan contains 800 MW of Fuel Cell capacity. In 2011, 378 MW of CC capacity is added, and from 2015-2018, one CT is added each year. Cinergy stated that the decision as to the actual types of purchases to be made will depend upon the relative prices of the alternatives available at that time.

Cinergy's current estimates of the supply-side resource allocations between CG&E and PSI call for CG&E to be allocated approximately 52% of the supply-side resource additions in 1999 and 2000. In 2002, CG&E's percentage allocation decreases to 49.1%, with varying percentage allocations thereafter. These estimates are based on the methodology outlined in the Operating Agreement among CG&E, PSI, and Cinergy Services, but the IRP noted that the actual allocation will depend upon the relative needs of the two operating companies at the time the decision is made to acquire new resources.

ATTORNEY GENERAL'S COMMENTS

The AG provided extensive comments relative to the results of ULH&P's IRP process. The AG expressed particular concern with regards to ULH&P's full requirements contract with CG&E, which is due to expire at the end of 2001. Calling it "the biggest issue facing ULH&P in the near future," the AG raised several questions regarding the deregulated status of the generation which is currently used by CG&E to provide power to ULH&P. At an informal conference held during this proceeding, the Company explained that CG&E and ULH&P were in the process of renewing the all-needs supply contract with the expectation that the contract would last until the end of 2005, in order to coincide with certain provisions in Ohio's recently-enacted restructuring legislation. The Company further explained that power would be supplied to ULH&P during the extension period by a purchase power agreement executed between CG&E and the unregulated EWG which will own the generating assets transferred to it by CG&E, and that rates in effect would not change as a result of the power-purchase from the EWG prior to the end of 2005. According to the AG, if the situation as described above is true, then the AG's concerns in this regard are allayed, but the AG suggested that this area merits close attention.

The AG also criticized as "imprudent" the Company's plans in its 1999 IRP for the addition of new resource additions over the next four years. According to the AG, the Company's IRP primarily calls for purchasing capacity over the next four years in what may be "a limited and expensive wholesale market," followed by the addition of 330 MW of combustion turbines ("CTs") in 2003 and 2,354 MW of CTs in 2004. The AG questioned the future availability of CTs given utilities' recent difficulties in finding them. The AG did take some comfort from the Company's remarks at the informal conference which suggested that the addition of some capacity will be moved forward from the dates suggested in the IRP, but the AG also urged the Company and the Commission to follow these developments closely.

Two potential solutions offered by the AG were the possible availability of power from Cinergy's 9% ownership of Ohio Valley Electric Corporation ("OVEC") capacity, and the possibility of 100 MW of run-of-river hydroelectric power. Relative to the former, recent news reports have indicated that the U.S. Enrichment Corporation's Portsmouth Gaseous Diffusion Plant in southern Ohio will be closed because of financial difficulties, and the OVEC capacity could therefore become available to participating utilities. Prior to the officially-announced closing of the Portsmouth plant, the AG had recommended that the Company begin to explore the availability of this power, and the Company had responded favorably to this possibility. Therefore, in view of the announced plant closing, the Company in its next IRP should discuss in significant detail its efforts to obtain the OVEC capacity to meet the needs of its Kentucky ratepayers.

The AG also criticized as inadequate the Company's planning related to environmental considerations, including Global Climate Change and NOx emissions. The AG believed that voluntary emissions reductions associated with the Clinton Administration's Global Climate Change Initiative and the Kyoto Protocol should have been factored into the IRP for planning purposes. According to the AG, including a cost for future carbon dioxide emissions would give renewable resources, which have no emissions, proper weighting in the IRP. In addition, the AG criticized the Company's screening model for "an inherent and unintended bias against renewable resources," such as hydropower, wind power, and DSM.

ULH&P responded to the AG's suggestion that its reliance upon 2,354 MW of CT capacity in 2004 was imprudent by pointing out that the capacity represented by the 11 CTs represents a placeholder and that it might just as easily be added by power purchases, cogeneration, repowering or some other economical means of obtaining the power. In response to criticism of its environmental planning, the Company stated that the IRP describes a plan based on NOx compliance with a .15 lb/MMBtu standard beginning in 2003, but also stated that there are no pending regulations nor clear indication of the magnitude, timing, or implementation dates for CO2 emissions reductions or fees. Furthermore, the Company argued that any financial impacts related to the Kyoto Protocol cannot be presently determined with any degree of certainty, and that using CO2 costs in sensitivity screening addresses this concern for possible future impacts.

Relative to the AG's criticism that the Company's screening process is biased against renewable resources, ULH&P conceded that its screening curves ignore the fact that the energy produced by various resources will produce different revenues depending upon the time of day/season in which the energy is produced. However, the Company noted that the AG's proposal would result in skewing the screening curves in favor of renewables, when in fact it would be appropriate for all resources to be credited with the value of the energy produced, using market prices as a proxy. ULH&P promised to consider the feasibility of implementing this concept in the context of future resource screening in future IRPs.

DISCUSSION OF REASONABLENESS

In the Commission staff's 1995 Staff Report, the following recommendations were made relative to ULH&P's integration process:

- ULH&P should discuss the criteria used in the selection process, their relative weights, and how they are considered in developing the composite ranking.
- ULH&P should discuss the importance of other criteria in its resource selection process, including cost and rates over time, flexibility and the level and timing of financing requirements.
- ULH&P should more explicitly demonstrate that combined cycle plants are not a cost-effective resource option, recognizing key uncertainties, including fuel price and environmental considerations.
- In future filings ULH&P should clarify its intent with respect to future acquisition of new capacity. Specifically, it should clarify its planned activities for future competitive solicitations and its own participation in those schemes.
- ULH&P should expand its uncertainty analysis to consider a large number of alternative plans or resource acquisition strategies and more sophisticated decision analysis techniques.

As mentioned in previous sections of this report, Staff accepts the Company's position that the passage of time has rendered these recommendations moot.

Relative to the 1999 IRP and the integration process, Staff makes the following recommendations:

- In its next IRP filing, ULH&P should discuss in significant detail its efforts to obtain OVEC capacity related to the planned closing of the Portsmouth Gaseous Diffusion Plant.
- ULH&P should report on the feasibility of implementing the concept of crediting all resources with the value of the energy used, using market prices as a proxy, in the context of resource screening.
- Within 90 days from the date of this report, ULH&P shall provide Commission Staff an update on the status of the renewal/extension of ULH&P's full requirements power contract with CG&E.

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PUBLIC SERVICE COMMISSION

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058)
OF THE 1999 INTEGRATED RESOURCE) CASE NO. 99-449
PLAN OF THE UNION LIGHT, HEAT AND)
POWER COMPANY)

REPLY COMMENTS OF THE
UNION LIGHT, HEAT AND POWER COMPANY
TO COMMENTS OF THE ATTORNEY GENERAL
AND KENTUCKY DIVISION OF ENERGY'S COMMENTS
RELATED TO THE 1999 RESOURCE PLAN ON THE
UNION LIGHT, HEAT AND POWER COMPANY

The Union Light, Heat and Power Company (ULH&P or Company, which may also be used to ULH&P and/or its parent and affiliates) will reply first to the comments filed by the Attorney General's Office, then to the comments filed by the Kentucky Division of Energy (KDOE).

The Attorney General initially questions at page 2 whether ULH&P should renew its wholesale power purchase agreement with The Cincinnati Gas & Electric Company (CG&E), its parent company, because CG&E will own no generating assets as a consequence of the Ohio deregulation laws. In response, ULH&P first notes that the issue of whether and under what terms ULH&P should renew its power purchase agreement with CG&E when the agreement expires in 2001 is not before the Commission in this proceeding. The contract is subject to the approval of the Federal Energy Regulatory Commission and, if CG&E or an affiliated EWG and ULH&P seek to renew the contract when it expires in 2001, any interested party can challenge the terms and conditions of the contract at that time. Similarly, a change in ULH&P's retail rates, due to this contract or other factors, would be subject to review and approval by the Public Service Commission and interested parties could challenge the request at that time. ULH&P's electricity supply is not affected because CG&E will have a full requirements contract to obtain power from its Exempt Wholesale Generator. Even if ULH&P were to purchase the power from a third party, as the Attorney General advocates, the third party might be a marketing company that does not own generation. In that instance, ULH&P would seemingly be less protected than it would by purchasing the power from CG&E.

At the top of page 4, the Attorney General suggests that Cinergy Corp., CG&E's parent, will not be able to purchase necessary combustion turbines until 2004. At the bottom of page 4, the Attorney General comments that the Company imprudently believes that 2,354 MW of combustion turbine capacity will be available in 2004. ULH&P takes exception to the Attorney General's comment that ULH&P was imprudent in this regard. To the contrary, ULH&P's IRP filing at page 8-51 *clearly states* that the information on combustion turbine units merely represents a placeholder and that the capacity represented by the 11 combustion turbine units might just as easily be added by power purchases, cogeneration, repowering or some other economical means of obtaining the power.

The Attorney General notes on page 4, first full paragraph, that the Company is more likely to gain customers rather than lose customers in Ohio. In fact, the Ohio customer choice legislation as well as the developments in the Company's business over the past year will prevent this from happening. The Ohio customer choice legislation *requires* Ohio electric utility companies to obtain at least 20% customer switching, by class, by December 31, 2003. In addition, the Company sold the assets of its non-regulated retail marketing firm during the past year. Quite clearly, it will be impossible for CG&E to obtain retail customers without any retail marketing affiliate to attract the customers.

The Attorney General suggests at page 5 that the Company should obtain as much power as possible through its 9% ownership of Ohio Valley Electric Corporation (OVEC). ULH&P agrees with this comment. The Company has consistently purchased its full allotment of surplus power available from OVEC during the past few summers. The Company agrees with the Attorney General that power purchased from OVEC has proven to be an economical means of satisfying a portion of ULH&P's power needs.

The Attorney General comments on page 6 that the Company should pursue adding 100 MW of run-of-river hydro power. Of course, the Company intends to pursue adding power in an economical manner and would add hydro power capacity if economical.

On page 7, the Attorney General incorrectly notes that the Company did an inadequate job of evaluating the impact of NO_x emissions regulations. In fact, the IRP describes a plan based on NO_x compliance with the .15 lb/MMBtu standard beginning in 2003. With regard to CO2 emissions, there are no pending regulations nor clear indication of the magnitude, timing or implementation dates for CO2 emissions reductions or "fees."

The Kyoto Protocol sets targets for reductions but it is currently under debate and it is unclear whether it will be adopted. Furthermore, the mechanisms for implementation are far from being determined. Any financial impacts therefore cannot be presently determined with any degree of certainty. Using CO2 costs in sensitivity screening (based on the study from the U. S. Energy Information Administration) addresses this concern for possible future impacts. The IRP therefore gives reasonable and balanced consideration for the potential impact of future environmental regulations. Rather than chiding the Company for not giving adequate weight to potential environmental restrictions that are ill-defined and not currently in place, the Attorney General should be more concerned if the Company would have made resource decisions based on such ill-defined considerations. In sum, the Company prudently examined scenarios that reflect potential regulation and developed a flexible plan for meeting the forecast demand based on the best information available.

At the last paragraph of page 10, the Attorney General claims that the Company's screening curve process is flawed. This assertion is incorrect. The screening curve program utilized by the Company graphs all units from 0% to 100% capacity factor, regardless of whether the unit is capable of achieving capacity factors over the entire range. However, the Company only considered the relevant capacity factor range for each individual unit type when comparing the units on the screening curves.

The Attorney General suggests at page 11 that the Company gave inadequate consideration to renewable power sources. In the current wholesale market environment, however, the Company's resources are dispatched to the market price, not to the load level on the Company's system. The economics of dispatching generation is not a "zero sum" game where a fossil fired unit must be backed down if hydro capacity is added to the system. Instead, all units will be dispatched so that their incremental costs are equal to or less than the market price. For example, when market prices are high, the Company typically will dispatch its higher cost combustion turbine capacity and sell the surplus above what is needed for native load into the market. Similarly, when the market price is below the cost of running some of the Company's capacity, the Company typically will purchase from the market and reduce the level of its own generation.

The Attorney General has an interesting point that only costs are considered on screening curves, without offsets for savings or revenues. The screening curves ignore the fact that the energy produced by various resources will produce different revenues depending on the time of day/season in which the energy is produced. Power produced in the afternoon on the hottest day during the summer is worth considerably more than power produced overnight during the spring. The Attorney General's proposal only seeks to credit renewable resources with savings, which would result in skewing the screening curves in favor of renewables. To properly address the Attorney General's concern, all resources would have to be credited with the value of the energy produced, using market prices as a proxy. The Company has not had time yet to study the feasibility of implementing this concept in the context of resource screening, but will consider it in future IRPs.

At pages 11-12, the Attorney General advocates wind power as an economical alternative, citing that one of the Company's affiliates has installed wind capacity in Spain. The wind resource available in Indiana, southeastern Ohio, and northern Kentucky is considerably different from that available in Spain. Furthermore, power from wind units located in regions where there is sufficient wind resource must be wheeled across other transmission systems to get it to the Company's system. The wheeling costs must be included in the economics of these resources. The Attorney General has failed to take this consideration into account.

The Attorney General criticizes the Company at page 12 for not even screening hydro power. However, the IRP screened hydro power. The Attorney General's data request no. 12 addressed this issue and, in response to this data request, the Company explained the methodology it used to screen hydro resources in the IRP. In addition, the Company is actively negotiating with a hydro developer regarding capacity at two dams on the Ohio River.

The Attorney General comments at page 12 that the IRP fails to describe ULH&P's demand side management (DSM) activities. As explained in response to the question 10 of the Kentucky Division of Energy's data request, the energy efficiency and conservation DSM programs that are currently offered by ULH&P are educational and/or informational in nature. The impacts from these types of programs are very difficult to quantify. Therefore, they are not included as resources. This does not represent bias in the planning, but rather the characteristics of the current DSM portfolio. The current portfolio of DSM programs was the result of extensive screening and evaluation of a wide range of DSM measures that was conducted prior to enactment of enabling legislation and subsequent implementation of DSM by ULH&P. The original set of programs offered financial incentives for investment in residential and commercial and industrial efficiency measures, including motors, lighting, adjustable speed drives, HVAC systems, thermal storage and residential heat pumps. Chapter 4 of the IRP filing describes the process by which the Collaborative arrived at the current set of programs and the rationale behind the developments.

In response to the comments of the Division of Energy (KDOE), ULH&P notes that much of the discussion and recommendations by KDOE are outside of the scope of this IRP. ULH&P will nevertheless attempt to address those that specifically relate to the IRP and those that make specific recommendations regarding ULH&P's planning or resources. Many of KDOE's suggestions might be more effectively addressed in a policy debate during development of restructuring legislation or in development of regulations and programs to address state policy goals and objectives. Many of the specific recommendations, while promoting energy efficiency, might not result in programs whose impacts could be forecast with sufficient certainty to consider them as resources in the IRP.

ULH&P is pleased that KDOE recognizes: (1) the active presence of competitive energy service companies (ESCOs), including the Company's affiliated companies, serving the Northern Kentucky region; and (2) the development of innovative pricing programs that are being used to drive desired consumption patterns. Indeed, the growth of the competitive ESCO market and the development of innovative tariff options were cited in Chapter 4 as methods of influencing consumption that would be more sustainable in a competitive environment than the large DSM programs with ratepayer-subsidized, not market-driven, incentives. These developments, coupled with the lack of participation in the programs, and uncertainty that participants and non-participants would realize projected benefits in a competitive environment, were among the reasons why the Collaborative turned its focus to low-cost educational and information approaches to influence and transform the market for energy efficiency (See Chapter 4 of the IRP).

ULH&P agrees with the KDOE's comment at page 10, paragraph 1 that inclusion of the impacts of these market-driven mechanisms in the IRP is appropriate. Figure 1-4 of the IRP in fact does include 103 MW of such customer tariffs in the column "Energy Options." The adoption of energy efficiency in the market through the Company's and other competitive ESCOs will be recognized in forecasts of demand over time. However, as the KDOE acknowledges, the tariff options are relatively new and at the time the 1999 resource plan was developed, their impact could not be forecast with enough certainty to treat them as a resource.

Future IRPs will include the estimated effects of these programs to the extent that they can be utilized to reduce the Company's load to be served. The KDOE also recommends that ULH&P reflect the impacts of its education and information based programs in the IRP. At the time the IRP was filed, two studies were underway to estimate the energy reductions resulting from the Home Energy House Call and the Low Income Electric Weatherization program. As the KDOE representative on the Collaborative is aware, those reports were not available until the last quarter of 1999.

The KDOE states at 10, paragraph 3 that ULH&P did not perform a technical potential study to estimate the total available potential for demand-side resources in preparing its plan. As discussed previously, the portfolio of programs introduced by ULH&P in 1996 was the result of extensive study that began with development of technical potential. Technical potential is only part of the story. For impacts to be achieved, customers must participate. The lack of a current technical potential study did not affect the resource plan. The lack of participation in the original DSM programs and developments in the market place that were determined by the Collaborative to be more sustainable and effective at achieving desired consumption patterns were much more responsible for the level and type of DSM programs being considered and offered. Furthermore, as the KDOE's representative on the Collaborative is aware, program concepts are considered and may be submitted to the Commission for approval during the annual DSM filings. Because of the collaborative process established in Kentucky, the IRP reflects, rather than dictates, the DSM implemented, as the presence of educational and information programs in the DSM portfolio demonstrates.

The KDOE's discussion on pages 11, 12, and 13 refers to services that are provided by competitive providers, including the Company's affiliates. The companies cited in the examples are competitive providers of energy related services. These types of services are currently offered in the region by the Company's affiliates and other competitive ESCOs. While the Collaborative, of which Mr. Young is a member, has developed some complementary programs and has requested funding in its December 1, 1999 filing to consider development of others. Large DSM programs that subsidize activities that would not be sustainable in their absence are not complementary. In fact, in their absence, innovative financing and leasing, performance contracting and other approaches such as those described in the KDOE's report, have been developed. Part B discusses comprehensive market transformation in the commercial new construction sector. Again, technical potential is not the issue. There is little debate about the fact that significant technical potential exists. The task is to either make adoption financially attractive to the decision-makers in the new construction value chain or to mandate it.

Tax incentives and institution of other policies to enhance the financial attractiveness of investments that increase the energy efficiency of housing and building stock and equipment might be considered and enforcement of building and housing codes might also represent a complementary step that could be taken across the state. In addition, as previously stated, the Collaborative has requested funding and if approved it will investigate opportunities to encourage adoption of energy efficient measures. Part C discusses promotion of cogeneration and distributed generation options. The Company already considers renewables in developing its resource portfolio. New opportunities to encourage renewables use among its customers, including net metering, are currently being investigated.

The KDOE advocates that the Company adopt other energy efficiency programs, such as joining forces with an architectural and engineering firm to sell house designs. Clearly, this would not be a regulated business, and it seems out of place for them to suggest such a line of business for the Company. If KDOE's interest is to reduce market barriers to energy efficiency, then KDOE should advocate retail competition, and let customers face market prices. The market prices will create the proper economic incentives for consumers and businesses to implement the appropriate energy efficiency projects that KDOE promotes. Furthermore, the projects would be done in an economically efficient manner so as to maximize the savings to the customer.

The KDOE's comments also advocate Local Integrated Resource Planning (LIRP). While the Company would certainly entertain the idea of utilizing load reduction to reduce transmission and distribution expansion costs, it should not be a required method of planning. One element that LIRP success stories seem to have in common is that there is a single area readily identified where a load change will defer a major project resulting in significant savings. However, the configuration and topology of the network in northern Kentucky (and the ECAR area in general) is such that a high degree of integration exists throughout the system. Therefore, a small increase in load will not trigger an $80 million dollar expansion of the transmission system. Local areas are not readily identified in the northern Kentucky network area, therefore development of programs to fix a particular problem will be difficult. It would be difficult to target a particular area due to the electrical and geographic proximity of the areas.

There are significant disadvantages to LIRP. First, LIRP requires that load growth be small and consistent. If it is large and volatile, it is quite probable that the expansion will be required regardless of the DSM programs implemented, resulting in greater transmission and distribution costs. Also, if sufficient DSM does not materialize, the transmission and distribution components may be subject to overload conditions, resulting in loss of the load served by the affected equipment.

One topic not covered in the KDOE report is the planning criteria utilized by the host company. For example, if Ontario Hydro utilizes a double contingency planning criteria, or if the distribution planning criteria provides for expansion of the system at an 80% utilization level, then the system will have some slack available if the programs do not materialize. The LIRP concept should not be applied blindly, the total system planning function of the Company needs to be known.

Due to wholesale competition, the transmission systems of utilities are subject to increased transactions, and other impacts due to actions of other parties. These effects cannot be predicted with any great reliability. Therefore, even if LIRP were to be implemented, reinforcements could still be required due to the transmission flows arising from the actions of other market participants. For example, while KDOE does not indicate which Ontario facilities were impacted by the LIRP, for the last two years, Ontario Hydro has had a dramatic impact upon the eastern interconnection by repeatedly requesting transmission load relief (TLR). These TLRs have dramatically impacted the effectiveness of the wholesale commercial market in the United States. Ontario's solution for this problem was to spend millions of dollars to add phase angle regulators at the Ontario-Michigan interface. While this may fix Ontario's problems, it pushes additional flows onto other transmission system, thereby affecting transmission loadings and reliability. Again, the point is that despite investments in DSM to reduce transmission and distribution costs, events beyond the Company's borders will certainly impact the transmission and distribution investment, and LIRP should not be used as an end to itself.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that the foregoing Reply Comments of the Union, Light, Heat and Power Company to Comments of the Attorney General and Kentucky Division of Energy's Comments was sent by ordinary mail, postage prepaid, to the following parties of record, on this 18th day of May, 2000.

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COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

IN RE THE MATTER OF:

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PUBLIC SERVICE
COMMISSION

THE INTEGRATED RESOURCE PLAN OF UNION LIGHT HEAT & POWER	)))	Case No. 99-449

COMMENTS OF THE ATTORNEY GENERAL

In November 1999, Union Light, Heat and Power (ULH&P) filed its 1999 Integrated Resource Plan (IRP), which covered both it future plans for Kentucky, and the future plans of its parent company, Cinergy. The integrated plan included a load forecast, and the company's plans for both supply and demand side resources to meet projected future needs. The plan looked at other issues including environmental compliance. The Office of Attorney General of the Commonwealth of Kentucky has reviewed these plans and offers the following comments.

The uncertainty under which the companies (ULH&P and Cinergy) are operating at the time the IRP was filed results in an IRP which does not provide a roadmap setting out the clear route to meeting the future needs of its customers. Rather than answering questions, the IRP raises questions. highlighting areas where special attention should be focused to ensure that future customer needs are satisfied at the lowest possible cost to customers in Kentucky.

Clearly, the biggest issue facing ULH&P in the near future is where, and at what price, future energy resources will be secured to meet customers' needs. ULH&P has no generating assets. Currently, all energy sold to customers is purchased from CG&E (a part of Cinergy) through a full requirements contract with CG&E (which owns ULH&P). This full requirements contract is set to expire at the end of 2001. The issue is complicated by the fact that CG&E has requested permission, under the Ohio deregulation statute, to transfer its generating assets to an affiliated but unregulated Exempt Wholesale Generator (EWG). Should this transfer take place, ULH&P would then have a full requirements contract with an entity with no generating assets. To supply this contract, CG&E would have to purchase power for resale to ULH&P, presumably from the unregulated Cinergy EWG.

Initially, this raised many questions. If CG&E has no generating assets, should a new contract be signed with this entity after 2001? If the EWG is unregulated, how can ULH&P make sure the power purchased for resale to it was done not the product of self-dealing between affiliated companies? Should ULH&P avoid CG&E altogether as a resale agent, and get bids on the open market?

At the informal conference held April 14, 2000, the plan was made clearer with the explanation that CG&E and ULH&P were in the process of renewing the all needs supply contract, now destined to expire at the end of 2001, with the expectation that the contract would last until the end of 2005 in order to coincide with certain provisions in the Ohio restructuring legislation. During the period of that extension, power would be supplied to ULH&P via a purchase power agreement executed between CG&E and the unregulated EWG under which the price of power purchased is dictated by rates already in effect. The rates would not change as a result of the purchase of power from the EWG prior to the end of 2005. The price of power purchased would be driven by the rates now in effect rather than the price of the power purchased driving the rates to be put into effect, as is normally the case. If this is so, the concerns raised by the transfer of the CG&E's generation to the EWG and the impending expiration of the agreement between CG&E and ULH&P are allayed. This is an area that merits close attention.

Regardless of whether generating assets are transferred, ULH&P and Cinergy must provide sufficient resources to meet customer demand, as covered by the 1999 IRP. Again, the IRP is dominated by the uncertainty surrounding the deregulation legislation passed in Ohio. This can be seen clearly in Cinergy's "New Resource

Additions" - Figure 1-3. The addition plan primarily calls for purchasing capacity over the next four years. This culminates with the purchase of 2200 MW in 2003. The plan then calls for the addition of eleven 214-MW combustion turbines in 2004. The addition of 2,354 MW of combustion turbines in a single year seems unlikely. In recent years, utilities have had difficulty finding any new combustion turbines, let alone 11 large units in a single year. In 2004, many utilities will be scrambling to buy the limited number of combustion turbines available on the market.

The reason Cinergy is postponing adding significant new capacity until 2004 is because of the possibility of losing customers when Ohio deregulation is implemented. Should Cinergy lose the full mandatory compliment of customers to deregulation, without replacing them, it would be in a capacity surplus situation by 2005, according to information obtained during the informal conference. But, if Ohio follows the pattern of states like California, the loss of customers by existing utilities will be minimal. Considering that Cinergy has some of the lowest cost power in Ohio, Cinergy is more likely to gain customers in Ohio.

Cinergy believes it is imprudent to add capacity while the future number of customers is unknown. It is equally imprudent to believe that 2,354 MW of combustion turbine capacity will be available in 2004. As other utilities also play the waiting game, surplus generating capacity in the Midwest is quickly being used up. Some comfort may be taken from the assurance given at the informal conference that it now seems the time table for the addition of capacity will be moved forward, at least for some capacity. ULH&P and the Commission must follow developments closely. Customers will be well served by the inability to purchase enough new capacity in 2004 or by having to buy power on a limited and expensive wholesale market?

The Cinergy addition plan calls for adding 330 MW of combustion turbines in 2003 and another 2,354 MW in 2004, or 2684 MW by 2004. Considering the difficulty of obtaining so much capacity in such a short period of time, Cinergy needs to look at all reasonably priced capacity options. One of the best and lowest cost options that may become available to Cinergy is its 9% ownership of Ohio Valley Electric Corporation (OVEC) capacity.

OVEC owns 2150 MW of low cost generating capacity that supplies electricity to the U.S. Enrichment Corporation's Portsmouth Gaseous Diffusion Plant. Because of financial problems associated with enriching uranium at the two remaining plants in the United States, it is possible that one of the U.S. enrichment plants may be closed. Under agreement, neither plant can be closed until 2005, unless the Enrichment Corporation's financial condition significantly deteriorates. Whether a closure takes place in 2005 or before is unclear, but it seems likely that one the remaining plants will be closed, barring a bailout from Congress.

If the plant closed is the Portsmouth facility, the OVEC capacity could become available to the participating utilities. Cinergy companies own 9% or OVEC or 194 MW. Should this capacity become available, Cinergy could use this capacity to replace one of the proposed combustion turbines. Cinergy did not include this possibility in the IRP as a way to meet future capacity needs. Cinergy should begin now to explore how existing contracts can be used or modified to assure that this low cost OVEC capacity it is entitled to will become available, if the Portsmouth plant is closed.

Another potentially low cost capacity addition mentioned in the IRP is 100 MW of run-of-river hydro, which is presently in contract negotiations. Because of low environmental impacts and the absence of all fuel costs, hydropower has traditionally offered very low costs over the long-term. If Cinergy can obtain this capacity at a reasonable price, this capacity and the OVEC capacity could offer a way to meet the capacity additions soon called for at least in the year 2003. Cinergy should begin to determine how many of the combustion turbines needed in 2004 will be available in manufacturer's production schedules. If some of these units can be obtained at a reasonable price now, Cinergy should lock up at least some now before the future high demand drives the price up.

The IRP did an inadequate job of including the impact of pending environmental regulations, including Global Climate Change and NOx emissions. Cinergy did some sensitivity analysis with respect to screening supply side options, but no environmental costs beyond current regulations were included in the final plan. Unless these environmental issues are included in planning, future capacity addition might exacerbate environmental problems rather than correct them, causing higher rates for customers for many years into the future. A prime example is global climate change.

Cinergy has signed on to the Clinton Administration's Global Climate Change Initiative. Under this agreement, Cinergy is to voluntarily reduce its carbon dioxide emissions to 1990 levels by 2010. But the IRP shows that Cinergy will substantially miss meeting this commitment. Cinergy's CO_2 emissions were 46 million tons in 1990. By 1999, carbon emissions had grown to almost 73 million tons, a 58% increase. The IRP projects coal and natural gas use to increase over the next 20 years, thus further increasing CO_2 emissions. The Kioto Protocol goes further, calling for a 7% reduction below 1990 levels. If these voluntary reductions are made mandatory, Cinergy will have a very difficult time reducing CO2 emissions.

Cinergy has taken a number of voluntary actions to reduce greenhouse emissions. Between 1990 and 1999, Cinergy estimates that it reduced greenhouse gas emissions by 12.5 million tons cumulatively over this period. This seems impressive. But, Cinergy boosted CO2 emissions by 76 million tons from its generators over the same time period. The boost in CO2 emission is six times as much at the reductions for which Cinergy takes credit.

If voluntary CO2 reductions become mandatory, this could be expensive for Cinergy and its ratepayers. If, for example, Cinergy must pay a $28 fee for every tons of CO2 over its 1990 emissions, and if emissions were at 1999 levels, Cinergy will have to pay an annual penalty of $745 million. This cost would be passed on to ratepayers. If Cinergy had to pay $28 per ton for all CO2 emissions, such as with a carbon tax, that cost to ratepayers would be over $2 BILLION annually. Given the magnitude of the potential liability, this contingency must be included in the IRP.

Cinergy only has one possible capacity addition with no associated CO2 emissions, the 100 MW run-of-river hydro contract under negotiation. Including a cost for future CO2 emissions would give renewable energy options, with no emissions, proper financial weighting in the IRP. With CO2 emission at 1999 levels, a $28 per ton CO2 penalty translates into an additional cost about 3.4 cents per kilowatt-hour. Adding a premium for no emission renewable resources like hydro would make these resources a lot lower cost, even they are slightly more expensive when emissions are not considered.

Even if Cinergy does not include CO2 and NOx costs in its primary IRP plan, additional plans should be prepared that include these costs, so the Commission can see the marginal cost associated with proactive actions in light of likely future new environmental regulations.

Not only does the Cinergy IRP fail to include environmental considerations, the screening model utilized contains an inherent and unintended bias against renewable resources. It erroneously assumes all generating facilities will be operated on the same priorities as those which have variable fuel costs. This is not the case.

The IRP first screens its potential capacity options to eliminate the more expensive ones. This screening process charts cost versus capacity factors. For options which burn fuel, the cost increases as the capacity factor increases, as more fuel is burned. For renewable resources (except wood), there is no fuel cost, and thus the graph of these resources is flat, containing just the capital cost and fixed O&M cost which are the same at all capacity factors. But this is an inaccurate representation of these resources such as solar, hydro and wind.

Renewable resources which have no fuel costs are not operated on the same priority as facilities which have variable fuel costs. Instead, for renewable resources with no fuel costs, once the resources are up and running they can be run full out continuously, regardless of the capacity needs of the utility. Because it costs nothing to run the facilities full out, any excess power generated can be sold on the wholesale market, and the funds generated by those sales can be attributed to the reduction of the initial capital costs of the renewable resource unit at capacity factors lower than the one at which it operates.

For example, take a hydro plant with a 60% capacity factor. The Cinergy screening process would graph this option as a straight flat line from 0% to 100% capacity factor. This contains two problems. First, if the maximum capacity factor is 60%, the line on the graph should end at 60%, since the resource is not available beyond that point. Second, and most important, capacity factors below 60% do not reflect the fact that with no fuel costs, this unit will be dispatched first.

With a plant that burns fuel with an associated cost, the plant would only be dispatched if energy was needed. But by contrast, if a 60% capacity factor hydro plant was selected to fill a need for a 10% peaking need, the hydro plant would still be run whenever possible, since there is no additional cost to do so. The result would be that a fossil-fuel plant would be run less in the periods between the 10% peaking need and the 60% hydro plant's capacity. During these periods, the utility would save money running the hydro plant instead of burning fuel at the fossil plant. These savings, including savings of SO_2 allowances, should be credited to the cost of hydro plant.

Translated to the screening graph, the hydro line would trend downward as the capacity factor reduces (and the savings from displacing fossil fuel increases), like the other options that burn fuel. Without this correction, renewable resources with high capital costs look unrealistically non-competitive at low capacity factors.

The Cinergy IRP dismisses wind capacity as an immature technology, though one of Cinergy's unregulated subsidiaries is installing wind capacity in Spain. The IRP also states that wind is only cost effective at higher capacity factors. But wind has been screened out in lower capacity factors because of the built-in bias against no fuel cost renewables at low capacity factors. Further, the IRP states that wind speeds in this area are insufficient, ignoring the extensive transmissions system in the region which would allow Cinergy to transmit power from wind units in the Appalachian region where the wind is sufficient.

The most abundant renewable resource in the region, hydropower, was not even screened in the IRP. Cinergy has experience with hydro with its Markland plant. While most of the dams on the Ohio River are available for hydro development, and new technologies have dramatically reduced the cost of developing dams like those on the Ohio River, Cinergy failed screen this low cost renewable resource.

The IRP also states that it did not include ULH&P's Demand Side Management (DSM) efforts in the IRP. Unless Cinergy removes built-in biases against renewable resources and DSM, it has little chance of ever selecting these resources that offer real help in meeting the Company's environmental commitments, and thus keeping customer's rates low in the future.

Respectfully Submitted,

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CERTIFICATE OF SERVICE AND NOTICE OF FILING

I hereby give notice that this the 1st day of May, 2000 I have filed the original and twelve copies of the foregoing with the Public Service Commission at 211 Sower Blvd., Frankfort, Kentucky, 40601, and CERTIFY that I have served the parties this same day by mailing a true copy of same, postage prepaid to:

JAMES B GAINER
LEGAL DIVISION
THE UNION LIGHT HEAT & POWER CO
139 E FOURTH STREET
CINCINNATI OH 45202

/s/ Blackfl

RECEIVED

MAY 0 1 2000

PUBLIC SERVICE COMMISSION

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058 OF THE)
1999 INTEGRATED RESOURCE PLAN OF THE) CASE NO. 99-449
UNION LIGHT, HEAT AND POWER COMPANY)

KENTUCKY DIVISION OF ENERGY'S COMMENTS RELATED TO THE 1999 RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY

I. INTRODUCTION

The purpose of this analysis is to suggest a number of strategies that we believe the Union Light, Heat and Power Company (ULH&P) should consider in addition to those described in the resource plan the company submitted to the Commission on November 1, 1999. The Kentucky Division of Energy (KDOE) believes that the strategies and programs we will describe are consistent with the rationale that underlies integrated resource planning, and that they offer significant profitable long-term opportunities for the utility company and its shareholders as well as tangible economic benefits for its customers.

II. KDOE'S VISION OF THE FUTURE: A WELL-FUNCTIONING MARKET FOR ENERGY SERVICES

KDOE supports the increasing role of competitive markets and customer choice in the electric utility industry, because it believes that if the markets in energy services are properly structured, competitive forces would be unleashed that could give rise to truly phenomenal gains in efficiency within the energy sector. In a more competitive market, pricing signals would serve as the primary determinant for energy-related decisions. Customers would have, or could obtain, adequate information about the life-cycle costs and benefits of their purchasing and investment decisions. Customers would be less concerned about the price of each kWh of electricity than about the size of their energy bills and the net value that various competing packages of energy services could provide to their businesses or homes. Businesses would apply the same financial criteria (payback periods or return-on-investment "hurdle rates") to cost-reducing investments as they do to investments that promise to increase sales. In transactions involving multiple parties, accurate information about future energy costs would be reflected in negotiated contractual arrangements, so that those parties bearing the costs of energy upgrades would be compensated by those parties enjoying the benefits. Designers who took the extra time necessary to improve the efficiency and performance of their buildings would be compensated for their efforts by their clients. Financing would be available at market rates for cost-effective energy upgrades. A sufficient number of sellers would exist to create a competitive market for energy services. Electricity prices would approach marginal costs, which would change throughout the day and year because of generation, transmission, or distribution system constraints, thus passing price signals on to customers and other market participants. Government policies would monetize external environmental effects at societally efficient rates, or at least there would be a functioning market for "green power." There might even be a functioning market in saved energy, or "negawatts,"[1] in Amory Lovins' phrase.

While we recognize that the scenario described above can never be realized in its entirety, we believe that public agencies should promote policies that support the functioning of markets under competitive conditions to the extent possible.

[1] "Saving Gigabucks with Negawatts," Amory B. Lovins, *Public Utilities Fortnightly*, March 21, 1985, pp. 19-26.

III. THE PRESENT REALITY: PERVASIVE AND CHRONIC MARKET BARRIERS

In stark contrast to the idealized competitive market for energy services described in Section II above, present-day markets are riddled with barriers that prevent customers from obtaining the most economically advantageous energy services available to them. As pointed out in a Strategic Issues Paper produced by E Source, "Well over half of the energy used to cool and ventilate buildings in countries like the United States can be saved by improvements that typically repay their cost within a few years." Other analyses have found comparable potential savings in lighting, drivepower, office equipment and other end-uses. The report continues, "To a theoretical economist, these are astounding statements: it is inconceivable that in a market economy, such large and profitable savings would remain untapped. But to a practitioner who knows how buildings are created and run, it is not only conceivable but obvious."[2] The rest of the report provides a detailed examination of the process by which buildings are designed, built and operated, and how inefficiencies are introduced at every stage through practices which are typical in the commercial construction market. Most of the barriers result from split incentives, perverse incentives, lack of information, and lack of communication between the numerous parties involved. Although each market participant may be behaving rationally within his or her narrow area of responsibility, the overall result is a system that chronically undervalues energy efficiency. Some causes of the chronic market failure in the field of new commercial construction are listed below:

- Real estate developers and investors, who make early building decisions, discount energy-related issues heavily, focusing on minimizing construction time and cost.
- U.S. rules on taxes and depreciation exacerbate the focus on first cost.

[2] "Energy-Efficient Buildings: Institutional Barriers and Opportunities," E Source, Inc., 1992, Boulder, Colorado, p.6. KDOE first became aware of this report via the Cinergy/ULH&P DSM Collaborative's Commercial and Industrial subgroup (now defunct).

- Developers have very little information about the efficiency gains that are possible.

- Financial institutions may reject innovative designs, fearing delays in approval by code officials.

- Commercial appraisers and securities rating agencies know little about energy and have no way to evaluate designers' projections of energy performance.

- Site planning decisions may be made by professionals with little knowledge of energy before an architect is even hired, despite the fact that "Just proper choice of architectural form, envelope, and orientation can often save upwards of a third of the building's energy at no extra cost – 44% in one recent California design."[3]

- Most architects do not know enough about mechanical systems design and do not work very closely with the HVAC professionals – especially during the earliest phases of design, when decisions have the largest impacts.

- Mechanical designers and equipment vendors have economic incentives to oversize systems.

- Few HVAC designers perform dynamic thermal simulations; many use rules of thumb, and some leave system sizing decisions to the equipment manufacturers.

- The emphasis on "just-in-time" design leaves little time for optimizing whole systems.

- Most often, no single member of the design team has overall responsibility for the entire interactive system. Even if an interdisciplinary team approach is desired, each profession communicates using different terms and has different incentives, making cooperation difficult.

- Design fees are not structured to compensate for the extra time needed to optimize systems; in fact, fee structures reward speed above all.

- Architects and designers often handle potential liability concerns by oversizing equipment, but the client is left with higher capital and operating costs.

- Construction contractors frequently substitute less efficient equipment for what may have been specified; designers are usually not present to catch discrepancies or errors.

- Commissioning of the building's mechanical systems is rarely performed to make sure they work as specified.

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[3] Ibid., p.11.

- Thorough documentation on how to run a building optimally is not provided to building operators.

- Although much HVAC equipment fails to meet its specified capacity and efficiency ratings, measurement that could catch such discrepancies is not done.

- Building operators are not trained in or rewarded for energy-efficient operation, and may frequently disable automatic control systems to minimize complaints.

- The actual performance of HVAC systems in the field is often never monitored directly. The lack of actual data makes it difficult to know how best to improve their operation.

- Suppliers of parts and replacement equipment are not rewarded for selling high-efficiency products.

- Commercial leasing brokers are unfamiliar with energy, and tend to use rules of thumb rather than building-specific analyses.

- Commercial leases do not provide both parties an incentive to cooperate to implement energy efficiency upgrades.

- Few commercial tenants know enough about energy efficiency to demand it in the market.

Given this (non-exhaustive) list of barriers in the new commercial construction market, it should not be surprising when analysts reach the conclusion that huge gains in efficiency are technically feasible at very reasonable cost. The Environmental Energy Technologies Division of the Lawrence Berkeley National Laboratory estimates that "If only tune-ups and performance monitoring of existing buildings were performed, average energy use could be reduced by about 20%. If proven efficiency measures were applied when a building is retrofitted (usually about every 15 years), about 50% reduction could be attained. The full range of efficiency measures that can be designed and incorporated into new buildings could bring about an energy reduction of as much as 75%."[4] Other estimates (for example, by E Source) are even higher. The fact that

[4] Lawrence Berkeley National Laboratory, "Creating High-Performance Commercial Buildings," *EETD News*, Fall 1999, pp. 1-2.

a long list of market barriers exists does not mean that they could never be overcome through carefully targeted programs and policies.

Savings of a similar magnitude are obtainable in the residential sector as well. The U.S. Department of Energy's *Building America* program is applying whole-building principles to new home construction and reducing energy use by approximately 50%, at little or no additional cost to production builders in a range of climate zones.

The Rocky Mountain Institute describes a case study of what can be done in this sector by a utility company that is seriously interested in exploring the potential energy savings resulting from whole-system redesign. The Pacific Gas and Electric Company, as part of its Advanced Customer Technology Test (ACT2) program, hired the Davis Energy Group to improve an initial design for a house that already met California's strict Title 24 energy code, which is supposed to include all efficiency measures that are worth buying from a societal perspective. The first step was to eliminate unnecessary corners that had added 23 feet (11%) of length to the outside walls. The designers then put the windows in the right places, used window frames that would transmit less heat, and invented an engineered wall that saved about 74% of the wood, reduced construction costs, and nearly doubled the insulation. A number of small improvements to the building envelope, windows, lights, major appliances, and hot-water system raised the total energy saving to 60% and increased the cost by nearly $1,900. At the same time, however, the thicker insulation and better windows eliminated any need for the $2,050 furnace and its associated ducts and equipment. Instead, on the coldest nights, a small amount of hot water from the 94%-efficient gas-fired water heater could be run through a radiant coil cast into the floor-slab. Finally, the designers eliminated the air conditioner by adding several more efficiency measures that had not previously appeared to have been cost-effective based on a conventional (measure-by-measure) analysis. The report concludes as follows:

> "Factoring out small electrical appliances (one-third of initial electricity usage), which offered many savings opportunities but would be brought along by the buyer rather than installed by the builder, the resulting final design would save about 80% of total energy or 79% for electricity alone: 78% for space heating, 79% for water heating, 80% for refrigeration, 66% for lighting, 100% for space cooling, and 92% for space cooling plus ventilation). If such construction techniques became generally practiced—so-called "mature-market cost"—then those savings would make the house, in a mature market, cost about $1,800 less to build and $1,600 less to maintain.
>
> "The measured savings, adjusted for some last-minute design changes requested by the homebuyer, agreed well with these predictions. The house proved very comfortable even in a severe hot spell. Since by law the Title 24 code is supposed to include all cost-effective measures, the Davis house may mean that this influential state standard has to be rewritten from scratch."[5]

If Cinergy/ULH&P were interested in applying this approach in the northern Kentucky climate zone, it might be possible to develop marketable house designs that replace the central furnace by a water-heater based system – home builder Perry Bigelow has done so in the Chicago area – and downsize or eliminate the conventional air conditioning system.

Similar examples can be cited in the industrial sector. A major use of electricity in industry is to operate pumps for moving liquids around. The carpet company, Interface, was planning to build a new factory. One of the factory's processes required 14 pumps. A leading firm specializing in factory design sized the pumps to total 95 horsepower. An Interface engineer, Jan Schilham, however, took a fresh look and was able to come up with a design that was not only more efficient but cost *less* to build. The first change used larger pipes and smaller pumps, greatly reducing frictional losses. Second, Schilham laid out the pipes first and then the

[5] Rocky Mountain Institute, "Designing For Zero Cooling Equipment in a Hot Climate," 1999, www.naturalcapitalism.org/sitepages/pid27.asp

equipment, in the reverse order from standard practice, enabling him to use shorter and straighter pipe runs. The combination of these two approaches allowed for a system with only 7 horsepower of pumping capacity – a 92% decrease. The lower capital cost of the smaller pumps, motors, inverters, and associated electrical system more than compensated for the additional cost of larger diameter pipes. The payback period for the higher-efficiency system was instantaneous and its return on investment was infinite because it was cheaper than the inefficient design. However, "optimization" techniques in use throughout the industrial sector routinely ignore systemic effects such as these, focusing only on single-component or partial-system optimization.[6]

These examples illustrate an important point about whole-system design: It is frequently more cost-effective to save large amounts of energy than small amounts. It can make sense from a whole-system perspective to make certain components *more* efficient than a component-by-component "optimization" approach would suggest. This surprising phenomenon, called "tunneling through the cost barrier," results from capital cost reductions (e.g., smaller or no HVAC systems, smaller pumps) that can be added to the energy savings. "Optimizing components in isolation tends to pessimize the whole system."[7]

IV. ULH&P'S RESOURCE PLAN

Our analysis of ULH&P's resource plan and the discussion at the informal conference held on 4/14/00 indicate that the company is beginning to pursue initiatives that may reduce some of the market barriers to improve energy efficiency across its service area and beyond. Of particular note are the acquisition of the Rose Technology Group and alliances with Trigen Energy Corporation and Ballard Power Systems. Cinergy representatives at the hearing indicated

[6] Hawken et al., *Natural Capitalism*, pp. 116-117.
[7] *Ibid.*, p.117.

that the services of all three ventures would be available to customers within the ULH&P service area.

According to the *Energy User News*, the Rose Technology Group is "the leading Canadian performance contracting company." The combined company, called Vestar, "will offer facility and infrastructure solutions to institutional, commercial and industrial customers throughout North America."[8] We view this development as positive because the performance contracting approach may enable more Kentucky customers to assess the value of, and obtain financing for, cost-effective energy efficiency improvements in their facilities.

Similarly, Cinergy's partnership with Trigen Energy Corporation, a major developer of combined heat and power projects, may enable certain Kentucky firms to capture and use the thermal energy that is now being expelled as "waste heat" from centralized utility power plants. Trigen's Thomas R. Casten has long been a persuasive advocate of policies to reduce regulatory and other barriers to the increased use of cogeneration in the United States. The alliance with Ballard may increase Cinergy's ability to deploy fuel cells as a form of distributed generation in Kentucky.

Cinergy's increasing use of innovative tariffs is another promising development. The Experimental Real Time Pricing Program (RTP), the Energy Call Options Program (EOP-RTP), and the Peak Load Management rider (PLM) all help align the pricing signals faced by customers with those of the utility, reducing the need to add new generating capacity to cover peak load periods. In response to a data request, the company stated, "At the end of 1999, there were 300 Cinergy customers participating in the experimental Rate RTP program. Cinergy is

[8] *Energy User News*, March 2000, p.4

currently aggressively targeting over 500 Cinergy commercial and industrial customers for summer 2000 under Rider PLM."[9]

KDOE believes that the future impacts arising from the increasing use of innovative tariffs, and from the activities of Cinergy's partners in the areas of cogeneration and performance contracting, should be reflected quantitatively in its resource planning forecasts (e.g., in Figures 1-3 and 1-4). Admittedly, most of these developments are recent and the impacts are hard to project with precision, but to leave them out of the forecasts is to make an implicit projection of zero impacts. To the extent that these initiatives are implemented successfully, the assumption of zero impacts will lead to distortions in the plan.

Cinergy assigns an impact of zero to its Kentucky DSM programs.[10] Most of the Kentucky DSM programs are largely educational in nature, and their impacts are therefore hard to estimate quantitatively, but the Home Energy House Call program installs energy-efficient devices in customers' homes. We believe that the energy and demand impacts should be estimated for this program and included in the resource plan.

In preparing its 1999 resource plan, ULH&P did not perform a study to estimate the total quantity of demand-side energy efficiency and load shifting measures that would be available within the ULH&P service area (i.e., a technical potential study).[11] Similarly, "No new [demand-side] resource programs were considered for inclusion in this IRP for ULH&P's service territory."[12] The company does not use local integrated resource planning (LIRP) and does not intend to use it in the future.[13] KDOE is concerned that ULH&P is seriously underestimating the potential impacts that DSM programs could have in meeting future resource

[9] KPCo's response to KDOE Information Request #9a.
[10] KPCo 1999 resource plan, p. 4-9.
[11] KPCo's response to KDOE Information Request #2.
[12] KPCo 1999 resource plan, p. 4-17.
[13] KPCo's response to KDOE Information Request #14.

needs, and is in danger of missing major opportunities, some of which will be outlined in Section V below.

V. MARKET TRANSFORMATION PROGRAM OPTIONS

Cinergy begins the DSM chapter in its 1999 resource plan with the following statement:

> "Cinergy, its customer representatives, and its regulators have begun taking steps to prepare for a competitive utility industry, not by abandoning energy efficiency, conservation, and demand reduction, but by shifting from ratepayer-subsidized DSM programs to market-based, customer-driven energy-efficiency related products and services."[14]

This statement seems to set up an opposition between ratepayer-subsidized DSM programs versus market-based approaches, but KDOE believes that there is a large area of overlap between the two. A relatively small investment of ratepayer funds could enable ULH&P to pursue a wide range of programs aimed at transforming markets for energy-efficient technologies and designs. Innovative tariffs, ESCO activity, and cogeneration do not nearly exhaust the opportunities for cost-effective demand-side efficiency improvements.

It has long been a truism that customers do not need or desire energy or electricity per se, but rather the services – warmth, light, hot water, cooling, drive power – that it provides for them. An economically rational customer will seek to maximize the net value of energy services purchased (i.e., the value added by the energy services minus the energy bill). An energy company that helps its customers maximize this value should enjoy a large market demand for its services.

Is it realistic to think that a company that sells a commodity can change its approach to one of helping its customers maximize value, even when it might result in less of the commodity being sold? The book *Natural Capitalism*, by Paul Hawken, Amory Lovins, and Hunter Lovins,

[14] KPCo 1999 resource plan, p. 4-1.

describes several companies that are making the transition. Carrier, the world's largest manufacturer of air conditioning equipment, is now offering a "comfort lease" that ensures a certain indoor temperature during hot weather. Carrier can choose from a range of means to deliver the comfort: by doing lighting retrofits, installing high-performance windows, or installing its air conditioning equipment. "The less equipment Carrier has to install to deliver comfort, the more money Carrier makes. If Carrier retrofits a building so it no longer needs a lot, or even any, of its air conditioning capacity, Carrier can remove those modules and reinstall them elsewhere."[15]

The same concept is prevalent overseas:

> "Ten million buildings in metropolitan France have long been heated by *chauffagistes*; in 1995, 160 firms in this business employed 28,000 professionals. Rather than selling raw energy in the form of oil, gas, or electricity – none of which is what the customer really wants, namely warmth – these firms contract to keep a client's floorspace within a certain temperature range during certain hours at a certain cost. The rate is normally set to be somewhat below that of traditional heating methods like oil furnaces; *how* it's achieved is the contractors' business. They can convert your furnace to gas, make your heating system more efficient, or even insulate your building. They're paid for results – warmth – not for how they do it or how much of what inputs they use to do it. The less energy and materials they use – the more efficient they are – the more money they make. Competition between *chauffagistes* pushes down the market price of that "warmth service." Some major utilities, chiefly in Europe, provide heating on a similar basis, and some, like Sweden's Goteborg Energi, have recently made it the centerpiece of their growth strategy."[16]

Other examples:

- "Some utilities and third parties have been offering "torque services" that turn the shafts of your factory or pumping station for a set fee; the more efficiently they do so, the more they can earn."[17]

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[15] Hawken et al., *Natural Capitalism*, Rocky Mountain Institute, Snowmass, Colorado, 1999, p.135.
[16] *Ibid.*
[17] *Ibid.*, p.136.

- Dow Chemical has started moving toward providing "dissolving services" rather than merely leasing solvents; their German affiliate plans to charge by the square centimeter degreased instead of by the amount of solvent used, thereby providing an incentive for its technicians to use less solvent rather than more. (Even better would be to use environmentally safer or no solvents.)

- Ciba's Pigment Division is moving to provide "color services" rather than merely selling dyes and pigments.

- Cookson in England leases the insulating service of refractory liners for steel furnaces.

- Pitney Bowes handles your firm's mail instead of just leasing postal meters.

- Interface in Atlanta leases floor-covering services rather than selling carpet. Interface is responsible for keeping it clean and fresh, replaces parts of it when indicated by monthly inspections, and reduces overall life-cycle costs. Interface has also developed a new polymeric floor covering material, called Solenium, that combines many of the performance advantages of carpet and hard flooring and can replace carpet altogether. [18]

In each case, the firms providing the service may sell somewhat less of their commodity or product, but are able to meet the customer's actual needs in a more efficient way. They are paid for results – providing value to the customer – rather than for the quantity of inputs. The incentives of the service provider and the customer are no longer at odds; both parties are interested in performing the needed function in the most efficient way possible. This concept may represent a cutting-edge trend in our economy.

If Cinergy/ULH&P were to focus its activities more directly on becoming a provider of cost-effective energy services, it would initiate a number of programs and actions aimed at optimizing overall efficiency throughout the energy sector. Some of these initiatives would have immediate profit potential, while others would help transform energy markets so that customers would value more highly, and demand, the kinds of services the company could provide. The longer-term initiatives would also help establish Cinergy/ULH&P's image in the market as an efficiency-oriented company dedicated to providing maximum value to its customers.

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[18] *Ibid.*, pp. 137-141.

In the following section, we suggest a number of initiatives that we believe should be investigated for possible implementation:

A) Use Local Integrated Resource Planning (LIRP)

Although several states have restructured their electric industries to encourage retail choice, the distribution system has remained a regulated monopoly. The method of local integrated resource planning, as described in a 1995 strategic issues paper by E Source, is designed to determine if costs could be reduced by deferring transmission and distribution upgrades through the use of geographically-focused demand-side programs.[19] The E Source paper provides case studies illustrating how a number of utilities have used LIRP to forestall costly T&D upgrades. Targeted projects identified through the use of LIRP demonstrate its value both in rural areas with widely dispersed customers and in congested urban centers.

In 1993, Ontario Hydro planners were facing rapidly-growing demand in the congested Collingwood area and projected a T&D upgrade costing C$83 million. After conducting a LIRP analysis, they developed a strategy that combined load-shifting residential water heaters, improving lighting efficiency, scheduling the operation of industrial furnaces, and making much smaller T&D upgrades, for a total cost of C$24.3 million, which included the cost of analyzing and administering the alternative strategy. Similar results were obtained in numerous other locations. Overall, Ontario Hydro credits LIRP with deferring some C$1.7 billion in T&D investments through September, 1995. LIRP has become the standard method of planning customer service and T&D planning. In the words of one distribution planner, "LIRP has become our business."[20]

[19] E Source, "Local Integrated Resource Planning: A New Tool for a Competitive Era," Boulder, Colorado, 1995.
[20] E Source, 1995, pp. 6-8.

The New York State Electric and Gas Corporation was able to avoid a $6.5 million T&D upgrade by providing an interruptible service rate to one large user and contracting to dispatch the user's two 300-kW backup generators, all at a hardware cost of $45,000.[21]

The E Source Strategic Issues paper concludes with a summary of advantages utilities can obtain by making use of the LIRP approach. The following benefits, which are reprinted from the report, would apply whether or not the utility industry is ever restructured in Kentucky:

- *"Improves utilization of existing T&D system assets while increasing grid reliability,* leading to lower costs per unit of electricity delivered, and deferred or avoided capital expenditures.
- *"Expands knowledge of the true cost of supplying electricity to a particular area at a specific time.* This information would be vital should a utility wheel power from another supplier to a retail customer. Such information can also be used by internal business units.
- *"Provides risk insurance during power sector restructuring.* With the future structure of the electricity industry uncertain, deferring capital expenditures makes additional economic sense from a risk reduction perspective. No one can predict who will own the grid in the future, or what compensation might be provided should ownership change.
- *"Reduces the need to obtain regulatory and public approval for potentially contentious T&D projects.* By reducing the need for new and upgraded powerlines and other T&D hardware, utilities clearly benefit in the public relations arena.
- *"Avoids long-term commitments to one-time, high-cost, supply-side options by investing in more flexible and modular technologies.* Incrementally adding capacity is likely to ensure that capital investment accurately reflects the needed demand rather than potentially overinvesting in a supply-side option---a particular concern for utilities that are experiencing slow growth in demand or that now service demand that might disappear.
- *"Provides experience with additional modular technologies whose costs are falling as production scales up.* Examples include advanced gas turbines, fuel cells, photovoltaics, chemical-battery storage, and flywheels.
- *"Provides customers with higher-quality service.* This should occur since the LIRP process is driven by the customer's concerns and needs. In fact, the LIRP approach

[21] Ibid., p.10.

could be used in determining the needs of individual customers, a key marketing foundation that could aid customer retention in the future.

- *"Maintains profitable load.* Once a utility looks closely at customer uses, it may discover a potential loss of load to competing fuels. Upon such a finding, the utility can develop a load retention program, as appropriate. LIRP may also reveal that some loads are not economic to serve and thus are good candidates for fuel switching or other measures.

- *"Assists a utility in getting various department plans in sync with each other.* Once a utility starts using LIRP as the start of its planning process, the utility can produce marketing, customer service, and sales plans that are more consistent with its distribution plans. This also increases the likelihood of producing a coordinated interface and a consistent relationship with customers.

- *"Leads to better utilization of generating assets.* Peak clipping options (storage and generation) would result in higher utilization of baseload generators. Smaller generating units also can lead to smaller reserve capacity requirements, and distributed generation can cut grid losses."[22]

B) Initiate a Comprehensive Market Transformation Program in the New Commercial Construction Sector

To overcome the litany of chronic market barriers to energy-efficient new construction outlined in Section III above, a multi-pronged approach is advisable. The magnitude of the potential savings can be estimated by performing a technical potential study or by comparing the efficiency of typical new buildings being constructed today with state-of-the-art buildings in other jurisdictions. Since Cinergy/ULH&P has subscribed to E Source in the past, an excellent way to start the analysis of the technical potential would be to study the E Source Technology Atlas Series, which include the following titles: *Commercial Space Cooling and Air Handling*; *Lighting*; *Drivepower*; *pace Heating*; and *Residential Appliances*. A key theme found over and over throughout these highly detailed, thoroughly-documented works is that there are major efficiencies to be gained through the whole-system integration of properly-sized technologies. Initial costs can frequently be held constant or even reduced through careful, whole-system

[22] Ibid., pp. 22-23.

design. KDOE's information requests relating to the amount of new construction occurring in the ULH&P service area were intended to see if the utility had made any preliminary estimates of the size of the technical potential for efficiency improvements in the buildings sector.[23]

Indirect economic benefits resulting from improved daylighting designs such as increased retail sales[24] or improvement in the performance of students or workers[25,26] can make TRC benefit/cost ratios extremely high. For example, while the energy savings generated by the daylight-oriented whole-building design of Lockheed's 600,000 square foot office building in Sunnyvale, California paid back the initial extra costs in four years, absenteeism among a known population of workers dropped by 15%, which represents annual cost savings equal to the entire incremental cost of the improved design. To this could be added productivity gains estimated at another 15%, bringing the payback period down to a matter of weeks.[27]

There are several ways ULH&P could enter the market for energy-efficient design services. One way would be to establish an architectural/design firm, or purchase or form a joint venture with one or more existing firms with experience in designing highly-efficient buildings. Another would be to initiate a program providing training, design incentives, and awards for energy-efficient architects, engineers, and HVAC system designers. A joint venture with a manufacturer of energy-efficient modular or mobile homes would be another possible way to share in the efficiency gains available in new residential construction.

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[23] KPCo's responses to KDOE Information Requests #3 and #4.

[24] Heschong Mahone Group, "Skylighting and Retail Sales," submitted to Pacific Gas and Electric Company on behalf of the California Board for Energy Efficiency Third Party Program, 1999.

[25] Romm, Joseph J. and William D. Browning, "Greening the Building and the Bottom Line: Increasing Productivity Through Energy-Efficient Design," Rocky Mountain Institute, Boulder, Colorado, 1994, p. 11.

[26] Heschong Mahone Group, "Daylighting in Schools: An Investigation into the Relationship Between Daylighting and Human Performance," submitted to Pacific Gas and Electric Company on behalf of the California Board for Energy Efficiency Third Party Program, 1999.

[27] Romm and Browning, op. cit., pp. 8-9.

An instructive example of what other investor-owned utilities are doing is the Pacific Gas & Electric Energy Center (PEC), established by PG&E in December, 1991. The PEC provides educational programs, consulting services and building performance tools to architects, HVAC engineers, electrical engineers, lighting designers, building owners, facility managers, and facility engineers. Its goal is to train professionals and create a sustainable market demand for energy-efficient design and products. It applies a whole-building approach aimed at optimizing owner value, user comfort, and energy efficiency.[28] A recent study concluded that the PEC is effectively reaching its intended audience and is causing long-lasting behavioral changes that lead to more energy-efficient buildings.[29]

A multi-pronged program aimed at transforming the market for energy-efficient new commercial buildings would encompass training and technical assistance for the numerous parties involved in design, construction, and financing within this market sector. It could include an awards program to recognize and reward the parties involved in producing and operating highly efficient new buildings. ULH&P could work with building code officials to "raise the floor" of allowable performance, thus complementing the awards program that affects the high-performance end. The company could help promote the use of energy lease agreements to reduce the problem of split incentives between commercial landlords and tenants.[30] Another way to impact the low-efficiency end of the market would be to invert the hookup fee policy that is now in effect so that energy-efficient new buildings would be charged a low fee, or even would receive a rebate for hooking up to the grid, while energy sieves would be charged a much higher fee to cover some of the additional costs of distributing power to an inefficient building over its

[28] Pacific Energy Center web site.

[29] Reed, John H. and Nicholas P. Hall, "PG&E Energy Center Market Effects Study," TecMRKT Works, Arlington, Virginia, May, 1998.

[30] Alliance to Save Energy, "Guidelines for Energy Efficient Commercial Leasing Practices," Washington, DC, 1992.

lifetime. If the fee differential were set high enough, such a policy would affect a building's initial costs, which would get the immediate attention of a segment of the market that might not otherwise respond to information about energy efficiency.

C) Promote Cogeneration and Other Distributed Generation

Central power plants are on the order of 33% efficient, with the remaining two-thirds or so of the fuel energy converted to waste heat. As noted by Trigen's Thomas Casten, however, combined heat and power systems can make beneficial use of 80% or more of the energy content of the fuel.[31] A firm seeking to optimize the efficiency of the energy sector as a whole would develop programs to enable customers with sizeable thermal loads to put this vast amount of wasted energy to use, and would develop shared savings arrangements to enable both parties to benefit from the increase in system efficiency.

Some analysts believe that the electric industry of the future will make much greater use of small-scale, distributed generation units, and that such a trend would fit well with the needs of a more competitive industry.[32] Distributed resources "could be applied at or near customer sites to manage multiple energy needs and to meet increasingly rigorous requirements for power quality and reliability. Distributed generators could also be deployed at utility sites – for example, at substations for transmission and distribution grid support. Some experts predict that 20% or more of all new generating capacity built in the United States over the next 10 to 12 years could be for distributed applications."[33]

In an effort to promote cost-effective distributed generation and renewable energy technologies, approximately thirty states have instituted "net metering."[34] Net metering laws

[31] Casten, Thomas R. and Mark C. Hall, "Barriers to Deploying More Efficient Electrical Generation and Combined Heat and Power Plants," Trigen Energy Corp., revised March, 2000.
[32] Moore, Taylor, "Emerging Markets for Distributed Resources," *EPRI Journal*, March/April, 1998, pp. 8-17.
[33] *Ibid.*, pp. 9-10.
[34] Starrs, Thomas J., "Summary of State Net Metering Programs (Current)," updated September, 1999.

(enacted by legislatures) or orders (instituted by public utility commissions) require electric utilities to purchase excess power from small-scale, renewable sources at the same retail rate they charge those customers. In effect, the owner of a small photovoltaic system can "run the meter backwards" when the system is producing more power than needed. Net metering policies usually set an upper limit on the size of the systems that are covered, and usually prohibit the utility from erecting other barriers such as unreasonably burdensome interconnect and safety requirements.

Net metering would make small-scale distributed generation by customers more economically feasible. Because power is generated on-site, distributed generation would reduce transmission and distribution losses and improve the efficiency of the electricity grid. Certain renewable energy technologies such as photovoltaics can reduce costs system-wide by producing at their peak output on hot, sunny, summer days when the system may be facing its peak annual load.

The Rocky Mountain Institute has performed detailed research on the question of the value of distributed generation to utility companies. They conclude that "Properly counting approximately 75 documented and measurable diseconomies of scale, not just the few well-known economies of scale, will typically make decentralized ways to make, store, or save electricity around ten times more valuable than conventionally scale-blind comparisons had long shown."[35] If their analysis is even close to correct, it suggests that Cinergy/ULH&P may be able to garner substantial economic benefits from distributed generation technologies that are now being overlooked because of outmoded analytical methods.

[35] Rocky Mountain Institute, "Scale in Power Systems," 1999, www.naturalcapitalism.org/sitepages/pid27.asp

D) Support Statewide and Regional Market Transformation Initiatives

The term "market transformation" refers to a set of planned interventions in the market that lead to longer-lasting impacts than traditional utility-sponsored DSM programs that are dependent on ongoing rebates for their effectiveness.[36,37]

Although some market transformation initiatives may not offer as much potential for short-term profit as some of the other measures discussed above, the participation of Cinergy/ULH&P in market transformation activities could help the company establish its image in the market as an expert in energy efficiency, and as a company dedicated to maximizing the value its customers receive from the energy they purchase.

Regional market transformation alliances have been established in California, the Northwest, the Northeast, and the Midwest. Efforts typically involve a wide range of participants, and may include utilities, energy users, manufacturers, vendors, engineers, architects, construction firms, developers, building code officials, building owner associations, real estate professionals, lending institutions, federal agencies such as the U.S. Department of Energy and U.S. Environmental Protection Agency, state energy offices, and other parties.[38]

Kentucky companies and other interested organizations would be eligible to join the Midwest Energy Efficiency Alliance (MEEA). The mission of MEEA is "to work as a regional network of organizations to develop, design and implement energy efficiency and renewable energy resources in the rapidly-changing Midwest energy markets. The goals are to increase

[36] Meyers, Edward M., Stephen M. Hastie, and Grace M. Hu, "Using Market Transformation to Achieve Energy Efficiency: The Next Steps," *Electricity Journal*, May, 1997, pp. 34-41.
[37] Hall, Nick and John Reed, "Market Transformation: Expectations vs. Reality," *Home Energy*, July/August, 1999, pp. 16-20.
[38] Meyers et al., op. cit., p. 40.

public value, improve environmental quality, lower energy costs, and promote sustainable economic development."[39]

The Northwest Energy Efficiency Alliance, founded in 1997, has already reduced regional demand by 16 MW through market transformation initiatives related to compact fluorescent light bulbs, residential clothes washers, and semiconductor manufacturing process improvements.[40] The California Board for Energy Efficiency administers a variety of market transformation programs, including increasing the use of performance contracting with energy service companies, work with lighting manufacturers and distributors to bring energy-efficient lighting products to the market, home duct system improvements, and design tools for commercial architects and engineers.[41] Northeast Energy Efficiency Partnerships, Inc., has started market transformation programs in diverse areas including residential appliances, energy codes, high-efficiency motors, and commercial lighting design.[42]

E) Launch a Kentucky Design Initiative

The foregoing discussion has emphasized the large potential efficiency gains that can be made through improved design of energy systems. RMI quotes the following example provided by senior mechanical engineer Eng Lock Lee:

> A typical colleague may specify nearly $3 million worth of heating, ventilating, and air-conditioning (HVAC) equipment every year – enough to raise a utility's summer peak load by a megawatt. Producing and delivering that extra megawatt conventionally requires the utility to invest several million dollars in infrastructure. If better engineering education were ultimately responsible for the equipment's being made 20-50 percent more efficient (a reasonably attainable and usually conservative goal), then over a 30-year engineering career, the utility would avoid about $6-15 million in present-valued investments *per brain*,

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[39] Midwest Energy Efficiency Alliance web page, updated 2/23/00.

[40] Northwest Energy Efficiency Alliance, "Northwest Utilities to Invest $100 Million in Energy Efficiency through a Regional Alliance," press release, March 17, 2000.

[41] California Board for Energy Efficiency, "About the CBEE," web page updated 9/15/99.

[42] Northeast Energy Efficiency Partnerships Initiatives web page.

> without taking into account any of the savings in operating energy or pollution. This returns at least a hundred to a thousand times the extra cost of that better education. The savings would cost even less if good practitioners disseminated their improved practices through professional discourse, mentoring, or competition, so that educating just one engineer could influence many more.[43]

A company dedicated to providing optimum value to the purchasers of its energy services should be keenly interested in improving the quality of energy system design and engineering. The design of better industrial processes is particularly important. A comprehensive market transformation strategy cannot afford to overlook this high-leverage activity, and could use strategies such as awards, seminars, scholarships, and on-the-job training to encourage better whole-system design.

VI. CONCLUSION

The foregoing discussion was intended to illustrate some of the ways we believe that energy efficiency can be improved significantly in every sector of the market. Achieving these potential efficiency gains will involve numerous parties in addition to the utility company, and it will require the development of imaginative, market-oriented strategies over a sustained period of time. While the task is not wholly the responsibility of the utility, we believe it still has an important role to play. The benefits to customers, the utility company, and society as a whole will make increased efforts in this area more than worthwhile.

A good way to identify promising market opportunities is to focus on total resource costs. Wherever a TRC analysis or life-cycle cost analysis indicates a large savings potential, the market may be ripe for the development of a particular new energy service offering, shared savings arrangement, or market transformation initiative. We hope that ULH&P will seriously consider market-transforming initiatives such as those outlined above, and will work toward the

[43] Hawken et al., *Natural Capitalism.*, pp. 111-112.

development of a variety of ways to improve end-use efficiency within Kentucky's energy sector while at the same time expanding its opportunities to earn financial returns for its shareholders.

VERIFICATION

I, Geoffrey M. Young, state that I have written the above document and that to the best of my knowledge and belief all statements and allegations contained therein are true and correct.

Geoffrey M. Young

Geoffrey M. Young, Assistant Director
Division of Energy
Department for Natural Resources

Subscribed and sworn to before me by Geoffrey M. Young, this the 1st day of May, 2000.

Martha Sherrow

NOTARY PUBLIC

My Commission Expires: March 3, 2004.

Respectfully submitted,

IRIS SKIDMORE
RONALD P. MILLS
Office of Legal Services
Fifth Floor, Capital Plaza Tower
Frankfort, Kentucky 40601
Telephone: (502) 564-6676

COUNSEL FOR NATURAL RESOURCES
AND ENVIRONMENTAL PROTECTION CABINET

CERTIFICATE OF SERVICE

I hereby certify that on the 1st day of May, 2000 a true and accurate copy of the foregoing KENTUCKY DIVISION OF ENERGY'S COMMENTS RELATED TO THE 1999 RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY was mailed, postage pre-paid, to the following:

Honorable John J. Finnigan, Jr.
Senior Counsel Cinergy Corp.
139 East Fourth Street
Rm 25 AT II, P.O. Box 960
Cincinnati, OH 45201 0960

Hon. Elizabeth E. Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, Kentucky 40601

Iris Skidmore

Paul E. Patton, Governor

Ronald B. McCloud, Secretary
Public Protection and
Regulation Cabinet

Martin J. Huelsmann
Executive Director
Public Service Commission

COMMONWEALTH OF KENTUCKY
PUBLIC SERVICE COMMISSION
211 SOWER BOULEVARD
POST OFFICE BOX 615
FRANKFORT, KENTUCKY 40602-0615
www.psc.state.ky.us
(502) 564-3940
Fax (502) 564-3460

B. J. Helton
Chairman

Edward J. Holmes
Vice Chairman

Gary W. Gillis
Commissioner

April 28, 2000

Mr. John J. Finnegan, Jr.
107 Brent Spence Square
Covington, Kentucky 41011

Ms. Elizabeth Blackford
Assistant Attorney General
Division of Rate Intervention
P.O. Box 2000
Frankfort, Kentucky 40602-2000

Ms. Iris P. Skidmore
Counsel for Natural Resources
And Environmental Protection
Office of Legal Services
Fifth Floor, Capital Plaza Tower
Frankfort, Kentucky 40601

Mr. John Stapleton
Division of Energy
663 Teton Trail
Frankfort, Kentucky 40601

RE: Case No. 99-449
The Union Light, Heat and Power Company

Dear Madams and Sirs:

Enclosed please find a memorandum that has been filed in the record of the above referenced case. Any comments regarding the contents of the memorandum should be submitted to the Commission within five days of receipt of this letter.

Sincerely,

Martin J. Huelsmann
Executive Director

Enclosure

INTRA-AGENCY MEMORNADUM

KENTUCKY PUBLIC SERVICE COMMISSION

FILED
APR 2 8 2000
PUBLIC SERVICE COMMISSION

TO: Case File No. 99-449

FROM: Jeff Shaw

DATE: April 28, 2000

RE: Informal Conference of April 14, 2000
Regarding The Union Light, Heat and Power
Company's 1999 Integrated Resource Plan Filing

On April 14, 2000, and informal conference was held at the Commission's offices in Frankfort, Kentucky, for the purpose of discussing issues related to The Union Light, Heat and Power Company's ("ULH&P") 1999 Integrated Resource Plan ("IRP"). The parties represented at the conference were ULH&P, the Office of the Attorney General ("AG"), the Natural Resources and Environmental Protection Cabinet's Division of Energy ("NREPC") and the Commission Staff. A list of the attendees is attached to this memorandum. ULH&P is part of the Cinergy electric system and serves five counties in the greater metropolitan Cincinnati area on northern Kentucky.

NREPC raised issues regarding the future market for energy efficiency products and how it believed those products should be incorporated into the IRP process. It also discussed the benefits it saw from the development of programs aimed at new construction and construction retrofits that have significant potential for energy savings in both the residential and commercial sectors. It suggested that ULH&P should investigate large-scale customer-driven programs that could result in transforming existing energy markets. One example of this was "Technical Potential Studies" in all customer sectors to compare state of the art technologies with the existing stock of equipment in preparation of changing out old equipment at the time it requires replacement. NREPC suggested that ULH&P should review the effective Demand Side Management ("DSM") programs offered by its sister companies, Public Service of Indiana ("PSI") and Cincinnati Gas and Electric Company ("CG&E"), in Indiana and Ohio for possible implementation in Kentucky. It also recommended that ULH&P look into on-the-bill financing programs to promote the purchase of energy efficient appliances by its customers, changing service connection policies to reward energy-efficient construction, and implementing net metering to support small cogeneration projects.

The AG raised issues concerning the status of ULH&P as a full-requirements wholesale customer of CG&E under Ohio's recently enacted electric restructuring legislation and whether ULH&P would have the opportunity to seek power supplies from the open market after Ohio's restructuring was implemented. The AG expressed concern about the Cinergy system's reliance on purchased power through the year 2003 and whether reliable power supplies could be acquired at reasonable prices given the volatility in the wholesale power markets over the past two years. The AG also urged ULH&P to modify its DSM evaluation model to more accurately measure the value of renewable energy resources that had high capital costs but zero fuel costs. The AG stated that renewable resources with no fuel costs have greater value than what is modeled because the energy generated by those resources that is not used by the utility will be sold off-system at a profit, to the benefit of the utility. The AG also stated that CO_2 emissions should be included in the review of resource options because renewable resources and DSM programs look more attractive if CO_2 costs are included in the evaluation of resource options.

ULH&P indicated that it hoped that electric restructuring legislation in Kentucky would be comprehensive and would address many of the issues raised by NREPC and the AG. ULH&P stated that it had initiated its DSM planning in Kentucky using programs originally offered by PSI and CG&E, but that some of those programs had been discontinued due to lack of participation, particularly by commercial and industrial customers. It also indicated that there were significant limitations on DSM expenditures in both Indiana and Ohio currently and that because of ULH&P's small size, relative to PSI and CG&E, there was little impact, system-wide, from programs in place, or that could be started, in Kentucky. ULH&P stated that during the transition period of Ohio's electric restructuring it would continue to be a full requirements wholesale customer of CG&E, but that after the transition period, ULH&P would have the opportunity to choose a different power supplier. ULH&P indicated that it did not foresee problems with relying on purchased over the next few years due to the number of merchant plants under construction, but that it was looking more at a portfolio approach for power supply resources that would likely include capacity additions prior to 2003. ULH&P indicated that the existing DSM models available from the Electric Power Research Institute did not provide for the types of evaluations the AG had suggested and that it would either have to develop or acquire different models in order to perform those evaluations.

Commission Staff inquired about whether there were plans for either extending the existing wholesale power contract between CG&E and ULH&P or entering into a new contract when the current contract expired at the end of 2001. The Staff also asked about the IRP including 25 MW fuel cells as power supply resources beginning in 2009. The Staff asked about the Cinergy system's plans regarding the NO_x limitations being imposed by EPA to become effective May 2003.

ULH&P stated that the existing contract with CG&E would either be extended through the end of the Ohio restructuring transition period or that a new contract would be executed to remain in effect for that same period of time. ULH&P indicated that the fuel cells included in the IRP were in effect, "placeholders" for a form of low-emission, base-load capacity that it would plan to install within the next 10 years. ULH&P indicated that the Cinergy system was going to be installing Selective Catalytic Reduction devices ("SCRs") on its larger base-load generating units and that it would be installing Selective Non-Catalytic Reduction ("SNCRs") devices on the older and smaller units that are used as intermediate or peaking capacity. ULH&P stated that SNCR technology, while acceptable for smaller, intermediate and peaking units, was not a proven technology for larger base-load units. ULH&P indicated, with the May 2003 deadline imposed by EPA, that it had already entered into contracts with catalyst manufacturers and was in the process of securing contracts with the contractors, steelworkers, and other laborers necessary to perform the installation of the SCRs.

The conference was adjourned after Staff reminded the parties of the schedule for filing written comments and reply comments on ULH&P's IRP filing and the issues discussed at the informal conference.

Paul E. Patton, Governor

Ronald B. McCloud, Secretary
Public Protection and
Regulation Cabinet

Martin J. Huelsmann
Executive Director
Public Service Commission

Commonwealth of Kentucky
Public Service Commission
211 Sower Blvd.
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B.J. Helton
Chairman

Edward J. Holmes
Vice Chairman

Gary W. Gillis
Commissioner

April 6, 2000

John J. Finnigan, Jr., Esq.
107 Brent Spence Square
Covington, Kentucky 41011

RE: Union Light, Heat and Power Company
Case No 99-449
Petition for Confidential Protection

Dear Mr. Finnigan:

The Commission has received your petition filed March 29, 2000, on behalf of Union Light, Heat and Power Company to protect as confidential certain parts of Petitioner's response to PSC data request concerning Petitioner's Integrated Resource Plan. A review of the information has determined that it is entitled to the protection requested on the grounds relied upon in the petition, and it will be withheld from public inspection.

If the information becomes publicly available or no longer warrants confidential treatment, you are required by 807 KAR 5:001, Section 7(9)(a) to inform the Commission so that the information may be placed in the public record.

Sincerely,

Martin J. Huelsmann
Executive Director

Cinergy Corp.
139 East Fourth Street
Rm 25 AT II
P.O. Box 960
Cincinnati, OH 45201-0960
Tel 513.287.3601
Fax 513.287.3810
jfinnigan@cinergy.com

John J. Finnigan, Jr.
Senior Counsel

CINERGY.

RECEIVED
MAR 29 2000
PUBLIC SERVICE COMMISSION

March 28, 2000

VIA OVERNIGHT MAIL

Honorable Martin J. Huelsmann
Executive Director
Public Service Commission
211 Sower Boulevard
P. O. Box 615
Frankfort, KY 40602

Re: In the Matter of: THE REQUEST OF THE UNION LIGHT, HEAT AND POWER COMPANY FOR CONFIDENTIAL TREATMENT OF INFORMATION

Dear Executive Director Huelsmann:

Enclosed herewith please find an original and 11 copies of The Union Light, Heat and Power Company's Petition for Confidentiality. Also enclosed under separate cover are the documents for which ULH&P seeks confidential treatment in connection with the case styled *In the Matter of A Review Pursuant to 807 KAR 5:0058 of the 1999 Integrated Resource Plan of The Union, Light and Power Company,* Case No. 99-449.

A copy of the enclosed Petition and attached redacted documents has been sent to all parties of record in this case of even date herewith.

I would appreciate your returning a time stamped copy of the enclosed petition in the enclosed, self-addressed envelope. Please call me at 513-287-3601 if you have any questions.

Very truly yours,

John J. Finnigan

John J. Finnigan, Jr.
Senior Counsel

Enclosures as stated.

JJF/nlb

RECEIVED
MAR 29 2000
PUBLIC SERVICE COMMISSION

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of the Request of The Union Light, Heat and Power Company for Confidential Treatment of Information)))

Case No. 99-449

PETITION FOR CONFIDENTIALITY

Now comes The Union Light, Heat and Power Company ("ULH&P"), Petitioner, to respectfully ask the Kentucky Public Service Commission ("Commission") to afford confidentiality to the following documents, tendered this day in conformance with 807 KAR 5.011, as such information is proprietary information and meets the test set forth in the Commission's regulations for confidential treatment of information. These are all documents that the Commission's Staff has requested ULH&P to produce in connection with the case styled: *In the Matter of A Review Pursuant to 807 KAR 5:058 of the 1999 Integrated Resource Plan of the Union Light, Heat and Power Company,* Case No. 99-449. The documents for which ULH&P seeks confidential treatment are:

(1) Page GA-158 of the General Appendix of ULH&P's IRP filing. This page contains the SO2 compliance supply curve data for Cinergy's generating stations;

(2) Price estimates for combustion turbine and combined cycle units, which responds to data request no. 23 of the Staff's first set of data requests;

(3) Studies showing that fuel cells will be commercially available in 25 mw during the 2009-2019 time period, which responds to data request no. 25 of the Staff's first set of data requests;

(4) SO2 compliance supply curve data for Cinergy's generating stations, which responds to data request no. 28 of the Staff's first set of data requests;

(5) NO2 compliance data for Cinergy's generating stations, which responds to data request no. 29 of the Staff's first set of data requests;

(6) Reserve margin study, which responds to data request no. 1 of the Staff's second set of data requests.

Respectfully submitted,

John J. Finnigan, Jr. (86657)
107 Brent Spence Square
Covington, Kentucky 41011
(513) 287-3601
Attorney for The Union Light, Heat and Power Company

I. Background

The procedure for obtaining confidential protection of information filed with the Commission is set forth in 807 KAR 5:001, Section 7. This regulation requires any person wishing to protect information filed with the Commission as confidential to submit a formal written petition identifying the material sought to be protected and setting forth the specific grounds upon which the petition is based. To qualify for protection as confidential commercial information, the petition must establish that the information cannot be obtained from other sources and that disclosure is likely to cause substantial competitive harm to the party who filed the information. In order to satisfy this test, the party claiming confidentiality must demonstrate actual competition and a likelihood of substantial competitive injury if the information is disclosed. Competitive injury occurs when disclosure of the information gives competitors an unfair business advantage.

II. Rationale for Confidentiality Protection

The information in question cannot be obtained from any other source. The information is proprietary to ULH&P and/or its consultants. The information contains specific details regarding ULH&P's operating costs and lists specific activities that ULH&P intends to follow to comply with environmental regulations and reliability council guidelines for operating its generating stations. If disclosed, this information would permit competitors to construct the cost structure for power generated by The Cincinnati Gas & Electric Company, ULH&P's parent company. Excess power generated by CG&E is sold into the wholesale power market. There are several other companies that compete in the wholesale power market in this area.

If these competitors knew CG&E's cost structure, they would gain a substantial advantage in pricing their own power to compete with sales of power generated by CG&E. This would lead to fewer sales and less revenue. Since ULH&P obtains its power from CG&E, ULH&P's cost for obtaining power would ultimately increase. This would give ULH&P's competitors an unfair business advantage.

WHEREFORE, The Union Light, Heat and Power Company respectfully requests that the Commission treat the information described herein as confidential by timely granting its Petition for Confidentiality.

Respectfully submitted,

John J. Finnigan, Jr. (86657)
107 Brent Spence Square
Covington, Kentucky 41011
(513) 287-3601
Attorney for The Union Light, Heat and Power Company

Dated: March 27, 2000

Doc. no. 57850

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing Responses was served on the following parties by overnight mail, this 28th day of March, 2000.

John J. Finnigan

John J. Finnigan, Jr.

Iris Skidmore
Ronald P. Mills
Office of Legal Services
Fifth Floor, Capital Plaza Towe
Frankfort, Kentucky 40601

Richard Raff
Public Service Commission of Kentucky
211 Sower Boulevard
Frankfort, Kentucky 40602

Elizabeth E. Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, Ky 40601

CONFIDENTIAL

2009 Cinergy Compliance Supply Curve Data

Unit/Year	Option/Breakpoint	SO2 Tons Removed	Unit Specific Cost	Joint Cost	Average Cost $/Ton	Marginal Cost $/Ton
GALLAGHER/2009						
BECKJORD/2009						
CAYUGA/2009						
CONESVILLE/2009						
GIBSON/2009						
KILLEN/2009						
MIAMI FORT/2009						
STUART/2009						
WABASH/2009						
CAYUGA/2009						
GALLAGHER/2009						
STUART/2009						
WABASH/2009						
CONESVILLE/2009						
WABASH/2009						
GIBSON/2009						
MIAMI FORT/2009						
BECKJORD/2009						
BECKJORD/2009						
MIAMI FORT/2009						
MIAMI FORT/2009						
BECKJORD/2009						
GIBSON/2009						
MIAMI FORT/2009						
GIBSON/2009						
CONESVILLE/2009						
STUART/2009						
BECKJORD/2009						
BECKJORD/2009						
MIAMI FORT/2009						
GALLAGHER/2009						
KILLEN/2009						
BECKJORD/2009						
CAYUGA/2009						
STUART/2009						
MIAMI FORT/2009						
KILLEN/2009						
WABASH/2009						
GALLAGHER/2009						
MIAMI FORT/2009						
BECKJORD/2009						
MIAMI FORT/2009						
BECKJORD/2009						

CONFIDENTIAL & PROPRIETARY

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Supply-Side Alternatives for 1999 IRP

Note:$/kW figures are based on ISO rating

Alternative	Years Available	Months Available	Capital ($/kW) (1999 $'s)	Average Capital Escalation	LFCR	Book Life	Oper. Life	ISO Rating	Summer Rating	Winter Rating	Fixed O&M ($/kW-yr) (1999 $'s)	Variable O&M ($/MWh) (1999 $'s)
New CT w/ cooling	2002-2003											
TAG New CT w/ cooling	2004-2020											
New CC w/ cooling	2002-2003											
T[illegible] New CC w/ cooling	2004-2020											

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Table FC-2 Technology Process Development "Map"

Process Identification

Unit capacity

Operating temp.
& pressure

Major Features and Adv
Environmental

Fuel Cell

Fuel Conversion

Integration

Heat Rate, HHV

Major Disadvantages
Fuel Conversion

Others

Key technology needs

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Development Timeframe
- Research
- Development
- Demonstration

Commercialization Date

Key Issues

Dec 1998 $

Technology Name
Technology ID
Base Tech ID
Unit Size, MW
Number of Units
Region
State
Fuel ID
Fuel Name
Economic Scenario ID
Economic Scenario Name
First Commer Service, yr
Avail Commer Order, yr

Duty Cycle
Capacity Factor, %
Minimum Load, %
Preconstruction Time, yr
Plant Construct Time, yr
Booklife, yr
Taxlife, yr
Depreciation Method
Unit Life, yr
Land Required, Ac/MW

Tech Development Rating
Cost Estimate Rating

Process Capital, $/kW
General Facilities, $/kW
Eng/Home Office Fees, $/kW
Project Contingency, $/kW
Process Contingency, $/kW
Total Plant Cost, $/kW

Total Cash Expended, $/kW
AFUDC, $/kW
Total Plant Investment, $/kW
  Royalties, $/kW
  Preproduction, $/kW
  Land Cost, $/kW
  Chemicals $/kW
  Inventory, $/kW
  Other Inventory, $/kW
  Other Owner Costs, $/kW
Owner Costs, $/kW
Total Capital Required, $/kW

Full Heatrate, Btu/kWh
75% Heatrate, Btu/kWh
50% Heatrate, Btu/kWh
25% Heatrate, Btu/kWh
Avg Heatrate, Btu/kWh
Heatrate used in Analysis

ec 1998 $

Technology Name
FIXED O&M, $/kW-yr
Operating Labor
Other Operating
Total Fixed Operating Cost
Maint-Labor
Maint-Material
Other Maintenance
Total Fixed Maint. Cost
Other Fixed O&M
Environmental FOM Total
Total Fixed O&M

VARIABLE O&M, mills/kWh
Inspections
Other Inc. Maint.
Other Variable O&M
Production(tax) Credit
Environmental VOM Total
Consumables
Water Required, GPM/MW
Water Cost, mills/kWh
Chemicals/Catalyst tons/GWh
Chem./Cat. Cost, mills/kWh
Sulfur Removed, %
Sorbent Name
Sorbent Consumed, tons/GWh
Sorbent Cost, mills/kWh
Byproduct Name
Byproduct, Units
Byproduct, Amount
Byproduct Credit, mills/kWh
Total Ash, tons/GWh
Ash Cost, mills/kWh
Solid Waste, tons/GWh
Solid Waste Cost, mills/kWh
Liquid Waste, GPM/MW
Liquid Waste Cost, mills/kW
Other Consumables, mills/kW
Other Byprod Cred, mills/kW
Emission Consume, mills/kWh
Net Consumables, mills/kWh
Total Variable O&M, mills/kWh

c 1998 $

Technology Name Adj
EMISSIONS
Air, lb/MWh
CO_2
CO
SO_2
NOx
Particulates
Liquid, gpm/MW
Waste Water
Other Liquids
Solids, lb/MWh
Non-Consumable Waste
Spent Catalyst
Sludge
Bottom Ash
Fly Ash
Fly Ash w/Nahcolite
Ash as Slag
Sorbent Dry Waste
Sorbent Byproduct
Total Costs
Capital Cost, $/kW
Fixed O&M, $/kW-yr
Variable O&M, $/kWh
Consumables, $/kWh

After Tax Lev. Discount Rate,%
Levelized Busbar Costs, mills/kWh
Capital
O&M
Fuel
Total

Planned Outage Rate, %
Unplanned Outage Rate, %
Equiv. Planned Outage, %
Equiv. Unplanned Outage, %

Operating Availability, %
Equivalent Availability, %
Avg Daily Unavail, %
Capability Ratio, %

Construction Profile, %/yr
Yr 1
Yr 2
Yr 3
Yr 4
Yr 5
Yr 6
Yr 7
Yr 8
Yr 9
Yr 10

Time varying data

CONFIDENTIAL

2000 Cinergy Compliance Supply Curve Data

Unit/Year	Option/Breakpoint	SO2 Tons Removed	Unit Specific Cost	Joint Cost	Average Cost $/Ton	Marginal Cost $/Ton
GALLAGHER/2000						
BECKJORD/2000						
CAYUGA/2000						
CONESVILLE/2000						
GIBSON/2000						
KILLEN/2000						
MIAMI FORT/2000						
STUART/2000						
WABASH/2000						
WABASH/2000						
GALLAGHER/2000						
GALLAGHER/2000						
CONESVILLE/2000						
STUART/2000						
BECKJORD/2000						
BECKJORD/2000						
MIAMI FORT/2000						
MIAMI FORT/2000						
MIAMI FORT/2000						
GIBSON/2000						
WABASH/2000						
WABASH/2000						
GIBSON/2000						
MIAMI FORT/2000						
CAYUGA/2000						
BECKJORD/2000						
GIBSON/2000						
CAYUGA/2000						
STUART/2000						
MIAMI FORT/2000						
CONESVILLE/2000						
MIAMI FORT/2000						
KILLEN/2000						
BECKJORD/2000						
KILLEN/2000						
BECKJORD/2000						
WABASH/2000						
MIAMI FORT/2000						
WABASH/2000						
GALLAGHER/2000						
MIAMI FORT/2000						
BECKJORD/2000						
BECKJORD/2000						
BECKJORD/2000						
MIAMI FORT/2000						
BECKJORD/2000						
MIAMI FORT/2000						
STUART/2000						
KILLEN/2000						
WABASH/2000						

CONFIDENTIAL

2009 Cinergy Compliance Supply Curve Data

Unit/Year	Option/Breakpoint	SO2 Tons Removed	Unit Specific Cost	Joint Cost	Average Cost $/Ton	Marginal Cost $/Ton
GALLAGHER/2009						
BECKJORD/2009						
CAYUGA/2009						
CONESVILLE/2009						
GIBSON/2009						
KILLEN/2009						
MIAMI FORT/2009						
STUART/2009						
WABASH/2009						
CAYUGA/2009						
GALLAGHER/2009						
STUART/2009						
WABASH/2009						
CONESVILLE/2009						
WABASH/2009						
GIBSON/2009						
MIAMI FORT/2009						
BECKJORD/2009						
BECKJORD/2009						
MIAMI FORT/2009						
MIAMI FORT/2009						
BECKJORD/2009						
GIBSON/2009						
MIAMI FORT/2009						
GIBSON/2009						
CONESVILLE/2009						
STUART/2009						
BECKJORD/2009						
BECKJORD/2009						
MIAMI FORT/2009						
GALLAGHER/2009						
KILLEN/2009						
BECKJORD/2009						
CAYUGA/2009						
STUART/2009						
MIAMI FORT/2009						
KILLEN/2009						
WABASH/2009						
GALLAGHER/2009						
MIAMI FORT/2009						
BECKJORD/2009						
MIAMI FORT/2009						
BECKJORD/2009						

CONFIDENTIAL

2005 Cinergy Compliance Supply Curve Data

Unit/Year	Option/Breakpoint	SO2 Tons Removed	Unit Specific Cost	Joint Cost	Average Cost $/Ton	Marginal Cost $/Ton
GALLAGHER/2005						
BECKJORD/2005						
CAYUGA/2005						
CONESVILLE/2005						
GIBSON/2005						
KILLEN/2005						
MIAMI FORT/2005						
STUART/2005						
WABASH/2005						
WABASH/2005						
WABASH/2005						
CAYUGA/2005						
GALLAGHER/2005						
STUART/2005						
GALLAGHER/2005						
CONESVILLE/2005						
MIAMI FORT/2005						
GIBSON/2005						
BECKJORD/2005						
BECKJORD/2005						
MIAMI FORT/2005						
WABASH/2005						
GIBSON/2005						
GIBSON/2005						
WABASH/2005						
MIAMI FORT/2005						
BECKJORD/2005						
MIAMI FORT/2005						
CONESVILLE/2005						
BECKJORD/2005						
STUART/2005						
KILLEN/2005						
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KILLEN/2005						
WABASH/2005						
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BECKJORD/2005						
MIAMI FORT/2005						
BECKJORD/2005						
MIAMI FORT/2005						
BECKJORD/2005						
CAYUGA/2005						
MIAMI FORT/2005						
BECKJORD/2005						
BECKJORD/2005						
MIAMI FORT/2005						
STUART/2005						
KILLEN/2005						

Figure GA-6-3

1999 IRP Economic CAAA Compliance Options											
	Option in Indicated Years										
Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Beckjord 5&6											
Wabash River 2-6											
Gallagher 1-4											
Cayuga 1&2											
Stuart 1-4											
All other units											

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Figure GA-6-4
Summary of Base Case NOx Compliance Plan

Unit	Recommended NOx Compliance Plan
Cayuga 1	
Cayuga 2	
East Bend 2	
Edwardsport 6	
Edwardsport 7	
Edwardsport 8	
Gallagher 1	
Gallagher 2	
Gallagher 3	
Gallagher 4	
Gibson 1	
Gibson 2	
Gibson 3	
Gibson 4	
Gibson 5	
Miami Fort 5	
Miami Fort 6	
Miami Fort 7	
Miami Fort 8	
Noblesville 1	
Noblesville 2	
Wabash River 1	
Wabash River 2	
Wabash River 3	
Wabash River 4	
Wabash River 5	
Wabash River 6	
W.C. Beckjord 1	
W.C. Beckjord 2	
W.C. Beckjord 3	
W.C. Beckjord 4	
W.C. Beckjord 5	
W.C. Beckjord 6	
W.H. Zimmer 1	

Key
SCR
SNCR
LNB
OFA
LNCDS II

DRAFT

CINERGY GENERATION RELIABILITY AND SECURITY
Criteria During The Transition To Customer Choice

Cinergy Corp.
139 East Fourth Street
Rm 25 AT II
P.O. Box 960
Cincinnati, OH 45201-0960
Tel 513.287.3601
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jfinnigan@cinergy.com

John J. Finnigan, Jr.
Senior Counsel

RECEIVED
MAR 22 2000
PUBLIC SERVICE COMMISSION

CINERGY.

MAR 21 2000
GENERAL COUNSEL

March 20, 2000

VIA OVERNIGHT MAIL

Richard Raff
Staff Attorney
Public Service Commission of Kentucky
211 Sower Blvd.
P. O. Box 615
Frankfort, Kentucky 40602

RE: In the Matter of A Review Pursuant to 807 KAR 5:058 of The 1999 Integrated Resource Plan of The Union Light, Heat and Power Company
Case No. 99-449

Dear Mr. Raff:

Enclosed is an original and 6 copies of The Union Light, Heat and Power Company's responses to the Commission Staff's Supplemental Requests for Information in the above captioned case.

Very truly yours,

John J. Finnigan nlb

John J. Finnigan
Senior Counsel

JJF/nlb

Enclosure

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing Responses was served on the following parties by overnight mail, this 20th day of March, 2000.

John J. Finnigan, Jr.

RECEIVED
MAR 22 2000
PUBLIC SERVICE
COMMISSION

Iris Skidmore
Ronald P. Mills
Office of Legal Services
Fifth Floor, Capital Plaza Towe
Frankfort, Kentucky 40601

Richard Raff
Public Service Commission of Kentucky
211 Sower Boulevard
Frankfort, Kentucky 40602

Elizabeth E. Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, Ky 40601

RECEIVED
MAR 2 1 2000
GENERAL COUNSEL

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058 OF	
THE JOINT 1999 INTEGRATED RESOURCE	)
PLAN OF THE UNION LIGHT, HEAT AND	) CASE NO.99-449
POWER COMPANY	)

THE UNION LIGHT, HEAT AND POWER COMPANY'S RESPONSES TO COMMISSION STAFF'S REQUEST FOR INFORMATION TO THE UNION LIGHT, HEAT AND POWER COMPANY

March 20, 2000

KY PSC
Staff Data Request Set No. 2
Case No. 99-449
Date Received: March 1, 2000
Response Due Date: March 21, 2000

KyStaff-02-001

REQUEST:

1. Refer to Item 3 of the response to the Commission Staff's initial request for information. The response indicates the latest reserve margin study performed by PSI was in 1991 and that the most recent study which documented CG&E's stand-alone reserve margin of 17 percent, which is what was adopted for the Cinergy system at the time of the merger, cannot be located.

a. As the result of reserve margin planning studies performed within the past five years, both the AEP system and the combined LG&E/KU system are using planning reserve margins of 12 percent. Recognizing that reserve margin criteria vary from one utility to another, was Cinergy aware of the lower reserve margins being used by these neighboring systems?

b. Explain why a reserve margin study has not been performed for the Cinergy system since the time of the merger of CG&E and PSI.

RESPONSE:

a. Yes.

b. ULH&P has previously produced the reserve margin study supporting the 17% reserve margin, as requested by the Staff's previous data requests. Following the merger of CG&E and PSI in 1994, an analysis of generation reliability and security was performed, and a draft report was prepared for the Cinergy operating system. A copy of the draft report will be filed under seal. Neither the analysis, nor the report were approved internally by Cinergy, and the draft does not incorporate comments or changes that probably would have been incorporated as a result of a rigorous internal review. The recommendations of the draft report also would have had to have been approved by the Indiana, Kentucky, and Ohio state commissions as well as the FERC, as required to amend the Operating Agreement, in order to officially change the planning reserve criteria. However, partially based on some of the results contained in the draft report, the Cinergy Operating Committee, during its Fall/Winter meetings, has generally approved year-by-year operating reserve levels below 17% for the upcoming summer peak seasons.

WITNESS RESPONSIBLE:

Diane Jenner

KY PSC
Staff Data Request Set No. 2
Case No. 99-449
Date Received: March 1, 2000
Response Due Date: March 21, 2000

KyStaff-02-002

REQUEST:

2. Refer to Item 8 of the response to the Commission Staff's initial request for information. The response indicates that the analysis used to identify the breakpoints associated with the relationship between load and temperature used peak load data from the hot summer of 1988.

a. Explain why load data from the summer of 1988 was used in this analysis.

b. Identify and describe any limitations as to the data that is available for more recent summers that might have been as hot or hotter than 1988 that causes the analysis to use data that is nearly 12 years old.

c. This 1999 IRP is the first ULH&P IRP that discusses weather-sensitive industrial usage, which implies that this is a relatively recent development. If that is the case, explain in detail why it is appropriate to not have performed a more current analysis that incorporates this development.

RESPONSE:

a. The summer of 1988 was chosen for its large number of hot days. There were 46 days when the temperature exceeded 90 degrees Fahrenheit. Greater variability in temperature data facilitates the statistical analysis of the relationship of electric load to temperature.

b. There are no limitations.

This was exploratory research to help understand the relationship of electric loads to summer weather. It's major purpose was to help identify the temperature that would be a good criteria for selecting hot days from which to project peak loads. One could develop a summer peak model using only one data point from each year, namely, the load and weather at the time of the peak. However, by using several data points from each year, a better representation of the relationship of electric load to weather can be obtained. Therefore, this exploratory model was utilized to identify all of the summer days that should be included in an electric peak load forecasting model. All days, when the temperature reached or exceeded 90 degrees Fahrenheit, are included in the peak forecasting model shown on page 1-214 of Attachment A of the ULH&P IRP. This applies to all of the historical years on which the peak load model is based.

The resulting criteria, that a hot day should be defined as one where the temperature equals or exceeds 90 degrees Fahrenheit, seems reasonable. There was no need to re-estimate the model using more recent data.

c. This statement is incorrect. The 1993 IRP discusses weather sensitive industrial usage on pages

1-73 and 1-74 of Attachment A.

WITNESS RESPONSIBLE:

James A. Riddle

KY PSC
Staff Data Request Set No. 2
Case No. 99-449
Date Received: March 1, 2000
Response Due Date: March 21, 2000

KyStaff-02-003

REQUEST:

3. Refer to the response to Item 11 of the Commission Staff's initial request for information. From the year-end customer numbers the growth rate for non-electric space heating customers is projected to be somewhat greater than the growth rate for electric space heating customers over the 20-year planning horizon.

a. Identify the specific reasons for differences in growth rates and patterns between the two customer groups.

b. Being a combination utility with a large portion of its electric customers also being its gas customers, ULH&P is a strong summer peaking system. Identify any efforts that have been, or are being, undertaken to promote electric heating or other off-peak uses of electricity that might make for more efficient use of the generating capacity which supplies ULH&P.

c. Provide the results of the most recent surveys performed by ULH&P, CG&E or Cinergy that would demonstrate the preferences among customers for gas heat versus electric heat.

RESPONSE:

a. The saturation of gas space heating is expected to increase at a faster rate than electric space heating. It is also more economical on a price basis to heat with gas than electricity. The most recent residential saturation survey shows that the percentage of newer homes heated with electricity is below the average for all residences heated with electricity.

b. In the past, Cinergy had a direct load control program for air conditioners and an interruptible rate tariff. Currently, Cinergy offers a Real Time Pricing tariff, which impacts off-peak usage of electricity.

c. From the 1997 Residential Saturation Survey of the CG&E service area (which includes ULH&P), 64.3% of the households respond that they have gas heat versus 24.5% for electric. For those who identified their residence as being built during the years 1995 to 1997, 71.4% indicate gas heat versus 22.9% for electric space heat. This demonstrates a strong preference by customers for gas heat over electric heat.

WITNESS RESPONSIBLE:

James A. Riddle

KY PSC
Staff Data Request Set No. 2
Case No. 99-449
Date Received: March 1, 2000
Response Due Date: March 21, 2000

KyStaff-02-004

REQUEST:

4. Refer to Item 20 of the response to the Commission Staff's initial request for information. The `Policies and Procedures Manual" for the Cinergy Services fuel department is approximately four years old and appears to have been prepared shortly after the merger of CG&E and PSI.

a. With Phase II of the Clean Air Act Amendments commencing this year, identify what, if any, modifications might be required to update this manual.

b. Identify any likely changes to Cinergy's current fuel procurement policies and procedures that will result from the electric restructuring that will begin in Ohio in 2001.

RESPONSE:

Cinergy's fuel procurement policies for meeting Phase II of the Clean Air Act Amendments will essentially remain the same as for Phase I. We will try to maintain a large degree of flexibility so that we can move rapidly in response to market conditions. We will evaluate prices for compliance (<1.2 lb SO2/MMBtu) coal, low sulfur coal, high sulfur coal, emission allowance prices, and other SO2 reduction strategies (i.e. adding a scrubber). Based on the market conditions, we will take a least cost strategy to meet the fuel needs of the Company. Our latest projections show that burning low to medium sulfur coal and purchasing allowances is the least cost strategy.

Cinergy does not currently intend to make any changes to its procurement policies and practices due to the electric restructuring in Ohio. We plan to continue to purchase coal that is low cost and meets the quality needs of our units while enabling us to comply with relevant emission limits.

WITNESS RESPONSIBLE:

John Kreinest

COMMONWEALTH OF KENTUCKY
BEFORE THE
PUBLIC SERVICE COMMISSION

IN RE THE MATTER OF:

THE INTEGRATED RESOURCE)
PLAN OF UNION LIGHT) Case No. 99-449
HEAT & POWER)

THE ATTORNEY GENERAL'S SUPPLEMENTAL REQUESTS FOR INFORMATION

Comes now the intervenor, the Attorney General of the Commonwealth of Kentucky, by and through his Office for Rate Intervention, and submits these Requests for Information to Union Light Heat & Power, to be answered in accord with the following:

(1) In each case where a request seeks data provided in response to a staff request, reference to the appropriate request item will be deemed a satisfactory response.

(2) Please identify the company witness who will be prepared to answer questions concerning each request.

(3) These requests shall be deemed continuing so as to require further and supplemental responses if the company receives or generates additional information within the scope of these requests between the time of the response and the time of any hearing conducted hereon.

(4) If any request appears confusing, please request clarification directly from the Office of Attorney General.

(5) To the extent that the specific document, workpaper or information as requested does not exist, but a similar document, workpaper or information does exist, provide the similar document, workpaper, or information.

(6) To the extent that any request may be answered by way of a computer printout, please identify each variable contained in the printout which would not be self evident to a person not familiar with

the printout.

(7) If the company has objections to any request on the grounds that the requested information is proprietary in nature, or for any other reason, please notify the Office of the Attorney General as soon as possible.

(8) For any document withheld on the basis of privilege, state the following: date; author; addressee; indicated or blind copies; all persons to whom distributed, shown, or explained; and, the nature and legal basis for the privilege asserted.

(9) In the event any document called for has been destroyed or transferred beyond the control of the company state: the identity of the person by whom it was destroyed or transferred, and the person authorizing the destruction or transfer; the time, place, and method of destruction or transfer; and, the reason(s) for its destruction or transfer. If destroyed or disposed of by operation of a retention policy, state the retention policy.

Respectfully Submitted,

E Blackford

ELIZABETH E. BLACKFORD
ASSISTANT ATTORNEY GENERAL
1024 CAPITAL CENTER DRIVE
FRANKFORT KY 40601
(502) 696-5453
FAX: (502) 573-4814

NOTICE OF FILING AND CERTIFICATE OF SERVICE

I hereby give notic that this the 29th day of February, 2000, I have filed the original and ten true copies of the foregoing with the Kentucky Public Service Commission at 211 Sower Blvd, Frankfort, Kentucky, 40601, and certify that this same date I have served the parties by mailing true copies of same, postage prepaid, to the following:

JAMES B GAINER
LEGAL DIVISION
THE UNION LIGHT HEAT & POWER CO
139 E FOURTH STREET
CINCINNATI OH. 45202

JJ Blackford

SUPPLEMENTAL DATA REQUESTS OF THE ATTORNEY GENERAL

1) Follow-up to Item 1. Please supply similar total CO2 emission data for the years 1989 through 1994. If all years are not available, please supply the years that are available.

2) Follow-up to Item 1. Please supply the following information for each of the years 1989-1999:

a) Total MWH generated.

b) Total Off-system sales in MWH.

c) Total Internal sales in MWH.

d) Energy losses in MWH.

e) Power Purchases in MWH.

3) Follow-up to Item 9. With respect to Cinergy turning its generating assets over to an unregulated EWG, please supply the following information:

a) Will ULH&P be obligated to purchase its energy from this EWG under its present contract though the EWG is not the Ohio regulated company with which the contract was originally signed. Can ULH&P purchase from other EWGs or utilities under the present contract?

b) After the present contract expires at the end of 2001, will ULH&P be obligated to purchase its energy from this EWG? Will ULH&P be able to purchase from other EWGs or utilities after

2001? Will Cinergy allow purchases from competing EWGs or is there some reason why ULH&P must purchase from the Cinergy EWG?

4) Follow-up to Item 11. Is there a possibility of a new diversity agreement with EKPC or has this arrangement that has been in place for many years permanently ended?

5) Follow-up to Item 16c.

a) With respect to the Cinergy and ULH&P avoided cost rates, is it true that these rates have not been updated in 15 years? If so, why have they not been updated? If they have been updated, please provide the updated rates.

b) With respect to the DSM avoided costs, please explain why there is a dip from 30.7 mils in 1999 to 26.1 mils in 2000.

c) Please quantify any difference between the current DSM avoid costs and the current QF avoided costs.

6) Follow-up to Item 19. This response provided examples suggesting that electric application had fewer CO2 emissions than direct fuel applications (example: lawnmowers). Please provide the analysis, including all calculations, assumptions and workpapers for each of these examples to document the statement that electric substitution will lower CO2 emissions.

7) Follow-up to PSC Item 1-27. For the possible purchase under negotiation that is described in this response, please provide the following information:

a) Expected average annual MWH to be received by Cinergy.

b) Facility's nameplate rating in MW.

c) Expected average summer MW output.

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John J. Finnigan, Jr.
Senior Counsel

February 16, 2000

CINERGY RECEIVED

FEB 22 2000

GENERAL COUNSEL

Deborah T. Eversole
Deputy General Counsel
Public Service Commission of Kentucky
211 Sower Blvd.
P. O. Box 615
Frankfort, Kentucky 40602

RE: In the Matter of: A REVIEW PURSUANT TO 807 KAR 5:058 OF THE 1999 INTEGRATED RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY
Case No. 99-449

Dear Ms. Eversole:

Enclosed are 6 copies of Cinergy/The Cincinnati Gas & Electric Company's 1999 Integrated Resource Plan Volume II dated November 1, 1999 which is referred to in The Union Light, Heat and Power Company's Responses to Requests for Information in the above captioned case.

Very truly yours,

John J. Finnigan *nlb*

John J. Finnigan
Senior Counsel

JJF/nlb

Enclosure

CINERGY®

1996

Integrated Resource Plan

OHIO APPENDIX

VOLUME II

CINERGY®

The Cincinnati Gas & Electric Company

1999

INTEGRATED RESOURCE PLAN

VOLUME II

OHIO APPENDIX

November 1, 1999

By: Cinergy Services
Douglas F. Esamann, Vice President
139 E. Fourth St.
P.O. Box 960
Cincinnati, Ohio 45201-0960

NOTICE

This state-specific Appendix, including the STATUS Report, Volume II, is an integral part of the Cinergy 1999 IRP filing. Please see the submittal letters and other specific filing attachments contained in the front of Volume I of the Cinergy 1999 Integrated Resource Plan.

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OHIO APPENDIX

Table of Contents

IN COMPLIANCE WITH THE CODES OF CONDUCT IN FERC ORDER 889, ALL OF THE FOLLOWING SECTIONS ARE CONTAINED IN THE TRANSMISSION VOLUME OF THIS REPORT, WHICH WAS PREPARED INDEPENDENTLY

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4901:5-5-01

(D)(2)(a) Ohio Energy Strategy

On April 15, 1994, the Public Utilities Commission of Ohio issued The Ohio Energy Strategy Report (OES), the product of lengthy discussion, the collection of comments and ideas, and the assessment of existing state regulations, codes, and policies related to use of energy resources. The OES provides an overall energy policy for the state contained within 7 implementation strategies which include 53 specific initiatives. The major focus of the OES is to "...develop and utilize energy resources in a manner which fosters economic growth, enhances global competitiveness, employs efficiency and conversation standards, and ensures energy security and environmental quality." [1]

The Company has received a copy of the OES and has given it consideration. Several of the strategies contain initiatives applicable to electric utilities.

Strategy I

The first strategy on educational needs contains an initiative to educate utility company customers regarding the benefits of energy efficiency. CG&E has, for many years, provided

[1] The Ohio Energy Strategy Report, p. 7.

customers with information on energy efficiency. Chapter 4 in Volume I, the Short-Term Implementation Plan, and the Status Report of this 1999 filing contain further information on CG&E's specific educational efforts.

Strategy II

Strategy II focuses on conservation and energy efficiency measures. Some specific initiatives for electric utilities involve: (1) developing lending opportunities for low and moderate income energy consumers, (2) promoting direct load control programs to limit electricity consumption during peak demand hours, and (3) establishing electric utility sponsored energy efficiency awards programs for each utility's service area. CG&E has previously implemented programs in accordance with each of the initiatives. However, the loan program and the direct load control program have been discontinued following review and action by the PUCO. The specifics of the remaining programs are provided in Chapter 4 of Volume I, the Short-Term Implementation Plan, and the Status Report of this 1999 filing. In addition, CG&E has been working with residential customers to examine their energy use efficiency through an audit program, which includes extensive education, efficient refrigerator programs, an education program targeting behavior modification addressing the PIPP eligible customers, and has been weatherizing homes in the service area. These actions and the discontinuation of non-residential programs are consistent with PUCO decisions. More detailed information on CG&E's efforts and a discussion of the termination of non-residential programs can be found in Chapter 4 of Volume I, the Short-Term Implementation Plan, and the Status Report of this filing.

Strategy III

Strategy III concentrates on the development of traditional indigenous resources such as coal, oil, and natural gas. The initiatives for electric utilities involve: (1) exploring and establishing cost-effective programs to develop and promote commercial products prepared from fly-ash and other by-products of coal combustion, and (2) encouraging technology transfer, marketing, and exporting of Ohio-supported clean coal technologies. For several years, CG&E has been selling 100,000 tons or more of fly-ash each year through a marketer. Cinergy is also investing capital dollars at Zimmer Station to make high quality synthetic gypsum that will be sold to a new wallboard manufacturing plant. Cinergy expects to create a significant environmental benefit by converting the by-product from the unit's sulfur dioxide scrubber into synthetic gypsum, rather than landfilling it. The amount of material placed in the station's landfill can be reduced by as much as 77 percent.

Strategy IV

Strategy IV involves the research and development of renewable energy resources to enhance the diversity of supply options. Within this strategy, the major initiative affecting electric utilities is Initiative #34 which states, "Expand the list of alternatives that need to be considered in any integrated resource plan to include cogeneration, district heating, and cooling applications, the distributed utility concept, and research and development for renewable energy resources."[2] Cogeneration as a future resource option was discussed in Volume I, Section E of Chapter 5 of this filing, which is repeated below:

> It is Cinergy's practice to cooperate with potential cogenerators and independent power producers. A major concern, however, exists in situations where either customers would be subsidizing generation projects through higher than avoided cost buyback rates, or the safety or reliability of the electric system would be jeopardized. Both PSI and CG&E typically receive several requests a year for independent/small power production and cogeneration buyback rates. Currently, on the CG&E system, prospective cogenerators proposing the sale of 100 kW

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[2] The Ohio Energy Strategy Report, p. 110.

or less are sent both a copy of the filed tariff for small power producers of 100 kW and under, and a copy of the standard interconnection agreement. The larger prospective cogenerators are provided with an explanation of the CG&E methodology for determining avoided cost which is market-based and, if requested, interconnection requirements. The CG&E avoided costs are determined on a case-by-case basis depending on MW size, contract length, and the projected reliability of the cogeneration unit. Currently, on the PSI system, prospective cogenerators are given the interconnection requirements and the current rates under Standard Contract Rider No. 50 - Parallel Operation for Qualifying Facility.

A customer's decision to self-generate or cogenerate is, of course, based on economics. Customers know their costs, profit goals, and competitive positions. The cost of electricity is just one of the many costs associated with the successful operation of their business. If customers believe they can lower their overall costs by self-generating, they will investigate this possibility on their own. There is no way that a utility can know all of the projected costs and/or savings associated with a customer's self-generation. However, during a customer's investigation into self-generation, the customer usually will contact the utility for an estimate of electricity buyback rates. With Cinergy's comparatively low electricity rates and avoided cost buyback rates, cogeneration and small power production are generally uneconomical for most customers.

For these reasons, neither PSI nor CG&E attempts to forecast specific megawatt levels of this activity in their service areas. However, as contracts are signed, the resulting energy and capacity supply will be reflected in future plans. The electric load forecasts discussed in Chapter 3 do consider the impacts on electricity consumption caused by the relative price differences between alternate fuels (such as oil and natural gas) and electricity. As the relative price gap favors alternate fuels, electricity is displaced lowering the forecasted use of electricity and increasing the use of the alternate fuels. Some of the decrease in forecasted electricity consumption may be due to self-generation/cogeneration projects, but the exact composition cannot be determined.

Cinergy has direct involvement in the cogeneration area. In December 1996, Cinergy and Trigen Energy Corporation formed a joint venture, Trigen-Cinergy Solutions, LLC. The joint venture company will build, own, and operate cogeneration and trigeneration facilities for industrial plants, office buildings, shopping centers, hospitals, universities, and other major energy users that can benefit from combined heating/cooling and power production economies.

Other supply-side options such as simple-cycle Combustion Turbines, Combined Cycle units, Fuel Cells, coal-fired units, and/or renewables (all discussed later in this chapter) could represent potential non-utility generating units, power purchases, or utility-constructed units. At the time that Cinergy initiates the acquisition of new capacity, a decision will be made as to the best source.

With regard to district heating and cooling applications, Cinergy's joint venture with Trigen Energy Corporation (Trigen-Cinergy Solutions, LLC) is building and managing a centralized chiller system that will cool downtown Cincinnati.

Trigen is the leading owner and operator of district energy systems in North America, with 23 energy facilities in 13 locations.

The opportunities for district heating in downtown Cincinnati are limited because of the number of buildings built with electric resistance heaters. Conversion of these buildings to a hydronic or a steam system would be very expensive. One major economic barrier is the fact that centralized district energy projects must pay income taxes, while building owners that self cool and heat do not pay income taxes on this service, but generally deduct it as an expense item. As a result, the economic efficiencies created by district energy have to be great enough to absorb all the taxes (the Cincinnati Franchise also has a 4% gross receipts tax) and have a profit remaining, while still being less expensive than self heating or cooling to the building owner/operator.

Fuel Cell technology may be well suited to distributed generation service. Cinergy's research, development, and delivery (RD&D) activities involve Fuel Cell technology. For example, by joining forces with the U.S. Government and Ballard Generation Systems, Cinergy is installing one of the world's first 250 kW class, natural gas-powered, Proton Exchange Membrane (PEM) Fuel Cells. This unit is scheduled to be installed in 1999 at the Naval Surface Warfare Center located in Crane, Indiana. Cinergy is also licensing a 3 kW hydrogen Fuel Cell from Ballard to help develop military and civilian applications. In addition, Cinergy participates in the IEEE Fuel Cell Standards Committee to establish national standards for stationary deployment. As outlined in Volume I, Section F of Chapter 5, Fuel Cells were included in the supply-side screening analysis.

Cinergy has analyzed the use of renewable resources as discussed in Volume I, Section F of Chapter 5 of this filing. The applicable portion is repeated below:

> The information obtained from a continuing review of available alternative energy technologies was considered in the preparation of the 1999 IRP. There is a very limited opportunity to apply renewable resource technologies in Central Indiana, Southwestern Ohio, and Northern Kentucky. With wind speeds averaging 5-6 MPH and relatively low solar power density, generation of significant amounts of electricity using wind or solar energy is not cost-effective relative to more conventional technologies. This is not to say that these technologies may not be feasible in supplying limited amounts of power in

very remote locations or in other special applications. However, their use on a large utility scale is not practical in this region and no major breakthroughs on a utility scale are anticipated in the near future. Consequently, under current environmental assumptions, they continue to be not as cost competitive or as reliable in the Midwest as the more conventional power supply technologies.

Biogas, or landfill gas, generally has both high levels of contaminants and a low-heat content resulting in an overall quality far below that required for pipeline quality natural gas. It is possible to process the gas to pipeline quality standards but doing so increases the cost. This low grade gas may be collected, transported short distances and used in various manufacturing processes, but this activity is generally best suited to private enterprise ventures, not utility-scale projects. To Cinergy's knowledge, a few private companies currently collect landfill gas at three or four different landfills within Cinergy's franchised service territory.

At the present time, the use of tire-derived fuel is not a significant utility-scale energy source. Over time, as operational and environmental issues are resolved, tires or tire residue may become a competitive, but limited, fuel source.

Municipal solid waste (MSW) burning to produce energy is rarely economical from the energy production standpoint. The technology to burn this waste cleanly and reliably is very expensive. Generally, when communities resort to MSW burning it is to dispose of the waste more economically than alternative methods, not to generate low-cost energy. In most instances, the energy sales help to offset some of the costs associated with burning the waste. Siting a MSW burning facility is also a challenge. Concerns abound about truck traffic, odors, vectors, and air toxins. The Public Utility Regulatory Policies Act of 1978 (PURPA) obligates Cinergy to purchase power and energy from a MSW facility within its franchised service territories. However, Cinergy will defend electric customers against subsidizing the disposal costs of municipal solid wastes.

Biomass energy production facilities are generally limited by the availability of fuel within about a 50-mile radius. This is a result of the bulk material handling problems due to the low heat content of current biomass fuels. This limitation negatively impacts both the size and economics of biomass energy facilities. Development of specialized energy crops and further technology developments will be necessary to permit expansion of biomass-generated energy.

Storage technologies such as Pumped Hydro and Compressed Air Energy Storage (CAES) generally have limited application due to the need for suitable geologic formations. Other storage technologies such as Batteries and Superconducting Magnetic Energy Storage (SMES) are applicable to more areas, but the storage time (one to five hours) is a limiting factor. Presently, batteries perform best in systems that require relatively short bursts of energy on an infrequent basis. Demonstration plants such as the 10 MW CHINO Battery Plant at Southern California Edison have been difficult to maintain and have proven to be more suitable for power delivery system stabilization than as a capacity resource. Other demonstration projects, such as EPRI's Transportable Battery System, should further quantify the benefits and appropriate applications of battery storage systems. However, at this point in time, large utility scale battery storage systems are not commercially viable.

The focus of Cinergy's R&D efforts with regard to Alternative Technologies is to provide planning and evaluation methods to assure a strategic advantage in the deployment of emerging technologies and the use of storage to manage energy supply. Despite the fact that Alternative Technologies are generally not economic in comparison to more traditional technologies, they were included nevertheless as part of the screening process to allow an economic comparison between the different technologies and to allow sensitivity analysis around base assumptions to be performed.

Strategies V, VI, and VII

These last three Strategies focus on encouraging competition, government policies and programs, and state government as an energy user. While no specific initiatives require direct utility action, CG&E actively supported the passage of customer choice legislation in Ohio, and, as part of Cinergy, has sought and achieved FERC approval for a transmission tariff that does not create market power for CG&E, i.e., it establishes comparability for transmission charges. Cinergy has also been the leader in the establishment of a Midwest Independent System Operator (ISO) for transmission service providers. In addition, Cinergy continues to promote and support customer choice activities throughout the country.

provide a credit mechanism for early reductions. Nevertheless, Cinergy intends to continue its efforts to reduce its greenhouse gas emissions by implementing cost-effective GHG emission-reducing activities. Cinergy will continue to participate in the U.S. Initiative on Joint Implementation (USIJI) approved Belize Rio Bravo forest preservation and sustainable management project with three other investor owned utilities, The Nature Conservancy, The Programme for Belize (a non-profit environmental organization), and UtiliTree Carbon Company (a utility industry initiative through the Edison Electric Institute). The project includes two components: Component A, forest preservation; and Component B, sustainable forestry practices.

Component A of the project involved the purchase of a 15,000-acre parcel of endangered forest land that links two protected properties with the Rio Bravo Conservation Area. Imminent conversion to agricultural use threatened this property. Winrock International, an independent consultant, measured the greenhouse gas benefit of this purchase and estimated it at more than 800,000 tons of carbon dioxide. This figure is higher than what was originally estimated.

Component B of the project will implement a sustainable forest management program on the Rio Bravo Conservation and Management Area. The program is designed to increase the total pool of sequestered carbon in a 60,000-acre area of the 125,000-acre Rio Bravo Conservation Area, including the area of Component A. It will then seek to extend the sustainable forestry model into adjacent properties. This component also includes plans to develop and implement a marketing strategy for sustainable timber extraction.

Cinergy has committed to invest in the project over a ten-year period. However, Cinergy will receive carbon offsets for a forty-year period. After the first ten years, the Programme for Belize will be self-sufficient based on revenues generated by the sustainable forestry program, forest products program, and environmental tourism. Cinergy estimates that the cost of carbon offsets from the Belize project will be about \$0.64 per ton of CO_2.

Cinergy submits an annual Section 1605(b) report concerning Cinergy's GHG emission reduction and offsetting activities. Cinergy's first report in 1995 identified activities implemented between 1991 and 1995 that reduced or offset Cinergy's GHG emissions. This first report listed activities that reduced or offset Cinergy's GHG emissions by an estimated 1.3 million tons of CO_2 equivalents. (CO_2 equivalents include actual CO_2 emissions as well as methane converted to CO_2 equivalents by using the Intergovernmental Panel on Climate Change (IPCC) factors for these other GHGs.) Cinergy's 1996, 1997, and 1998 reports listed activities that reduced or offset Cinergy GHG emissions by an estimated 8.3 million tons of CO_2 equivalents. Activities implemented or supported by Cinergy that have reduced or offset its GHG emissions include:

- Electric generation from recovered landfill (methane) gas;
- Demand-side management programs;
- Landfill gas recovery for use as a natural gas supply;
- Rio Bravo carbon sequestration project;
- Trees planted at Cinergy facilities;
- Forestry projects with the Ohio and Indiana Chapters of The Nature Conservancy, Ducks Unlimited, and the National Wild Turkey Federation.
- Edison Electric Institute UtiliTree Carbon Co.;
- Beneficial reuse of coal ash;
- Efficiencies created through merged dispatching;
- Power plant efficiency programs;
- Paper and aluminum recycling.

Cinergy's efforts have resulted in a cumulative total of nearly 12.5 million tons of CO_2 equivalent reductions and offsets since 1991.

Cinergy, through its non-regulated subsidiary companies Cinergy Global Power and Trigen-Cinergy Solutions, is developing and implementing a number of renewable energy and higher energy efficiency projects (e.g. cogeneration, district heating and cooling, etc.). These projects are being developed in the United States, including Ohio, and in other countries around the world.

Alternative property and right-of-way management practices are being investigated to reduce annual property management costs. One of the more promising practices appears to be the planting of warm season prairie grasses. Benefits of planting the prairie grasses include less mowing, wildlife habitat, and sequestration of carbon. Cinergy is identifying potential properties and transmission rights-of-way on which to implement the alternative management practices. Cinergy is funding research to develop and implement a protocol to measure the amount of carbon sequestered by the warm season grasses.

New technologies are the only long-term solution that would make the large reductions in carbon dioxide (CO_2) emissions necessary to have any real effect on atmospheric carbon concentrations. Research and development will be very important to any effort to reduce CO_2 emissions by the electric industry.

Even without short-term changes in the carbon-based fossil fuels used to generate electricity, electricity can be part of the solution to reducing GHG emissions. Through the promotion of electrotechnologies to replace less efficient use of fossil fuels, GHG emissions can be reduced. The more wide spread use of electrotechnologies will increase CO_2 emissions from the electric sector, but will be more than offset by the overall reduced CO_2 emissions from the fossil fuels that they replace.

DISTRIBUTION SYSTEM PLANNING

Provide a description of the Company's distribution system planning process, including a discussion of how existing system problems are identified, how future growth is estimated and how the impact of that growth on distribution system performance is determined.

Provide a description of all distribution facilities at voltages greater than or equal to 12.5 kV planned or scheduled for years zero through five.

Provide a discussion of the Company's process for obtaining community involvement in the planning and implementation of distribution system enhancements.

In compliance with the codes of conduct in FERC Order 889, the relevant distribution information is located in the Transmission Volume of this report, which was prepared independently.

WABASH RIVER UNIT OUTAGE MONITORING

Wabash River Station has been eliminating or reducing the amount of Forced Outage Hours for units 2-4. The station staff continuously looks for ways to enhance the station's availability and reduce the Equivalent Forced Outage Rate (EFOR). Both O&M expenditures and capital budget expenditures are involved. Through the efforts of better maintenance practices and increased emphasis on long term planning, the station is working to continue to reduce the amount of Forced Outage Hours (FOH).

Station performance improvement can be seen by looking at the increasing station Net Capacity Factor (NCF). The NCF is increasing, illustrating that the units are running more often and at higher loads than in the past. This is partly a result of the reduction in forced outage hours. Graphs of NCF and EFOR are shown in Figures OA-1 and OA-2 located in the Proprietary and Confidential Information section of this Appendix.

Some of the forced outage hours experienced by Wabash River station are beyond the control of the station. For example, warm weather has caused a lot of extended forced outages due to high river water temperatures. The station requires cooling water from the Wabash River, and during the hot summer months the river water temperature increases. As a result, the station must reduce load or shut down completely at a certain predefined water temperature limit to comply with environmental regulations. Approximately 14% of the forced outage hours the station has experienced between 1991 and 1998 can be attributed to factors that are beyond the control of the station.

Looking at the EFOR for years 1988 to 1999, a couple of items stand out. The major cause of forced outage hours of Unit 4 from 1988 through 1990 was a cracked generator rotor. This has since been replaced, eliminating this cause. In addition, many of the capital expenditures in the past few years address the major availability degraders. For example, the precipitators on Units 2-5 were all upgraded, which has reduced the amount of forced outages due to precipitator failures. This upgrade has also dramatically reduced the amount of precipitator-related derates (partial outages) on these units. Multiple boiler tube replacement projects also have helped to improve the availability of Units 2-4. These include replacement of the unit #4 superheat tubing, unit #5 radiant reheat tubing, and units #2, #3, and #4 spaghetti tubing (section of reheat tubing).

Other boiler work centered on the tubing around the front wall burners. The station startup practices were revisited, front wall tubes around the burners were replaced, and oil guns were modified. Recent changes to the air compressors have reduced derates caused by previous inadequate compressed air supply and thus allowed operators to blow soot more effectively on all units.

As the station continues to age, more equipment will begin to wear out, but, by careful planning and budgeting of our resources, the station will be able to minimize the effects of aging.

SPECIFIC RETIREMENT DATE ASSIGNMENT RESULTS

In the 95-203-EL-FOR Order, Cinergy was ordered to establish retirement dates for all generating units with service lives in excess of 40 years and determine the impact of these tentative retirements in developing future resource plans. To perform this analysis, all units that would be 40 years old or older during the 1999-2008 modeling period were considered. Although many units on Cinergy's system fall into this category, Cinergy's performance of engineering condition analysis has shortened the list of units that would be retired during the ten year modeling period under the guidelines given. Using the retirement dates contained in the last depreciation study filed in an electric rate case for each Operating Company (CG&E and PSI Energy), the following retirements were included in this special sensitivity required in the 95-203-EL-FOR Order:

- Miami Fort 5 12/31/2000
- Dicks Creek 1, 3-5 12/31/2000
- Miami Fort CT 3-6 12/31/2000
- Beckjord CT 1-4 12/31/2000
- Wabash River Diesel 12/31/2002
- Miami Wabash 1-4 12/31/2003
- Miami Wabash 5-6 12/31/2004
- Edwardsport 6-8 12/31/2004
- Beckjord 5 12/31/2005
- Miami Fort 6 12/31/2005
- Noblesville 1-2 12/31/2005
- Connersville 1-2 12/31/2007
- Cayuga Diesel 12/31/2007

Figure OA-3 shows the resulting plans. The Least Cost Plan contains the DSM bundle, as did the Base Case Least Cost Plan. The supply-side resources again consist of purchases for 1999-2003, and a number of Combustion Turbines in 2003-2006. The main difference is that the level of purchases and the number of CTs required is higher, as one would expect.

The 2002 CT Plan is identical to the Least Cost Plan through 2001. It contains the DSM bundle. In 2002, two Combustion Turbines are added, and the level of the purchases is smaller than in the Least Cost Plan. In 2003, 2700 MW is purchased, and from 2004 through 2006, the plan is identical to the Least Cost Plan.

The No DSM Plan is identical to the Least Cost Plan, with the exception of the DSM. Again, the main difference between this sensitivity and the Base Case was the level of supply-side resources required.

The 1st CC Plan also contains purchases through 2001. In 2002, one Combined Cycle unit is added along with a 2229 MW purchase. In 2003, two CCs are added along with a 2229 MW purchase; in 2004, twelve CTs are added; and from 2005 to 2006, the plan is identical to the Least Cost Plan.

The values obtained from the PROVIEW™ model for relative Present Value Total Cost for the four plans are as follows:

	1998 Present Value Total Cost ($1000)*	% Change from Least Cost Plan
Least Cost Plan	$25,243,886	0.00%
2002 CT Plan	$25,246,232	+0.01%
No DSM Plan	$25,253,454	+0.04%
1st CC Plan	$25,250,640	+0.03%

* Based on Market Purchases in increments of 300 MW

Again, as stated in Chapter 8, the figures above should be used only for the relative comparison of the four plans.

There is nothing particularly revealing in this sensitivity. As expected, the level of supply-side resources needed to satisfy the reliability criteria is higher because of the unit retirements. Even though some of the units retired are base load units, the least cost resources chosen were still peaking purchases and CTs, as under Base Case conditions.

As stated previously, the modeling of this sensitivity was required by the PUCO in its 95-203-EL-FOR order. However, the actual retirement dates for Cinergy's units are currently unknown (see Figure 5-1).

CLEAR DETERMINATION OF NEED FOR ADDITIONAL RESOURCE OPTIONS

The PUCO Staff requested more specific information concerning the determination of need for additional electricity resource options in Case No. 95-203-EL-FOR. As a result, the process is clearly and specifically described in Volume I, Chapter 2 near the end of Section D "Reliability Criteria."

ENGINEERING CONDITION PROGRAMS

The PUCO Staff requested in the Order in Case No. 95-203-EL-FOR that this topic be specifically addressed in all future full-LTFR filings. As specified in the Ohio rules, this topic is addressed generally in Volume I, Chapter 5, Section B, subsections (6) and (7) of this filing. The following is provided in this filing to augment the above sections.

There have been no significant engineering condition assessment studies conducted for any of the Cinergy units since the filing of the 1995 IRP (LTFR). With respect to individual pieces of equipment and components, the focus has been on maintenance, repair, and replacement. Evaluations of potential changes are considered when making decisions around replacement of such components on a case-by-case basis, and generally for larger items, during the budgeting process. The main area of "studies" has been for both the scheduled and potential environmental compliance activities.

QF EVALUATION AND MARKET PRICE DETERMINATION

The PUCO Staff raised concerns in Case No. 95-203-EL-FOR about how a potential QF was evaluated and the methodology then used to determine the market price for electricity to evaluate the potential QF.

As discussed in Volume I, Chapter 2, Section E(2) "Analytical Process," the screening and integration steps undertaken during the development of this IRP involved comparisons to a projected market price for electricity. This is in contrast to the traditional comparison to the utility's internal system costs, or what Staff refers to as "build" costs. All resource decisions, both for existing resources and any future resources are compared to the commodity market price of electricity. Generally, the market price is the cost-to-beat before any other resource alternatives are considered seriously. The Energy Market Forecasting (EMF) model is a proprietary model developed for Cinergy. Cinergy considers all of the inputs, methodology, and the specific outputs of the EMF model to be trade secrets and proprietary competitive information. A brief description of and discussion about the model is contained in Volume I, Chapter 8, Section B(1) "Model Descriptions." Cinergy believes this methodology is consistent with the Commission's finding that, on a going-forward basis, any new resource will be presumed to be at market cost, and, thus, cannot be a stranded cost.

As with any other resource alternative, all QF/IPP offers, counteroffers, and negotiations consider the EMF discussed above. Also, as mentioned in Volume I, Chapters 1, 5, and 8, any options surviving the screening or integration phases of the process could ultimately represent potential non-utility generating units, purchases, repowering of existing Cinergy units, or utility constructed units.

Figure OA-3

Significantly Different Plans- Retirement Sensitivity

	Least Cost Plan	2002 CT Plan	No DSM Plan	1st CC Plan
1999	763MW Purch. DSM Bundle	763MW Purch. DSM Bundle	763MW Purch.	763MW Purch. DSM Bundle
2000	1600MW Purch.	1600MW Purch.	1600MW Purch.	1629MW Purch.
2001	2200MW Purch.	2200MW Purch.	2200MW Purch.	2229MW Purch.
2002	2500MW Purch.	2-165MW CTs 2200MW Purch.	2500MW Purch.	1-256MW CC 2229MW Purch.
2003	2-165MW CTs 2700MW Purch.	2700MW Purch.	2-165MW CTs 2700MW Purch.	2-256MW CCs 2129MW Purch.
2004	14-214MW CTs	14-214MW CTs	14-214MW CTs	12-214MW CTs
2005	2-214MW CTs	2-214MW CTs	2-214MW CTs	2-214MW CTs
2006	4-214MW CTs	4-214MW CTs	4-214MW CTs	4-214MW CTs
2007				
2008				

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(D)(4) ENERGY-PRICE RELATIONSHIPS

(a) Impacts Due to Energy-Price Changes. The energy price changes identified within the forecast period reflect changes in energy demand due to changes in the real price of energy.

The difference between a forecast based upon a zero percent increase in real energy price and the actual forecast is the basis for the energy demand and peak load impacts provided on the following Tables 1 and 2.

(b) Description of Methodology. The impact of energy-price changes are based upon the same equations and models as the base forecast. Energy-price impacts were identified by comparing the actual forecast to one based upon a zero percent annual increase (1998 - 2019) in the real price of electricity. The resulting differences in energy (MWh) and peak demand (MW) represent the total forecasted impacts of changes in energy prices.

(D) (4) (cont'd)

TABLE 1

CG&E

PRICE INDUCED IMPACTS (MWH)

YEAR	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	SENDOUT
1998	(206)	(12,967)	(20,024)	(43,543)
1999	(6,434)	(38,534)	(79,941)	(162,207)
2000	(19,515)	(68,179)	(172,116)	(320,214)
2001	(33,796)	(97,905)	(277,681)	(498,587)
2002	(45,488)	(128,662)	(391,763)	(685,638)
2003	(58,296)	(162,959)	(522,086)	(896,857)
2004	(71,850)	(198,238)	(664,438)	(1,123,480)
2005	(85,958)	(296,751)	(934,714)	(1,594,481)
2006	(104,741)	(308,180)	(1,165,117)	(1,880,102)
2007	(116,735)	(310,068)	(1,281,092)	(2,018,918)
2008	(119,669)	(311,848)	(1,331,922)	(2,078,951)
2009	(123,360)	(314,246)	(1,363,076)	(2,119,879)
2010	(127,331)	(318,665)	(1,396,659)	(2,167,319)
2011	(132,084)	(323,546)	(1,433,012)	(2,219,217)
2012	(137,392)	(327,575)	(1,461,712)	(2,262,169)
2013	(142,618)	(333,330)	(1,494,176)	(2,311,867)
2014	(148,946)	(337,922)	(1,525,668)	(2,359,678)
2015	(155,255)	(342,879)	(1,559,990)	(2,411,261)
2016	(161,891)	(348,783)	(1,590,993)	(2,461,030)
2017	(167,856)	(353,609)	(1,626,632)	(2,513,003)
2018	(175,144)	(359,709)	(1,660,864)	(2,566,897)
2019	(182,760)	(366,186)	(1,694,237)	(2,620,970)

(D)(4)(cont'd)

TABLE 2

CG&E

PRICE INDUCED IMPACTS (MWH)

YEAR	SUMMER PEAK	WINTER PEAK
1998	(10)	(14)
1999	(31)	(34)
2000	(61)	(59)
2001	(92)	(84)
2002	(126)	(112)
2003	(163)	(141)
2004	(202)	(190)
2005	(293)	(247)
2006	(334)	(272)
2007	(355)	(282)
2008	(364)	(287)
2009	(370)	(292)
2010	(378)	(299)
2011	(387)	(305)
2012	(394)	(311)
2013	(403)	(318)
2014	(410)	(324)
2015	(419)	(331)
2016	(427)	(337)
2017	(436)	(344)
2018	(445)	(351)
2019	(455)	(358)

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(D) (5) (b) HOURLY LOAD DATA

The 1998 hourly load data mentioned in Volume I, General Appendix, represents hourly sendout for the total CG&E service area, part of which is in Kentucky and Indiana. To provide an indication of the percentage of the total system that is in Ohio, ratios have been computed for recent seasonal peaks. The proportions are as follows:

	Total		Percent
	Ohio	Cinergy System	Ohio
1998 Summer Peak	3981	10,430	38.3%
1998 Winter Peak	3348	8735	38.3%

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(E)(1)(d)(i) and (ii) EQUATIONS and STATISTICAL TEST RESULTS

Following is a display of all the relevant equations and statistical test results used in the development of the CG&E franchised service territory load forecast.

U.S. AVERAGE HOURLY EARNINGS FOR MANUFACTURING

REGRESSION RESULTS:

LEAST SQUARES WITH 2ND ORDER AUTOCORRELATION CORRECTION

```
---------------------------------------------------------------

FREQUENCY: Q

INTERVAL:  1979:1 TO 1997:4  (76 OBS.)

DEPENDENT VARIABLE: LAHEM

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE


0)  2.356     0.0042415 555.46       CONSTANT
1)                                   PDL(LECIWSP,1,2,FAR)

 \0     0.56444 0.0096215   .            +*
 \1     0.28222 0.0048107   .      *

LAG SUM: 0.84667  STD. ERR.: 0.014432
MEAN LAG: 0.33333

2)  0.0046002 0.0014804   3.1075     Q804
3)  1.3597    0.10942    12.426      RHO1
4) -0.42535   0.108      -3.9384     RHO2

R-BAR SQUARED:0.9998
DURBIN-WATSON:2.04
STANDARD ERROR:0.0025764     NORMALIZED:0.0011171
```

U.S. AVERAGE HOURLY EARNINGS FOR MANUFACTURING

WHERE:

LAHEM	=LOG(AHEM)
LECIWSP	=LOG(ECIWSP)
Q804	QUALITATIVE VARIABLE - FOURTH QUARTER, 1980

AND:

AHEM	US AVERAGE HOURLY EARNINGS FOR MANUFACTURING
ECIWSP	EMPLOYMENT COST INDEX - WAGES AND SALARIES, ALL PRIVATE INDUSTRY WORKERS

FORECAST EQUATION:

```
1>AHEM=EXP(<2.356>+PDL(LECIWSP,1,2,FAR,<0.56444,0.28222>)+AHEM@AR2)
```

SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
FREQUENCY: Q
INTERVAL:  1972:1 TO 1997:4  (104 OBS.)
DEPENDENT VARIABLE: LRELAHEM

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  0.040867 0.016368   2.4968     CONSTANT
1)  0.19352  0.083328   2.3224     LRELCHEM
2)                                 PDL(LRELPCNT283337,1,2,FAR)

 \0    0.085222 0.024153   .       +    *  +
 \1    0.042611 0.012077   .    + *+
LAG SUM: 0.12783  STD. ERR.: 0.03623
MEAN LAG: 0.33333

3) -0.013113 0.0052375 -2.5036     Q751
4)  0.02053  0.0044732  4.5896     Q801851
5)  0.80356  0.058366  13.768      RHO
R-BAR SQUARED:0.83666
DURBIN-WATSON:1.77
STANDARD ERROR:0.0065986     NORMALIZED:0.065255
```

SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING

WHERE:

LRELAHEM	=LOG(AHEMNS@1640/AHEM)
LRELCHEM	=LOG((EM@CGE/EM@CGE\1)/(EM/EM\1))
LRELPCNT283337	=LOG(((E28@CGE+E33NS@CMSA+E33NS@BUTLER+E371NS@CGE +E372@9NS@CGE)/EM@CGE)/((E28+E33+E37)/EM))
Q751	QUALITATIVE VARIABLE - FIRST QUARTER, 1975
Q801851	QUALITATIVE VARIABLE - FIRST QUARTER, 1980 TO FIRST QUARTER, 1985

AND:

AHEMNS@1640	SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING
AHEM	US AVERAGE HOURLY EARNINGS FOR MANUFACTURING
E28@CGE	SERVICE AREA EMPLOYMENT - CHEMICALS AND PRODUCTS
E33NS@CMSA	CINCINNATI CMSA EMPLOYMENT - PRIMARY METAL INDUSTRIES
E33NS@BUTLER	SERVICE AREA EMPLOYMENT - BUTLER COUNTY - PRIMARY METAL INDUSTRIES
E371NS@CGE	SERVICE AREA EMPLOYMENT - TRANSPORTATION EQUIPMENT MOTOR VEHICLES AND PARTS
E372@9NS@CGE	SERVICE AREA EMPLOYMENT - TRANSPORTATION EQUIPMENT OTHER THAN MOTOR VEHICLES AND PARTS
EM@CGE	SERVICE AREA EMPLOYMENT - MANUFACTURING
E28	US EMPLOYMENT - CHEMICALS AND PRODUCTS
E33	US EMPLOYMENT - PRIMARY METAL INDUSTRIES
E37	US EMPLOYMENT - TRANSPORTATION EQUIPMENT
EM	US EMPLOYMENT - MANUFACTURING

FORECAST EQUATION:

```
1>AHEMNS@1640=AHEM*EXP(<0.041681>+<0.20024>*LRELCHEM&&
2>+PDL(LRELPCNT283337,1,2,FAR,<0.084026,0.042013>)&&
3>+AHEMNS@1640@AR1)
```

SERVICE AREA WAGE AND SALARY DISBURSEMENTS

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

FREQUENCY: Q
INTERVAL: 1970:1 TO 1995:4 (104 OBS.)
DEPENDENT VARIABLE: LWSDE@CGE

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
0)	0.1632	0.021526	7.5819	CONSTANT
1)	0.91645	0.007347	124.74	LWSDE
2)	0.02204	0.0050802	4.3383	Q704
3)	-0.012289	0.0050786	-2.4198	Q711
4)	-0.010115	0.0044164	-2.2904	Q741
5)	-0.011673	0.0044159	-2.6434	Q751
6)	-0.014449	0.0044157	-3.2722	Q811
7)	0.84741	0.052062	16.277	RHO

R-BAR SQUARED:0.99979
DURBIN-WATSON:2.20
STANDARD ERROR:0.0057876 NORMALIZED:0.002053

SERVICE AREA WAGE AND SALARY DISBURSEMENTS

WHERE:

LWSDE@CGE	=LOG(WSD@ADJ@CGE/E@CGE)
LWSDE	=LOG(WSD@ADJ@CGE/E@CGE)
Q704	QUALITATIVE VARIABLE - FOURTH QUARTER, 1970
Q711	QUALITATIVE VARIABLE - FIRST QUARTER, 1971
Q741	QUALITATIVE VARIABLE - FIRST QUARTER, 1974
Q751	QUALITATIVE VARIABLE - FIRST QUARTER, 1975
Q811	QUALITATIVE VARIABLE - FIRST QUARTER, 1981

AND:

WSD@ADJ@CGE	SERVICE AREA WAGE AND SALARY DISBURSEMENTS PLUS OTHER INCOME
E@CGE	SERVICE AREA EMPLOYMENT - TOTAL

FORECAST EQUATION:

```
1>WSD@ADJ@CGE=E@CGE*EXP(<0.1632>+<0.91645>*LWSDE+WSDE@CGE@AR1)
```

SERVICE AREA PERSONAL PROPERTY INCOME

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

FREQUENCY: Q
INTERVAL: 1973:1 TO 1995:4 (92 OBS.)
DEPENDENT VARIABLE: LRPCYPPROP@CGE

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
0)	0.012095	0.022428	0.5393	CONSTANT
1)	0.99331	0.027162	36.57	LRPCYPPROP
2)	-0.0061929	0.0016406	-3.7748	Q651854*Q1
3)	0.014996	0.0058056	2.583	Q831
4)	0.013412	0.0055577	2.4132	Q901+Q902
5)	0.9122	0.042719	21.353	RHO

R-BAR SQUARED:0.99875
DURBIN-WATSON:1.75
STANDARD ERROR:0.0075344 NORMALIZED:0.0095744

SERVICE AREA PERSONAL PROPERTY INCOME

WHERE:

LRPCYPPROP@CGE	=LOG(YPPROP@CGE/(N@CGE*CPI))
LRPCYPPROP	=LOG((YRENTADJ+INTBUS+DIV)/(N*CPI))
Q651854	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO FOURTH QUARTER, 1985
Q1	QUALITATIVE VARIABLE - FIRST QUARTER
Q831	QUALITATIVE VARIABLE - FIRST QUARTER, 1983
Q901	QUALITATIVE VARIABLE - FIRST QUARTER, 1990
Q902	QUALITATIVE VARIABLE - SECOND QUARTER, 1990

AND:

YPPROP@CGE	SERVICE AREA PERSONAL PROPERTY INCOME
N@CGE	SERVICE AREA TOTAL POPULATION
YRENTADJ	RENTAL INCOME OF PERSONS WITH CAPITAL CONSUMPTION ADJUSTMENT
INTBUS	NET INTEREST COMPONENT OF NATIONAL INCOME
DIV	DIVIDENDS
N	US TOTAL POPULATION
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS

FORECAST EQUATION:

```
1>YPPROP@CGE=(CPI*N@CGE)*EXP(<0.012095>+<0.99331>*LRPCYPPROP&&
2>+YPPROP@CGE@AR1)
```

SERVICE AREA NONFARM PROPRIETORS INCOME

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

FREQUENCY: Q
INTERVAL: 1970:1 TO 1995:4 (104 OBS.)
DEPENDENT VARIABLE: LRPCYENT@CGE

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
0)	-0.21388	0.070836	-3.0194	CONSTANT
1)	1.0663	0.062315	17.111	LRPCYENT
2)	-0.029995	0.012404	-2.4182	Q781
3)	-0.030105	0.01246	-2.4162	Q831
4)	0.029923	0.012403	2.4126	Q891
5)	0.030923	0.012364	2.501	Q901
6)	-0.034828	0.012443	-2.7989	Q911
7)	0.98364	0.017664	55.686	RHO

R-BAR SQUARED:0.98549
DURBIN-WATSON:1.72
STANDARD ERROR:0.017343 NORMALIZED:-0.052397

SERVICE AREA NONFARM PROPRIETORS INCOME

WHERE:

LRPCYENT@CGE	=LOG(YENT@CGE/(N@CGE*CPI))
LRPCYENT	=LOG(YENTNFADJ/(N*CPI)
Q781	QUALITATIVE VARIABLE - FIRST QUARTER, 1978
Q831	QUALITATIVE VARIABLE - FIRST QUARTER, 1983
Q891	QUALITATIVE VARIABLE - FIRST QUARTER, 1989
Q901	QUALITATIVE VARIABLE - FIRST QUARTER, 1990
Q911	QUALITATIVE VARIABLE - FIRST QUARTER, 1991

AND:

YENT@CGE	SERVICE AREA NONFARM PROPRIETORS INCOME
N@CGE	SERVICE AREA TOTAL POPULATION
YENTNFADJ	NONFARM PROPRIETORS INCOME WITH IVA AND CCADJ
N	US TOTAL POPULATION
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS

FORECAST EQUATION:

```
1>YENT@CGE=(N@CGE*CPI)*EXP(<-0.21388>+<1.0663>*LRPCYENT&&
2>+YENT@CGE@AR1)
```

SERVICE AREA TRANSFER PAYMENTS TO PERSONS

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

FREQUENCY: Q
INTERVAL: 1980:1 TO 1995:4 (64 OBS.)
DEPENDENT VARIABLE: LPCV@CGE

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
0)	-0.038412	0.021836	-1.7591	CONSTANT
1)	0.99707	0.019973	49.92	LPCV
2)	0.012289	0.0034163	3.5972	Q821+Q822
3)	-0.0089229	0.0034174	-2.611	Q901
4)	0.9698	0.030485	31.812	RHO

R-BAR SQUARED:0.99975
DURBIN-WATSON:1.75
STANDARD ERROR:0.004745 NORMALIZED:0.0056349

SERVICE AREA TRANSFER PAYMENTS TO PERSONS

WHERE:

LPCV@CGE	=LOG(V@CGE/N@CGE)
LPCV	=LOG(VG/N)
Q821	QUALITATIVE VARIABLE - FIRST QUARTER, 1982
Q822	QUALITATIVE VARIABLE - SECOND QUARTER, 1982
Q901	QUALITATIVE VARIABLE - FIRST QUARTER, 1990

AND:

V@CGE	SERVICE AREA TRANSFER PAYMENTS TO PERSONS
N@CGE	SERVICE AREA TOTAL POPULATION
VG	US GOVERNMENT TRANSFER PAYMENTS TO PERSONS
N	US TOTAL POPULATION

FORECAST EQUATION:

```
1>V@CGE=(N@CGE)*EXP(<-0.038412>+<0.99707>*LPCV&&
2>+V@CGE@AR1)
```

SERVICE AREA PERSONAL CONTRIBUTION TO SOCIAL INSURANCE

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

FREQUENCY: Q
INTERVAL: 1976:1 TO 1995:4 (80 OBS.)
DEPENDENT VARIABLE: LPCTWPER@CGE

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
0)	-0.048615	0.011961	-4.0646	CONSTANT
1)	1.0223	0.016608	61.554	LPCTWPER
2)	-0.016044	0.0039961	-4.015	Q811
3)	-0.014233	0.0039342	-3.6177	Q821
4)	0.95956	0.031475	30.487	RHO

R-BAR SQUARED:0.99985
DURBIN-WATSON:1.71
STANDARD ERROR:0.005443 NORMALIZED:0.11453

SERVICE AREA PERSONAL CONTRIBUTION TO SOCIAL INSURANCE

WHERE:

LPCTWPER@CGE	=LOG(TWPER@CGE/N20@64@CGE)
LPCTWPER	=LOG(TWPER/N20@64)
Q811	QUALITATIVE VARIABLE - FIRST QUARTER, 1981
Q821	QUALITATIVE VARIABLE - FIRST QUARTER, 1982

AND:

TWPER@CGE	SERVICE AREA PERSONAL CONTRIBUTIONS TO SOCIAL INSURANCE
N20@64@CGE	SERVICE AREA POPULATION AGED 20 TO 64
TWPER	US PERSONAL CONTRIBUTIONS TO SOCIAL INSURANCE
N20@64	US POPULATION AGED 20 TO 64

FORECAST EQUATION:

```
1>TWPER@CGE=(N20@64@CGE)*EXP(<-0.048615>+<1.0223>*LPCTWPER&&
2>+TWPER@CGE@AR1)
```

```
SERVICE AREA EMPLOYMENT - FOOD AND PRODUCTS

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION
---------------------------------------------------------
FREQUENCY: Q
INTERVAL:  1968:1 TO 1997:4  (120 OBS.)
DEPENDENT VARIABLE: LE20@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  8.6885   0.22969   37.826      CONSTANT
1)                                 PDL(LJQIND20,2,6,BOTH)

 \0    0.12099 0.049724   .  + * +
 \1    0.20165 0.082873   .    +   *  +
 \2    0.24198 0.099448   .     +    *   +
 \3    0.24198 0.099448   .     +    *   +
 \4    0.20165 0.082873   .    +   *  +
 \5    0.12099 0.049724   .  + * +
LAG SUM: 1.1293   STD. ERR.: 0.46409
MEAN LAG: 2.5

2)                                 PDL(LJQE20,2,6,BOTH)

 \0    -0.17733 0.047575          + * +   .
 \1    -0.29555 0.079291     +  *  +      .
 \2    -0.35466 0.095149   +  *  +        .
 \3    -0.35466 0.095149   +  *  +        .
 \4    -0.29555 0.079291     +  *  +      .
 \5    -0.17733 0.047575          + * +   .
LAG SUM: -1.6551   STD. ERR.: 0.44403
MEAN LAG: 2.5

3)                                 PDL(LRELRTCGSL@OH,1,8,FAR)

 \0    -0.028717  0.012662    +    *   +     .
 \1    -0.025127  0.011079      +   *   +    .
 \2    -0.021538  0.0094967       +  *   +   .
 \3    -0.017948  0.0079139         + *  +   .
 \4    -0.014358  0.0063311          +  * +  .
 \5    -0.010769  0.0047483            + * + .
 \6    -0.0071792 0.0031656              +* +.
 \7    -0.0035896 0.0015828                +*.
LAG SUM: -0.12923   STD. ERR.: 0.05698
MEAN LAG: 2.3333

4) -0.045376 0.0091724 -4.947      Q683
5)  0.078506 0.013206   5.9447     Q651824
6) -0.029751 0.0091737 -3.243      Q692
7)  0.97271  0.02118   45.926      RHO
R-BAR SQUARED:0.99599
DURBIN-WATSON:1.91
STANDARD ERROR:0.012791     NORMALIZED:0.0013235
```

(e)

SERVICE AREA EMPLOYMENT - FOOD AND PRODUCTS

WHERE:

LE20@CGE	=LOG(E20@CGE)
LJQIND20	=LOG(JQIND20)
LJQE20	=LOG(JQIND20/E20)
LRELRTCGSL@OH	=LOG(RTCGSL@OH/RTCGSL)
Q683	QUALITATIVE VARIABLE - THIRD QUARTER, 1968
Q651824	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO FOURTH QUARTER, 1982
Q692	QUALITATIVE VARIABLE - SECOND QUARTER, 1969

AND:

E20@CGE	SERVICE AREA EMPLOYMENT - FOOD AND PRODUCTS
JQIND20	US INDUSTRIAL PRODUCTION INDEX - FOOD AND PRODUCTS
E20	US EMPLOYMENT - FOOD AND PRODUCTS
RTCGSL@OH	EFFECTIVE TAX RATE - OHIO CORPORATE INCOME TAXES
RTCGSL	EFFECTIVE TAX RATE - STATE AND LOCAL CORPORATE INCOME TAXES - US

FORECAST EQUATION:

```
1>E20@CGE=EXP(<8.6885>&&
2>+PDL(LJQIND20,2,6,BOTH,<0.12099,0.20165,0.24198,0.24198,0.20165,
3>0.12099>)&&
4>+PDL(LJQE20,2,6,BOTH,<-0.17733,-0.29555,-0.35466,-0.35466,-0.29555,
5>-0.17733>)&&
6>+PDL(LRELRTCGSL@OH,1,8,FAR,<-0.028717,-0.025127,-0.021538,-0.017948,
7>-0.014358,-0.010769,-0.0071792,-0.0035896>)+E20@CGE@AR1)
```

SERVICE AREA EMPLOYMENT - PAPER AND PRODUCTS

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
---------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1975:1 TO 1997:4  (92 OBS.)
DEPENDENT VARIABLE: LE26@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  9.7207   0.054139  179.55       CONSTANT
1)                                  PDL(LJQIND26,1,4,FAR)

 \0    0.19786  0.038496    .          +  * +
 \1    0.1484   0.028872    .        +* +
 \2    0.098932 0.019248    .    ++*+
 \3    0.049466 0.0096239   .  *+
LAG SUM: 0.49466  STD. ERR.: 0.096239
MEAN LAG: 1

2)                                  PDL(LRELAHEM,1,4,FAR)

 \0    -0.36771  0.1256      +   *   +      .
 \1    -0.27578  0.094198        +  * +     .
 \2    -0.18386  0.062799           + * +   .
 \3    -0.091928 0.031399               ++*+ .
LAG SUM: -0.91928  STD. ERR.: 0.31399
MEAN LAG: 1

3)                                  PDL(LJQE26,2,12,BOTH)

 \0     -0.033762 0.0041476              *+  .
 \1     -0.061898 0.0076039          +*+     .
 \2     -0.084406 0.010369         +* +      .
 \3     -0.10129  0.012443       + *+        .
 \4     -0.11254  0.013825      +* +         .
 \5     -0.11817  0.014516     + *+          .
 \6     -0.11817  0.014516     + *+          .
 \7     -0.11254  0.013825      +* +         .
 \8     -0.10129  0.012443       + *+        .
 \9     -0.084406 0.010369         +* +      .
 \10    -0.061898 0.0076039          +*+     .
 \11    -0.033762 0.0041476              *+  .
LAG SUM: -1.0241  STD. ERR.: 0.12581
MEAN LAG: 5.5

4) -0.02188  0.009092   -2.4065     Q802
5) -0.021116 0.0090901  -2.323      Q902
6)  0.027813 0.010774    2.5813     Q851
7)  0.030815 0.010582    2.9119     Q852
8)  0.9065   0.044018   20.594      RHO
R-BAR SQUARED:0.97997
DURBIN-WATSON:1.80
STANDARD ERROR:0.012251     NORMALIZED:0.001312
```

SERVICE AREA EMPLOYMENT - PAPER AND PRODUCTS

WHERE:

LE26@CGE	=LOG(E26@CGE)
LJQIND26	=LOG(JQIND26)
LRELAHEM	=LOG(AHEMNS@1640/AHEM)
LJQE26	=LOG(JQIND26/E26)
Q802	QUALITATIVE VARIABLE - SECOND QUARTER, 1980
Q902	QUALITATIVE VARIABLE - SECOND QUARTER, 1990
Q851	QUALITATIVE VARIABLE - FIRST QUARTER, 1985
Q852	QUALITATIVE VARIABLE - SECOND QUARTER, 1985

AND:

E26@CGE	SERVICE AREA EMPLOYMENT - PAPER AND PRODUCTS
AHEMNS@1640	SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING
AHEM	US AVERAGE HOURLY EARNINGS FOR MANUFACTURING
JQIND26	US INDUSTRIAL PRODUCTION INDEX - PAPER AND PRODUCTS
E26	US EMPLOYMENT - PAPER AND PRODUCTS

FORECAST EQUATION:

```
1>E26@CGE=EXP(<9.7207>&&
2>+PDL(LJQIND26,1,4,FAR,<0.19786,0.1484,0.098932,0.049466>)&&
3>+PDL(LRELAHEM,1,4,FAR,<-0.36771,-0.27578,-0.18386,-0.091928>)&&
4>+PDL(LJQE26,2,12,BOTH,<-0.033762,-0.061898,-0.084406,-0.10129,-0.11254,
5>-0.11817,-0.11817,-0.11254,-0.10129,-0.084406,-0.061898,-0.033762>)&&
6>+E26@CGE@AR1)
```

SERVICE AREA EMPLOYMENT - CHEMICALS AND PRODUCT

REGRESSION RESULTS:

LEAST SQUARES WITH 2ND ORDER AUTOCORRELATION CORRECTION

```
--------------------------------------------------------
FREQUENCY: Q
INTERVAL:  1970:1 TO 1997:4  (112 OBS.)
DEPENDENT VARIABLE: LE28@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0) 10.071    0.022746  442.75       CONSTANT
1)                                  PDL(LJQIND28,1,8,FAR)

 \0    0.25302  0.032813    .          +* +
 \1    0.22139  0.028711    .         + *+
 \2    0.18977  0.02461     .        +*+
 \3    0.15814  0.020508    .      +*+
 \4    0.12651  0.016406    .     +*
 \5    0.094883 0.012305    .   +*+
 \6    0.063255 0.0082032   .  *+
 \7    0.031628 0.0041016   .+*
LAG SUM: 1.1386  STD. ERR.: 0.14766
MEAN LAG: 2.3333

2)                                  PDL(LJQE28,1,8,FAR)

 \0    -0.19011  0.033288   + * +            .
 \1    -0.16634  0.029127     + * +          .
 \2    -0.14258  0.024966       +* +         .
 \3    -0.11882  0.020805         +*+        .
 \4    -0.095053 0.016644          + *+      .
 \5    -0.07129  0.012483            +*+     .
 \6    -0.047527 0.008322              +*    .
 \7    -0.023763 0.004161                *+.
LAG SUM: -0.85548   STD. ERR.: 0.1498
MEAN LAG: 2.3333

3)                                  PDL(LRELAHEM,1,3,FAR)

 \0    -0.23669  0.087854   +    *    +      .
 \1    -0.15779  0.058569       +   * +      .
 \2    -0.078897 0.029285            +* + .
LAG SUM: -0.47338   STD. ERR.: 0.17571
MEAN LAG: 0.66667

4)                                  PDL(LRELRTCGSL@OH,1,8,FAR)

 \0    -0.017966  0.0046519    +  *  +         .
 \1    -0.01572   0.0040704      +  * +        .
 \2    -0.013475  0.0034889        + * +       .
 \3    -0.011229  0.0029075          + *+      .
 \4    -0.0089831 0.002326            + * +    .
 \5    -0.0067373 0.0017445             + *+   .
 \6    -0.0044915 0.001163                +*+ .
 \7    -0.0022458 0.00058149                +*.
LAG SUM: -0.080848   STD. ERR.: 0.020934
MEAN LAG: 2.3333

5)  0.030712 0.0041757   7.3551     Q711
6) -0.011075 0.0041913  -2.6423     Q752
7)  0.013683 0.0042095   3.2504     Q861
8) -0.017433 0.0041914  -4.1592     Q884
9) -0.022216 0.0041812  -5.3133     Q944
10) -0.018276 0.004177   -4.3755     Q971
11)  1.3751   0.079538   17.288      RHO1
12) -0.56204  0.080324   -6.9972     RHO2
R-BAR SQUARED:0.99079
DURBIN-WATSON:2.14
STANDARD ERROR:0.007472    NORMALIZED:0.00074801
```

SERVICE AREA EMPLOYMENT - CHEMICALS AND PRODUCT

WHERE:

LE28@CGE	=LOG(E28@CGE)
LJQIND28	=LOG(JQIND28)
LJQE28	=LOG(JQIND28/E28)
LRELAHEM	=LOG(AHEMNS@1640/AHEM)
LRELRTCGSL@OH	=LOG(RTCGSL@OH/RTCGSL)
Q711	QUALITATIVE VARIABLE - FIRST QUARTER, 1971
Q752	QUALITATIVE VARIABLE - SECOND QUARTER, 1975
Q861	QUALITATIVE VARIABLE - FIRST QUARTER, 1986
Q884	QUALITATIVE VARIABLE - FOURTH QUARTER, 1988
Q944	QUALITATIVE VARIABLE - FOURTH QUARTER, 1994
Q971	QUALITATIVE VARIABLE - FIRST QUARTER, 1997

AND:

E28@CGE	SERVICE AREA EMPLOYMENT - CHEMICALS AND PRODUCTS
JQIND28	US INDUSTRIAL PRODUCTION INDEX - CHEMICALS AND PRODUCTS
E28	US EMPLOYMENT - CHEMICALS AND PRODUCTS
AHEMNS@1640	SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING
AHEM	US AVERAGE HOURLY EARNINGS FOR MANUFACTURING
RTCGSL@OH	EFFECTIVE TAX RATE - OHIO CORPORATE INCOME TAXES
RTCGSL	EFFECTIVE TAX RATE - STATE AND LOCAL CORPORATE INCOME TAXES - US

FORECAST EQUATION:

```
1>E28@CGE=EXP(<10.071>+PDL(LJQIND28,1,8,FAR,<0.25302,0.22139,0.18977,0.15814,0
2>+PDL(LJQE28,1,8,FAR,<-0.19011,-0.16634,-0.14258,-0.11882,-0.095053,-0.07129,
3>+PDL(LRELAHEM,1,3,FAR,<-0.23669,-0.15779,-0.078897>)&&
4>+PDL(LRELRTCGSL@OH,1,8,FAR,<-0.017966,-0.01572,-0.013475,-0.011229,-0.008983
5>+E28@CGE@AR2)
```

```
SERVICE AREA EMPLOYMENT - PRIMARY METAL - BUTLER COUNTY

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION
---------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1969:2 TO 1997:4  (115 OBS.)
DEPENDENT VARIABLE: LE33NS@BUTLER

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0) 11.618     1.2456     9.3267     CONSTANT
1)                                  PDL(LJQIND33,1,3,FAR)

 \0    0.42456 0.05759     .          + * +
 \1    0.28304 0.038393    .        +*+
 \2    0.14152 0.019197    .    *+
LAG SUM: 0.84913  STD. ERR.: 0.11518
MEAN LAG: 0.66667

2)                                  PDL(LJQIND371,1,3,FAR)

 \0    0.098921 0.030767   .        +  *    +
 \1    0.065947 0.020511   .    +   *  +
 \2    0.032974 0.010256   .  +*+
LAG SUM: 0.19784  STD. ERR.: 0.061534
MEAN LAG: 0.66667

3)                                  PDL(LJQE33,1,4,FAR)

 \0    -0.38213  0.079182  +  * +          .
 \1    -0.2866   0.059386     + * +        .
 \2    -0.19107  0.039591        + *+      .
 \3    -0.095534 0.019795            +*+ .
LAG SUM: -0.95534  STD. ERR.: 0.19795
MEAN LAG: 1

4)                                  PDL(LRELAPGI,2,12,BOTH)

 \0     -0.013795 0.0065374           +*+ .
 \1     -0.025291 0.011985         +  * +  .
 \2     -0.034488 0.016344       +   *   +  .
 \3     -0.041385 0.019612     +   *    +   .
 \4     -0.045984 0.021791    +    *    +   .
 \5     -0.048283 0.022881   +     *    +   .
 \6     -0.048283 0.022881   +     *    +   .
 \7     -0.045984 0.021791    +    *    +   .
 \8     -0.041385 0.019612     +   *    +   .
 \9     -0.034488 0.016344       +   *   +  .
 \10    -0.025291 0.011985         +  * +  .
 \11    -0.013795 0.0065374           +*+ .
LAG SUM: -0.41845  STD. ERR.: 0.1983
MEAN LAG: 5.5

5) -0.95029  0.29536   -3.2174      LRELAHEM\6
6)  0.067934 0.017463   3.8902      Q753
7) -0.24019  0.017453 -13.762       Q863
8) -0.045301 0.017294  -2.6195      Q902+Q903
9) -0.037203 0.017671  -2.1054      Q933
10)  0.97584  0.020375  47.893       RHO
R-BAR SQUARED:0.9877
DURBIN-WATSON:1.90
STANDARD ERROR:0.023982     NORMALIZED:0.0027047
```

SERVICE AREA EMPLOYMENT - PRIMARY METAL - BUTLER COUNTY

WHERE:

LE33NS@BUTLER	=LOG(E33NS@BUTLER)
LJQIND33	=LOG(JQIND33)
LJQIND371	=LOG(JQIND371)
LJQE33	=LOG(JQIND33/E33)
LRELAPGI	=LOG(APGIND@CGE/WPI053)
LRELAHEM	=LOG(AHEMNS@1640/AHEM)
Q753	QUALITATIVE VARIABLE - THIRD QUARTER, 1975
Q863	QUALITATIVE VARIABLE - THIRD QUARTER, 1986
Q902	QUALITATIVE VARIABLE - SECOND QUARTER, 1990
Q903	QUALITATIVE VARIABLE - THIRD QUARTER, 1990
Q933	QUALITATIVE VARIABLE - THIRD QUARTER, 1993

AND:

E33NS@BUTLER	SERVICE AREA EMPLOYMENT - BUTLER COUNTY - PRIMARY METAL INDUSTRIES
JQIND371	US INDUSTRIAL PRODUCTION INDEX - MOTOR VEHICLES AND PARTS
JQIND33	US INDUSTRIAL PRODUCTION INDEX - PRIMARY METAL INDUSTRIES
E33	US EMPLOYMENT - PRIMARY METAL INDUSTRIES
APGIND@CGE	SERVICE AREA AVERAGE PRICE OF GAS FOR INDUSTRIAL CUSTOMERS
WPI053	WHOLESALE PRICE INDEX - GAS FUELS
AHEMNS@1640	SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING
AHEM	US AVERAGE HOURLY EARNINGS FOR MANUFACTURING

FORECAST EQUATION:

```
1>E33NS@BUTLER=EXP(<11.618>&&
2>+PDL(LJQIND33,1,3,FAR,<0.42456,0.28304,0.14152>)&&
3>+PDL(LJQIND371,1,3,FAR,<0.098921,0.065947,0.032974>)&&
4>+PDL(LJQE33,1,4,FAR,<-0.38213,-0.2866,-0.19107,-0.095534>)&&
5>+PDL(LRELAPGI,2,12,BOTH,<-0.013795,-0.025291,-0.034488,
6>-0.041385,-0.045984,-0.048283,-0.048283,-0.045984,-0.041385,
7>-0.034488,-0.025291,-0.013795>)&&
8>+<-0.95029>*LRELAHEM\6&&
9>+E33NS@BUTLER@AR1)
```

SERVICE AREA EMPLOYMENT - PRIMARY METAL - CINCINNATI CMSA

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
-------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1967:1 TO 1997:4  (124 OBS.)
DEPENDENT VARIABLE: LE33NS@CMSA

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  8.8019   0.28531   30.85       CONSTANT
1)                                 PDL(LJQIND33,1,4,FAR)

 \0     0.37828 0.041243    .           + *+
 \1     0.28371 0.030932    .        +*+
 \2     0.18914 0.020621    .     +*
 \3     0.09457 0.010311    .  *+
LAG SUM: 0.9457  STD. ERR.: 0.10311
MEAN LAG: 1

2)                                 PDL(LJQE33,1,4,FAR)

 \0     -0.1616   0.04565    +  *   +        .
 \1     -0.1212   0.034237       + *  +      .
 \2     -0.080799 0.022825          + * +    .
 \3     -0.0404   0.011412              +*+  .
LAG SUM: -0.404  STD. ERR.: 0.11412
MEAN LAG: 1

3)                                 PDL(LRELAPEI,1,8,FAR)

 \0     -0.090184 0.045605    +    *    +    .
 \1     -0.078911 0.039904      +   *    +   .
 \2     -0.067638 0.034204        +   *  +   .
 \3     -0.056365 0.028503          +  *  +  .
 \4     -0.045092 0.022802           +  *  + .
 \5     -0.033819 0.017102             + *  + .
 \6     -0.022546 0.011401               + *+.
 \7     -0.011273 0.0057006                +*.
LAG SUM: -0.40583  STD. ERR.: 0.20522
MEAN LAG: 2.3333

4)  0.017533 0.007858   2.2312     QOIL*LRPCOCP
5)  0.29301  0.038452   7.6201     Q651802
6) -0.53061  0.041668 -12.734      Q651884
7)  0.081545 0.029728   2.743      Q803
8) -0.12198  0.022852  -5.3378     Q811
9) -0.20069  0.028408  -7.0645     Q891954
10) -0.070302 0.022862  -3.0751     Q951
11)  0.80636  0.053112  15.182      RHO
R-BAR SQUARED:0.98393
DURBIN-WATSON:1.93
STANDARD ERROR:0.029341     NORMALIZED:0.0036753
```

SERVICE AREA EMPLOYMENT - PRIMARY METAL - CINCINNATI CMSA

WHERE:

LE33NS@CMSA	=LOG(E33NS@CMSA)
LJQIND33	=LOG(JQIND33)
LJQE33	=LOG(JQIND33/E33)
LRELAPEI	=LOG(APEIND@CGE/WPI054)
QOIL	QUALITATIVE VARIABLE - THIRD QUARTER, 1981 TO FOURTH QUARTER, 1992
LRPCOCP	=LOG(PCOCP/CPI)
Q651802	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO SECOND QUARTER, 1980
Q651884	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO FOURTH QUARTER, 1988
Q803	QUALITATIVE VARIABLE - THIRD QUARTER, 1980
Q811	QUALITATIVE VARIABLE - FIRST QUARTER, 1981
Q891954	QUALITATIVE VARIABLE - FIRST QUARTER, 1989 TO FOURTH QUARTER, 1995
Q951	QUALITATIVE VARIABLE = FIRST QUARTER, 1995

AND:

E33NS@CMSA	CINCINNATI CMSA EMPLOYMENT - PRIMARY METAL INDUSTRIES
JQIND33	US INDUSTRIAL PRODUCTION INDEX - PRIMARY METAL INDUSTRIES
E33	US EMPLOYMENT - PRIMARY METAL INDUSTRIES
APEIND@CGE	SERVICE AREA AVERAGE PRICE OF ELECTRICITY FOR INDUSTRIAL CUSTOMERS
WPI054	WHOLESALE PRICE INDEX - ELECTRIC POWER
PCOCP	AVERAGE REFINERS' ACQUISITION PRICE - CRUDE OIL - COMPOSITE
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS

FORECAST EQUATION:

```
1>E33NS@CMSA=EXP(<8.8019>&&
2>+PDL(LJQIND33,1,4,FAR,<0.37828,0.28371,0.18914,0.09457>)&&
3>+PDL(LJQE33,1,4,FAR,<-0.1616,-0.1212,-0.080799,-0.0404>)&&
4>+PDL(LRELAPEI,1,8,FAR,<-0.090184,-0.078911,-0.067638,
5>-0.056365,-0.045092,-0.033819,-0.022546,-0.011273>)&&
6>+<0.017533>*(QOIL*LRPCOCP)&&
7>+E33NS@CMSA@AR1)
```

SERVICE AREA EMPLOYMENT - INDUSTRIAL MACHINERY AND EQUIPMENT

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
---------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1967:1 TO 1997:4  (124 OBS.)
DEPENDENT VARIABLE: LE35NS@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  9.313    0.086613 107.52       CONSTANT
1)  0.96162 0.076029  12.648       LJQIND35
2)                                 PDL(LRELAHEM,1,6,FAR)

 \0    -0.37167  0.10249     +  *  +         .
 \1    -0.30972  0.085405     +  *  +        .
 \2    -0.24778  0.068324       + * +        .
 \3    -0.18583  0.051243        + * +       .
 \4    -0.12389  0.034162           +*+      .
 \5    -0.061944 0.017081             +*+.
LAG SUM: -1.3008  STD. ERR.: 0.3587
MEAN LAG: 1.6667

3)                                 PDL(LJQE35,1,2,FAR)

 \0    -0.73219 0.058876   +*+              .
 \1    -0.3661  0.029438          +*+       .
LAG SUM: -1.0983  STD. ERR.: 0.088313
MEAN LAG: 0.33333

4)  0.92432 0.034271  26.971       RHO
R-BAR SQUARED:0.98416
DURBIN-WATSON:1.90
STANDARD ERROR:0.014373     NORMALIZED:0.0014284
```

SERVICE AREA EMPLOYMENT - INDUSTRIAL MACHINERY AND EQUIPMENT

WHERE:

LE35NS@CGE	=LOG(E35NS@CGE)
LJQIND35	=LOG(JQIND35)
LRELAHEM	=LOG(AHEMNS@1640/AHEM)
LJQE35	=LOG(JQIND35/E35)

AND:

E35NS@CGE	SERVICE AREA EMPLOYMENT - INDUSTRIAL MACHINERY AND EQUIPMENT
AHEMNS@1640	SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING
AHEM	US AVERAGE HOURLY EARNINGS FOR MANUFACTURING
JQIND35	US INDUSTRIAL PRODUCTION INDEX - INDUSTRIAL MACHINERY AND EQUIPMENT
E35	US EMPLOYMENT - INDUSTRIAL MACHINERY AND EQUIPMENT

FORECAST EQUATION:

```
1>E35NS@CGE=EXP(<9.313>+<0.96162>*LJQIND35&&
2>+PDL(LRELAHEM,1,6,FAR,<-0.37167,-0.30972,-0.24778,-0.18583,-0.12389,
3>-0.061944>)&&
4>+PDL(LJQE35,1,2,FAR,<-0.73219,-0.3661>)+E35NS@CGE@AR1)
```

SERVICE AREA EMPLOYMENT - ELECTRONIC AND OTHER ELECTRICAL EQUIPMENT

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
------------------------------------------------------------
FREQUENCY: Q
INTERVAL:  1969:1 TO 1997:4  (116 OBS.)
DEPENDENT VARIABLE: LE36NS@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  5.9887   0.70011   8.554       CONSTANT
1)                                 PDL(LJQIND36,1,2,FAR)

 \0    0.57857 0.080326   .           + * +
 \1    0.28929 0.040163   .      +*
LAG SUM: 0.86786  STD. ERR.: 0.12049
MEAN LAG: 0.33333

2)                                 PDL(LJQE36,1,6,FAR)

 \0    -0.27057  0.035604   + *+            .
 \1    -0.22548  0.02967     + *+           .
 \2    -0.18038  0.023736       +*+         .
 \3    -0.13529  0.017802         +*+       .
 \4    -0.09019  0.011868            +*     .
 \5    -0.045095 0.005934              +*   .
LAG SUM: -0.947   STD. ERR.: 0.12461
MEAN LAG: 1.6667

3) -0.594    0.25721   -2.3094     LRELAHEM\1
4)  0.28815  0.076076   3.7877     LRELE15\2
5)  0.093172 0.020816   4.4759     Q681784
6)  0.035812 0.016612   2.1558     Q743+Q744
7) -0.034135 0.016316  -2.0922     Q891
8)  0.8509   0.048775  17.446      RHO
R-BAR SQUARED:0.94304
DURBIN-WATSON:1.79
STANDARD ERROR:0.021255     NORMALIZED:0.0023454
```

SERVICE AREA EMPLOYMENT - ELECTRONIC AND OTHER ELECTRICAL EQUIPMENT

WHERE:

LE36NS@CGE	=LOG(E36NS@CGE)
LJQIND36	=LOG(JQIND36)
LJQE36	=LOG(JQIND36/E36)
LRELAHEM	=LOG(AHEMNS@1640/AHEM)
LRELE15	=LOG(E15@CGE/EC)
Q681784	QUALITATIVE VARIABLE - FIRST QUARTER, 1968 TO FOURTH QUARTER, 1978
Q743	QUALITATIVE VARIABLE - THIRD QUARTER, 1974
Q744	QUALITATIVE VARIABLE - FOURTH QUARTER, 1974
Q891	QUALITATIVE VARIABLE - FIRST QUARTER, 1989

AND:

E36NS@CGE	SERVICE AREA EMPLOYMENT - ELECTRONIC AND OTHER ELECTRICAL EQUIPMENT
JQIND36	US INDUSTRIAL PRODUCTION INDEX - ELECTRONIC AND OTHER ELECTRICAL EQUIPMENT
E36	US EMPLOYMENT - ELECTRONIC AND OTHER ELECTRICAL EQUIPMENT
AHEMNS@1640	SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING
AHEM	US AVERAGE HOURLY EARNINGS FOR MANUFACTURING
E15@CGE	SERVICE AREA EMPLOYMENT - CONTRACT CONSTRUCTION
EC	US EMPLOYMENT - CONTRACT CONSTRUCTION

FORECAST EQUATION:

```
1>E36NS@CGE=EXP(<5.9887>+PDL(LJQIND36,1,2,FAR,<0.57857,0.28929>)&&
2>+PDL(LJQE36,1,6,FAR,<-0.27057,-0.22548,-0.18038,-0.13529,
3>-0.09019,-0.045095>)&&
4>+<-0.594>*LRELAHEM\1&&
5>+<0.28815>*LRELE15\2&&
6>+E36NS@CGE@AR1)
```

SERVICE AREA EMPLOYMENT - MOTOR VEHICLES AND PARTS

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
FREQUENCY: Q
INTERVAL:  1974:1 TO 1997:4  (96 OBS.)
DEPENDENT VARIABLE: LE371NS@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  9.2852  0.28223  32.9        CONSTANT
1)                               PDL(LJQIND371,1,4,FAR)

 \0    0.30983  0.041304   .          + * +
 \1    0.23238  0.030978   .        +*+
 \2    0.15492  0.020652   .     +*
 \3    0.077459 0.010326   .  *+
LAG SUM: 0.77459  STD. ERR.: 0.10326
MEAN LAG: 1

2)                               PDL(LJQE37,1,2,FAR)

 \0    -0.35325 0.1842      +    *    +    .
 \1    -0.17663 0.092098           +  *  + .
LAG SUM: -0.52988  STD. ERR.: 0.2763
MEAN LAG: 0.33333

3)                               PDL(LRELAHEM,2,16,BOTH)

 \0     -0.069975 0.029459             +*+.
 \1     -0.1312   0.055235          + *+   .
 \2     -0.18369  0.077329       +  *  +   .
 \3     -0.22742  0.09574      +  *    +   .
 \4     -0.26241  0.11047    +   *   +     .
 \5     -0.28865  0.12152   +   *    +     .
 \6     -0.30614  0.12888  +    *    +     .
 \7     -0.31489  0.13256  +   *     +     .
 \8     -0.31489  0.13256  +   *     +     .
 \9     -0.30614  0.12888  +    *    +     .
 \10    -0.28865  0.12152   +   *    +     .
 \11    -0.26241  0.11047    +   *   +     .
 \12    -0.22742  0.09574      +  *    +   .
 \13    -0.18369  0.077329       +  *  +   .
 \14    -0.1312   0.055235          + *+   .
 \15    -0.069975 0.029459             +*+.
LAG SUM: -3.5687  STD. ERR.: 1.5024
MEAN LAG: 7.5

4) -0.51152 0.2323   -2.202      LRELAPEI\10
5)  0.76955 0.058219 13.218      GMSHUTDOWN
6) -0.1156  0.053946 -2.1429     Q763
7) -0.1577  0.053811 -2.9306     Q764
8) -0.17276 0.049116 -3.5173     Q803
9) -0.17475 0.048896 -3.5739     Q813
10) -0.16833 0.049166 -3.4237     Q862
11) -0.23661 0.049006 -4.8282     Q871
12)  0.49542 0.088656  5.5881     RHO
R-BAR SQUARED:0.97289
DURBIN-WATSON:2.06
STANDARD ERROR:0.054412     NORMALIZED:0.0060788
```

SERVICE AREA EMPLOYMENT - TRANSPORTATION EQUIPMENT OTHER THAN AUTOS

WHERE:

LE372@9NS@CGE	=LOG(E372@9NS@CGE)
LJQIND372	=LOG(JQIND372)
LGFML92C	=LOG(GFML92C)
LJQE37	=LOG(JQIND37/E37)
LRELRTCGSL@OH	=LOG(RTCGSL@OH/RTCGSL)
Q651813	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO THIRD QUARTER, 1981
Q763	QUALITATIVE VARIABLE - THIRD QUARTER, 1976
Q814	QUALITATIVE VARIABLE - FOURTH QUARTER, 1981
Q881	QUALITATIVE VARIABLE - FIRST QUARTER, 1988
Q931	QUALITATIVE VARIABLE - FIRST QUARTER, 1993

AND:

E372@9NS@CGE	SERVICE AREA EMPLOYMENT - TRANSPORTATION EQUIPMENT OTHER THAN MOTOR VEHICLES AND PARTS
JQIND372	US INDUSTRIAL PRODUCTION INDEX - AIRCRAFT AND PARTS
GFML92C	FEDERAL GOVERNMENT PURCHASES FOR NATIONAL DEFENSE - CHAINED 1992 DOLLARS
JQIND37	US INDUSTRIAL PRODUCTION INDEX - TRANSPORTATION EQUIPMENT
E37	US EMPLOYMENT - TRANSPORTATION EQUIPMENT
RTCGSL@OH	EFFECTIVE TAX RATE - OHIO CORPORATE INCOME TAXES
RTCGSL	EFFECTIVE TAX RATE - STATE AND LOCAL CORPORATE INCOME TAXES - US

FORECAST EQUATION:

```
1>E372@9NS@CGE=EXP(<7.1147>&&
2>+PDL(LJQIND372,2,5,BOTH,<0.069674,0.11148,0.12541,0.11148,0.069674>)&&
3>+PDL(LGFML92C,1,4,FAR,<0.14566,0.10924,0.072829,0.036414>)&&
4>+PDL(LJQE37,2,5,BOTH,<-0.10992,-0.17587,-0.19785,-0.17587,-0.10992>)&&
5>+PDL(LRELRTCGSL@OH,2,12,BOTH,<-0.022738,-0.041686,-0.056845,-0.068214,
6>-0.075793,-0.079583,-0.079583,-0.075793,-0.068214,-0.056845,-0.041686,
7>-0.022738>)+E372@9NS@CGE@AR2)
```

SERVICE AREA EMPLOYMENT - ALL OTHER INDUSTRIES - DURABLE GOODS

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
---------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1971:1 TO 1997:4  (108 OBS.)
DEPENDENT VARIABLE: LEAOIDG@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  8.1878   0.393     20.834      CONSTANT
1)  0.39282  0.12802    3.0684     LJQINDAOIDG
2)                                 PDL(LJQEAOIDG,2,12,BOTH)

 \0     -0.030026 0.0059173              *+   .
 \1     -0.055047 0.010848           +* +     .
 \2     -0.075064 0.014793        + * +       .
 \3     -0.090077 0.017752      + * +         .
 \4     -0.10009  0.019724     + * +          .
 \5     -0.10509  0.02071     + *   +         .
 \6     -0.10509  0.02071     + *   +         .
 \7     -0.10009  0.019724     + * +          .
 \8     -0.090077 0.017752      + * +         .
 \9     -0.075064 0.014793        + * +       .
 \10    -0.055047 0.010848           +* +     .
 \11    -0.030026 0.0059173              *+   .
LAG SUM: -0.91078  STD. ERR.: 0.17949
MEAN LAG: 5.5

3)                                 PDL(LEC,1,2,FAR)

 \0    0.37337 0.086814    .       +   *   +
 \1    0.18668 0.043407    .   +*+
LAG SUM: 0.56005  STD. ERR.: 0.13022
MEAN LAG: 0.33333

4)                                 PDL(LRELAHEM,1,2,FAR)

 \0    -0.38066 0.19774    +    *    +    .
 \1    -0.19033 0.098869        +    *   + .
LAG SUM: -0.57099  STD. ERR.: 0.29661
MEAN LAG: 0.33333

5)  0.012065 0.0037959  3.1784     Q1*Q851964
6) -0.03641  0.012587  -2.8926     Q784
7) -0.03009  0.012753  -2.3595     Q824
8)  0.043806 0.013098   3.3445     Q961
9)  0.97123  0.022914  42.387      RHO
R-BAR SQUARED:0.97865
DURBIN-WATSON:1.72
STANDARD ERROR:0.017455     NORMALIZED:0.0016707
```

SERVICE AREA EMPLOYMENT - ALL OTHER INDUSTRIES - DURABLE GOODS

WHERE:

LEAOIDG@CGE	=LOG(EAOIDG@CGE)
LJQINDAOIDG	=LOG(JQINDAOIDG)
LJQEAOIDG	=LOG(JQINDAOIDG/EAOIDG)
LEC	=LOG(EC)
LRELAHEM	=LOG(AHEMNS@1640/AHEM)
Q1	QUALITATIVE VARIABLE - FIRST QUARTER
Q851964	QUALITATIVE VARIABLE - FIRST QUARTER, 1985 TO FOURTH QUARTER, 1996
Q784	QUALITATIVE VARIABLE - FOURTH QUARTER, 1978
Q824	QUALITATIVE VARIABLE - FOURTH QUARTER, 1982
Q961	QUALITATIVE VARIABLE - FIRST QUARTER, 1996

AND:

EAOIDG@CGE	SERVICE AREA EMPLOYMENT - ALL OTHER INDUSTRIES - DURABLE GOODS
JQINDAOIDG	US INDUSTRIAL PRODUCTION INDEX - ALL OTHER INDUSTRIES - DURABLE GOODS
EAOIDG	US EMPLOYMENT - ALL OTHER DURABLE GOODS INDUSTRIES
EC	US EMPLOYMENT - CONTRACT CONSTRUCTION
AHEMNS@1640	SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING
AHEM	US AVERAGE HOURLY EARNINGS FOR MANUFACTURING

FORECAST EQUATION:

```
1>EAOIDG@CGE=EXP(<8.1878>+<0.39282>*LJQINDAOIDG&&
2>+PDL(LJQEAOIDG,2,12,BOTH,<-0.030026,-0.055047,-0.075064,-0.090077,
3>-0.10009,-0.10509,-0.10509,-0.10009,-0.090077,-0.075064,-0.055047,
4>-0.030026>)&&
5>+PDL(LEC,1,2,FAR,<0.37337,0.18668>)&&
6>+PDL(LRELAHEM,1,2,FAR,<-0.38066,-0.19033>)+EAOIDG@CGE@AR1)
```

SERVICE AREA EMPLOYMENT - ALL OTHER INDUSTRIES - NONDURABLE GOODS

REGRESSION RESULTS:

```
LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION
---------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1971:3 TO 1997:4  (106 OBS.)
DEPENDENT VARIABLE: LEAOINDG@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  9.7487    0.23483   41.513      CONSTANT
1)                                  PDL(LJQINDAOINDG,1,5,FAR)

 \0    0.25488  0.042944     .          + * +
 \1    0.2039   0.034355     .        +* +
 \2    0.15293  0.025766     .     + *+
 \3    0.10195  0.017177     .   ++
 \4    0.050976 0.0085887    . +*
LAG SUM: 0.76463   STD. ERR.: 0.12883
MEAN LAG: 1.3333

2)                                  PDL(LJQEAOINDG,1,4,FAR)

 \0    -0.26151  0.055398   +  • +              .
 \1    -0.19613  0.041549       + * +           .
 \2    -0.13075  0.027699          + *+         .
 \3    -0.065377 0.01385               ++*+ .
LAG SUM: -0.65377   STD. ERR.: 0.1385
MEAN LAG: 1

3)                                  PDL(LRELAHEM,2,12,BOTH)

 \0      -0.03153  0.014997                ++*+ .
 \1      -0.057805 0.027495             +  * +  .
 \2      -0.078825 0.037493          +   *   +  .
 \3      -0.094589 0.044991        +   *     +  .
 \4      -0.1051   0.04999        +    *     +  .
 \5      -0.11035  0.05249       +     *     +  .
 \6      -0.11035  0.05249       +     *     +  .
 \7      -0.1051   0.04999        +    *     +  .
 \8      -0.094589 0.044991        +   *     +  .
 \9      -0.078825 0.037493          +   *   +  .
 \10     -0.057805 0.027495             +  * +  .
 \11     -0.03153  0.014997                ++*+ .
LAG SUM: -0.9564   STD. ERR.: 0.45491
MEAN LAG: 5.5

4) -0.25081    0.059859  -4.1901      LRELAPEI\14
5) -0.0034187 0.0014685 -2.328        Q3
6) -0.021301  0.0074245 -2.8691       Q751
7)  0.017848  0.0075268  2.3713       Q903
8)  0.020074  0.0074142  2.7075       Q964
9)  0.96036   0.027076  35.468        RHO
R-BAR SQUARED:0.96723
DURBIN-WATSON:1.68
STANDARD ERROR:0.010228     NORMALIZED:0.00099775
```

LRMINWAGE	=LOG(MINWAGE/CPI)
LRELPOP	=LOG(N@CGE/N)
Q651734	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO FOURTH QUARTER, 1973
Q714	QUALITATIVE VARIABLE - FOURTH QUARTER, 1971
Q743	QUALITATIVE VARIABLE - THIRD QUARTER, 1974
Q754	QUALITATIVE VARIABLE - FOURTH QUARTER, 1975
Q773	QUALITATIVE VARIABLE - THIRD QUARTER, 1977
Q791	QUALITATIVE VARIABLE - FIRST QUARTER, 1979
Q971	QUALITATIVE VARIABLE - FIRST QUARTER, 1997

AND:

E90X@CGE	SERVICE AREA EMPLOYMENT - STATE AND LOCAL GOVERNMENT
EGSL	US EMPLOYMENT - STATE AND LOCAL GOVERNMENT
YP@CGE	SERVICE AREA PERSONAL INCOME
YP	US PERSONAL INCOME
MINWAGE	MINIMUM WAGE
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS
N@CGE	SERVICE AREA TOTAL POPULATION
N	US TOTAL POPULATION

FORECAST EQUATION:

```
1>E90X@CGE=EXP(<1.3864>&&
2>+PDL(LEGSL,2,4,BOTH,<0.19931,0.29896,0.29896,0.19931>)&&
3>+PDL(LRELPCYP,1,3,FAR,<0.19398,0.12932,0.064658>)&&
4>+PDL(LRMINWAGE,1,5,FAR,<-0.030323,-0.024259,
5>-0.018194,-0.012129,-0.0060647>)&&
6>+PDL(LRELPOP,2,8,BOTH,<0.057385,0.10042,0.12912,
7>0.14346,0.14346,0.12912,0.10042,0.057385>)&&
8>+E90X@CGE@AR1)
```

SERVICE AREA EMPLOYMENT - CONTRACT CONSTRUCTION

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
--------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1975:1 TO 1997:4  (92 OBS.)
DEPENDENT VARIABLE: LE15@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0) 8.7337    0.21589   40.454      CONSTANT
1)                                 PDL(LEC,1,3,FAR)

 \0    0.60335 0.066372   .            + *+
 \1    0.40224 0.044248   .        +*+
 \2    0.20112 0.022124   .    +*
LAG SUM: 1.2067  STD. ERR.: 0.13274
MEAN LAG: 0.66667

2)                                 PDL(RMSHORTREALNS,2,6,BOTH)

 \0    -0.0018288 0.00058301         + * +    .
 \1    -0.0030481 0.00097168     +   *  +     .
 \2    -0.0036577 0.001166     +   *  +       .
 \3    -0.0036577 0.001166     +   *  +       .
 \4    -0.0030481 0.00097168     +   *  +     .
 \5    -0.0018288 0.00058301         + * +    .
LAG SUM: -0.017069  STD. ERR.: 0.0054414
MEAN LAG: 2.5

3) 0.65935   0.31735    2.0777      LRELCHECOM
4) 1.3414    0.65765    2.0397      LRELPCYP
5) 0.049831 0.016442    3.0308      Q801
6) 0.95799  0.029901   32.039       RHO
R-BAR SQUARED:0.98928
DURBIN-WATSON:1.99
STANDARD ERROR:0.021013     NORMALIZED:0.0020199
```

SERVICE AREA EMPLOYMENT - CONTRACT CONSTRUCTION

WHERE:

LE15@CGE	=LOG(E15@CGE)
LEC	=LOG(EC)
RMSHORTREALNS	REAL SHORT-TERM INTEREST RATE
LRELCHECOM	=LOG((ECOM@CGE/ECOM@CGE\1)/(ECOM/ECOM\1))
LRELPCYP	=LOG((YP@CGE/N@CGE)/(YP/N))
Q801	QUALITATIVE VARIABLE - FIRST QUARTER, 1980

AND:

E15@CGE	SERVICE AREA EMPLOYMENT - CONTRACT CONSTRUCTION
EC	US EMPLOYMENT - CONTRACT CONSTRUCTION
ECOM@CGE	SERVICE AREA EMPLOYMENT - COMMERCIAL
ECOM	US EMPLOYMENT - COMMERCIAL
YP@CGE	SERVICE AREA PERSONAL INCOME
N@CGE	SERVICE AREA TOTAL POPULATION
YP	US PERSONAL INCOME
N	US TOTAL POPULATION

FORECAST EQUATION:

```
1>E15@CGE=EXP(<8.7337>&&
2>+PDL(LEC,1,3,FAR,<0.60335,0.40224,0.20112>)&&
3>+PDL(RMSHORTREALNS,2,6,BOTH,<-0.0018288,-0.0030481,
4>-0.0036577,-0.0036577,-0.0030481,-0.0018288>)&&
5>+<0.65935>*LRELCHECOM&&
6>+<1.3414>*LRELPCYP&&
7>+E15@CGE@AR1)
```

SERVICE AREA PERSONAL INCOME

EQUATION:

YP@CGE=WSD@ADJ@CGE+YPPROP@CGE+YENT@CGE+V@CGE-TWPER@CGE

WHERE:

YP@CGE	SERVICE AREA PERSONAL INCOME
V@CGE	SERVICE AREA TOTAL TRANSFER PAYMENTS
WSD@ADJ@CGE	SERVICE AREA WAGE AND SALARY DISBURSEMENTS PLUS OTHER INCOME
YENT@CGE	SERVICE AREA NONFARM PROPRIETORS INCOME
YPROP@CGE	SERVICE AREA PERSONAL PROPERTY INCOME
TWPER@CGE	SERVICE AREA PERSONAL CONTRIBUTIONS FOR SOCIAL INSURANCE

SERVICE AREA EMPLOYMENT - MANUFACTURING

EQUATION:

EM@CGE=E20@CGE+E26@CGE+E28@CGE+E33NS@BUTLER+E33NS@CMSA&&
+E35NS@CGE+E36NS@CGE+E371NS@CGE+E372@9NS@CGE+EAOIDG@CGE+EAOINDG@CGE

WHERE:

EM@CGE	SERVICE AREA EMPLOYMENT - MANUFACTURING
EAOIDGNS@CGE	SERVICE AREA EMPLOYMENT - ALL OTHER INDUSTRIES - DURABLE GOODS
EAOINDGNS@CGE	SERVICE AREA EMPLOYMENT - ALL OTHER INDUSTRIES - NON-DURABLE GOODS
E20@CGE	SERVICE AREA EMPLOYMENT - FOOD AND PRODUCTS
E26@CGE	SERVICE AREA EMPLOYMENT - PAPER AND PRODUCTS
E28@CGE	SERVICE AREA EMPLOYMENT - CHEMICALS AND PRODUCTS
E33NS@BUTLER	SERVICE AREA EMPLOYMENT - PRIMARY METALS INDUSTRIES - BUTLER COUNTY
E33NS@CINN	SERVICE AREA EMPLOYMENT - PRIMARY METALS INDUSTRIES - ALL COUNTIES EXCEPT BUTLER
E35NS@CGE	SERVICE AREA EMPLOYMENT - MACHINERY EXCEPT ELECTRICAL
E36NS@CGE	SERVICE AREA EMPLOYMENT - ELECTRICAL MACHINERY
E371NS@CGE	SERVICE AREA EMPLOYMENT - TRANSPORTATION EQUIPMENT MOTOR VEHICLES AND PARTS
E372@9NS@CGE	SERVICE AREA EMPLOYMENT - TRANSPORTATION EQUIPMENT OTHER THAN MOTOR VEHICLES AND PARTS

SERVICE AREA EMPLOYMENT - TOTAL

EQUATION:

E@CGE=EM@CGE+ECOM@CGE+E9OX@CGE+E15@CGE

WHERE:

E@CGE	SERVICE AREA EMPLOYMENT - TOTAL
EM@CGE	SERVICE AREA EMPLOYMENT - MANUFACTURING
ECOM@CGE	SERVICE AREA EMPLOYMENT - COMMERCIAL
E9OX@CGE	SERVICE AREA EMPLOYMENT - STATE AND LOCAL GOVERNMENT
E15@CGE	SERVICE AREA EMPLOYMENT - CONTRACT CONSTRUCTION

KWH SALES - FOOD AND PRODUCTS

WHERE:

LKWH20NS@CGE	=LOG(KWH20NS@CGE)
LJQIND20@CGE	=LOG(JQIND20@CGE)
LDS@KW@IND@CPI	=LOG(DS@KW@IND@CGE/CPI)
LDS@KWH@IND@OIL	=LOG(DS@KWH@IND@CGE/WPI0561)
Q3	QUALITATIVE VARIABLE - THIRD QUARTER
CDDB	BILLING COOLING DEGREE DAYS
HDDB	BILLING HEATING DEGREE DAYS
Q2	QUALITATIVE VARIABLE - SECOND QUARTER
Q922	QUALITATIVE VARIABLE - SECOND QUARTER, 1992
Q932	QUALITATIVE VARIABLE - SECOND QUARTER, 1993
Q952	QUALITATIVE VARIABLE - SECOND QUARTER, 1995

AND:

KWH20NS@CGE	KWH SALES - FOOD AND PRODUCTS
JQIND20@CGE	SERVICE AREA INDUSTRIAL PRODUCTION INDEX - FOOD AND PRODUCTS
DS@KW@IND@CGE	SERVICE AREA DS RATE FOR DEMAND FOR INDUSTRIAL CUSTOMER
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS
DS@KWH@IND@CGE	SERVICE AREA DS RATE FOR USAGE FOR INDUSTRIAL CUSTOMER
WPI0561	WHOLESALE PRICE INDEX FOR CRUDE PETROLEUM

FORECAST EQUATION:

```
1>KWH20NS@CGE=EXP(<18.08>+PDL(LJQIND20@CGE,1,2,FAR,<0.57799,0.28899>)&&
2>+PDL(LDS@KW@IND@CPI,2,8,BOTH,<-0.014675,-0.025682,-0.033019,
3>-0.036688,-0.036688,-0.033019,-0.025682,-0.014675>)&&
4>+PDL(LDS@KWH@IND@OIL,1,4,FAR,<-0.041606,-0.031205,-0.020803,-0.010402>)&&
5>+<0.00008661>*(Q3*CDDB)+<-0.000053231>*HDDB&&
6>+<-0.040779>*Q2+KWH20NS@CGE@AR1)
```

KWH SALES - PAPER AND PRODUCTS

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
-------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1976:1 TO 1997:4  (88 OBS.)
DEPENDENT VARIABLE: LKWH26NS@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)                                  PDL(LJQIND26@CGE,1,5,FAR)

 \0    0.3123   0.08746    .       +   *  +
 \1    0.24984  0.069968   .      + *   +
 \2    0.18738  0.052476   .    + * +
 \3    0.12492  0.034984   .  + **
 \4    0.062459 0.017492   . *+
LAG SUM: 0.93689   STD. ERR.: 0.26238
MEAN LAG: 1.3333

1)                                  PDL(LDS@KWH@IND@AHEM,1,3,FAR)

 \0    -0.10347  0.040872   +   *   +       .
 \1    -0.068983 0.027248       +   *   +   .
 \2    -0.034491 0.013624             ** +  .
LAG SUM: -0.20695   STD. ERR.: 0.081745
MEAN LAG: 0.66667

2)                                  PDL(LDS@KW@IND@CPI,1,2,FAR)

 \0    -0.073843 0.033067   +    *   +      .
 \1    -0.036922 0.016534        +  *  +    .
LAG SUM: -0.11077   STD. ERR.: 0.049601
MEAN LAG: 0.33333

3) 17.457     0.50042  34.884      Q1
4) 17.518     0.5005   35.001      Q2
5) 17.525     0.50019  35.037      Q3
6) 17.496     0.50063  34.948      Q4
7) -0.12661   0.032759 -3.8648     Q781
8)  0.068554  0.032703  2.0962     Q921
9)  0.13314   0.032741  4.0665     Q931
10) -0.074514 0.03266  -2.2815      Q963
11)  0.73133  0.072704 10.059       RHO
R-BAR SQUARED:0.91053
DURBIN-WATSON:1.96
STANDARD ERROR:0.039432     NORMALIZED:0.0021308
```

KWH SALES - CHEMICALS AND PRODUCTS

WHERE:

LKWH28NS@CGE	=LOG(KWH28NS@CGE)
LJQIND28@CGE	=LOG(JQIND28@CGE)
LTS@KWH@IND@OIL	=LOG(TS@KWH@IND@CGE/WPI0561)
LTS@KWH@IND@AHEM	=LOG(TS@KWH@IND@CGE/AHEM@1640)
LTS@KWH@IND@COAL	=LOG(TS@KWH@IND@CGE/WPI051)
HDDB	BILLING HEATING DEGREE DAYS
Q651824	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO FOURTH QUARTER, 1982
CDDB	BILLING COOLING DEGREE DAYS
Q1	QUALITATIVE VARIABLE - FIRST QUARTER
Q2	QUALITATIVE VARIABLE - SECOND QUARTER
Q3	QUALITATIVE VARIABLE - THIRD QUARTER
Q4	QUALITATIVE VARIABLE - FOURTH QUARTER
Q923	QUALITATIVE VARIABLE - THIRD QUARTER, 1992

AND:

KWH28NS@CGE	SERVICE AREA KWH SALES - INDUSTRIAL - CHEMICALS AND PRODUCTS
JQIND28@CGE	SERVICE AREA INDUSTRIAL PRODUCTION INDEX - CHEMICALS AND PRODUCTS
WPI0561	WHOLESALE PRICE INDEX FOR CRUDE PETROLEUM
AHEM@1640	SERVICE AREA AVERAGE HOURLY EARNINGS FOR MANUFACTURING
TS@KWH@IND@CGE	SERVICE AREA TS RATE FOR USAGE FOR INDUSTRIAL CUSTOMER
WPI051	PRODUCER PRICE INDEX - COAL

FORECAST EQUATION:

```
1>KWH28NS@CGE=EXP(PDL(LJQIND28@CGE,1,3,FAR,<0.4431,0.2954,0.1477>)&&
2>+PDL(LTS@KWH@IND@OIL,2,12,BOTH,<-0.0045935,-0.0084214,-0.011484,
3>-0.01378,-0.015312,-0.016077,-0.016077,-0.015312,-0.01378,-0.011484,
4>-0.0084214,-0.0045935>)&&
5>+PDL(LTS@KWH@IND@AHEM,1,2,FAR,<-0.066289,-0.033145>)&&
6>+PDL(LTS@KWH@IND@COAL,2,12,BOTH,<-0.010666,-0.019555,-0.026666,
7>-0.031999,-0.035555,-0.037333,-0.037333,-0.035555,-0.031999,-0.026666,
8>-0.019555,-0.010666>)&&
9>+<0.000014835>*(Q1*HDDB*(1-Q651824))+<0.00017378>*CDDB+<16.901>*Q1+<16.939>*
```

KWH SALES - PRIMARY METALS LESS - AK STEEL CO.

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
-----------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1976:1 TO 1997:4  (88 OBS.)
DEPENDENT VARIABLE: LKWH33NS@ARMCO@BASE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0) 10.152   3.5672    2.8459     CONSTANT
1)  2.9898  0.55979   5.341      (Q651854)*LJQIND33@BUTLER
2)  1.558   0.62727   2.4838     (1-Q651854)*LJQIND33@BUTLER
3)                               PDL(LTS@KW@IND@CPI,2,14,BOTH)

 \0     -0.013992 0.0067938               +* +.
 \1     -0.025984 0.012617             + *  + .
 \2     -0.035978 0.01747           +   *  +  .
 \3     -0.043973 0.021352        +   *   +   .
 \4     -0.04997  0.024264       +   *   +    .
 \5     -0.053967 0.026205      +    *   +    .
 \6     -0.055966 0.027175     +     *   +    .
 \7     -0.055966 0.027175     +     *   +    .
 \8     -0.053967 0.026205      +    *   +    .
 \9     -0.04997  0.024264       +   *   +    .
 \10    -0.043973 0.021352        +   *   +   .
 \11    -0.035978 0.01747           +   *  +  .
 \12    -0.025984 0.012617             + *  + .
 \13    -0.013992 0.0067938               +* +.
LAG SUM: -0.55966   STD. ERR.: 0.27175
MEAN LAG: 6.5

4)                               PDL(LTS@KWH@IND@WAPARM,1,4,FAR)

 \0    -0.38911  0.15485    +   *    +     .
 \1    -0.29184  0.11614        +  *  +    .
 \2    -0.19456  0.077426          +  * +  .
 \3    -0.097279 0.038713              ++* .
LAG SUM: -0.97279   STD. ERR.: 0.38713
MEAN LAG: 1

5) -0.525   0.21372  -2.4565     Q651854
6) -0.55924 0.22477  -2.488      Q651954
7)  0.09121 0.0449    2.0314     Q3
8) -0.52061 0.19193  -2.7125     Q902+Q903
9)  0.69506 0.1979    3.5122     Q914
10)  0.68459 0.077704  8.8102     RHO
R-BAR SQUARED:0.77573
DURBIN-WATSON:2.22
STANDARD ERROR:0.23784     NORMALIZED:0.013359
```

KWH SALES - PRIMARY METALS - AK STEEL CO.

WHERE:

LKWH33NS@ARMCO@BASE	=LOG(KWH33NS@ARMCO-KWH33NS@ARMCO@BASE)
LJQIND33@BUTLER	=LOG(JQIND33@BUTLER)
LTS@KW@IND@CPI	=LOG(TS@KW@IND@CGE/CPI)
LTS@KWH@IND@WAPARM	=LOG(TS@KWH@IND@CGE/WAPARMNS@C)
Q651854	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO FOURTH QUARTER, 1985
Q651954	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO FOURTH QUARTER, 1995
Q3	QUALITATIVE VARIABLE - THIRD QUARTER
Q902	QUALITATIVE VARIABLE - SECOND QUARTER, 1990
Q903	QUALITATIVE VARIABLE - THIRD QUARTER, 1990
Q914	QUALITATIVE VARIABLE - FOURTH QUARTER, 1991

AND:

KWH33NS@ARMCO	SERVICE AREA SALES - INDUSTRIAL - PRIMARY METAL INDUSTRIES - AK STEEL CORP.
KWH33NS@ARMCO@BASE	BASE KWH SALES TO AK STEEL - 190,000,000 KWH
JQIND33@BUTLER	INDUSTRIAL PRODUCTION INDEX - PRIMARY METAL INDUSTRIES - BUTLER COUNTY ONLY
TS@KW@IND@CGE	SERVICE AREA TS RATE FOR DEMAND FOR INDUSTRIAL CUSTOMER
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS
TS@KWH@IND@CGE	SERVICE AREA TS RATE FOR USAGE FOR INDUSTRIAL CUSTOMER
WAPARMNS@C	WEIGHTED AVERAGE OF OFF-PEAK AND SPOT PRICES OF GAS - REFLECTS AVERAGE MARGINAL PRICE PAID BY AK STEEL FOR INTERRUPTIBLE GAS

FORECAST EQUATION:

```
1>KWH33NS@ARMCO=ARMCOBASE+EXP(<10.152>&&
2>+<1.558>*LJQIND33@BUTLER&&
3>+PDL(LTS@KW@IND@CPI,2,14,BOTH,<-0.013992,-0.025984,-0.035978,
4>-0.043973,-0.04997,-0.053967,-0.055966,-0.055966,-0.053967,
5>-0.04997,-0.043973,-0.035978,-0.025984,-0.013992>)&&
6>+PDL(LTS@KWH@IND@WAPARM,1,4,FAR,<-0.38911,-0.29184,-0.19456,-0.097279>)&&
7>+<0.09121>*Q3&&
8>+KWH33NS@ARMCO@AR1)
```

```
KWH SALES - PRIMARY METALS - LESS AK STEEL CO.

REGRESSION RESULTS:

ORDINARY LEAST SQUARES
---------------------

FREQUENCY: Q
INTERVAL:  1976:1 TO 1997:4  (88 OBS.)
DEPENDENT VARIABLE: LKWH33LARMNS@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)                                      PDL(LJQIND33@CMSA,1,2,FAR)

 \0    0.56823 0.021632   .             *+
 \1    0.28412 0.010816   .      *
LAG SUM: 0.85235  STD. ERR.: 0.032448
MEAN LAG: 0.33333

1)                                      PDL(LTS@KWH@IND@APG,2,10,BOTH)

 \0    -0.020404 0.0071643             +* + .
 \1    -0.036727 0.012896          + *  +   .
 \2    -0.048969 0.017194       +  *  +     .
 \3    -0.057131 0.02006      +   *  +      .
 \4    -0.061212 0.021493    +   *   +      .
 \5    -0.061212 0.021493    +   *   +      .
 \6    -0.057131 0.02006      +   *  +      .
 \7    -0.048969 0.017194       +  *  +     .
 \8    -0.036727 0.012896          + *  +   .
 \9    -0.020404 0.0071643             +* + .
LAG SUM: -0.44888  STD. ERR.: 0.15761
MEAN LAG: 4.5

2)                                      PDL(LTS@KW@IND@CPI,2,6,BOTH)

 \0    -0.042207 0.012075          + * +   .
 \1    -0.070345 0.020124     +  *  +      .
 \2    -0.084413 0.024149   +  *   +       .
 \3    -0.084413 0.024149   +  *   +       .
 \4    -0.070345 0.020124     +  *  +      .
 \5    -0.042207 0.012075          + * +   .
LAG SUM: -0.39393  STD. ERR.: 0.1127
MEAN LAG: 2.5

3)  0.070394 0.02404    2.9282     Q813974*LRPCOCP
4) 14.173    1.4176     9.9977     Q1
5) 14.171    1.4172     9.9992     Q2
6) 14.172    1.4189     9.9877     Q3
7) 14.153    1.4192     9.9721     Q4
8)  0.43362  0.042185 10.279       Q864882
9) -0.3963   0.072083 -5.4978      Q803+Q804
10) -0.51466  0.10171   -5.0602     Q811
11) -0.24438  0.096167 -2.5412      Q823
12)  0.19064  0.094936  2.0081      Q834
13)  0.19106  0.093982  2.033       Q923
14)  0.21359  0.093539  2.2834      Q924
15) -0.24324  0.095875 -2.5371      Q963
16) -0.26976  0.095494 -2.8249      Q972
17) -0.49917  0.09673   -5.1605     Q973
R-BAR SQUARED:0.93112
DURBIN-WATSON:1.95
STANDARD ERROR:0.090279     NORMALIZED:0.004938
```

KWH SALES - PRIMARY METALS - LESS AK STEEL CO.

WHERE:

LKWH33LARMNS@CGE	=LOG(KWH33LARMNS@CGE)
LJQIND33@CMSA	=LOG(JQIND33@CMSA)
LTS@KWH@IND@APG	=LOG(TS@KWH@IND@CGE/APGIND@CGE)
LTS@KW@IND@CPI	=LOG(TS@KW@IND@CGE/CPI)
Q813974	QUALITATIVE VARIABLE - THIRD QUARTER, 1981 TO FOURTH QUARTER, 1997
LRPCOCP	=LOG(PCOCP/CPI)
Q1	QUALITATIVE VARIABLE - FIRST QUARTER
Q2	QUALITATIVE VARIABLE - SECOND QUARTER
Q3	QUALITATIVE VARIABLE - THIRD QUARTER
Q4	QUALITATIVE VARIABLE - FOURTH QUARTER
Q864882	QUALITATIVE VARIABLE - FOURTH QUARTER, 1986 TO SECOND QUARTER, 1988
Q803	QUALITATIVE VARIABLE - THIRD QUARTER, 1980
Q804	QUALITATIVE VARIABLE - FOURTH QUARTER, 1980
Q811	QUALITATIVE VARIABLE - FIRST QUARTER, 1981
Q823	QUALITATIVE VARIABLE - THIRD QUARTER, 1982
Q834	QUALITATIVE VARIABLE - FOURTH QUARTER, 1983
Q923	QUALITATIVE VARIABLE - THIRD QUARTER, 1992
Q924	QUALITATIVE VARIABLE - FOURTH QUARTER, 1992
Q963	QUALITATIVE VARIABLE - THIRD QUARTER, 1996
Q972	QUALITATIVE VARIABLE - SECOND QUARTER, 1997
Q973	QUALITATIVE VARIABLE - THIRD QUARTER, 1997

AND:

KWH33LARMNS@CGE	SERVICE AREA LESS AK STEEL - INDUSTRIAL - PRIMARY METAL INDUSTRIES
JQIND33@CMSA	CINCINNATI CMSA INDUSTRIAL PRODUCTION INDEX - PRIMARY METAL INDUSTRIES
TS@KWH@IND@CGE	SERVICE AREA TS RATE FOR USAGE FOR INDUSTRIAL CUSTOMER
APGIND@CGE	SERVICE AREA AVERAGE PRICE OF GAS FOR INDUSTRIAL CUSTOMERS
TS@KW@IND@CGE	SERVICE AREA TS RATE FOR DEMAND FOR INDUSTRIAL CUSTOMER
PCOCP	AVERAGE REFINERS' ACQUISITION PRICE - CRUDE OIL - COMPOSITE
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS

FORECAST EQUATION:

```
1>KWH33LARMNS@CGE=EXP(PDL(LJQIND33@CMSA,1,2,FAR,<0.56823,0.28412>)&&
2>+PDL(LTS@KWH@IND@APG,2,10,BOTH,<-0.020404,-0.036727,-0.048969,
3>-0.057131,-0.061212,-0.061212,-0.057131,-0.048969,-0.036727,-0.020404>)&&
4>+PDL(LTS@KW@IND@CPI,2,6,BOTH,<-0.042207,-0.070345,-0.084413,
5>-0.084413,-0.070345,-0.042207>)&&
6>+<0.070394>*LRPCOCP&&
7>+<14.173>*Q1+<14.171>*Q2+<14.172>*Q3+<14.153>*Q4)
```

KWH SALES - MACHINERY - EXCEPT ELECTRICAL

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
--------------------------------------------------------
FREQUENCY: Q
INTERVAL:  1969:1 TO 1997:4  (116 OBS.)
DEPENDENT VARIABLE: LKWH35NS@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0) 18.349       0.12821      143.11       CONSTANT
1)  0.65882     0.058183      11.323      LJQIND35@CGE
2)                                        PDL(LDS@KW@IND@CPI,2,7,BOTH)

 \0    -0.010277 0.0051299            +   * + .
 \1    -0.017617 0.0087941        +  *    +   .
 \2    -0.022022 0.010993      +    *    +    .
 \3    -0.02349  0.011725     +    *     +    .
 \4    -0.022022 0.010993      +    *    +    .
 \5    -0.017617 0.0087941        +  *    +   .
 \6    -0.010277 0.0051299            +   * + .
LAG SUM: -0.12332  STD. ERR.: 0.061558
MEAN LAG: 3

3)                                        PDL(LRWPI0561,2,6,BOTH)

 \0     0.010445 0.0050073   . + * +
 \1     0.017408 0.0083455   .  +   *   +
 \2     0.02089  0.010015    .   +    *    +
 \3     0.02089  0.010015    .   +    *    +
 \4     0.017408 0.0083455   .  +   *   +
 \5     0.010445 0.0050073   . + * +
LAG SUM: 0.097485  STD. ERR.: 0.046735
MEAN LAG: 2.5

4)  0.000010435 0.0000028352   3.6805     HDDB
5)  0.000031808 0.0000099409   3.1997     CDDB*Q651862
6)  0.000077179 0.00001049     7.3572     CDDB*(1-Q651862)
7) -0.086774    0.028117      -3.0861     Q781
8) -0.084531    0.027549      -3.0684     Q782
9) -0.059669    0.024231      -2.4625     Q793
10)  0.081917    0.024536      3.3387     Q801
11)  0.15611     0.032907      4.7441     Q651862
12)  0.82947     0.05186      15.994      RHO
R-BAR SQUARED:0.96387
DURBIN-WATSON:2.01
STANDARD ERROR:0.030865     NORMALIZED:0.0017057
```

KWH SALES - MOTOR VEHICLES AND PARTS

WHERE:

LKWH371NS@CGE	=LOG(KWH371NS@CGE)
LJQIND371@CGE	=LOG(JQIND371@CGE)
LTS@KW@IND@CPI	=LOG(TS@KW@IND@CGE/CPI)
LTS@KWH@IND@APG	=LOG(TS@KWH@IND@CGE/APGIND@CGE)
CDDB	BILLING COOLING DEGREE DAYS
Q1	QUALITATIVE VARIABLE - FIRST QUARTER
Q2	QUALITATIVE VARIABLE - SECOND QUARTER
Q3	QUALITATIVE VARIABLE - THIRD QUARTER
Q4	QUALITATIVE VARIABLE - FOURTH QUARTER
Q651802	QUALITATIVE VARIABLE - FIRST QUARTER, 1965 TO SECOND QUARTER, 1980
Q704	QUALITATIVE VARIABLE - FOURTH QUARTER, 1970
Q713	QUALITATIVE VARIABLE - THIRD QUARTER, 1971
Q724	QUALITATIVE VARIABLE - FOURTH QUARTER, 1972
Q731	QUALITATIVE VARIABLE - FIRST QUARTER, 1973
Q732	QUALITATIVE VARIABLE - SECOND QUARTER, 1973
Q803	QUALITATIVE VARIABLE - THIRD QUARTER, 1980
Q813	QUALITATIVE VARIABLE - THIRD QUARTER, 1981
Q881	QUALITATIVE VARIABLE - FIRST QUARTER, 1988

AND:

KWH371NS@CGE	SERVICE AREA KWH SALES - INDUSTRIAL - MOTOR VEHICLES AND PARTS
JQIND371@CGE	SERVICE AREA INDUSTRIAL PRODUCTION INDEX - MOTOR VEHICLES AND PARTS
TS@KW@IND@CGE	SERVICE AREA TS RATE FOR DEMAND FOR INDUSTRIAL CUSTOMER
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS
TS@KWH@IND@CGE	SERVICE AREA TS RATE FOR USAGE FOR INDUSTRIAL CUSTOMER
APGIND@CGE	SERVICE AREA AVERAGE PRICE OF GAS FOR INDUSTRIAL CUSTOMERS

FORECAST EQUATION:

```
1>KWH371NS@CGE=EXP(PDL(LJQIND371@CGE,2,5,BOTH,<0.088737,0.14198,
2>0.15973,0.14198,0.088737>)&&
3>+PDL(LTS@KW@IND@CPI,2,14,BOTH,<-0.004752,-0.0088252,-0.012219,-0.014935,
4>-0.016971,-0.018329,-0.019008,-0.019008,-0.018329,-0.016971,-0.014935,
5>-0.012219,-0.0088252,-0.004752>)&&
6>+PDL(LTS@KWH@IND@APG,1,2,FAR,<-0.11906,-0.059531>)&&
7>+<0.00018378>*CDDB&&
8>+<16.633>*Q1+<16.695>*Q2+<16.583>*Q3+<16.642>*Q4&&
9>+KWH371NS@CGE@AR1)
```

KWH SALES - AIRCRAFT AND PARTS

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

```
-------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1969:1 TO 1997:4  (116 OBS.)
DEPENDENT VARIABLE: LKWH372@9NS@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  0.41393     0.047426     8.7278     LJQIND372@CGE
1) -0.24541     0.030677    -7.9998     LTS@KWH@IND@CPI
2)                                      PDL(LTS@KWH@IND@APG,2,12,BOTH)

 \0     -0.0041233 0.0020052              +* +.
 \1     -0.0075594 0.0036762          +  * +  .
 \2     -0.010308  0.005013         +  *  +   .
 \3     -0.01237   0.0060156      +  *   +    .
 \4     -0.013744  0.006684      +  *   +     .
 \5     -0.014432  0.0070182    +   *   +     .
 \6     -0.014432  0.0070182    +   *   +     .
 \7     -0.013744  0.006684      +  *   +     .
 \8     -0.01237   0.0060156      +  *   +    .
 \9     -0.010308  0.005013         +  *  +   .
 \10    -0.0075594 0.0036762          +  * +  .
 \11    -0.0041233 0.0020052              +* +.
LAG SUM: -0.12507  STD. ERR.: 0.060824
MEAN LAG: 5.5

3)                                      PDL(LTS@KWH@IND@OIL,2,14,BOTH)

 \0     -0.0027258 0.0013638              + *+.
 \1     -0.0050623 0.0025329           + *  + .
 \2     -0.0070093 0.003507          +  *  +  .
 \3     -0.0085669 0.0042864       +  *    +  .
 \4     -0.0097351 0.0048709      +  *    +   .
 \5     -0.010514  0.0052605     +  *    +    .
 \6     -0.010903  0.0054554    +   *    +    .
 \7     -0.010903  0.0054554    +   *    +    .
 \8     -0.010514  0.0052605     +  *    +    .
 \9     -0.0097351 0.0048709      +  *    +   .
 \10    -0.0085669 0.0042864       +  *    +  .
 \11    -0.0070093 0.003507          +  *  +  .
 \12    -0.0050623 0.0025329           + *  + .
 \13    -0.0027258 0.0013638              + *+.
LAG SUM: -0.10903  STD. ERR.: 0.054554
MEAN LAG: 6.5

4)  0.00017783  0.000046157   3.8526    CDDB
5) -0.000023366 0.0000058584 -3.9885    HDDB*(1-Q651774)
6) 15.738       0.56389      27.91      Q1
7) 15.703       0.56415      27.836     Q2
8) 15.604       0.56581      27.578     Q3
9) 15.7         0.56428      27.822     Q4
10) -0.071521     0.035325    -2.0246    Q781
11)  0.2497       0.032619     7.655     Q914
12)  0.1103       0.036704     3.0052    Q922
13)  0.11729      0.039011     3.0065    Q923
14) -0.13712      0.032647    -4.2       Q942
15)  0.070011     0.032998     2.1217    Q961
16)  0.099786     0.032865     3.0363    Q973
17)  0.65792      0.069923     9.4092    RHO
R-BAR SQUARED:0.95001
DURBIN-WATSON:2.02
STANDARD ERROR:0.038168      NORMALIZED:0.0021087
```

KWH SALES - AIRCRAFT AND PARTS

WHERE:

LKWH372@9NS@CGE	=LOG(KWH372@9NS@CGE)
LJQIND372@CGE	=LOG(JQIND372@CGE)
LTS@KWH@IND@CPI	=LOG(TS@KWH@IND@CGE/CPI)
LTS@KWH@IND@APG	=LOG(TS@KWH@IND@CGE/APGIND@CGE)
LTS@KWH@IND@OIL	=LOG(TS@KWH@IND@CGE/WPI0561)
CDDB	BILLING COOLING DEGREE DAYS
HDDB	BILLING HEATING DEGREE DAYS
Q651774	QUALITATIVE VARIABLE - FIRST QUARTER, 1965TO FOURTH QUARTER, 1974
Q1	QUALITATIVE VARIABLE - FIRST QUARTER
Q2	QUALITATIVE VARIABLE - SECOND QUARTER
Q3	QUALITATIVE VARIABLE - THIRD QUARTER
Q4	QUALITATIVE VARIABLE - FOURTH QUARTER
Q781	QUALITATIVE VARIABLE - FIRST QUARTER, 1978
Q914	QUALITATIVE VARIABLE - FOURTH QUARTER, 1991
Q922	QUALITATIVE VARIABLE - SECOND QUARTER, 1992
Q923	QUALITATIVE VARIABLE - THIRD QUARTER, 1992
Q942	QUALITATIVE VARIABLE - SECOND QUARTER, 1994
Q961	QUALITATIVE VARIABLE - FIRST QUARTER, 1996
Q973	QUALITATIVE VARIABLE - THIRD QUARTER, 1997

AND:

KWH372@9NS@CGE	SERVICE AREA KWH SALES - INDUSTRIAL - TRANSPORTATION EQUIPMENT OTHER THAN MOTOR VEHICLES AND PARTS
JQIND372@CGE	SERVICE AREA INDUSTRIAL PRODUCTION INDEX - AIRCRAFT AND PARTS
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS
APGIND@CGE	SERVICE AREA AVERAGE PRICE OF GAS FOR INDUSTRIAL CUSTOMERS
TS@KWH@IND@CGE	SERVICE AREA TS RATE FOR USAGE FOR INDUSTRIAL CUSTOMER
WPI0561	WHOLESALE PRICE INDEX FOR CRUDE PETROLEUM

FORECAST EQUATION:

```
 1>KWH372@9NS@CGE=EXP(<0.41393>*LJQIND372@CGE&&
 2>+<-0.24541>*LTS@KWH@IND@CPI**
 3>+PDL(LTS@KWH@IND@APG,2,12,BOTH,<-0.0041233,-0.0075594,-0.010308,
 4>-0.01237,-0.013744,-0.014432,-0.014432,-0.013744,-0.01237,
 5>-0.010308,-0.0075594,-0.0041233>)&&
 6>+PDL(LTS@KWH@IND@OIL,2,14,BOTH,<-0.0027258,-0.0050623,-0.0070093,
 7>-0.0085669,-0.0097351,-0.010514,-0.010903,-0.010903,-0.010514,
 8>-0.0097351,-0.0085669,-0.0070093,-0.0050623,-0.0027258>)&&
 9>+<0.00017783>*CDDB&&
10>+<-0.000023366>*HDDB&&
11>+<15.738>*Q1+<15.703>*Q2+<15.604>*Q3+<15.7>*Q4&&
12>+KWH372@9NS@CGE@AR1)
```

KWH SALES - ALL OTHER INDUSTRIALS

REGRESSION RESULTS:

```
LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION
-----------------------------------------------------------

FREQUENCY: Q
INTERVAL:  1971:1 TO 1997:4   (108 OBS.)
DEPENDENT VARIABLE: LKWHAOINS@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0) 17.583       0.49144      35.779      CONSTANT
1)                                       PDL(LJQINDAOIDG@CGE,1,3,FAR)

 \0    0.21079  0.044763   .          + *  +
 \1    0.14053  0.029842   .      + * +
 \2    0.070263 0.014921   .  +*+
LAG SUM: 0.42158   STD. ERR.: 0.089527
MEAN LAG: 0.66667

2)  0.96035     0.090411     10.622      LJQINDAOINDG@CGE
3)                                       PDL(LDS@KWH@IND@APG,2,5,BOTH)

 \0    -0.011429 0.005712            + *  +  .
 \1    -0.018286 0.0091392      +    *    +  .
 \2    -0.020572 0.010282     +     *     +  .
 \3    -0.018286 0.0091392      +    *    +  .
 \4    -0.011429 0.005712            + *  +  .
LAG SUM: -0.080001   STD. ERR.: 0.039984
MEAN LAG: 2

4)                                       PDL(LDS@KWH@IND@OIL,1,9,FAR)

 \0    -0.019166  0.0093347  +    *    +     .
 \1    -0.017036  0.0082975    +   *   +     .
 \2    -0.014907  0.0072603     +   *   +    .
 \3    -0.012777  0.0062231       +  *   +   .
 \4    -0.010648  0.0051859         + *  +   .
 \5    -0.0085181 0.0041488          +  * +  .
 \6    -0.0063886 0.0031116            + *+  .
 \7    -0.0042591 0.0020744             +*+.
 \8    -0.0021295 0.0010372              +*.
LAG SUM: -0.095829   STD. ERR.: 0.046674
MEAN LAG: 2.6667

5)                                       PDL(LDS@KWH@IND@COAL,2,9,BOTH)

 \0    -0.011455 0.0053944           +* + .
 \1    -0.020365 0.0095901      +  *    + .
 \2    -0.026729 0.012587    +   *    +   .
 \3    -0.030547 0.014385   +    *    +   .
 \4    -0.03182  0.014985  +     *    +   .
 \5    -0.030547 0.014385   +    *    +   .
 \6    -0.026729 0.012587    +   *    +   .
 \7    -0.020365 0.0095901      +  *    + .
 \8    -0.011455 0.0053944           +* + .
LAG SUM: -0.21001   STD. ERR.: 0.098898
MEAN LAG: 4

6)  0.0001443   0.0000127    11.362      CDDB
7)  0.000033417 0.0000095825  3.4873     HDDB
8) -0.074551    0.018564     -4.016      Q1
9) -0.013339    0.0071647    -1.8617     Q4
10) -0.044624     0.018287     -2.4402     Q771
11) -0.062259     0.019832     -3.1393     Q781
12)  0.061395     0.017839      3.4416     Q933
13) -0.080096     0.01763      -4.5431     Q962
14) -0.049553     0.017876     -2.772      Q972
15)  0.75023      0.063622     11.792      RHO
R-BAR SQUARED:0.99329
DURBIN-WATSON:1.88
STANDARD ERROR:0.021508       NORMALIZED:0.0011091
```

KWH SALES - ALL OTHER INDUSTRIALS

WHERE:

LKWHAOINS@CGE	=LOG(KWHAOINS@CGE)
LJQINDAOIDG@CGE	=LOG(JQINDAOIDG@CGE)
LJQINDAOINDG@CGE	=LOG(JQINDAOINDG@CGE)
LDS@KWH@IND@APG	=LOG(DS@KWH@IND@CGE/APGIND@CGE)
LDS@KWH@IND@OIL	=LOG(DS@KWH@IND@CGE/WPI0561)
LDS@KWH@IND@COAL	=LOG(DS@KWH@IND@CGE/WPI051)
CDDB	BILLING COOLING DEGREE DAYS
HDDB	BILLING HEATING DEGREE DAYS
Q1	QUALITATIVE VARIABLE - FIRST QUARTER
Q4	QUALITATIVE VARIABLE - FOURTH QUARTER
Q771	QUALITATIVE VARIABLE - FIRST QUARTER, 1977
Q781	QUALITATIVE VARIABLE - FIRST QUARTER, 1978
Q933	QUALITATIVE VARIABLE - THIRD QUARTER, 1993
Q962	QUALITATIVE VARIABLE - SECOND QUARTER, 1996
Q972	QUALITATIVE VARIABLE - SECOND QUARTER, 1997

AND:

KWHAOINS@CGE	SERVICE AREA KWH SALES - ALL OTHER INDUSTRIES
JQINDAOIDG@CGE	SERVICE AREA INDUSTRIAL PRODUCTION - ALL OTHER INDUSTRIES - DURABLE GOODS
JQINDAOINDG@CGE	SERVICE AREA INDUSTRIAL PRODUCTION - ALL OTHER INDUSTRIES - NON-DURABLE GOODS
APGIND@CGE	SERVICE AREA AVERAGE PRICE OF GAS FOR INDUSTRIAL CUSTOMERS
WPI0561	WHOLESALE PRICE INDEX FOR CRUDE PETROLEUM
DS@KWH@IND@CGE	SERVICE AREA DS RATE FOR USAGE FOR INDUSTRIAL CUSTOMER
WPI051	WHOLESALE PRICE INDEX FOR COAL

FORECAST EQUATION:

```
 1>KWHAOINS@CGE=EXP(<17.583>&&
 2>+PDL(LJQINDAOIDG@CGE,1,3,FAR,<0.21079,0.14053,0.070263>)&&
 3>+<0.96035>*LJQINDAOINDG@CGE&&
 4>+PDL(LDS@KWH@IND@APG,2,5,BOTH,<-0.011429,-0.018286,
 5>-0.020572,-0.018286,-0.011429>)&&
 6>+PDL(LDS@KWH@IND@OIL,1,9,FAR,<-0.019166,-0.017036,-0.014907,
 7>-0.012777,-0.010648,-0.0085181,-0.0063886,-0.0042591,-0.0021295>)&&
 8>+PDL(LDS@KWH@IND@COAL,2,9,BOTH,<-0.011455,-0.020365,-0.026729,
 9>-0.030547,-0.03182,-0.030547,-0.026729,-0.020365,-0.011455>)&&
10>+<0.0001443>*CDDB&&
11>+<0.000033417>*HDDB&&
12>+<-0.074551>*Q1+<-0.013339>*Q4&&
13>+KWHAOINS@CGE@AR1)
```

KWH SALES - STREET LIGHTING

REGRESSION RESULTS:

LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION

FREQUENCY: Q
INTERVAL: 1977:1 TO 1997:4 (84 OBS.)
DEPENDENT VARIABLE: LKWHSL@CGE

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
0)	10.266	1.1572	8.872	CONSTANT
1)	0.47722	0.07897	6.0431	LCUSRES@CGE
2)	-0.52993	0.19028	-2.7851	LOG(.50*SATMERC@CGE+.50*SATSODVAP@CGE)
3)	-0.024637	0.0032644	-7.5473	Q782+Q812
4)	-0.038287	0.0043169	-8.8689	Q791
5)	-0.013441	0.0033389	-4.0256	Q793+Q913
6)	-0.012888	0.0054399	-2.3692	Q794
7)	-0.0324	0.005094	-6.3605	Q801
8)	0.030092	0.004612	6.5247	Q811
9)	-0.020204	0.0043179	-4.6792	Q851
10)	-0.050708	0.0043163	-11.748	Q911
11)	0.88797	0.05018	17.696	RHO

R-BAR SQUARED:0.95981
DURBIN-WATSON:2.06
STANDARD ERROR:0.0057717 NORMALIZED:0.00033973

KWH SALES - STREET LIGHTING

WHERE:

LKWHSL@CGE	=LOG(KWHSL@CGE)
LCUSRES@CGE	=LOG(CUSRES@CGE)
SATMERC@CGE	SERVICE AREA SATURATION OF MERCURY VAPOR STREET LIGHTING
SATSODVAP@CGE	SERVICE AREA SATURATION OF SODIUM VAPOR STREET LIGHTING
Q782	QUALITATIVE VARIABLE - SECOND QUARTER, 1978
Q812	QUALITATIVE VARIABLE - SECOND QUARTER, 1981
Q791	QUALITATIVE VARIABLE - FIRST QUARTER, 1979
Q793	QUALITATIVE VARIABLE - THIRD QUARTER, 1979
Q913	QUALITATIVE VARIABLE - THIRD QUARTER, 1991
Q794	QUALITATIVE VARIABLE - FOURTH QUARTER, 1979
Q801	QUALITATIVE VARIABLE - FIRST QUARTER, 1980
Q811	QUALITATIVE VARIABLE - FIRST QUARTER, 1981
Q851	QUALITATIVE VARIABLE - FIRST QUARTER, 1985
Q911	QUALITATIVE VARIABLE - FIRST QUARTER, 1991

AND:

KWHSL@CGE	SERVICE AREA KWH SALES - STREET LIGHTING
CUSRES@CGE	SERVICE AREA ELECTRIC CUSTOMERS - RESIDENTIAL

FORECAST EQUATION:

```
1>KWHSL@CGE=EXP(<10.266>+<0.47722>*LCUSRES@CGE&&
2>+<-0.52993>*(LOG(.50*SATMERC@CGE+.50*SATSODVAP@CGE))&&
3>+KWHSL@CGE@AR1)
```

KWH SALES - OTHER PUBLIC AUTHORITIES: LESS WATER PUMPING

REGRESSION RESULTS:

```
LEAST SQUARES WITH FIRST-ORDER AUTOCORRELATION CORRECTION
---------------------------------------------------------

FREQUENCY: M
INTERVAL:  1976:1 TO 1997:12  (264 OBS.)
DEPENDENT VARIABLE: LKWHOPALWPNS@CGE

COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)  3.0096     1.7913       1.6801      CONSTANT
1)                                      PDL(LE90X@CGE,1,2,FAR)

 \0    0.75681 0.108        .          + * +
 \1    0.3784  0.053999     .      +*
LAG SUM: 1.1352  STD. ERR.: 0.162
MEAN LAG: 0.33333

2)                                      PDL(LDS@KWH@OPA@CPI,1,2,FAR)

 \0    -0.17035  0.036449    +  •  +          .
 \1    -0.085177 0.018224          +  *+      .
LAG SUM: -0.25553  STD. ERR.: 0.054673
MEAN LAG: 0.33333

3)                                      PDL(LDS@KWH@OPA@APG,1,6,FAR)

 \0    -0.032617  0.0081805   +  •  +         .
 \1    -0.027181  0.006817     +  *  +        .
 \2    -0.021745  0.0054536       + * +       .
 \3    -0.016309  0.0040902         + * +     .
 \4    -0.010872  0.0027268            +*+    .
 \5    -0.0054362 0.0013634              +*+.
LAG SUM: -0.11416  STD. ERR.: 0.028632
MEAN LAG: 1.6667

4)  0.00033534 0.000047148  7.1125      CDDB*M7618412
5)  0.00054793 0.00003844  14.254       CDDB*(1-M7618412)
6)  0.00015136 0.00001388  10.905       HDDB*M7618412
7)  0.00013133 0.0000132    9.9491      HDDB*(1-M7618412)
8)  0.029912   0.0070139    4.2647      MJUN
9)  0.041976   0.0072628    5.7796      MSEP
10)  0.071922   0.031175     2.307       M7612
11)  0.10292    0.031488     3.2685      M775
12) -0.11259    0.035267    -3.1924      M782
13) -0.098339   0.035198    -2.7938      M783
14) -0.10869    0.031117    -3.4931      M892
15) -0.15093    0.031326    -4.8181      M928
16)  0.14427    0.036163     3.9893      M939
17) -0.11532    0.039725    -2.903       M9310
18) -0.27315    0.035571    -7.6791      M9311
19) -0.25554    0.031483    -8.1167      M941
20) -0.24209    0.031124    -7.7784      M943
21)  0.077123   0.031872     2.4198      M946
22)  0.11604    0.031361     3.7001      M9410
23) -0.17132    0.032084    -5.3396      M969
24) -0.085884   0.031163    -2.7559      M9611
25) -0.16519    0.03116     -5.3015      M9711
26) -0.19079    0.031856    -5.9892      M958
27)  0.56662    0.050713    11.173       RHO
R-BAR SQUARED:0.96671
DURBIN-WATSON:2.09
STANDARD ERROR:0.035745     NORMALIZED:0.00195
```

KWH SALES - OTHER PUBLIC AUTHORITIES: LESS WATER PUMPING

WHERE:

LKWHOPALWPNS@CGE	=LOG(KWHOPALWPNS@CGE)
LE90X@CGE	=LOG(E90X@CGE)
LDS@KWH@OPA@CPI	=LOG(DS@KWH@OPA@CGE/CPI)
LDS@KWH@OPA@APG	=LOG(DS@KWH@OPA@CGE/APGOPA@CGE)
CDDB	BILLING COOLING DEGREE DAYS
HDDB	BILLING HEATING DEGREE DAYS
M7618412	QUALITATIVE VARIABLE - JANUARY, 1976 TO DECEMBER, 1984
MJUN	QUALITATIVE VARIABLE - JUNE
MSEP	QUALITATIVE VARIABLE - SEPTEMBER
M7612	QUALITATIVE VARIABLE - DECEMBER, 1976
M775	QUALITATIVE VARIABLE - MAY, 1977
M782	QUALITATIVE VARIABLE - FEBRUARY, 1978
M783	QUALITATIVE VARIABLE - MARCH, 1978
M892	QUALITATIVE VARIABLE - FEBRUARY, 1989
M928	QUALITATIVE VARIABLE - AUGUST, 1992
M939	QUALITATIVE VARIABLE - SEPTEMBER, 1993
M9310	QUALITATIVE VARIABLE - OCTOBER, 1993
M9311	QUALITATIVE VARIABLE - NOVEMBER, 1993
M941	QUALITATIVE VARIABLE - JANUARY, 1994
M943	QUALITATIVE VARIABLE - MARCH, 1994
M946	QUALITATIVE VARIABLE - JUNE, 1994
M9410	QUALITATIVE VARIABLE - OCTOBER, 1994
M969	QUALITATIVE VARIABLE - SEPTEMBER, 1996
M9611	QUALITATIVE VARIABLE - NOVEMBER, 1996
M9711	QUALITATIVE VARIABLE - NOVEMBER, 1997
M958	QUALITATIVE VARIABLE - AUGUST, 1995

AND:

KWHOPALWPNS@CGE	KWH SALES - OPA LESS WATER PUMPING
E90X@CGE	SERVICE AREA EMPLOYMENT - STATE AND LOCAL GOVERNMENT
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS
DS@KWH@OPA@CGE	SERVICE AREA DS RATE FOR USAGE FOR OTHER PUBLIC AUTHORITIES CUSTOMER
APGOPA@CGE	SERVICE AREA AVERAGE PRICE OF GAS FOR OPA CUSTOMER

FORECAST EQUATION:

```
1>KWHOPALWPNS@CGE=EXP(<3.0096>+PDL(LE90X@CGE,1,2,FAR,<0.75681,0.3784>)&&
2>+PDL(LDS@KWH@OPA@CPI,1,2,FAR,<-0.17035,-0.085177>)&&
3>+PDL(LDS@KWH@OPA@APG,1,6,FAR,<-0.032617,-0.027181,-0.021745,-0.016309,
4>-0.010872,-0.0054362>)&&
5>+<0.00033534>*(CDDB*M7618412)+<0.00054793>*(CDDB*(1-M7618412))&&
6>+<0.00015136>*(HDDB*M7618412)+<0.00013133>*(HDDB*(1-M7618412))&&
7>+<0.029912>*MJUN+<0.041976>*MSEP+KWHOPALWPNS@CGE@AR1)
```

KWH SALES - OTHER PUBLIC AUTHORITIES: WATER PUMPING

REGRESSION RESULTS:

ORDINARY LEAST SQUARES

FREQUENCY: M
INTERVAL: 1976:1 TO 1997:12 (264 OBS.)
DEPENDENT VARIABLE: LKWHOPAWPNS@CGE

```
COEFFICIENT STD.ERROR T-STAT  INDEPENDENT VARIABLE

0)                                         PDL(LCUSRESNS@CGE,1,2,FAR)

 \0    0.53537 0.02629    .                *+
 \1    0.26769 0.013145   .       *
LAG SUM: 0.80306  STD. ERR.: 0.039436
MEAN LAG: 0.33333

1)                                         PDL(LDS@KW@OPA@CPI,1,2,FAR)

 \0    -0.032558 0.0079741   +  *  +          .
 \1    -0.016279 0.0039871         + *+       .
LAG SUM: -0.048837  STD. ERR.: 0.011961
MEAN LAG: 0.33333
```

2)	-0.0095175	0.0016215	-5.8697	(MMAY+MJUN+MJUL+MAUG+MSEP)*(PRC+PRC\1)
3)	-0.0052336	0.002296	-2.2795	(MNOV+MOCT+MAPR)*(PRC+PRC\1)
4)	0.00038223	0.000077084	4.9586	CDD
5)	0.000057184	0.000027217	2.101	(MDEC+MJAN+MFEB+MMAR+MAPR)*HDD
6)	5.9392	0.5157	11.517	MJAN
7)	5.8591	0.51446	11.389	MFEB
8)	5.9151	0.51352	11.519	MMAR
9)	5.9431	0.51316	11.581	MAPR
10)	6.0431	0.51074	11.832	MMAY
11)	6.0803	0.51194	11.877	MJUN
12)	6.1025	0.51288	11.898	MJUL
13)	6.1126	0.51234	11.931	MAUG
14)	6.0953	0.51127	11.922	MSEP
15)	6.0226	0.51143	11.776	MOCT
16)	5.9687	0.51183	11.661	MNOV
17)	5.8925	0.51496	11.443	MDEC
18)	0.17615	0.022074	7.9802	SUMMER885888
19)	0.46039	0.043989	10.466	M789
20)	0.12455	0.043445	2.8668	M8011
21)	0.7882	0.044582	17.68	M826
22)	-0.16184	0.04409	-3.6706	M9111
23)	-0.17864	0.043395	-4.1166	M9112
24)	-0.29605	0.044325	-6.679	M926
25)	-0.22915	0.043715	-5.2419	M927
26)	-0.18353	0.04332	-4.2365	M923
27)	-0.22951	0.044082	-5.2063	M937
28)	-0.16766	0.044128	-3.7994	M968
29)	-0.093054	0.043592	-2.1347	M972
30)	0.22624	0.044217	5.1167	M9710

R-BAR SQUARED:0.894
DURBIN-WATSON:1.71
STANDARD ERROR:0.042186 NORMALIZED:0.0025455

KWH SALES - OTHER PUBLIC AUTHORITIES: WATER PUMPING

WHERE:

LKWHOPAWPNS@CGE	=LOG(KWHOPAWPNS@CGE)
LCUSRESNS@CGE	=LOG(CUSRESNS@CGE)
LDS@KW@OPA@CPI	=LOG(DS@KW@OPA@CGE/CPI)
PRC	PRECIPITATION
CDD	ACTUAL COOLING DEGREE DAYS
HDD	ACTUAL HEATING DEGREE DAYS
MJAN	QUALITATIVE VARIABLE - JANUARY
MFEB	QUALITATIVE VARIABLE - FEBRUARY
MMAR	QUALITATIVE VARIABLE - MARCH
MAPR	QUALITATIVE VARIABLE - APRIL
MMAY	QUALITATIVE VARIABLE - MAY
MJUN	QUALITATIVE VARIABLE - JUNE
MJUL	QUALITATIVE VARIABLE - JULY
MAUG	QUALITATIVE VARIABLE - AUGUST
MSEP	QUALITATIVE VARIABLE - SEPTEMBER
MOCT	QUALITATIVE VARIABLE - OCTOBER
MNOV	QUALITATIVE VARIABLE - NOVEMBER
MDEC	QUALITAITVE VARIABLE - DECEMBER
SUMMER885888	QUALITATIVE VARIABLE - MAY, 1988 THRU AUG, 1988
M789	QUALITATIVE VARIABLE - SEPTEMBER, 1978
M8011	QUALITATIVE VARIABLE - NOVEMBER, 1980
M826	QUALITATIVE VARIABLE - JUNE, 1982
M9111	QUALITATIVE VARIABLE - NOVEMBER, 1991
M9112	QUALITATIVE VARIABLE - DECEMBER, 1991
M926	QUALITATIVE VARIABLE - JUNE, 1992
M927	QUALITATIVE VARIABLE - JULY, 1992
M923	QUALITATIVE VARIABLE - MARCH, 1992
M937	QUALITATIVE VARIABLE - JULY, 1993
M968	QUALITATIVE VARIABLE - AUGUST, 1996
M972	QUALITATIVE VARIABLE - FEBRUARY, 1997
M9710	QUALITATIVE VARIABLE - OCTOBER, 1997

AND:

KWHOPAWPNS@CGE	KWH SALES - OPA WATER PUMPING
CUSRESNS@CGE	SERVICE AREA ELECTRIC CUSTOMERS - RESIDENTIAL
DS@KW@OPA@CGE	SERVICE AREA DS RATE FOR DEMAND FOR OTHER PUBLIC AUTHORITIES CUSTOMER
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS

FORECAST EQUATION:

```
1>KWHOPAWPNS@CGE=EXP(PDL(LCUSRESNS@CGE,1,2,FAR,<0.53537,0.26769>)&&
2>+PDL(LDS@KW@OPA@CPI,1,2,FAR,<-0.032558,-0.016279>)&&
3>+<-0.0095175>*((MMAY+MJUN+MJUL+MAUG+MSEP)*(PRECIP+PRECIP\1))&&
4>+<-0.0052336>*((MNOV+MOCT+MAPR)*(PRECIP+PRECIP\1))
5>+<0.00038223>*CDD&&
6>+<0.000057184>*((MDEC+MJAN+MFEB+MMAR+MAPR)*HDD)&&
7>+<5.9392>*MJAN+<5.8591>*MFEB+<5.9151>*MMAR+<5.9431>*MAPR+<6.0431>*MMAY&&
8>+<6.0803>*MJUN+<6.1025>*MJUL+<6.1126>*MAUG+<6.0953>*MSEP+<6.0226>*MOCT&&
9>+<5.9687>*MNOV+<5.8925>*MDEC)
```

KWH SALES - OTHER PUBLIC UTILITIES : BETHEL, OHIO

REGRESSION RESULTS:

ORDINARY LEAST SQUARES

FREQUENCY: M
INTERVAL: 1976:1 TO 1997:12 (264 OBS.)
DEPENDENT VARIABLE: LKWHOPUBETHELNS@C

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
1)	0.4275	0.051806	8.252	LKWHRESNS@CGE
2)	0.45928	0.038062	12.067	LKWHCOMNS@CGE
3)	0.000091674	0.000032746	2.7995	HDDB
4)	-3.2412	0.44401	-7.2997	MJAN
5)	-3.1842	0.44255	-7.1952	MFEB
6)	-3.3219	0.44101	-7.5325	MMAR
7)	-3.2273	0.43767	-7.3738	MAPR
8)	-3.2528	0.43466	-7.4834	MMAY
9)	-3.3212	0.44021	-7.5447	MJUN
10)	-3.3915	0.44967	-7.5421	MJUL
11)	-3.3634	0.45158	-7.4481	MAUG
12)	-3.3689	0.44745	-7.529	MSEP
13)	-3.2798	0.43542	-7.5324	MOCT
14)	-3.1723	0.43549	-7.2844	MNOV
15)	-3.2382	0.44103	-7.3423	MDEC
16)	-0.056086	0.0099926	-5.6127	GASR731796
17)	0.12941	0.045953	2.8161	M829
18)	0.13148	0.04549	2.8904	M834
19)	0.12939	0.045501	2.8437	M836
20)	0.15973	0.045319	3.5246	M843
21)	-0.16032	0.045293	-3.5397	M945
22)	0.18661	0.045377	4.1124	M948
23)	-0.21069	0.045549	-4.6255	M949
24)	-0.11145	0.04543	-2.4533	M9710

R-BAR SQUARED:0.96589
DURBIN-WATSON:2.11
STANDARD ERROR:0.044024 NORMALIZED:0.0030711

KWH SALES - OTHER PUBLIC UTILITIES : BETHEL, OHIO

WHERE:

LKWHCOMNS@CGE	=LOG(KWHCOMNS@CGE)
LECOM@CGE	=LOG(ECOM@CGE)
LDS@KWH@COM@CPI	=LOG(DS@KWH@COM@CGE/CPI)
LRAPGCOM@CGE	=LOG(APGCOM@CGE/CPI)
HDDB	BILLING HEATING DEGREE DAYS
CDDB	BILLING COOLING DEGREE DAYS
MJAN	QUALITATIVE VARIABLE - JANUARY
MFEB	QUALITATIVE VARIABLE - FEBRUARY
MMAR	QUALITATIVE VARIABLE - MARCH
MAPR	QUALITATIVE VARIABLE - APRIL
MMAY	QUALITATIVE VARIABLE - MAY
MJUN	QUALITATIVE VARIABLE - JUNE
MJUL	QUALITATIVE VARIABLE - JULY
MAUG	QUALITATIVE VARIABLE - AUGUST
MSEP	QUALITATIVE VARIABLE - SEPTEMBER
MOCT	QUALITATIVE VARIABLE - OCTOBER
MNOV	QUALITATIVE VARIABLE - NOVEMBER
MDEC	QUALITAITVE VARIABLE - DECEMBER
M7511	QUALITATIVE VARIABLE - NOVEMBER, 1975
M7711	QUALITATIVE VARIABLE - NOVEMBER, 1977
M805	QUALITATIVE VARIABLE - MAY, 1980
M806	QUALITATIVE VARIABLE - JUNE, 1980
M817	QUALITATIVE VARIABLE - JULY, 1981
M849	QUALITATIVE VARIABLE - SEPTEMBER, 1984
M9111	QUALITATIVE VARIABLE - NOVEMBER, 1991
M914	QUALITATIVE VARIABLE - APRIL, 1991
M927	QUALITATIVE VARIABLE - JULY, 1992
M938	QUALITATIVE VARIABLE - AUGUST, 1993
M939	QUALITATIVE VARIABLE - SEPTEMBER, 1993
M9310	QUALITATIVE VARIABLE - OCTOBER, 1993
M954	QUALITATIVE VARIABLE - APRIL, 1995
M956	QUALITATIVE VARIABLE - JUNE, 1995
M972	QUALITATIVE VARIABLE - FEBRUARY, 1997
M973	QUALITATIVE VARIABLE - MARCH, 1997
M977	QUALITATIVE VARIABLE - JULY, 1997

AND:

KWHCOMNS@CGE	KWH SALES - COMMERCIAL
ECOM@CGE	SERVICE AREA EMPLOYMENT - COMMERCIAL
DS@KWH@COM@CGE	SERVICE AREA DS RATE FOR USAGE FOR COMMERCIAL CUSTOMER
APGCOM@CGE	SERVICE AREA AVERAGE PRICE OF GAS FOR COMMERCIAL CUSTOMER
CPI	CONSUMER PRICE INDEX (ALL URBAN) - ALL ITEMS

FORECAST EQUATION:

```
1>KWHOPUBETHELNS@C=EXP(<0.42154>*LKWHRESNS@CGE&&
2>+<0.46739>*LKWHCOMNS@CGE&&
3>+<0.000097568>*HDDB&&
4>+<-3.2893>*MJAN+<-3.2279>*MFEB+<-3.3683>*MMAR+<-3.2689>*MAPR&&
5>+<-3.2958>*MMAY+<-3.3626>*MJUN+<-3.43>*MJUL+<-3.4068>*MAUG&&
6>+<-3.4082>*MSEP+<-3.3223>*MOCT+<-3.2141>*MNOV+<-3.2802>*MDEC)
```

KWH SALES - OTHER PUBLIC UTILITIES : BLANCHESTER, OHIO

REGRESSION RESULTS:

ORDINARY LEAST SQUARES

FREQUENCY: M
INTERVAL: 1975:1 TO 1997:12 (276 OBS.)
DEPENDENT VARIABLE: LKWHOPUBLANCNS@C

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
1)	0.4242	0.043604	9.7285	LOG(KWHRESNS@CGE)
2)	0.17294	0.032488	5.3232	LOG(KWHCOMNS@CGE)
3)	0.0001957	0.000028476	6.8723	HDDB
4)	3.0258	0.37467	8.0759	MJAN
5)	3.0889	0.37348	8.2705	MFEB
6)	2.9796	0.37247	7.9997	MMAR
7)	3.081	0.36996	8.3279	MAPR
8)	3.0378	0.36775	8.2604	MMAY
9)	3.0184	0.37243	8.1044	MJUN
10)	2.9327	0.38033	7.711	MJUL
11)	2.9897	0.38194	7.8277	MAUG
12)	2.9705	0.37829	7.8526	MSEP
13)	3.0211	0.36868	8.1943	MOCT
14)	3.127	0.36827	8.4911	MNOV
15)	3.048	0.37243	8.184	MDEC
16)	-0.017924	0.0084918	-2.1107	GASR731796
17)	0.11626	0.040576	2.8651	M785
18)	-0.11816	0.040451	-2.9211	M826
19)	0.1284	0.040413	3.1773	M843
20)	-0.091804	0.040487	-2.2675	M914
21)	-0.1167	0.04064	-2.8716	M9310
22)	-0.13802	0.040399	-3.4164	M956

R-BAR SQUARED:0.9594
DURBIN-WATSON:1.98
STANDARD ERROR:0.039314 NORMALIZED:0.0026245

KWH SALES - OTHER PUBLIC UTILITIES : BLANCHESTER, OHIO

WHERE:

LKWHOPUBLANCNS@C	=LOG(KWHOPUBLANCNS@C)
KWHRESNS@CGE	KWH SALES - RESIDENTIAL
KWHCOMNS@CGE	KWH SALES - COMMERCIAL
HDDB	BILLING HEATING DEGREE DAYS
MJAN	QUALITATIVE VARIABLE - JANUARY
MFEB	QUALITATIVE VARIABLE - FEBRUARY
MMAR	QUALITATIVE VARIABLE - MARCH
MAPR	QUALITATIVE VARIABLE - APRIL
MMAY	QUALITATIVE VARIABLE - MAY
MJUN	QUALITATIVE VARIABLE - JUNE
MJUL	QUALITATIVE VARIABLE - JULY
MAUG	QUALITATIVE VARIABLE - AUGUST
MSEP	QUALITATIVE VARIABLE - SEPTEMBER
MOCT	QUALITATIVE VARIABLE - OCTOBER
MNOV	QUALITATIVE VARIABLE - NOVEMBER
MDEC	QUALITAITVE VARIABLE - DECEMBER
GASR731796	QUALITATIVE VARIABLE - JANUARY, 1973 TO JUNE, 1979 - GAS HOOKUP RESTRICTION
M785	QUALITATIVE VARIABLE - MAY, 1978
M826	QUALITATIVE VARIABLE - JUNE, 1982
M843	QUALITATIVE VARIABLE - MARCH, 1984
M914	QUALITATIVE VARIABLE - APRIL, 1991
M9310	QUALITATIVE VARIABLE - OCTOBER, 1993
M956	QUALITATIVE VARIABLE - JUNE, 1995

AND:

KWHOPUBLANCNS@C	KWH SALES - OTHER PUBLIC UTILITIES - BLANCHESTER

FORECAST EQUATION:

```
1>KWHOPUBLANCNS@C=EXP(<0.4242>*LOG(KWHRESNS@CGE)&&
2>+<0.17294>*LOG(KWHCOMNS@CGE)&&
3>+<0.0001957>*HDDB&&
4>+<3.0258>*MJAN+<3.0889>*MFEB+<2.9796>*MMAR+<3.081>*MAPR+<3.0378>*MMAY&&
5>+<3.0184>*MJUN+<2.9327>*MJUL+<2.9897>*MAUG+<2.9705>*MSEP+<3.0211>*MOCT&&
6>+<3.127>*MNOV+<3.048>*MDEC)
```

KWH SALES - OTHER PUBLIC UTILITIES : GEORGETOWN, OHIO

REGRESSION RESULTS:

ORDINARY LEAST SQUARES

FREQUENCY: M
INTERVAL: 1976:1 TO 1997:12 (264 OBS.)
DEPENDENT VARIABLE: LKWHOPUGTOWNNS@C

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
0)	1.5645	0.46046	3.3978	CONSTANT
1)	0.40206	0.027474	14.635	LKWHRESNS@CGE
2)	0.25402	0.030314	8.3796	LKWHCOMNS@CGE
3)	0.00027941	0.000012209	22.885	M6518712*HDDB
4)	0.0002926	0.000015303	19.12	(1-M6518712)*HDDB
5)	0.0000887	0.000046373	1.9127	(1-M6518712)*CDDB
6)	-0.024955	0.0090989	-2.7426	GASR731796
7)	-0.10556	0.0104	-10.15	MMAR
8)	-0.034132	0.011501	-2.9676	MJUL
9)	-0.043189	0.011085	-3.8963	MSEP
10)	0.056328	0.010094	5.5804	MNOV
11)	0.090022	0.042131	2.1367	M788
12)	0.097313	0.041112	2.367	M834
13)	0.14156	0.042028	3.3683	M843
14)	0.10407	0.04252	2.4477	M937
15)	0.14341	0.042219	3.3968	M939
16)	0.20795	0.042085	4.9411	M943
17)	0.12097	0.041282	2.9304	M946
18)	0.16284	0.041568	3.9174	M948
19)	0.14527	0.041461	3.5038	M952
20)	0.12918	0.04109	3.1438	M955
21)	0.11447	0.042369	2.7017	M959
22)	0.10446	0.041496	2.5174	M9510
23)	0.13715	0.042006	3.265	M9511
24)	0.12871	0.041527	3.0994	M962
25)	0.095203	0.042149	2.2587	M963
26)	0.11551	0.041306	2.7965	M965
27)	0.094108	0.042032	2.239	M967
28)	0.12138	0.042122	2.8815	M9611
29)	0.091685	0.042135	2.176	M973
30)	0.094305	0.041422	2.2767	M975
31)	0.15344	0.04202	3.6517	M978
32)	0.10814	0.042298	2.5566	M979
33)	0.12582	0.041675	3.0192	M9710

R-BAR SQUARED:0.96688
DURBIN-WATSON:2.13
STANDARD ERROR:0.0407 NORMALIZED:0.0027641

KWH SALES - OTHER PUBLIC UTILITIES : GEORGETOWN, OHIO

WHERE:

LKWHOPUGTOWNNS@C	=LOG(KWHOPUGTOWNNS@C)
LKWHRESNS@CGE	=LOG(KWHRESNS@CGE)
LKWHCOMNS@CGE	=LOG(KWHCOMNS@CGE)
HDDB	BILLING HEATING DEGREE DAYS
M6518712	QUALITATIVE VARIABLE - JANUARY, 1965 TO DECEMBER, 1987
CDDB	BILLING COOLING DEGREE DAYS
GASR731796	QUALITATIVE VARIABLE - JANUARY, 1973 TO JUNE, 1979 - GAS HOOKUP RESTRICTION
MMAR	QUALITATIVE VARIABLE - MARCH
MJUL	QUALITATIVE VARIABLE - JULY
MSEP	QUALITATIVE VARIABLE - SEPTEMBER
MNOV	QUALITATIVE VARIABLE - NOVEMBER
M788	QUALITATIVE VARIABLE - AUGUST, 1978
M834	QUALITATIVE VARIABLE - APRIL, 1983
M843	QUALITATIVE VARIABLE - MARCH, 1984
M937	QUALITATIVE VARIABLE - JULY, 1993
M939	QUALITATIVE VARIABLE - SEPTEMBER, 1993
M943	QUALITATIVE VARIABLE - MARCH, 1994
M946	QUALITATIVE VARIABLE - JUNE, 1994
M948	QUALITATIVE VARIABLE - AUGUST, 1994
M952	QUALITATIVE VARIABLE - FEBRUARY, 1995
M955	QUALITATIVE VARIABLE - MAY, 1995
M959	QUALITATIVE VARIABLE - SEPTEMBER, 1995
M9510	QUALITATIVE VARIABLE - OCTOBER, 1995
M9511	QUALITATIVE VARIABLE - NOVEMBER, 1995
M962	QUALITATIVE VARIABLE - FEBRUARY, 1996
M963	QUALITATIVE VARIABLE - MARCH, 1996
M965	QUALITATIVE VARIABLE - MAY, 1996
M967	QUALITATIVE VARIABLE - JULY, 1996
M9611	QUALITATIVE VARIABLE - NOVEMBER, 1996
M973	QUALITATIVE VARIABLE - MARCH, 1997
M975	QUALITATIVE VARIABLE - MAY, 1997
M978	QUALITATIVE VARIABLE - AUGUST, 1997
M979	QUALITATIVE VARIABLE - SEPTEMBER, 1997
M9710	QUALITATIVE VARIABLE - OCTOBER, 1997

AND:

KWHOPUGTOWNNS@C	KWH SALES - OTHER PUBLIC UTILITIES - GEORGETOWN
KWHRESNS@CGE	KWH SALES - RESIDENTIAL
KWHCOMNS@CGE	KWH SALES - COMMERCIAL

FORECAST EQUATION:

```
1>KWHOPUGTOWNNS@C=EXP(<1.5645>+<0.40206>*LKWHRESNS@CGE&&
2>+<0.25402>*LKWHCOMNS@CGE+<0.00027941>*(M6518712*HDDB)&&
3>+<0.0002926>*((1-M6518712)*HDDB)+<0.0000887>*((1-M6518712)*CDDB)&&
4>+<-0.024955>*GASR731796+<-0.10556>*MMAR+<-0.034132>*MJUL&&
5>+<-0.043189>*MSEP+<0.056328>*MNOV)
```

KWH SALES - OTHER PUBLIC UTILITIES : HAMERSVILLE, OHIO

REGRESSION RESULTS:

ORDINARY LEAST SQUARES

FREQUENCY: M
INTERVAL: 1982:1 TO 1997:12 (192 OBS.)
DEPENDENT VARIABLE: LKWHOPUHAMERSNS@C

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
0)	-6.2597	0.56527	-11.074	CONSTANT
1)	0.48772	0.065929	7.3977	LOG(KWHRESNS@CGE)
2)	0.45604	0.049159	9.2767	LOG(KWHCOMNS@CGE)
3)	0.00033725	0.000035473	9.5071	HDDB
4)	-0.08378	0.0163	-5.1398	MJAN
5)	-0.081112	0.01448	-5.6018	MMAR
6)	0.054486	0.014035	3.8821	MAPR
7)	-0.078114	0.017934	-4.3555	MJUN
8)	-0.16635	0.029801	-5.582	MJUL
9)	-0.13108	0.031782	-4.1244	MAUG
10)	-0.097715	0.025287	-3.8643	MSEP
11)	0.11299	0.014001	8.0698	MNOV
12)	0.10613	0.050595	2.0977	M821
13)	0.11323	0.050426	2.2455	M843
14)	-0.1477	0.049243	-2.9994	M9212
15)	0.12296	0.050211	2.4489	M944
16)	-0.24284	0.049457	-4.9102	M945
17)	0.12636	0.050452	2.5046	M948
18)	-0.13033	0.050481	-2.5818	M949
19)	0.17409	0.049196	3.5387	M955
20)	0.13832	0.049623	2.7875	M9510

R-BAR SQUARED:0.96143
DURBIN-WATSON:1.94
STANDARD ERROR:0.048469 NORMALIZED:0.0038293

KWH SALES - OTHER PUBLIC UTILITIES : HAMERSVILLE, OHIO

WHERE:

LKWHOPUHAMERSNS@C	=LOG(KWHOPUHAMERSNS@C)
KWHRESNS@CGE	KWH SALES - RESIDENTIAL
KWHCOMNS@CGE	KWH SALES - COMMERCIAL
HDDB	BILLING HEATING DEGREE DAYS
MJAN	QUALITATIVE VARIABLE - JANUARY
MMAR	QUALITATIVE VARIABLE - MARCH
MAPR	QUALITATIVE VARIABLE - APRIL
MJUN	QUALITATIVE VARIABLE - JUNE
MJUL	QUALITATIVE VARIABLE - JULY
MAUG	QUALITATIVE VARIABLE - AUGUST
MSEP	QUALITATIVE VARIABLE - SEPTEMBER
MNOV	QUALITATIVE VARIABLE - NOVEMBER
M821	QUALITATIVE VARIABLE - JANUARY, 1982
M843	QUALITATIVE VARIABLE - MARCH, 1984
M9212	QUALITATIVE VARIABLE - DECEMBER, 1992
M944	QUALITATIVE VARIABLE - APRIL, 1994
M945	QUALITATIVE VARIABLE - MAY, 1994
M948	QUALITATIVE VARIABLE - AUGUST, 1994
M949	QUALITATIVE VARIABLE - SEPTEMBER, 1994
M955	QUALITATIVE VARIABLE - MAY, 1995
M9510	QUALITATIVE VARIABLE - OCTOBER, 1995

AND:

KWHOPUHAMERSNS@C	KWH SALES - OTHER PUBLIC UTILITIES

FORECAST EQUATION:

```
EKWHOPUHAMERSNS@C
1>KWHOPUHAMERSNS@C=EXP(<-6.2597>&&
2>+<0.48772>*LOG(KWHRESNS@CGE)&&
3>+<0.45604>*LOG(KWHCOMNS@CGE)&&
4>+<0.00033725>*HDDB&&
5>+<-0.08378>*MJAN+<-0.081112>*MMAR+<0.054486>*MAPR+<-0.078114>*MJUN&&
6>+<-0.16635>*MJUL+<-0.13108>*MAUG+<-0.097715>*MSEP+<0.11299>*MNOV)
```

KWH SALES - OTHER PUBLIC UTILITIES : LEBANON, OHIO

REGRESSION RESULTS:

LEAST SQUARES WITH 2ND ORDER AUTOCORRELATION CORRECTION

FREQUENCY: M
INTERVAL: 1985:1 TO 1997:12 (156 OBS.)
DEPENDENT VARIABLE: LKWHOPULEBANONNS@C

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
1)	0.25808	0.056358	4.5794	LKWHRESNS@CGE
2)	0.70774	0.053817	13.151	LKWHCOMNS@CGE
3)	-3.1837	0.6154	-5.1733	MJAN
4)	-3.1157	0.61317	-5.0813	MFEB
5)	-3.2824	0.60997	-5.3813	MMAR
6)	-3.1971	0.6062	-5.2739	MAPR
7)	-3.2692	0.60232	-5.4277	MMAY
8)	-3.2676	0.60685	-5.3846	MJUN
9)	-3.2867	0.61424	-5.3509	MJUL
10)	-3.2747	0.61485	-5.326	MAUG
11)	-3.2854	0.61168	-5.3711	MSEP
12)	-3.2884	0.60323	-5.4513	MOCT
13)	-3.1565	0.60461	-5.2207	MNOV
14)	-3.2149	0.61151	-5.2572	MDEC
15)	-0.15446	0.039513	-3.9091	M8511
16)	-0.38718	0.037472	-10.333	M8512
17)	-0.23743	0.039236	-6.0513	M861
18)	-0.16849	0.039043	-4.3156	M868
19)	0.11365	0.03922	2.8977	M8610
20)	-0.12848	0.0373	-3.4446	M871
21)	-0.1602	0.038885	-4.1198	M872
22)	0.26868	0.039276	6.8407	M874
23)	0.32378	0.037246	8.693	M875
24)	-0.098852	0.036898	-2.6791	M889
25)	-0.10189	0.037997	-2.6816	M914
26)	-0.075283	0.037051	-2.0319	M936
27)	-0.090423	0.037208	-2.4302	M9310
28)	-0.091389	0.037257	-2.4529	M9411
29)	-0.14773	0.040673	-3.6322	M954
30)	0.15133	0.037572	4.0276	M955
31)	-0.12835	0.039424	-3.2556	M956
32)	0.11197	0.037279	3.0035	M968
33)	-1.1131	0.037319	-29.826	M977
34)	-0.42749	0.039234	-10.896	M978
35)	0.094462	0.039188	2.4105	M9710
36)	-0.1706	0.08496	-2.008	RHO1
37)	0.33026	0.087047	3.7941	RHO2

R-BAR SQUARED:0.95722
DURBIN-WATSON:2.07
STANDARD ERROR:0.037708 NORMALIZED:0.0023581

KWH SALES - OTHER PUBLIC UTILITIES : LEBANON, OHIO

WHERE:

LKWHOPULEBANONNS@C	=LOG(KWHOPULEBANONNS@C)
LKWHRESNS@CGE	=LOG(KWHRESNS@CGE)
LKWHCOMNS@CGE	=LOG(KWHCOMNS@CGE)
MJAN	QUALITATIVE VARIABLE - JANUARY
MFEB	QUALITATIVE VARIABLE - FEBRUARY
MMAR	QUALITATIVE VARIABLE - MARCH
MAPR	QUALITATIVE VARIABLE - APRIL
MMAY	QUALITATIVE VARIABLE - MAY
MJUN	QUALITATIVE VARIABLE - JUNE
MJUL	QUALITATIVE VARIABLE - JULY
MAUG	QUALITATIVE VARIABLE - AUGUST
MSEP	QUALITATIVE VARIABLE - SEPTEMBER
MOCT	QUALITATIVE VARIABLE - OCTOBER
MNOV	QUALITATIVE VARIABLE - NOVEMBER
MDEC	QUALITAITVE VARIABLE - DECEMBER
M8511	QUALITATIVE VARIABLE - NOVEMBER, 1985
M8512	QUALITATIVE VARIABLE - DECEMBER, 1985
M861	QUALITATIVE VARIABLE - JANUARY, 1986
M868	QUALITATIVE VARIABLE - AUGUST, 1986
M8610	QUALITATIVE VARIABLE - OCTOBER, 1986
M871	QUALITATIVE VARIABLE - JANUARY, 1987
M872	QUALITATIVE VARIABLE - FEBRUARY, 1987
M874	QUALITATIVE VARIABLE - APRIL, 1987
M875	QUALITATIVE VARIABLE - MAY, 1987
M889	QUALITATIVE VARIABLE - SEPTEMBER, 1988
M914	QUALITATIVE VARIABLE - APRIL, 1991
M936	QUALITATIVE VARIABLE - JUNE, 1993
M9310	QUALITATIVE VARIABLE - OCTOBER, 1993
M9411	QUALITATIVE VARIABLE - NOVEMBER, 1994
M954	QUALITATIVE VARIABLE - APRIL, 1995
M955	QUALITATIVE VARIABLE - MAY, 1995
M956	QUALITATIVE VARIABLE - JUNE, 1995
M968	QUALITATIVE VARIABLE - AUGUST, 1996
M977	QUALITATIVE VARIABLE - JULY, 1997
M978	QUALITATIVE VARIABLE - AUGUST, 1997
M9710	QUALITATIVE VARIABLE - OCTOBER, 1997

AND:

KWHOPULEBANONNS@C	KWH SALES - OTHER PUBLIC UTILITIES - LEBANON
KWHRESNS@CGE	KWH SALES - RESIDENTIAL
KWHCOMNS@CGE	KWH SALES - COMMERCIAL

FORECAST EQUATION:

```
EKWHOPULEBANONNS@C
1>KWHOPULEBANONNS@C=EXP(<0.38582>*LKWHRESNS@CGE&&
2>+<0.64172>*LKWHCOMNS@CGE&&
3>+<-4.4845>*MJAN+<-4.4091>*MFEB+<-4.5514>*MMAR+<-4.4658>*MAPR&&
4>+<-4.4964>*MMAY+<-4.5233>*MJUN+<-4.5603>*MJUL+<-4.5393>*MAUG&&
5>+<-4.5526>*MSEP+<-4.5181>*MOCT+<-4.4164>*MNOV+<-4.4834>*MDEC)
```

KWH SALES - OTHER PUBLIC UTILITIES : RIPLEY, OHIO

REGRESSION RESULTS:

ORDINARY LEAST SQUARES

FREQUENCY: M
INTERVAL: 1979:1 TO 1997:12 (228 OBS.)
DEPENDENT VARIABLE: LKWHOPURIPLEYNS@C

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
0)	-0.039204	0.33582	-0.11674	CONSTANT
1)	0.32722	0.026184	12.497	LKWHRESNS@CGE
2)	0.37832	0.026392	14.335	LKWHCOMNS@CGE
3)	0.05476	0.014123	3.8773	MFEB
4)	0.063569	0.013264	4.7924	MNOV
5)	-0.10087	0.022087	-4.567	M8378312
6)	-0.18259	0.053151	-3.4353	M793
7)	0.11613	0.052928	2.1942	M834
8)	-0.1862	0.054009	-3.4476	M842
9)	-0.16307	0.052744	-3.0918	M863
10)	-0.16477	0.052735	-3.1245	M893
11)	-0.15633	0.052695	-2.9667	M913
12)	-0.1206	0.052793	-2.2844	M9212
13)	-0.14069	0.052631	-2.6732	M934
14)	-0.14868	0.05301	-2.8048	M935
15)	-0.17091	0.052939	-3.2283	M936
16)	-0.21859	0.053289	-4.1019	M9310
17)	-0.19284	0.053082	-3.6328	M945
18)	-0.15785	0.052923	-2.9827	M949
19)	0.092352	0.038378	2.4064	M952+M9511
20)	-0.14107	0.052705	-2.6765	M953
21)	0.10783	0.053016	2.0338	M959
22)	0.20132	0.053091	3.792	M978

R-BAR SQUARED:0.90673
DURBIN-WATSON:1.80
STANDARD ERROR:0.052458 NORMALIZED:0.0037519

KWH SALES - OTHER PUBLIC UTILITIES : RIPLEY, OHIO

WHERE:

LKWHOPURIPLEYNS@C	=LOG(KWHOPURIPLEYNS@C)
LKWHRESNS@CGE	=LOG(KWHRESNS@CGE)
LKWHCOMNS@CGE	=LOG(KWHCOMNS@CGE)
MFEB	QUALITATIVE VARIABLE - FEBRUARY
MNOV	QUALITATIVE VARIABLE - NOVEMBER
M8378312	QUALITATIVE VARIABLE - JULY, 1983 TO DECEMBER, 1983
M793	QUALITATIVE VARIABLE - MARCH, 1979
M834	QUALITATIVE VARIABLE - APRIL, 1983
M842	QUALITATIVE VARIABLE - FEBRUARY, 1984
M863	QUALITATIVE VARIABLE - MARCH, 1986
M893	QUALITATIVE VARIABLE - MARCH, 1989
M913	QUALITATIVE VARIABLE - MARCH, 1991
M9212	QUALITATIVE VARIABLE - DECEMBER, 1992
M934	QUALITATIVE VARIABLE - APRIL, 1993
M935	QUALITATIVE VARIABLE - MAY, 1993
M936	QUALITATIVE VARIABLE - JUNE, 1993
M9310	QUALITATIVE VARIABLE - OCTOBER, 1993
M945	QUALITATIVE VARIABLE - MAY, 1994
M949	QUALITATIVE VARIABLE - SEPTEMBER, 1994
M952	QUALITATIVE VARIABLE - FEBRUARY, 1995
M9511	QUALITATIVE VARIABLE - NOVEMBER, 1995
M953	QUALITATIVE VARIABLE - MARCH, 1995
M959	QUALITATIVE VARIABLE - SEPTEMBER, 1995
M978	QUALITATIVE VARIABLE - AUGUST, 1997

AND:

KWHOPURIPLEYNS@C	KWH SALES - OTHER PUBLIC UTILITIES - RIPLEY
KWHRESNS@CGE	KWH SALES - RESIDENTIAL

FORECAST EQUATION:

```
1>KWHOPURIPLEYNS@C=EXP(<-0.039204>&&
2>+<0.32722>*LKWHRESNS@CGE&&
3>+<0.37832>*LKWHCOMNS@CGE&&
4>+<0.05476>*MFEB+<0.063569>*MNOV)
```

SERVICE AREA SUMMER MW PEAK

REGRESSION RESULTS:

ORDINARY LEAST SQUARES

FREQUENCY: M
INTERVAL: 1971:4 TO 1989:7 (220 OBS.)
DEPENDENT VARIABLE: LOG(MWSPEAK)

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
1)	-4.0294	0.31281	-12.881	MJUN
2)	-3.5488	0.1652	-21.482	MJUL+MAUG
3)	0.96722	0.025713	37.616	MJUN*LSENDDAYS
4)	0.93218	0.011902	78.319	(MJUL+MAUG) *LSENDDAYS
5)	0.01003	0.0029978	3.3458	TPMH*MJUN
6)	0.010459	0.0012095	8.6477	TPMH* (MJUL+MAUG)
7)	0.0032659	0.0014413	2.266	TPMHL1*MJUN
8)	0.0033325	0.00070082	4.7551	TPMHL1* (MJUL+MAUG)
9)	0.0039527	0.0013999	2.8237	TAM*MJUN
10)	0.0037529	0.0008198	4.5778	TAM* (MJUL+MAUG)
11)	0.0028717	0.00077624	3.6995	HUM*MJUN
12)	0.00064929	0.00031633	2.0526	HUM* (MJUL+MAUG)
13)	-0.00045523	0.000061773	-7.3695	JULY4WKALT*TPMH
14)	0.00063724	0.000080203	7.9454	MAUGEND*TPMH
15)	-0.060662	0.027376	-2.2159	M715
16)	-0.12258	0.028399	-4.3162	M717
17)	-0.069015	0.025833	-2.6716	M7210
18)	-0.067137	0.026479	-2.5355	M766
19)	-0.11709	0.031546	-3.7116	M801
20)	0.061363	0.026016	2.3587	M822
21)	0.064487	0.025722	2.5071	M823
22)	-0.072714	0.026221	-2.7731	M8411
23)	0.052793	0.026127	2.0207	M8412
24)	-0.056399	0.026502	-2.1281	M858
25)	0.078284	0.026068	3.0031	M875
26)	0.09443	0.025845	3.6538	M876
27)	0.052699	0.025782	2.044	M877
28)	0.079331	0.025938	3.0584	M878
29)	0.080692	0.025891	3.1166	M879
30)	0.088209	0.025824	3.4158	M8711
31)	-0.06002	0.02606	-2.3031	M895

R-BAR SQUARED:0.97969
DURBIN-WATSON:1.21
STANDARD ERROR:0.025458 NORMALIZED:0.003124

SERVICE AREA SUMMER MW PEAK

WHERE:

MWSPEAK	SERVICE AREA MW PEAK - SUMMER
LSENDDAYS	=LOG(MWHSENDNORMNS@CGE/DAYS)
TPMHL1	TPMH\1
TAM	MINIMUM HOURLY TEMPERATURE - MORNING
MJUN	QUALITATIVE VARIABLE - JUNE
HUM	HUMIDITY - AFTERNOON
MJUL	QUALITATIVE VARIABLE - JULY
MAUG	QUALITATIVE VARIABLE - AUGUST
JULY4WKALT	QUALITATIVE VARIABLE FOR THE WEEK OF JULY 4TH
MAUGEND	QUALITATIVE VARIABLE FOR THE END OF AUGUST
TPMH	MAXIMUM HOURLY TEMPERATURE - AFTERNOON
M715	QUALITATIVE VARIABLE - MAY, 1971
M717	QUALITATIVE VARIABLE - JULY, 1971
M7210	QUALITATIVE VARIABLE - OCTOBER, 1972
M766	QUALITATIVE VARIABLE - JUNE, 1976
M801	QUALITATIVE VARIABLE - JANUARY, 1980
M822	QUALITATIVE VARIABLE - FEBRUARY, 1982
M823	QUALITATIVE VARIABLE - MARCH, 1982
M8411	QUALITATIVE VARIABLE - NOVEMBER, 1984
M8412	QUALITATIVE VARIABLE - DECEMBER, 1984
M858	QUALITATIVE VARIABLE - AUGUST, 1985
M875	QUALITATIVE VARIABLE - MAY, 1987
M876	QUALITATIVE VARIABLE - JUNE, 1987
M877	QUALITATIVE VARIABLE - JULY, 1987
M878	QUALITATIVE VARIABLE - AUGUST, 1987
M879	QUALITATIVE VARIABLE - SEPTEMBER, 1987
M8711	QUALITATIVE VARIABLE - NOVEMBER, 1987
M895	QUALITATIVE VARIABLE - MAY, 1989

AND:

MWHSENDNORMNS@CGE	MWH SENDOUT - WEATHER NORMALIZED
DAYS	NUMBER OF DAYS IN THE MONTH

FORECAST EQUATION:

```
1>MWSPEAK=EXP(<-3.5488>&&
2>+<0.93218>*LOG(MWHSENDNS@CGE/31)&&
3>+<0.010459>*TPMH&&
4>+<0.0033325>*TPMHL1&&
5>+<0.0037529>*TAM&&
6>+<0.00064929>*HUMIDITY)
```

SERVICE AREA WINTER MW PEAK

REGRESSION RESULTS:

ORDINARY LEAST SQUARES

FREQUENCY: M
INTERVAL: 1975:4 TO 1985:2 (119 OBS.)
DEPENDENT VARIABLE: LOG(MWWPEAK)

	COEFFICIENT	STD.ERROR	T-STAT	INDEPENDENT VARIABLE
1)	-1.522	0.15508	-9.8144	AMPEAK*MDEC
2)	-1.6454	0.15704	-10.478	AMPEAK*MJAN
3)	-1.6053	0.15554	-10.321	AMPEAK*MFEB
4)	0.88821	0.014315	62.049	AMPEAK* (MDEC+MJAN+MFEB) *LSENDDAYS
5)	-0.0053279	0.0011625	-4.5833	TEMPAMBLO@0*TEMPAM*MDEC*AMPEAK
6)	-0.006196	0.0016252	-3.8125	(1-TEMPAMBLO@0) *TEMPAM*MDEC*AMPEAK
7)	-0.0060219	0.00087915	-6.8497	TEMPAMBLO@0*TEMPAM*MJAN*AMPEAK
8)	-0.0041116	0.0010779	-3.8145	(1-TEMPAMBLO@0) *TEMPAM*MJAN*AMPEAK
9)	-0.0035267	0.00061921	-5.6955	TEMPAM*MFEB*AMPEAK
10)	0.0013696	0.00072876	1.8793	WINDAM*AMPEAK*MJAN
11)	-0.00084088	0.00041138	-2.044	TEMPPML1*AMPEAK
12)	-3.0691	0.48774	-6.2924	PMPEAK*MDEC
13)	-1.2707	0.29456	-4.3139	PMPEAK*MJAN
14)	-1.2356	0.29153	-4.2383	PMPEAK*MFEB
15)	1.0296	0.045219	22.769	PMPEAK*LSENDDAYS*MDEC
16)	0.855	0.026805	31.898	PMPEAK*LSENDDAYS* (MJAN+MFEB)
17)	-0.0062746	0.00081425	-7.706	TEMPPM*PMPEAK* (MDEC+MFEB)
18)	-0.0073107	0.0007465	-9.7933	TEMPPM*PMPEAK*MJAN
19)	-0.077575	0.011938	-6.498	XMAS*AMPEAK
20)	-0.068725	0.021188	-3.2437	M777
21)	-0.053074	0.02137	-2.4835	M7711
22)	-0.059197	0.023506	-2.5183	M786
23)	0.037981	0.008317	4.5667	M788+M768+M802+M815+M827+M845+M846

R-BAR SQUARED:0.98263
DURBIN-WATSON:1.48
STANDARD ERROR:0.019773 NORMALIZED:0.0024652

SERVICE AREA WINTER MW PEAK

WHERE:

MWWPEAK	SERVICE AREA MW PEAK - WINTER
TEMPAMBLO@0	QUALITATIVE VARIABLE - TEMPAM BELOW 0
TEMPAM	MINIMUM HOURLY TEMPERATURE - MORNING
WINDAM	WIND SPEED MPH - MORNING
TEMPPML1	TEMPPM\1
LSENDDAYS	=LOG(MWHSENDNORMNS@CGE/DAYS)
MDEC	QUALITAITVE VARIABLE - DECEMBER
MFEB	QUALITATIVE VARIABLE - FEBRUARY
TEMPPM	MINIMUM HOURLY TEMPERATURE - EVENING
PMPEAK	QUALITATIVE VARIABLE - EVENING PEAK
MJAN	QUALITATIVE VARIABLE - JANUARY
XMAS	QUALITATIVE VARIABLE - CHRISTMAS WEEK
AMPEAK	QUALITATIVE VARIABLE - MORNING PEAK
M777	QUALITATIVE VARIABLE - JULY, 1977
M7711	QUALITATIVE VARIABLE - NOVEMBER, 1977
M786	QUALITATIVE VARIABLE - JUNE, 1978
M788	QUALITATIVE VARIABLE - AUGUST, 1978
M768	QUALITATIVE VARIABLE - AUGUST, 1976
M802	QUALITATIVE VARIABLE - FEBRUARY, 1980
M815	QUALITATIVE VARIABLE - MAY, 1981
M827	QUALITATIVE VARIABLE - JULY, 1982
M845	QUALITATIVE VARIABLE - MAY, 1984
M846	QUALITATIVE VARIABLE - JUNE, 1984

AND:

MWHSENDNORMNS@CGE	MWH SENDOUT - WEATHER NORMALIZED
DAYS	NUMBER OF DAYS IN THE MONTH

FORECAST EQUATION:

```
1>MWWPEAK=EXP(<-1.6454>
2>+<0.88821>*LOG(MWHSENDNS@CGE@JAN/31)
3>+<-0.0041116>*TEMPAM
4>+<0.0013696>*WINDAM
5>+<-0.00084088>*TEMPPML1)
```

Cinergy

FORM IRP-1

GENERAL SUPPLY - SIDE PLANNING INFORMATION

Marginal Costing Period Duration (1):

	Summer Season Months (June through September)			Winter Season Months (All Other Months)		
	On Peak	Mid Peak	Off Peak	On Peak	Mid Peak	Off Peak
Annual Hours:	784	262	1882	1562	1041	3229

Seasonal Demand Related Capacity Cost Allocation Factors:

Summer 100 %
Winter 0 %

NOTE: Estimate supplied for reporting purposes only. Cinergy does not use this in the evaluation of potential resources.

Generating Reserve Criteria:

Planned Average Generating Reserve Margin for the IRP Period: 17.0 % (2)

Projected Generating and Transmission Facility Costs:

Parameters	Trans. Data	Generating Facility Data				
Facility Designation		CT	NCT			
Capital Cost ($/kW) (4)	(3)	[redacted]				
Fixed O&M Cost ($/kW-yr) (4)	(3)					
Cost Escalation Rates (%/yr):						
Capital Cost	(3)					
Fixed O&M Cost	(3)					
LARR Rate (%/yr)	(3)	11.9	11.9			
Facility Book Life (years)		30	30			
Capacity Factors:						
Summer	N/A	Varies by Year, see note (5)				
Winter	N/A	Varies by Year, see note (5)				

Note: Capital and fixed O&M costs are in 1999 dollars, and capital costs include an estimate of AFUDC.

NOTES: (1) Period breakdowns are approximate and are provided as a filing requirement only, they are NOT necessarily recommended or used by Cinergy.

(2) This value is the System Planning Reserve Margin from the March 2, 1994, Operating Agreement among PSI, CG&E, and Cinergy Services, Inc.

(3) In compliance with FERC Order 889, the relevant transmission information is located in Volume II, which was prepared independently.

(4) The values shown are relative values used for planning purposes. Absolute values may vary considerable depending on many factors, including but not limited to: unit size, seasonal derating, specific site requirements, equipment vendor(s), ultimate number of units planned on a specific site and future and/or unforeseen regulatory requirements. Costs are based on ISO MW ratings.

(5) For generating facilities, capacity factor varies by year depending on, among other things, new unit additions, relative fuel costs, purchased power costs, and the actual performance of the other generating units on the system.

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Cinergy

FORM IRP-2

PROJECTED ON-SYSTEM VARIABLE ELECTRIC ENERGY COSTS

Marginal Variable Energy Costs ($/MWh) (1)

		Summer Season (2)			Winter Season (2)		
	Year	On Peak	Mid Peak	Off Peak	On Peak	Mid Peak	Off Peak
1999	0	[redacted]					
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11	First five years provided per order in case 95-203-EL-FOR.					
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						

Note: All cost data should be in nominal dollars.

The marginal variable energy cost information is considered by Cinergy to be trade secrets and confidential and competitive information. The redacted information will be made available to appropriate parties upon execution of an appropriate confidentiality agreement or protective order. Please contact Diane Jenner at (317)838-2183 for more information.

NOTES: (1) Estimated average marginal energy costs for the periods shown. Estimated costs of SO_2 allowances consumed are included. Cinergy is dispatched against the energy market.

(2) Period breakdowns are approximate and are provided as a filing requirement only, they are NOT necessarily recommended or used by Cinergy. Refer to Form IRP-1 for period duration.

CONFIDENTIAL

Figure OA-1

Wabash River Station EFOR 1988 - 1999

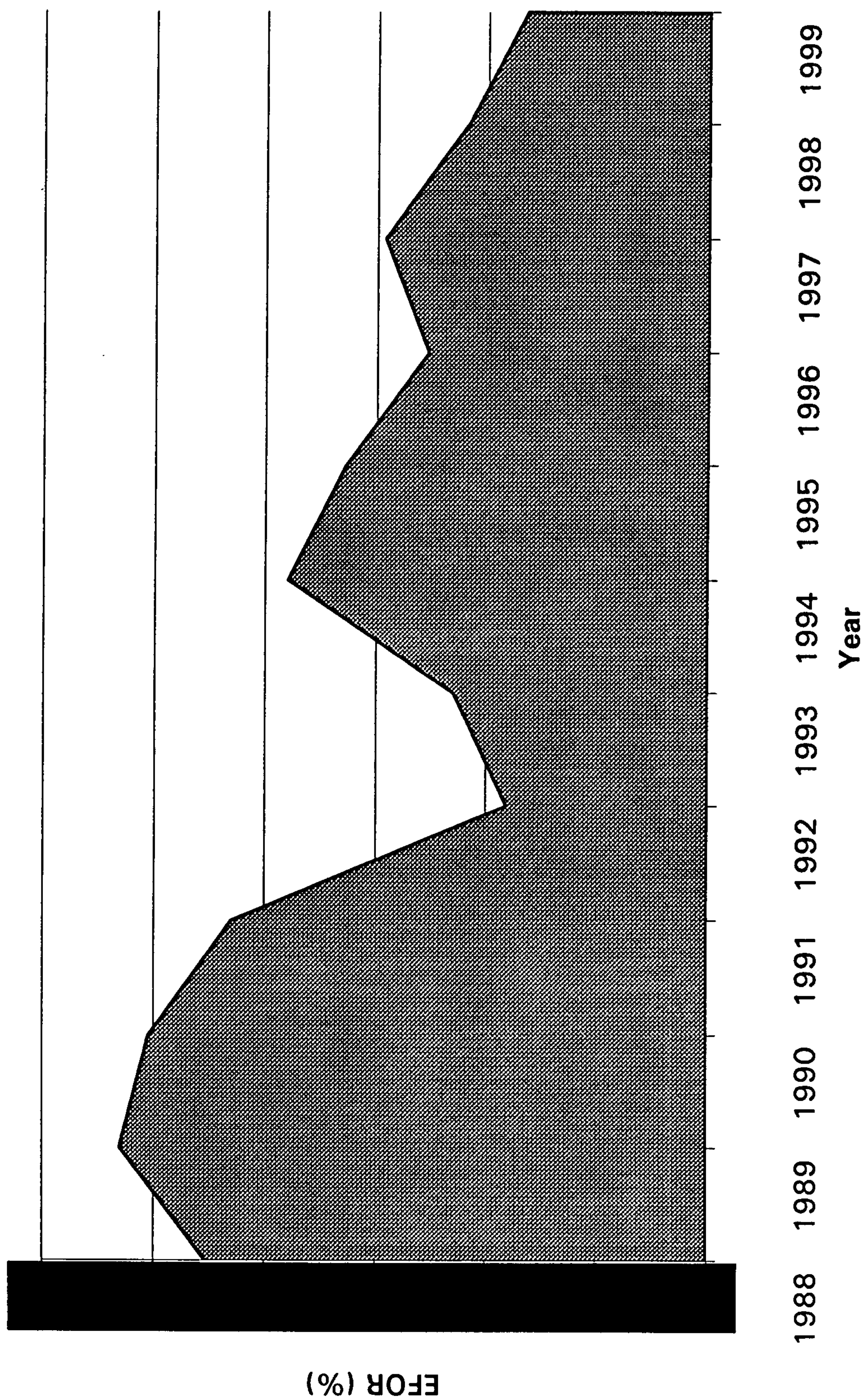
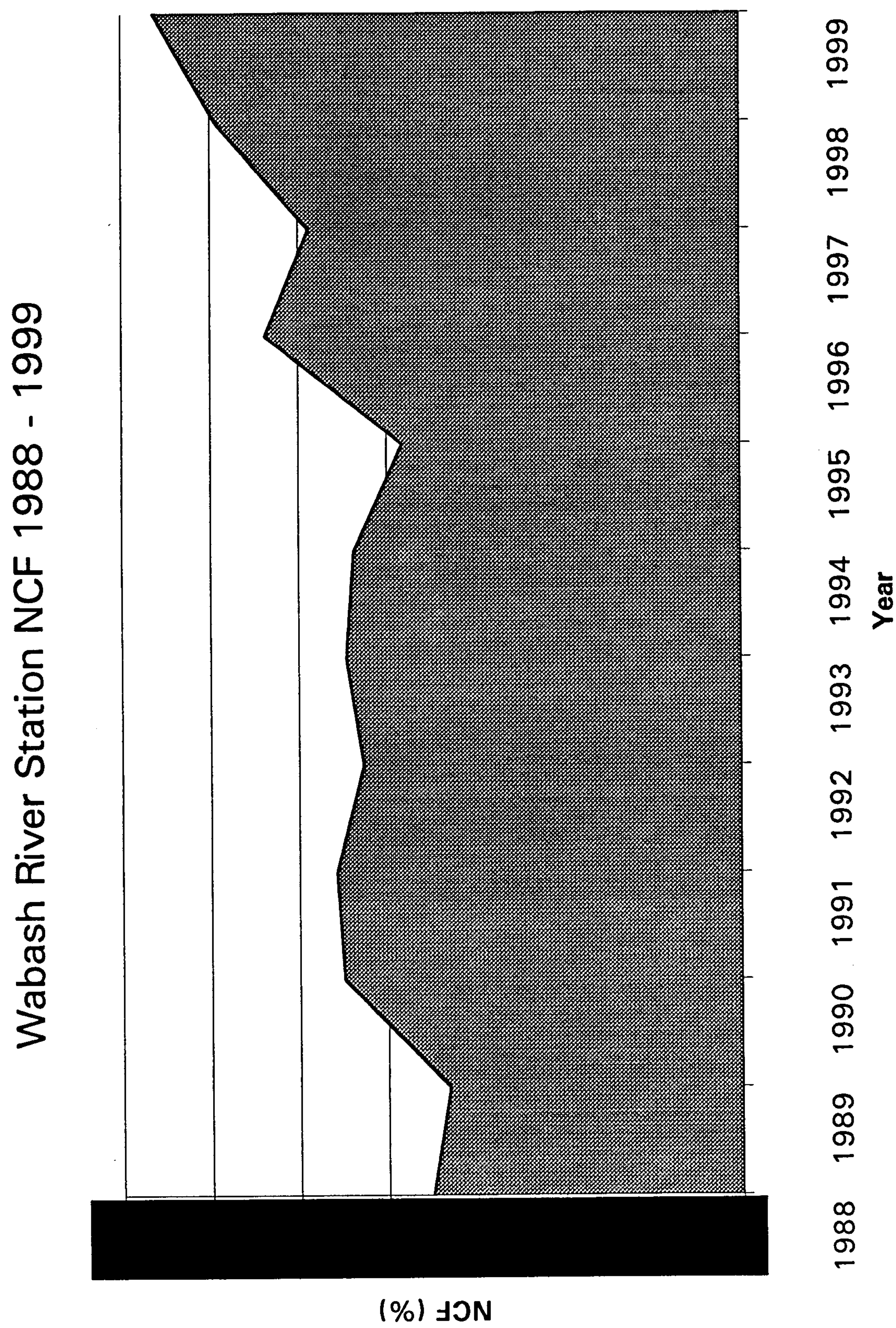


Figure OA-2


Wabash River Station NCF 1988 - 1999
NCF (%)
[redacted]
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year

CINERGY®

The Cincinnati Gas & Electric Company

1999

INTEGRATED RESOURCE PLAN

STATUS REPORT

November 1, 1999

By: Cinergy Services
Douglas F. Esamann, Vice President
139 East Fourth Street
P.O. Box 960
Cincinnati, Ohio 45201-0960

NOTICE

This STATUS Report is an integral part of the Cinergy 1999 IRP filing. Please see the submittal letters and other specific filing attachments contained in the front of Volume I of the Cinergy 1999 Integrated Resource Plan. For ease of comparison with past Short-Term Implementation Plans (STIPs), the same major headings as in the STIPs have been used.

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TABLE OF CONTENTS

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Planned New Generation and Transmission Facilities

There were no expenditures in 1998 on new generation facilities.

In compliance with the codes of conduct in FERC Order 889, the relevant transmission and distribution information is located in the Transmission Volume of this report, which was prepared independently.

Planned Improvements in Operations of Existing Generation, Transmission, and Distribution

Environmental Compliance Projects

In 1998, Cinergy made changes to some of its existing generating units as part of its compliance strategy for both the Federal Clean Air Act Amendments and state and local requirements. Several Projects have been consolidated for reporting purposes. The general types of projects included:

1) NO_x control projects.

2) Boiler Optimization

	PSI	CG&E	Cinergy
Estimated 1998 Expenditures	$ 292,602	$ 2,940,099	$ 3,232,701
Actual 1998 Expenditures	$ 198,206	$ 2,956,248	$ 3,154,454

Inlet Cooling

Cinergy has made Inlet Cooling changes to some of the Combustion Turbine units (see Figure GA-8-4 found in the General Appendix for the units affected). The expenditures for this project were budgeted for and occurred primarily in 1999.

	PSI	CG&E	Cinergy
Estimated 1998 Expenditures	$ -	$ -	$ -
Actual 1998 Expenditures	$ 16,781	$ 70,477	$ 87,258

Zimmer Synthetic Gypsum Project

Cinergy is investing capital dollars at Zimmer Station to make high quality synthetic gypsum that will be sold to a new wallboard manufacturing plant. Cinergy expects to create a significant environmental benefit by converting the by-product from the unit's sulfur dioxide scrubber into synthetic gypsum, rather than landfilling it. The amount of material placed in the station's landfill can be reduced by as much as 77 percent. The expenditures for this project will occur primarily in 1999 and 2000.

	PSI	CG&E	Cinergy
Estimated 1998 Expenditures	$ -	$ 60,000	$ 60,000
Actual 1998 Expenditures	$ -	$ 53,900	$ 53,900

In compliance with the codes of conduct in FERC Order 889, the relevant transmission and distribution information is located in the Transmission Volume of this report, which was prepared independently.

Planned Conservation, Load Modification, or Other Demand-Side Management Programs (Ohio Only)

Please note that estimated and actual expenditures reported throughout this section are for OHIO ONLY (not CG&E System).

Electric Weatherization

Program Description

The Electric Weatherization Program provides energy education and direct installation of energy saving measures in the homes of CG&E's electrically heated residential customers with income levels up to 200% of the poverty level. This program is only available to customers whose homes are being weatherized as part of the State Weatherization program. The program consists of the direct installation of specific DSM measures and energy education on the energy savings features of the measures. This program results in a reduction in the energy consumption of electric appliances and provides energy education for participants so that they can learn how to save energy and lower their electric bills. The measures available for installation under this program are:

- weatherization measures
- compact fluorescent lamps
- low flow showerheads
- faucet aerators

- pipe wrap
- water heater wraps
- waterbed covers

Process Evaluation

This "piggyback" program was not evaluated in 1998. Evaluation is expected in early 2000.

Impact Evaluation

This "piggyback" program was not evaluated in 1998. Evaluation is expected in early 2000.

Program Costs

Estimated 1998 Expenditures	$350,000
Actual 1998 Expenditures	$162

Program Performance

The program began at the end of 1998.

Energy Decisions

Program Description

The Energy Decisions program was jointly developed by CG&E

and the Educational Work Team of CG&E's Collaborative Effort. It is an annual educational series of training programs for area science and physics teachers.

This program focuses on energy use and economic decision-making for educators. The program offers the following classes: Three one-day classes for teachers (grades 2-9), and a one-week Summer Institute class. Class participants are assessed a nominal fee for materials.

All of the classes offered under this program are conducted in cooperation with the University of Cincinnati's Center for Economic Education (the Center). Educators who complete the one-day session receive one-quarter graduate credit hour. Completion of the five day Summer Institute class earns each educator three graduate credit hours. All recruiting for these classes is the responsibility of the Center.

Each course is taught primarily by staff of the Center, CG&E staff, and area science teachers. CG&E, Cinergy/Community Energy Partnership (CCEP), and the Center jointly developed the class topics.

Process Evaluation

Feedback from class participants is considered in the design of future class curricula.

Impact Evaluation

The Energy Decisions program has been designed as an educational program. Therefore, no attempt has been made to calculate load impacts.

Program Costs

Estimated 1998 Expenditures	$70,000
Actual 1998 Expenditures	$70,800

Promotional Efforts

The Center for Economic Education at the University of Cincinnati is responsible for promoting this program. Teachers apply to participate in the program through the internet.

Program Performance

Energy Decisions has been selected to receive the Governor's Award of Excellence for Energy Efficiency. More than 145 educators participated in one-day classes for educators were offered during 1998. Each class consisted of approximately 35 to 40 science and physics teachers from schools located in the CG&E service territory. The Summer Institute session was held in June 1998. One of the goals of the Summer Institute is to encourage teachers to incorporate energy economics into the school curriculum. It is hoped that at every Summer Institute at least one science teacher from each of the area school districts will participate in the class to facilitate this goal. The Center and CG&E cooperatively taught this class. CG&E discussed subjects ranging from how CG&E determines generation needs to the calculation of a typical bill. Tours of a power plant and an alternate energy source also were included in the class. There was a nominal charge of $20.00 for materials. Forty-five educators attended the Summer Institute in 1998.

Energy Maintenance Services

Program Description

This pilot program was designed to determine whether or not an energy maintenance program could result in energy savings for elderly/disabled customers with income levels less than

150% of poverty guidelines.

Process Evaluation

An evaluation was completed in 1998. It revealed high customer satisfaction and an increase in the efficiency of participants' homes.

Impact Evaluation

No formal impact evaluation was conducted in 1998.

Program Costs

Estimated 1998 Expenditures	$84,000
Actual 1998 Expenditures	$57,450

Program Performance

The program began in July 1998 and was completed in October 1998. Two hundred and one customers were served in 1998, exceeding the program goal to serve 200 customers.

General Use Program

Program Description

This program was designed to install energy savings measures in the homes of income-qualified electric customers throughout the CG&E service territory. This "piggyback" program promotes electric efficiency measures in low-income customers' homes as State Weatherization Agencies provide their services. Using an organization already in the home, these measures can be installed cost-effectively.

The program is delivered in conjunction with the State Weatherization Program through Community Action Agencies (CAA's) as a piggyback effort to their existing services. The CAA's solicit participation in this program. This program is only available to customers whose homes are being weatherized as part of the State Weatherization program. The program consists of the direct installation of specific DSM measures and energy education on the energy savings features of the measures. This program results in a reduction in the energy consumption of electric appliances and provides energy education for participants so that they can learn how to save energy and lower their electric bills. The measures available for installation under this program are:

- compact fluorescent lamps
- low flow showerheads
- faucet aerators
- pipe wrap
- water heater wraps
- waterbed covers

Process Evaluation

No process evaluation was performed in 1998.

Impact Evaluation

An impact evaluation was conducted in 1996. The results indicated that the program was not cost effective with a Total Resource Cost (TRC) test benefit/cost (B/C) ratio of 0.56.

Program Costs

1998 Estimated Expenditures	$15,000
1998 Actual Expenditures	$15,800

Program Performance

Seventy-eight customers were served in 1998. They following measures were installed in clients' homes:

213 compact fluorescent lamps

8 water heater jackets

25 insulated water heater pipes

23 low flow showerheads

61 faucet aerators

0 waterbed covers

Homebuyer Energy Education

Program Description

This program provides energy efficiency education to first-time homebuyers in low/moderate income communities. The training is conducted by the Communities United for Action (CUFA), which added an energy education component to its existing homebuyer training classes. CUFA is a grassroots coalition consisting of forty-four community groups, which was formed in 1980 to bring together residents of low and moderate income communities to work on common concerns. The energy education component of the program focuses on three primary areas: 1) guidance on how to shop for an energy efficient home, 2) making a home more energy efficient (measures to incorporate), and 3) conserving energy by reduced consumption and energy efficient measures. Besides the energy efficiency component, these classes also educate potential buyers on the following subjects: budgeting, qualifying for a loan, how to work with a realtor, how to shop for a home, sales contracts, applying for a loan, credit, etc. Each participant receives a compact fluorescent lamp.

Process Evaluation

No process evaluation was performed in 1998. However, participant evaluations are kept on file.

Impact Evaluation

Since this is an education program, there are currently no plans to perform an impact evaluation.

Program Costs

Expected 1998 Expenditures	\$18,850
Actual 1998 Expenditures	\$19,140

Program Performance

Eleven classes were conducted in 1998 and 225 customers were served.

Home Energy House Call

Program Description

The Home Energy House Call (HEHC) consists of three major components:

- Home Energy Survey
- Comprehensive Energy Audit & Review
- Measures Installation Opportunity

When a Home Energy House Call is requested by a customer, a qualified home energy specialist visits the site to gather information about the home. A questionnaire about the energy usage also is completed.

The energy specialist gives the customer a detailed report that explains how the customer's home uses energy each month. The specialist also will check the home for air leaks, inspect the furnace filter, and look at the insulation levels in different areas. If needed, the specialist will recommend cost saving do-it-yourself measures to make the home more energy efficient.

In addition to helping the customer with energy efficiency, the Home Energy House Call assists the customer with "Earth Perks." This part of the program looks at the natural resources and pollution prevention needs of the customer's home and community and offers a list of action items. This list of action items is prioritized by the home's environmental profile.

Program Evaluation

An evaluation was completed in 1998. The evaluation of the HEHC service showed a very successful program. A strong majority of participants are more knowledgeable about saving energy as a result of the audit. Participants implemented 39% of recommended measures within 6 months to 2 years after the audit and another 11% were still planned at the time of the survey. These findings indicate that customers have taken or plan to take 50% of all recommended actions contained in their audit report. Minor measures (items with low investment costs) were implemented at a much higher rate (74%) than major measures and most of the minor measures were implemented in less than 2 months, although there are some exceptions. The majority of all measures implemented (80%) were installed by customers and 17% were contracted out. Customer satisfaction with specific program components was very good and ranged from 8.2 to 9.6 on a 10-point scale. Saving money and learning about the home drove participation and many participants enrolled in the program for non-energy related reasons.

Impact Evaluation

An energy savings analysis was performed as part of the program evaluation discussed above. This study revealed that electric customers saved as much as 19 percent of their annual energy consumption. Home Energy House Call is essentially an educational program. No energy or demand impacts have been attributed to the program in the Integrated Resource Plan.

Program Costs

Estimated 1998 Expenditures	$350,000
Actual 1998 Expenditures	$390,000

Program Performance

During 1998, 4,500 audits were completed. More details are available in the 1998 CCEP Annual Report and in the evaluation reports.

Learn and Earn Pilot

Program Description

The Learn and Earn Pilot program was initiated to educate customers receiving Percentage of Income Payment Plan (PIPP) benefits about energy consumption within their homes. Eligible customers also receive education to help them reduce their energy usage and to assist them with money management so the participants can reduce their PIPP arrearages.

Process and Impact Evaluation

As a result of the process and impact evaluation completed by TecMRKT Works, an outside market research firm, the major findings were:

- Customer enrollment is strong
- Incentives drove participation but customers perceived education and information to be more valuable
- Agency familiarity is not necessary for participation
- Program drop out rate is very low
- Customer satisfaction is strong for program components and the home visits
- Baseline estimation methods worked well for the program as a whole
- Participants reduced their energy consumption

Complete details of their findings are available under separate cover. An impact evaluation completed in 1999 revealed average savings of 1.5 percent of gas consumption and 5.7 percent of electricity consumption.

Program Costs

Estimated 1998 Expenditures	$226,700
Actual 1998 Expenditures	$207,000

Program Performance

The goal of the pilot program was 150 customers. However, one provider was not able to perform the work as requested. For the pilot program, 126 customers started the program and 96 actually completed the program in its entirety.

Learn and Earn

Program Description

The Learn and Earn Program is a continuation and expansion of the pilot program that was conducted in 1998. The program provides a series of individual training and counseling sessions to participants on energy usage and conservation, as well as budget management. This program is open to any Percentage of Income Payment Plan (PIPP) customer as of January 1, 1998. The education sessions, which include a home energy audit, in-home basics education program, and follow-up counseling sessions for participants, are provided by social service/weatherization agencies now serving the PIPP customers. As an incentive for Program participation and energy consumption changes, CG&E, through the Providers, offers customers a two-part incentive award; the first incentive for Program Participation and the second incentive for lowering monthly energy consumption from a pre-determined baseline amount of energy consumption.

Process and Impact Evaluation

The evaluation of the pilot program is described above. This expanded program began in November 1998.

Program Costs

Estimated Expenditures through 1999	$384,000
Actual 1998 Expenditures	$49,300

Program Performance

At the end of 1998, initial visits had been completed for 151 customers. 1998 expenditures reflect the related costs.

Library Partnership Program

Program Description

The Library Partnership Program was a new program that uses libraries as the distribution points for energy education materials. Cinergy has the expertise and energy information, which it would like to share with the community. Libraries are an excellent distribution system for information, but often don't have the energy-related or the financial resources to identify and obtain the specialized materials required. Together the partnership provides a mechanism to get quality energy information to the interested public.

The Cinergy/Community Energy Partnership (CCEP) has developed this program with five main elements:

- Energy Materials: CCEP provides funding and guidance for the libraries to buy energy books, videos, computer disks and materials. This is in the form of a grant to the library. The library and CCEP will publicize the availability of this energy information.

- Adult Workshops: Cinergy will provide internal and/or community experts to provide energy workshops in the local libraries, some of which will be associated with other library activities. Participants will receive energy information and a compact fluorescent light bulb (CFL) to install in their home to start them saving.

- Children's Workshops: Energy Workshops will be held for children using the Ohio Energy Project, an existing program that the CCEP has funded for the past several years. The Ohio Energy Project uses trained high school aged instructors that relate well to young audiences.
- Displays: Energy displays will be circulated among the local libraries to demonstrate energy issues. Initial displays will relate to the workshop topics as well as general energy information and include how to read your energy meter, energy and the environment, energy conservation tips, low-income assistance programs, energy conservation in new construction, and fluorescent lighting energy savings.
- Energy Meters: Small plug-in energy meters will be loaned to library patrons to help them understand what a specific appliance consumes. Manufactured by Pacific Technologies, these devices read cumulative kWh over the time period installed.

Impact Evaluation

This is primarily an educational program and no impacts have been included in the Integrated Resource Plan; therefore, there are currently no plans to perform an impact evaluation.

Program Costs

Estimated 1998 Expenditures	$35,000
Actual 1998 Expenditures	$39,800

Promotional Efforts

Cinergy and the library systems have promoted this program through various marketing channels including direct mail, newsletters, media, and community posters.

Program Performance

Grants totaling $30,000 were awarded to eight libraries. An average of 5 participants attended each of the adult programs. Two children's programs were conducted and 3 more will be held in the Spring of 1999. Springboro rescheduled for 1999.

There was limited attendance at the Adult Programs, in spite of aggressive promotion via flyers, press releases, local newspaper ads and direct mailings to library patrons. Given the attendance and the fact that all of the participating libraries had extensive energy materials at the end of 1998, the program was not continued in 1999.

New Home Owners' Training

Program Description

The New Home Owners' Training program focuses on helping new homeowners understand how energy impacts their new home investment and finances. This information is incorporated into an existing "Life As a Homeowner Class" offered by the Better Housing League which is a one-night/morning 3-hour class offered monthly. Participants are educated about energy efficient upgrades and how they can make their home less expensive to maintain. They are also provided a compact fluorescent bulb. The program is designed to educate customers on energy consumption within their home, so they can modify their energy use behavior and reduce their energy consumption. Basic budgeting and money management skills are also included in the program.

Process Evaluation

Participant evaluations are on file with the Better Housing League.

Impact Evaluation

This is primarily an educational program; therefore, there are currently no plans to perform an impact evaluation.

Program Costs

Estimated 1998 Expenditures	$11,450
Actual 1998 Expenditures	$5,690

Promotional Efforts

The Better Housing League promotes the program through its community contacts.

Program Performance

Twelve workshops were conducted serving 408 participants in 1998.

Non-Profit Energy Management Program

Program Description

The Non-Profit Energy Management Program (NEMP) is an energy audit and financial assistance service offered to non-profit, social service agencies in the CG&E service area. The audit is provided at no cost to the customer and the program funds 50% percent of the cost of energy efficiency improvements implemented by participants with a 5-year or less simple payback up to $3,000. Workshops are also periodically offered to representatives of the targeted market segment to encourage participation in the program and to provide energy education. The program is designed to help non-profit social-service organizations reduce their own overhead costs through sound energy management practices. In theory, reducing these costs frees-up money to be applied to the provision of agency services.

Process Evaluation

None performed in 1998.

Impact Evaluation

None performed in 1998.

Program Costs

Estimated 1998 Expenditures	$235,000
Actual 1998 Expenditures	$30,750

Program Performance

Forty audits and three workshops were planned. Contractor issues resulted in completion of only four audits and one workshop in 1998. The program has been re-bid, and will now be provided through another contractor for the duration of the program.

Ohio Energy Project

Program Description

This is an education program designed to increase energy and environmental awareness to Ohio students, parents, and communities. Ohio Energy Project uses the method of children teaching children to get the word across. It provides unbiased information on the ten major energy sources. Energy education is provided through educational materials and leadership training workshops for students and teachers in grades K-12. The materials, developed by the national office, are designed to educate students at all levels of learning, which includes students with learning disabilities, gifted and talented students, and students that maintain average grades. An "Energy Kit," containing 30 energy activities, is provided to teachers free of charge. The activities emphasize cooperative learning and are developed to be entertaining as well as educational for the students. The Leadership Training Workshops are unique in that teachers attend workshops in their area with several of their students. The workshops are conducted by area high school students and demonstrate the success of "kids teaching kids." The goal of the workshops is to have students return to their schools and conduct similar activities for their classmates and community members.

Program Costs

Estimated 1998 Expenditures	$110,000
Actual 1998 Expenditures	$110,000

Program Performance

This program was identified in the Ohio Energy Strategy Report, under Strategy I: Educational Needs and Benefits, as an implementation strategy. The strategy recommends expansion of the Ohio Energy Project. As a response to the Strategy Report, CG&E funded the first state regional office in July 1994. Cinergy was presented the Regional Award at the 1995 Ohio Energy Project Youth Awards Banquet on May 17, 1995.

This program was presented the 1995 Ohio BEST (Building Excellent Schools Today) Practices Award and was recognized by the Ohio Business Roundtable (a business and education partnership) as a successful program.

PIPP Orientation Program

Program Description

The PIPP Orientation Program (PIPP-OR) is intended to provide orientation and education to customers about Percentage of Income Payment Plan (PIPP) and other possible payment options.

The objective of the PIPP Orientation Service is to educate new PIPP enrollees on the full implications of PIPP, review other payment options, and to educate the customer on potential strategies to save on their energy bill. If, during the course of the service, the customer determines another payment option to be superior to PIPP, then the customer will be enrolled in the chosen payment option plan and removed from the PIPP enrollee list. This service will also arrange for weatherization of customers who are currently missed. The initial test of this service concept will be from July 13 through September 11 and help approximately 200 customers.

The goal of the program was to increase the customer's understanding of PIPP and its obligations. Through this better understanding, it was anticipated that people would stay on PIPP for a shorter period and would shift to other billing plan options or reduce the rate of arrearage accumulation. The program evaluation measured the length of time these customers were on PIPP versus customers who had not received the orientation. It also compared the level of understanding of PIPP among participants and non-participants.

Two area providers delivered this service to Cinergy's PIPP customers in Ohio. Working in Neighborhoods (WIN) and People working Cooperatively (PWC) scheduled the appointments with the customers and visited the customer's homes to provide the program information. The program manager conducted a training class with the providers to give them the details of how to read customer bills, payment options, energy saving materials and the like.

Providers reviewed the following information with and provided the following services to customers:

a) customer's gas and electric usage history
b) PIPP program details and obligations
c) alternative payment options
d) walk through energy audit
e) energy saving materials
f) compact fluorescent bulbs
g) application of weatherization services, if applicable

h) other social service assistance, if applicable

Program Costs

Estimated 1998 Expenditures	$30,000
Actual 1998 Expenditures	$31,260

Program Performance

An evaluation based upon a small sample indicated that the program was well designed and operated and that PIPP-OR participants were very satisfied with the program. Additionally, the evaluation found that participants' desire to move off of the PIPP was increased by education and other services provided. Participants also reported that they were better able to control their energy consumption as a result of the program. However, there appeared to be no difference in the PIPP knowledge level between participants, non-participants, and those who refused to participate, providing evidence that the program did not significantly increase customer knowledge levels.

The CCEP did not authorize this program to continue in 1999.

Problem Diagnostic Service Test

Program Description

The Problem Diagnostic Services program provides customers who have high bill problems, heating/cooling problems, and moisture problems with an in-depth field analysis and recommendations. These problems are often observed during a regular energy audit (House Call audit) but require more in-depth analysis tools to diagnose the problem. Diagnostic tools such as blower door tests and infrared scans are used for this service.

Process Evaluation

The evaluation plan was developed and planned for completion in 1999.

Impact Evaluation

The evaluation plan was developed and planned for completion in 1999.

Program Costs

Estimated 1998 Expenditures	$20,000
Actual 1998 Expenditures	$16,000

Program Performance

The program began in June 1998 and fifty clients had been served by the end of 1998. The evaluation results will be reviewed and the CCEP will decide whether to develop the program to full scale in 1999.

Securities Issued

CG&E and its subsidiaries (including ULH&P), and PSI estimate that a combination of internal and external funds will be used to meet their capital needs. External funds will be used for refinancing of maturing debt and preferred stock, and the early refunding of existing high-cost debt and preferred stock, in addition to financing other capital needs.

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COMMONWEALTH OF KENTCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058 OF THE JOINT 1999 INTEGRATED RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY	))))	CASE NO. 99-449

COMMISSION STAFF'S REQUEST FOR INFORMATION TO THE UNION LIGHT, HEAT AND POWER COMPANY

The Commission Staff requests that The Union Light, Heat and Power Company ("ULH&P") file an original and 6 copies of the following information with the Executive Director, with a copy to all parties of record, by no later than the due date set out in the procedural schedule previously established for this case. Each copy of the data requested should be placed in a bound volume with each item tabbed. When a number of sheets are required for an item, each sheet should be appropriately indexed, for example, Item 1(a), Sheet 2 of 5. Include with each response the name of the person responsible for responding to questions relating to the information provided.

1. Refer to Item 3 of the response to the Commission Staff's initial request for information. The response indicates the latest reserve margin study performed by PSI was in 1991 and that the most recent study which documented CG&E's stand-alone reserve margin of 17 percent, which is what was adopted for the Cinergy system at the time of the merger, cannot be located.

a. As the result of reserve margin planning studies performed within the past five years, both the AEP system and the combined LG&E/KU system are using planning reserve margins of 12 percent. Recognizing that reserve margin criteria vary from one utility to another, was Cinergy aware of the lower reserve margins being used by these neighboring systems?

b. Explain why a reserve margin study has not been performed for the Cinergy system since the time of the merger of CG&E and PSI.

2. Refer to Item 8 of the response to the Commission Staff's initial request for information. The response indicates that the analysis used to identify the breakpoints associated with the relationship between load and temperature used peak load data from the hot summer of 1988.

a. Explain why load data from the summer of 1988 was used in this analysis.

b. Identify and describe any limitations as to the data that is available for more recent summers that might have been as hot or hotter than 1988 that causes the analysis to use data that is nearly 12 years old.

c. This 1999 IRP is the first ULH&P IRP that discusses weather-sensitive industrial usage, which implies that this is a relatively recent development. If that is the case, explain in detail why it is appropriate to not have performed a more current analysis that incorporates this development.

3. Refer to the response to Item 11 of the Commission Staff's initial request for information. From the year-end customer numbers the growth rate for non-electric space heating customers is projected to be somewhat greater than the growth rate for electric space heating customers over the 20-year planning horizon.

a. Identify the specific reasons for differences in growth rates and patterns between the two customer groups.

b. Being a combination utility with a large portion of its electric customers also being its gas customers, ULH&P is a strong summer peaking system. Identify any efforts that have been, or are being, undertaken to promote electric heating or other off-peak uses of electricity that might make for more efficient use of the generating capacity which supplies ULH&P.

c. Provide the results of the most recent surveys performed by ULH&P, CG&E or Cinergy that would demonstrate the preferences among customers for gas heat versus electric heat.

4. Refer to Item 20 of the response to the Commission Staff's initial request for information. The 'Policies and Procedures Manual" for the Cinergy Services fuel department is approximately four years old and appears to have been prepared shortly after the merger of CG&E and PSI.

a. With Phase II of the Clean Air Act Amendments commencing this year, identify what, if any, modifications might be required to update this manual.

b. Identify any likely changes to Cinergy's current fuel procurement policies and procedures that will result from the electric restructuring that will begin in Ohio in 2001.

Respectively submitted,

Richard G. Raff

Richard G. Raff
Staff Attorney

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John J. Finnigan, Jr.
Senior Counsel

February 7, 2000

CINERGY.

VIA OVERNIGHT MAIL

RECEIVED
FEB 08 2000
PUBLIC SERVICE COMMISSION

Iris Skidmore
Ronald P. Mills
Office of Legal Services
Fifth Floor, Capital Plaza Tower
Frankfort, Kentucky 40601

Re: In the Matter of A Review Pursuant to 807 KAR 5:059 of the 1999 Integrated Resource Plan of The Union Light, Heat and Power Company

Dear Ms. Skidmore and Mr. Mills:

Enclosed please find The Union Light, Heat and Power Company's responses to the Kentucky Division of Energy's First Request for Information in the above captioned case.

A copy of the responses has been sent to all parties of record by overnight mail on this date.

Very truly yours,

John J. Finnigan

John J. Finnigan, Jr.

JJF/nlb

Enclosure as stated.

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing Responses was served on the following parties by overnight mail this 7th day of February, 2000.

John J. Finnigan, Jr.

Hon. Helen Helton
Public Service Commission of Kentucky
211 Sower Blvd.
Frankfort, Kentucky 40602

Elizabeth E. Blackford
Office of the Attorney General
1024 Capital Center Drive
Frankfort, Kentucky 40601

RECEIVED
FEB 0 8 2000
PUBLIC SERVICE COMMISSION

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058 OF THE 1999 INTEGRATED RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY	)	CASE NO. 99-449

RESPONSE OF
UNION LIGHT, HEAT AND POWER COMPANY TO
KENTUCKY DIVISION OF ENERGY'S FIRST
REQUEST FOR INFORMATION

FIRST SET

FEBRUARY 7, 2000

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-001

REQUEST:

1. On page 4-1, the IRP states: "Cinergy, its customer representatives, and its regulators have begun taking steps to prepare for a competitive utility industry, not by abandoning energy efficiency, conservation, and demand reduction, but by shifting from ratepayer-subsidized Demand-Side Management (DSM) programs to market-based, customer-driven energy-efficiency related products and services.

a. Does ULH&P believe that in the future, the normal operation of market forces will cause customers to implement all energy efficiency measures that are cost effective?

b. Does ULH&P believe there are significant market barriers that act to prevent customers from implementing all the energy efficiency measures that would be cost effective? If so, please identify the barriers.

RESPONSE:

a. No.

b. Market barriers might include lack of awareness and lack of expertise to evaluate and select cost-effective options.

WITNESS RESPONSIBLE:

Victor A. Needham

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-002

REQUEST:

2. In developing its IRP, did ULH&P perform a study to estimate the total quantity of demand-side energy efficiency and load shifting measures that would be available within the ULH&P service area (i.e., a technical potential study), the cost of implementing such measures, and the revenue requirements that would be needed to acquire various portions of these potential resources through DSM programs?

RESPONSE:

No.

WITNESS RESPONSIBLE:

Victor A. Needham

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-003

REQUEST:

3. Did ULH&P estimate the square footage of residential, commercial, and industrial floor space that is being newly constructed each year in its service area? If so, what are the estimated square footage figures?

RESPONSE:

No.

Not applicable.

WITNESS RESPONSIBLE:

James A. Riddle

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-004

REQUEST:

4. Did ULH&P survey the energy efficiency of the new buildings being constructed in its service area? If so, please provide the results of this analysis.

RESPONSE:

No.

Not applicable.

WITNESS RESPONSIBLE:

James A. Riddle

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-005

REQUEST:

5. Has ULH&P availed itself of information from organizations such as E-Source, which is a source of comprehensive information on energy efficiency technologies and programs?

To what extent, if any, was information from such sources used in developing the IRP?

RESPONSE:

ULH&P continually considers developments in the industry in conducting its planning activities.

WITNESS RESPONSIBLE:

Diane Jenner.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-006

REQUEST:

6. In Volume I, Section 4 (pages 4-1 through 4-7), the IRP describes the 12/19/96 order issued by the Public Utility Commission of Ohio (PUCO) concerning the role of DSM in a more deregulated electricity industry. To what extent does Cinergy agree with the philosophy that underlies this PUCO order?

RESPONSE:

At this point, it is too early to tell what the role of DSM will be as the electric industry continues to become more deregulated. Furthermore, it is too early to tell how deregulated the electric industry ultimately will become. ULH&P will continue to monitor developments in the electric industry in general and will also monitor orders issued by the Kentucky Public Service Commission relating to the role of DSM in the deregulating electric industry.

WITNESS RESPONSIBLE:

Victor A. Needham.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-007

REQUEST:

7. As part of the transition to a more deregulated electricity industry, has PUCO or the Ohio legislature instituted any measures to ensure that cost-effective investments in energy efficiency are made, for example a statewide energy efficiency program funded by wires charges?

Have such measures been proposed by participants in the process? If so, please describe the nature and size of these proposed or actual measures.

RESPONSE:

The Ohio Legislature provided for an energy efficiency rider in Senate Bill 3, which is the deregulation bill signed into law on July 6, 1999. CG&E has proposed an Energy Efficiency Revolving Loan Program Rider (Rider EER) in its UNB rate schedules as part of its transition plan. The transition plan is available on Cinergy's web site at www.cinergy.com

WITNESS RESPONSIBLE:

Not applicable.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-008

REQUEST:

8. In the middle of page 4-7, reference is made to the "previous IRP." To which IRP is that reference made? The 1993 one?

RESPONSE:

The phrase "previous IRP" should be replaced with the phrase "1998 DSM Cost Recovery filing."

WITNESS RESPONSIBLE:

Victor A. Needham

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-009

REQUEST:

9. At the top of page 4-8, the IRP refers to "innovative tariff options designed to influence the improvement of customers' load shapes and the growth of the competitive Energy Service Company (ESCo) market" as alternatives to "non-participant subsidized rebate programs."

a. To what degree have such innovative tariff options been implemented in ULH&P's service area during the past few years?

b. To what degree has energy efficiency activity by ESCOs increased in ULH&P's service area during the past few years?

c. Is ULH&P projecting that these two trends will affect load growth in ULH&P's service area over the next 20 years? If so, please list the projected impacts on energy use and demand for each future year.

RESPONSE:

a. The referenced innovative tariffs options include the Rate RTP – Experimental Real Time Pricing Program, Rider EOP-RTP – Energy Call Options Program and Rider PLM – Peak Load Management. Rate RTP and Rider EOP-RTP was approved in March 1997. Rider PLM was approved in December 1999. Over the past several years Cinergy has been offering such tariffs to its mid to large commercial and industrial customers. At the end of 1999, there were 300 Cinergy Customers participating in the experimental Rate RTP program. Cinergy is currently aggressively targeting over 500 Cinergy commercial and industrial customers for summer 2000 under Rider PLM.

b. For a discussion of energy efficiency impacts, see pages 3-23 through 3-32 of the report.

c. While the innovative tariff options can have an impact on the forecast, there are no estimates available at this time for the ULH&P forecast. The only information on the Mw impacts from tariff options is for the Cinergy system. Those estimates are found on page 1-42 of the report.

Energy efficiency is primarily a price driven process. This is discussed in the methodology section of the report on pages 3-23 through 3-32. While energy efficiency impacts are captured with the ULH&P forecast, they have not been estimated.

WITNESS RESPONSIBLE:

Richard Stevie.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-010

REQUEST:

10. On page 4-9, the IRP states that Cinergy does not rely on the five proposed Kentucky DSM programs as resources in developing its integrated resource plan. Is that because the impacts on energy use and demand are considered negligible, or are there other reasons?

Please explain the response.

RESPONSE:

Most of the programs are educational and/or informational in nature. The impacts from these types of programs are very difficult to quantify, and therefore are not included as resources.

WITNESS RESPONSIBLE:

Victor A. Needham.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-011

REQUEST:

11. In the middle of page 4-15, the Utility Cost Test is identified as the primary criterion for screening DSM programs. Why is this test, rather than the Total Resource Cost (TRC) or Societal Cost test, considered primary?

RESPONSE:

This reference referred specifically to the PSI programs. This was the test selected by the parties to the PSI DSM Settlement Agreement.

WITNESS RESPONSIBLE:

Victor A. Needham.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-012

REQUEST:

12. When deciding on the set of DSM programs to recommend for implementation, did ULH&P consider "the extent to which the plan provides programs which are available, affordable, and useful to all customers" [Reference KRS 278.285 (l)(g)]? Please discuss the degree to which the set of DSM programs proposed for the ULH&P service territory meets this statutory criterion.

RESPONSE:

ULH&P provides ratepayer-subsidized demand-side management programs that are available, affordable, and useful to low-income residential customers, non-income qualified residential customers, and home builders in ULH&P's service territory. ULH&P's portfolio also includes rate options designed to cause customers to modify their energy usage based upon pricing signals.

WITNESS RESPONSIBLE:

Victor A. Needham.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-013

REQUEST:

13. Figure 1-4 (Volume I, page 1-40) projects that DSM impacts will level off and then decline over time. Has ULH&P considered the possibility that future advances in demand-side technologies will continue to open new opportunities for cost-effective energy efficiency improvements?

RESPONSE:

Figure 1-4 reflects the programs included as resources in the 1999 IRP. It does not reflect ULH&P's expectations about the potential impacts of advances in energy efficiency.

WITNESS RESPONSIBLE:

Victor A. Needham.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-014

REQUEST:

14. The method of local integrated resource planning (LIRP), as described in a strategic issues paper by E-Source (1995) titled, "Local Integrated Resource Planning: A New Tool for a Competitive Era," is designed to determine if costs could be reduced by deferring transmission and distribution upgrades through the use of geographically-focused demand-side programs. [Other names for LIRP include "targeted area planning," "local area investment planning," "distributed resources planning," or "area wide asset and customer service."]

a. Did ULH&P use the LIRP approach to determine whether any planned transmission or distribution projects could economically be deferred? If so, please provide the results of the studies.

b. Does ULH&P plan to use the LIRP approach in the future?

RESPONSE:

a. ULH&P did not use the LIRP approach to determine if planned transmission or distribution projects could be deferred.

b. ULH&P does not intend to use the LIRP approach in the future.

WITNESS RESPONSIBLE:

Ron Snead.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-015

REQUEST:

15. Please provide a detailed description of the method ULH&P uses to determine how much to charge a new residential, commercial or industrial customer to hook up their building to the grid. Please explain why this particular method or formula was chosen.

RESPONSE:

ULH&P will install an overhead service drop, supply one set of service drop attachment fittings and make connection to the customer's service terminal at no charge. Subject to the rules, conditions and riders covering the installation of service connections and extensions, the Company will make one standard service connection to the customer's installation. If three-phase service is required and an additional connection is necessary, both bills will be considered as one standard service connection.

When it is necessary for ULH&P to extend a distribution line to serve a customer, the provisions of ULH&P's Rider X, Line Extension Policy apply. If the estimated cost of extending the distribution lines to reach the customer's premise equals or is less than three times the estimated gross annual revenue, the Company will make the extension without additional guarantee by the customer over that applicable in the rate, provided the customer establishes credit in a manner satisfactory to the Company. When the estimated cost of extending the distribution lines to reach the customer's premise exceeds three times the estimated gross annual revenue, the customer may be required to guarantee, for a period of five years, a monthly bill of one percent of the line extension cost for residential service and two percent for non-residential service.

In those situations where ULH&P extends its distribution lines using pad-mounted transformers to serve new developments, the provisions of Rate UDP-R, Underground Residential Distribution Policy and Rate UDP-G, General Underground Distribution Policy apply. Rate UDP-R specifies charges for single family houses in increments of ten or more contiguous lots. Rate UDP-G specifies that charges for commercial and industrial facilities and single family houses that do not qualify for Rate UDP-R will be charged the difference between the Company's estimated cost to provide an underground system and the Company's estimated cost to provide an overhead system.

The rates for each class of service provided for in ULH&P's Rate Schedules contemplate the furnishing of service to one location or premise through one standard (overhead) service connection. The Company's rules regarding line extensions, underground service, and multiple services require customers to pay the costs of additional services that were not contemplated in the rates.

WITNESS RESPONSIBLE:

Jim Ziolkowski

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-016

REQUEST:

16. Did ULH&P evaluate the cofiring of coal with sawdust at low percentages (e.g., less than 2 or 3 percent sawdust by weight) at existing coal-fired plants, which would provide a valuable service for the sawmill operations located in or near ULH&P's service territory and also would reduce SO_2 emissions? Please explain the response.

RESPONSE:

ULH&P does not own any generating assets. Cinergy, which supplies electricity to ULH&P does operate a power plant in Rabbit Hash, Kentucky. The plant is located on the river and has access to low priced coal from both east and west Kentucky. We know of no local sawmills and the use of sawdust has not been evaluated at that plant. The plant is equipped with a scrubber and the resulting SO2 emissions are already very low.

WITNESS RESPONSIBLE:

John R. Kreinest.

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-017

REQUEST:

17. Has ULH&P considered the potential impact of net metering, as instituted in 30 other states and as outlined in legislation introduced in the U.S. Congress by Rep. Jay Inslee, which would require all retail electric suppliers to offer net metering service to retail customers that generate electricity using certain qualified technologies? [The proposed national legislation is titled the "Home Energy Generation Act."] If net metering were to be instituted on a national or statewide level, what would be the estimated impact on energy use and demand in the ULH&P service area over the next 20 years?

RESPONSE:

Not directly, no. However, see chapter 3, section C 1 b i and ii on pages 3-46 through 3-50 and Section C 1 b vi on pages 3-53 and 3-54 for a discussion of the impacts of alternate fuel prices and co-generation in the forecast. See also Chapter 5, Section E first full paragraph on page 5-28 for additional discussion. The forecast does consider the impact on electricity consumption due to relative price differences between electricity and alternate fuels. However, the exact composition of co-generation projects is not determined.

No direct analysis has been conducted. See pages OA – 35 through OA – 37 of the Cinergy 1999 Integrated Resource Plan, Ohio Appendix, Volume II for information which quantifies the impact to the forecast of holding real electric prices at the 1998 level.

WITNESS RESPONSIBLE:

James A. Riddle

KY Division of Energy
Cabinet Request Set No. 1
Case No. 99-449
Date Received: Jan. 6, 2000
Response Due Date: Feb. 8, 2000

KyDivEnergy-01-018

REQUEST:

18. To what extent has ULH&P encouraged the installation of combined heat and power (cogeneration) systems by industrial firms in its service area? Please provide quantitative information if available."

RESPONSE:

Installation of combined heat and power (cogeneration) system depends heavily upon the economics of the investment. Generally it involves comparing the cost of the investment in plant and the on-going operating costs with the value of the steam produced plus the reduction in electricity purchased from the utility. ULH&P has three types of tariff schedules available for customers interested in installing a co-generation system. The first tariff schedule is the Co-generation and Small Power Production Sale and Purchase Tariff (for sizes 100 kW or less and for sizes over 100 kW). Under this tariff, which became effective November 1985, customers receive the Company's avoided cost or the value of reduced electricity usage as the incentive for installing a co-generation system. The second and third tariff schedules are Rate RTP – Experimental Real Time Pricing Program and Rider EOP-RTP Energy Call Option. These tariffs, effective March 1997, provide incentives to customers to reduce usage during peak load times (high market price for energy) and increase usage during off-peak load times (low market price for energy). While not the only way to take advantage of the incentives in these tariffs, cogeneration systems can be employed to help a customer reduce usage during peak time periods to obtain the market based credit or to avoid buying high-priced power. Additionally, Rider PLM – Peak Loan Management was recently approved and replaces Rider EOP-RTP. Rider PLM provides more choices to customers to manage their peak load.

These tariff schedules of ULH&P provide an encouragement to customers for the installation of co-generation systems.

WITNESS RESPONSIBLE:

Jim Willis.

COMMONWEALTH OF KENTUCKY
BEFORE THE
PUBLIC SERVICE COMMISSION

IN RE THE MATTER OF:

THE INTEGRATED RESOURCE)
PLAN OF UNION LIGHT) Case No. 99-449
HEAT & POWER)

THE ATTORNEY GENERAL'S INITIAL REQUESTS FOR INFORMATION

Comes now the intervenor, the Attorney General of the Commonwealth of Kentucky, by and through his Office for Rate Intervention, and submits these Requests for Information to Union Light Heat & Power, to be answered in accord with the following:

(1) In each case where a request seeks data provided in response to a staff request, reference to the appropriate request item will be deemed a satisfactory response.

(2) Please identify the company witness who will be prepared to answer questions concerning each request.

(3) These requests shall be deemed continuing so as to require further and supplemental responses if the company receives or generates additional information within the scope of these requests between the time of the response and the time of any hearing conducted hereon.

(4) If any request appears confusing, please request clarification directly from the Office of Attorney General.

(5) To the extent that the specific document, workpaper or information as requested does not exist, but a similar document, workpaper or information does exist, provide the similar document, workpaper, or information.

(6) To the extent that any request may be answered by way of a computer printout, please identify each variable contained in the printout which would not be self evident to a person not familiar with

the printout.

(7) If the company has objections to any request on the grounds that the requested information is proprietary in nature, or for any other reason, please notify the Office of the Attorney General as soon as possible.

(8) For any document withheld on the basis of privilege, state the following: date; author; addressee; indicated or blind copies; all persons to whom distributed, shown, or explained; and, the nature and legal basis for the privilege asserted.

(9) In the event any document called for has been destroyed or transferred beyond the control of the company state: the identity of the person by whom it was destroyed or transferred, and the person authorizing the destruction or transfer; the time, place, and method of destruction or transfer; and, the reason(s) for its destruction or transfer. If destroyed or disposed of by operation of a retention policy, state the retention policy.

Respectfully Submitted,

ELIZABETH E. BLACKFORD
ASSISTANT ATTORNEY GENERAL
1024 CAPITAL CENTER DRIVE
FRANKFORT KY 40601
(502) 696-5453
FAX: (502) 573-4814

CERTIFICATE OF FILING AND OF SERVICE

I hereby certify that this the 7th day of January, 2000, I have filed the original and ten true copies of the foregoing with the Kentucky Public Service Commission at 730 Schenkel Lane, Frankfort, Kentucky, 40601, and further certify that this same date I have served the parties by mailing true copies of same, postage prepaid, to the following:

James B. Gainer
Legal Division
The Union Light Heat & Power Co
139 E. Fourth Street
Cincinnati, OH. 45202

JJ Blackford

INITIAL DATA REQUESTS OF THE ATTORNEY GENERAL

1. On page 8-26 of the IRP, Carbon Dioxide emissions and their effect on Global Climate Change is discussed. For each of the last 11 years, 1989-1999, please supply the following:

a) Total carbon dioxide emissions associated with supplying ULH&P's energy demand.

b) Total carbon dioxide emissions associated with supplying the internal energy demand for the total Cinergy system.

c) Total carbon dioxide emissions from Cinergy generators (including emission associated with off-systems sales but excluding emissions associated with energy purchased to supply internal energy demand).

2. On page 8-26 of the IRP, Carbon Dioxide emissions and their effect on Global Climate Change is discussed. For each of the years in the IRP planning period, through 2019, and based on the base plan in the IRP, please supply the following:

a) Total carbon dioxide emissions associated with supplying ULH&P's energy demand.

b) Total carbon dioxide emissions associated with supplying the internal energy demand for the total Cinergy system.

c) Total carbon dioxide emissions from Cinergy generators (including emission associated with off-systems sales but excluding emissions associated with energy purchased to supply internal energy demand).

3. On page 5-23 of the IRP, reference is made to Cinergy companies' participation in the Ohio Valley Electric Corporation (OVEC). With respect to that participation, please supply the following:

a) Percent of participation and associated number of Megawatts for each of the Cinergy companies.

b) Number of Kilowatt-hours sold to OVEC by Cinergy for each of the last 5 years.

c) Number of Kilowatt-hours bought by OVEC from Cinergy for each of the last 5 years.

d) On December 12, 1999, the Courier Journal (Uranium Operator Could Shut Down One of Its Two Plants", page B4) quotes the United States Enrichment Corporation's President, William Timbers, as saying that his company is "analyzing whether to shut down one of its two production plants", and that upgrades were being made to the

Paducah plant to match the capabilities of the Piketon plant. Has Cinergy included in the IRP the very real possibility that the Piketon plant may be shut down in the near future and that Cinergy's OVEC capacity may become available for Cinergy's use?

4. In Sections 5 and 6 of the IRP, coal, oil, natural gas and syngas use is discussed. For each of the past 11 years, 1989-1999, please supply:

a) Total tons of coal burned to supply the internal energy demand for the total Cinergy system.

b) Total tons of coal burned by Cinergy to supply both the internal energy demand for the Cinergy system and to make off-system sales.

c) Total gallons of oil burned to supply the internal energy demand for the total Cinergy system.

d) Total gallons of oil burned by Cinergy to supply both the internal energy demand for the Cinergy system and to make off-system sales.

e) Total MCF of natural gas burned to supply the internal energy demand for the total Cinergy system.

f) Total MCF of natural gas burned by Cinergy to supply both the internal energy demand for the total Cinergy system and to make off-system sales.

g) Total MCF of syngas burned to supply the internal energy demand for the total Cinergy system.

h) Total MCF of syngas burned by Cinergy to supply both the internal energy demand for the total Cinergy system and to make off-system sales.

5. In Sections 5 and 6 of the IRP, coal, oil, natural gas and syngas use is discussed. For each year of the IRP planning period, through 2019, and based on the plans in the IRP, please supply:

a) Total tons of coal burned to supply the internal energy demand for the total Cinergy system.

b) Total tons of coal burned by Cinergy to supply both the internal energy demand for the Cinergy system and to make off-system sales.

c) Total gallons of oil burned to supply the internal energy demand for the total Cinergy system.

d) Total gallons of oil burned by Cinergy to supply both the internal energy demand for the Cinergy system and to make off-system sales.

e) Total MCF of natural gas burned to supply the internal energy demand for the total Cinergy system.

f) Total MCF of natural gas burned by Cinergy to supply both the internal energy demand for the total Cinergy system and to make off-system sales.

g) Total MCF of syngas burned to supply the internal energy demand for the total Cinergy system.

h) Total MCF of syngas burned by Cinergy to supply both the internal energy demand for the total Cinergy system and to make off-system sales.

6. On page 6-6 of the IRP, Nitric Oxide emissions are discussed. For each of the last 11 years, 1989-1999, please supply the following:

a) Total NOx emissions associated with supplying ULH&P's energy demand.

b) Total NOx emissions associated with supplying the internal energy demand for the total Cinergy system.

c) Total NOx emissions from Cinergy generators (including emission associated with off-systems sales but excluding emissions associated with energy purchased to supply internal energy demand).

7. On page 6-6 of the IRP, Nitric Oxide emissions are discussed. For each of the years in the IRP planning period, through 2019, and based on the base plan in the IRP, please supply the following:

a) Total NOx emissions associated with supplying ULH&P's energy demand.

b) Total NOx emissions associated with supplying the internal energy demand for the total Cinergy system.

c) Total NOx emissions from Cinergy generators (thus including off-systems sales but excluding emissions associated with energy purchased to supply internal energy demand).

8. The chart on page 1-39 of the IRP shows that 2354 MW of new capacity will be added in the year 2004. While it is understood that this is just a "placeholder", if this capacity is actually added

as 11 new 214 MW combustion turbines:

a) When will permitting have to begin to get these units on line in 2004.

b) Manufacturers are having a difficult time keeping up with demand for Combustion Turbines. Given the tight market for combustion turbines, can any manufacturer supply Cinergy with 11 combustion turbine units in the same year?

c) Cinergy has delayed adding new capacity until the need is over 2300 MW. Please explain in detail why it is safe from a reliability standpoint to rely on purchasing up to 2200 MW at one time when there is limited capacity available on the market as a result of the general scramble to meet growing demand by all utilities which are running short of capacity.

9. Cinergy is going to be moving into a competitive environment in Ohio starting in 2001. With respect to this new environment:

a) Under the Ohio legislation, will Cinergy be divesting its generating assets? If so, how will ULH&P customers be served in a fully regulated state if their supplier divests their generating assets?

b) In a competitive environment, some suppliers offer a "green power" package to customers wanting pollution-free power. Cinergy's only renewable power comes from the Markland hydro station. Is Cinergy intending to try to compete for "green power" sales? If the answer is yes, please explain where Cinergy would get the "green power" to sell.

10. On page 5-22 of the IRP, it is stated that there is a 4 MW non-utility generator in the PSI territory. With respect to this facility, please provide the following information:

a) What is the fuel source or sources (example: solar or wood fired, etc.)?

b) Where is this facility located?

c) The IRP states that only 4MW is operational. Are there plans to enlarge this facility?

d) Are sales made under PURPA or a different type of contract?

11. On page 5-24 of the IRP, a diversity agreement with East Kentucky Power Cooperative that went through March 31, 1999 is mentioned. With respect to that arrangement:

a) Has a new agreement with EKPC been signed after the one mention expired? If there is a new agreement, please provide its details including when it will expire, the size, and any associated financial arrangements.

b) How has this agreement been included into the IRP planning, and for how many future years?

12. On pages 5-38 and 5-39 of the IRP, renewables are discussed. Please explain why the most widely used renewable, conventional hydro, was not considered, given Cinergy's knowledge that there conventional hydro is available, as is evidenced by its listing of two possible hydro purchases on page 8-7? Is Cinergy aware that there are a number of dams on the Ohio River that still can be developed like Cinergy developed Markland?

13. On page 5-41 of the IRP, Cinergy states that the use of Pump Storage Hydro is limited by the availability of suitable geologic formations. Is Cinergy aware that the Summit Pump Storage Hydro facility is licensed in the State of Ohio and is simply looking for a utility that needs the project? Has Cinergy considered this facility? If so, please state why it is not included as an IRP option?

14. On page 5-43 of the IRP, Cinergy states that there are no mature Wind technologies that could be used at this time. If this technology is not available today, please explain how Cinergy is installing this technology now in Spain (as shown on page B-15 of the Cinergy 1998 Annual Report which was included in the IRP).

15. On page 8-7 of the IRP, resource options considered by Cinergy are shown. On page 8-58, the 1999 Cinergy selected plan is shown. Comparing the resource options and selected plan:

a) Was the 25 MW of Interruptible DSM selected and included in the DSM Bundle or the purchases, or was this option not selected or rejected?

b) Were either of the two Hydro Purchases included in the selected plan as part of the purchased power, or were these options not selected or rejected?

16. On page 8-48 of the IRP, it is stated that "the potential still exists under PURPA for Cinergy to be forced to purchase power from cogenerators, whether the power is actually required or not." With respect to this statement:

a) Isn't it true that Cinergy needs to purchase about 2000 MW of power? Won't Cinergy be able to use any power they would buy under PURPA?

b) Isn't it true that under Cinergy's avoided costs, neither Cinergy nor its customers would be financially penalized by buying power at PURPA avoided cost rates.

c) Please provide both Cinergy's filed PURPA avoided cost rates and the avoided cost rates Cinergy uses in DSM cost/benefit calculations. If these two rates are different, please explain in detail why they are different.

17. On page 8-28 of the IRP, reference is made to a 1998 Section 1605(b) report that details Cinergy's Global Climate Change efforts. Please supply a copy of this 1998 report and a copy of the 1999 report, if it is available.

18. On page 8-31 of the IRP, it is stated that new technologies were the only long-term methods of reducing carbon dioxide emissions. With respect to the resource options considered by Cinergy on page 8-7, please supply the annual carbon dioxide reductions, compared to Cinergy's present average carbon dioxide emissions per kilowatt-hour, for the following options:

a) The DSM Bundle
b) 25 MW Interruptible DSM
c) 56 MW Hydro Purchase
d) 46 MW Hydro Purchase

19. On page 8-31 of the IRP, it is stated that electrotechnologies could replace fossil fuels to reduce carbon dioxide emissions. Considering that coal-fired power plants that generate the vast majority of Cinergy's electric energy are only about 33% efficient, please provide any fossil fuel technologies that could be replaced by electrotechnologies to reduce carbon dioxide emissions. For each, please supply all calculations to show that carbon dioxide emissions would be reduced.

20. In the General Appendix, in the Long Term Forecast page 12, the figures in 1999, 2005, 2011 and 2017 are about half of the previous years' figures, then the figures double in the next years. Please explain these erratic drops and explain how these figures affect the averages calculated on this page.

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Fax (502) 564-3460

Paul E. Patton
Governor

Ronald B. McCloud, Secretary
Public Protection and
Regulation Cabinet

Helen Helton
Executive Director
Public Service Commission

CERTIFICATE OF SERVICE

RE: Case No. 99-449
The Union Light, Heat and Power Company

I, Stephanie Bell, Secretary of the Public Service Commission, hereby certify that the enclosed copy of the Commission Staff's data request in the above case was served upon the following by U.S. Mail on January 7, 2000.

Parties:

Stephanie J. Bell
Secretary of the Commission

Enclosure

EDUCATION PAYS

COMMONWEALTH OF KENTUCKY
PUBLIC SERVICE COMMISSION
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Paul E. Patton
Governor

Ronald B. McCloud, Secretary
Public Protection and
Regulation Cabinet

Helen Helton
Executive Director
Public Service Commission

January 7, 2000

Mr. James Gainer, Esquire
Cinergy Services
Legal Department
Room 25ATII
139 East Fourth Street
Cincinnati, Ohio 45202

RE: Case No. 99-449
The Union Light, Heat and Power Company

We enclose one copy of the Commission Staff's data request in the above case.

Sincerely,

Stephanie Bell
Secretary of the Commission

Enclosure

COMMONWEALTH OF KENTCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058 OF THE)
1999 INTEGRATED RESOURCE PLAN OF THE) CASE NO. 99-449
UNION LIGHT, HEAT AND POWER COMPANY)

COMMISSION STAFF'S REQUEST FOR INFORMATION TO THE UNION LIGHT, HEAT AND POWER COMPANY

The Commission Staff requests that an original and 6 copies of the following information be provided to the Staff, with a copy to all parties of record, by no later than the due date set out in the procedural schedule previously established for this case. Each copy of the data requested should be placed in a bound volume with each item tabbed. When a number of sheets are required for an item, each sheet should be appropriately indexed, for example, Item 1(a), Sheet 2 of 5. Include with each response the name of the person responsible for responding to questions relating to the information provided.

1. Specify each of the equations that were estimated in Section III, the Load Forecast section, of the Integrated Resource Plan ("IRP") and submit the estimation results for each (i.e., the Output).

2. Referring again to Section III of the IRP, identify the equations that contained qualitative variables. Provide a definition of each of these variables and the reason for its inclusion in that particular equation.

3. Refer to page 1-6 of the IRP. Provide the most recent analysis, report, or study developed by Cinergy in support of its minimum reserve margin of 17 percent.

4. Refer to page 1-10 of the IRP. Provide the national economic forecast obtained from Data Resources, Inc. ("DRI") used in developing the forecasts contained in the IRP.

5. Refer to pages 2-6 through 2-7 of the report. Provide the "Standard and Poor's DRI Utility Cost and Price Review for First Quarter, 1998" and "The U.S. Economy – 25-Year Focus – Winter Issue 1999" used in developing the forecasts contained in the IRP.

6. Refer to pages 3-25 through 3-26 of the report. Explain in more detail how the increases in appliance efficiencies are reflected in the model of energy use and indicate for how long these efficiency increases have been modeled as part of the ULH&P/Cinergy forecasting process.

7. Refer to pages 3-28 through 3-29 of the report, specifically, the portion that discusses weather-sensitive industrial usage. Provide a more detailed discussion of this subject that focuses particularly on its frequency and its magnitude.

8. Refer to page 3-34 of the report. Provide a more detail description and discussion of the process conducted to identify the breakpoints where the relationship between load and temperature change. Also, provide a summary of the analysis and the results obtained therefrom.

9. Refer to pages 3-36 through 3-37 of the report, specifically, the manner in which sendout is weather normalized. If any analysis has been conducted to determine the greater degree of accuracy obtained by weather normalizing each sales sector separately, as opposed to in the aggregate, provide the results of such analysis. Also, given the differences in industrial loads for different SIC codes,

explain whether any consideration has been given to disaggregating the industrial sector by SIC codes for weather normalization purposes.

10. Refer to page 3-36, paragraph 3 of the report. Explain, from this discussion, whether for forecasting purposes, one of ULH&P/Cinergy's assumptions is that demand is not a function of price in the short-term. Also, for purposes of this request, provide ULH&P/Cinergy's definitions of short-term and long-term.

11. Refer to page 3-55 of the report that indicates that historical and projected numbers of residential customers are being provided disaggregated by electric heating and non-electric heating. The table referenced includes only one column reflecting the numbers of customers. Provide the numbers disaggregated into the two different categories referred to in the text.

12. Refer to page 3-67 of the report. Provide the value-added for individual SIC codes obtained from the Federal Reserve Board and the industrial productions indices obtained from DRI.

13. Refer to pages 3-82 through 3-83 of the report, specifically the references to the increases in load factor over the forecast horizon. Identify the reasons for this anticipated increase, including but not limited to greater impacts from Demand Side Management ("DSM"), greater utilization of interruptible loads, and improved appliance efficiencies.

14. Refer to pages 3-83 and 3-84 of the report. Provide a detailed discussion of the Census Bureau's X-11 procedure and how it is employed to perform the seasonal adjustments that are incorporated into the electric load forecasting models.

15. Refer to page 3-94 of the IRP report that discusses the interruptible load in the different of Cinergy's service territory. Identify the 37 megawatts ("MW") of load available for interruption in the Kentucky service territory and reconcile the combined 86 MW available for interruption in Kentucky and Ohio with the amounts of 33 MW and less shown for the Cincinnati Gas and Electric ("CG&E") system in Figure 1-4 on page 1-42 of the report.

16. Refer to page 3-119, Figure 3-15 of the report. Explain the reasons for the Sales for Resale, Column 5, declining to zero beginning in 1998.

17. On pages 1-6 and 1-7 of the report reference is made to the emphasis of the first 5 years of the forecast period. Figures 3-22 and 3-24 show projected load growth for the Ohio and Kentucky service territories separately. Explain the reasons for the higher projected load growth in Kentucky versus Ohio during the first 5 years of the forecast period.

18. Refer to page 4-2 of the report. Describe the extent to which DSM programs already in place have been affected by the revision to the Total Resource Cost ("TRC") test. Also, describe the impact this revision has had on potential programs screened since the revision became effective.

19. Refer to page 4-9 concerning the DSM application ULH&P planned to be file in October 1999. The application was ultimately filed in December 1999. Provide a general description of the application, including but not limited to, any programs that are being discontinued, any new programs being proposed, and the most recent benefit to cost ratios for the programs that are proposed to be continued beyond the pilot period originally authorized by the Commission.

20. Refer to pages 5-7 through 5-12 of the report. Provide CG&E's current fuel procurement manual that sets out its present fuel procurement strategies.

21. Refer to page 5-13 of the report. With the increased availability of propane describe any efforts or plans currently being considered to use propane at more units as either a back-up fuel or possibly as a primary fuel.

22. Refer to pages 5-24 and 5-25 of the report. Provide additional information regarding the diversity exchange agreements with East Kentucky Power Cooperative, Inc. regarding any changes, updates, or other modifications that have occurred since the time the IRP was prepared.

23. Refer to page 5-30 of the report. Provide, in summary form, a schedule which reflects the differences in the price estimates for Combustion Turbines and Combined Cycle Units based on the EPRI data and the information obtained from vendors.

24. Refer to page 5-45 of the report. Provide chapters 5 and 6 of the 1995 Cinergy IRP filing which contained the "extensive screening" of repowering options.

25. Refer to pages 5-46 and 5-47 of the report. Provide the specific analysis, studies, etc. that have been relied upon to form the basis for the expectation that Fuel Cells will be commercially available in 25 MW increments during the 2009-2019 time period.

26. Refer to page 5-59 of the report. Provide definitions and/or descriptions of the different types of proposals identified therein.

27. Refer to page 5-60 of the report. Provide the current status of contract negotiations with power suppliers. Also, indicate whether there are any plans for issuing a new Request for Proposals in early 2000 for power supplies in the 2000-2003 period.

28. Refer to page 6-31 of the report, which references Figure GA-6-3 in the General Appendix. Provide the compliance screening curve data and final CAAA compliance option results for the 1999 IRP.

29. Refer to pages 6-31 to 6-37 or the report which references Figure GA-6-4 in the General Appendix. Provide the NO_x compliance plan referenced therein.

30. Reference pages 8-12, and 8-33 through 8-38 concerning the Least Cost Plan and the basis for its selection. After all sensitivity analysis and environmental considerations are taken into consideration, provide the Present Value Total Cost ("PVTC") of the other plans against which it was measured in arriving at its PVTC of $29,869,692,000.

Respectively submitted,

Deborah T. Eversole

Deborah T. Eversole
Deputy General Counsel

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058 OF THE 1999 INTEGRATED RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY	)))	**CASE NO. 99-449**

KENTUCKY DIVISION OF ENERGY'S FIRST REQUEST FOR INFORMATION TO THE UNION LIGHT, HEAT AND POWER COMPANY

Comes the Natural Resources and Environmental Protection Cabinet, Division of Energy, Intervenor herein, and makes the following request for information for the purpose of evaluating the effectiveness of the proposed integrated resource plan (IRP):

1. On page 4-1, the IRP states: "Cinergy, its customer representatives, and its regulators have begun taking steps to prepare for a competitive utility industry, not by abandoning energy efficiency, conservation, and demand reduction, but by shifting from ratepayer-subsidized Demand-Side Management (DSM) programs to market-based, customer-driven energy-efficiency related products and services."

a. Does ULH&P believe that in the future, the normal operation of market forces will cause customers to implement all energy efficiency measures that are cost effective?

b. Does ULH&P believe there are significant market barriers that act to prevent customers from implementing all the energy efficiency measures that would be cost effective? If so, please identify the barriers.

2. In developing its IRP, did ULH&P perform a study to estimate the total quantity of demand-side energy efficiency and load shifting measures that would be available within the ULH&P service area (i.e., a technical potential study), the cost of implementing such measures, and the revenue requirements that would be needed to acquire various portions of these potential resources through DSM programs?

3. Did ULH&P estimate the square footage of residential, commercial, and industrial floor space that is being newly constructed each year in its service area? If so, what are the estimated square footage figures?

4. Did ULH&P survey the energy efficiency of the new buildings being constructed in its service area? If so, please provide the results of this analysis.

5. Has ULH&P availed itself of information from organizations such as E-Source, which is a source of comprehensive information on energy efficiency technologies and programs? To what extent, if any, was information from such sources used in developing the IRP?

6. In Volume I, Section 4 (pages 4-1 through 4-7), the IRP describes the 12/19/96 order issued by the Public Utility Commission of Ohio (PUCO) concerning the role of DSM in a more deregulated electricity industry. To what extent does Cinergy agree with the philosophy that underlies this PUCO order?

7. As part of the transition to a more deregulated electricity industry, has PUCO or the Ohio legislature instituted any measures to ensure that cost-effective investments in energy efficiency are made, for example a statewide energy efficiency program funded by wires charges? Have such measures been proposed by participants in the process? If so, please describe the nature and size of these proposed or actual measures.

8. In the middle of page 4-7, reference is made to the "previous IRP." To which IRP is that reference made? The 1993 one?

9. At the top of page 4-8, the IRP refers to "innovative tariff options designed to influence the improvement of customers' load shapes and the growth of the competitive Energy Service Company (ESCo) market" as alternatives to "non-participant subsidized rebate programs."

a. To what degree have such innovative tariff options been implemented in ULH&P's service area during the past few years?

b. To what degree has energy efficiency activity by ESCOs increased in ULH&P's service area during the past few years?

c. Is ULH&P projecting that these two trends will affect load growth in ULH&P's service area over the next 20 years? If so, please list the projected impacts on energy use and demand for each future year.

10. On page 4-9, the IRP states that Cinergy does not rely on the five proposed Kentucky DSM programs as resources in developing its integrated resource plan. Is that because the impacts on energy use and demand are considered negligible, or are there other reasons? Please explain the response.

11. In the middle of page 4-15, the Utility Cost Test is identified as the primary criterion for screening DSM programs. Why is this test, rather than the Total Resource Cost (TRC) or Societal Cost test, considered primary?

12. When deciding on the set of DSM programs to recommend for implementation, did ULH&P consider "the extent to which the plan provides programs which are available, affordable, and useful to all customers" [Reference KRS 278.285 (1)(g)]? Please discuss the

degree to which the set of DSM programs proposed for the ULH&P service territory meets this statutory criterion.

13. Figure 1-4 (Volume I, page 1-40) projects that DSM impacts will level off and then decline over time. Has ULH&P considered the possibility that future advances in demand-side technologies will continue to open new opportunities for cost-effective energy efficiency improvements?

14. The method of local integrated resource planning (LIRP), as described in a strategic issues paper by E-Source (1995) titled, "Local Integrated Resource Planning: A New Tool for a Competitive Era," is designed to determine if costs could be reduced by deferring transmission and distribution upgrades through the use of geographically-focused demand-side programs. [Other names for LIRP include "targeted area planning," "local area investment planning," "distributed resources planning," or "area wide asset and customer service."]

a. Did ULH&P use the LIRP approach to determine whether any planned transmission or distribution projects could economically be deferred? If so, please provide the results of the studies.

b. Does ULH&P plan to use the LIRP approach in the future?

15. Please provide a detailed description of the method ULH&P uses to determine how much to charge a new residential, commercial, or industrial customer to hook up their building to the grid. Please explain why this particular method or formula was chosen.

16. Did ULH&P evaluate the cofiring of coal with sawdust at low percentages (e.g., less than 2 or 3 percent sawdust by weight) at existing coal-fired plants, which would provide a valuable service for the sawmill operations located in or near ULH&P's service territory and also would reduce SO_2 emissions? Please explain the response.

17. Has ULH&P considered the potential impact of net metering, as instituted in 30 other states and as outlined in legislation introduced in the U.S. Congress by Rep. Jay Inslee, which would require all retail electric suppliers to offer net metering service to retail customers that generate electricity using certain qualified technologies? [The proposed national legislation is titled the "Home Energy Generation Act."] If net metering were to be instituted on a national or statewide level, what would be the estimated impact on energy use and demand in the ULH&P service area over the next 20 years?

18. To what extent has ULH&P encouraged the installation of combined heat and power (cogeneration) systems by industrial firms in its service area? Please provide quantitative information if available."

Respectfully submitted,

Ronald P. Mills

IRIS SKIDMORE
RONALD P. MILLS
Office of Legal Services
Fifth Floor, Capital Plaza Tower
Frankfort, Kentucky 40601
Telephone: (502) 564-6676

COUNSEL FOR NATURAL RESOURCES
AND ENVIRONMENTAL PROTECTION CABINET

CERTIFICATE OF SERVICE

I hereby certify that on the 5th day of January, 2000 a true and accurate copy of the foregoing Kentucky Division Of Energy's First Request For Information To The Union Light, Heat and Power Company was mailed, postage pre-paid, to the following:

Hon. James B. Gainer
Legal Division
The Union Light Heat & Power Co.
139 E. Fourth Street
Cincinnati, Ohio 45202

Hon. Elizabeth E. Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, Kentucky 40601

Ronald P. Mills

Ronald P. Mills

COMMONWEALTH OF KENTUCKY
PUBLIC SERVICE COMMISSION
730 SCHENKEL LANE
POST OFFICE BOX 615
FRANKFORT, KY. 40602
(502) 564-3940

November 30, 1999

James B. Gainer
Legal Division
The Union Light Heat & Power Co
139 E. Fourth Street
Cincinnati, OH. 45202

Honorable Elizabeth E. Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, KY. 40601

John Stapleton
Director of Energy
Natural Resources and Environmental
Protection
663 Teton Trail
Frankfort, KY. 40601

RE: Case No. 1999-449

We enclose one attested copy of the Commission's Order in the above case.

Sincerely,

Stephanie Bell

Stephanie Bell
Secretary of the Commission

SB/hv
Enclosure

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058 OF THE 1999 INTEGRATED RESOURCE PLAN OF THE UNION LIGHT, HEAT AND POWER COMPANY	)))	CASE NO. 99-449

O R D E R

The Commission, on its own motion, hereby initiates its review of the Integrated Resource Plan ("IRP") of The Union Light, Heat and Power Company ("ULH&P") filed on November 1, 1999 pursuant to 807 KAR 5:058. ULH&P is required by 807 KAR 5:058, Section 10, to publish, in a form prescribed by the Commission, notice of its filing in a newspaper of general circulation in its service area. The notice must be published within 30 days of the filing date of this IRP. The Commission finds that the following format should be used when publishing notice of the IRP filing:

> On October 21, 1999, The Union Light, Heat and Power Company filed its 1999 Integrated Resource Plan with the Kentucky Public Service Commission. This filing includes The Union Light, Heat and Power Company's most recent load forecast and a description of the existing and planned conservation programs, load management programs and generating facilities it intends to use to meet forecasted requirements in a reliable manner at the lowest possible cost. Any interested person may review the plan, submit written questions to the utility, and file written comments on the plan.
>
> Any person interested in participating in the review of this Integrated Resource Plan should, within 10 days of the publication of this notice, submit a motion to intervene to: Helen C. Helton, Executive Director, Public Service Commission, P.O. Box 615, Frankfort, KY 40602.

The newspaper notice should be published as soon as reasonably possible after the receipt of this Order. The publication of this notice is in addition to ULH&P's

responsibility under 807 KAR 5:058, Section 2(2), to provide notice, immediately upon filing its IRP, to intervenors in its last IRP proceeding, that its plan has been filed and is available from the utility upon request.

In addition to the notice requirements set forth above, the Commission, on its own motion, hereby adopts the schedule included in Appendix A, attached hereto and incorporated herein, which establishes the procedural dates for this proceeding. Pursuant to 807 KAR 5:058, Section 2(3), this schedule may include interrogatories, informal conferences, comments, and staff reports.

IT IS THEREFORE ORDERED that:

1. ULH&P shall publish the notice set forth herein as required by 807 KAR 5:058, Section 10.

2. The procedural schedule set forth in Appendix A, attached hereto and incorporated herein, shall be followed in this case.

Done at Frankfort, Kentucky, this 30th day of November, 1999.

By the Commission

ATTEST:

Executive Director

APPENDIX A

APPENDIX TO THE ORDER OF THE KENTUCKY PUBLIC SERVICE COMMISSION IN CASE NO. 99-449 DATED 11/30/99

Initial interrogatories to ULH&P shall be filed no later than 01/07/00

ULH&P's responses to initial interrogatories shall be filed no later than 02/08/00

Supplemental interrogatories to ULH&P shall be filed no later than 02/29/00

ULH&P responses to supplemental interrogatories shall be filed no later than 03/21/00

An Informal Conference will be held at 10:00 a.m., Eastern Standard Time, in the Commission's offices at 211 Sower Boulevard, Frankfort, Kentucky, for the purpose of discussing issues related to ULH&P's 1999 IRP filing 04/14/00

Intervenors shall have the option of filing written comments on issues related to ULH&P's 1999 IRP filing no later than. 05/01/00

ULH&P shall have the option to file written comments in reply to any written comments from intervenors no later than 05/19/00

COMMONWEALTH OF KENTUCKY
PUBLIC SERVICE COMMISSION
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November 24, 1999

James B. Gainer
Legal Division
The Union Light Heat & Power Co
139 E. Fourth Street
Cincinnati, OH. 45202

Honorable Elizabeth E. Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, KY. 40601

John Stapleton
Director of Energy
Natural Resources and Environmental
Protection
663 Teton Trail
Frankfort, KY. 40601

RE: Case No. 1999-449

We enclose one attested copy of the Commission's Order in the above case.

Sincerely,

Stephanie J. Bell

Stephanie Bell
Secretary of the Commission

SB/hv
Enclosure

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE FILING BY THE UNION LIGHT, HEAT AND POWER COMPANY OF ITS 1999 INTEGRATED RESOURCE PLAN	)))	CASE NO. 99-449

O R D E R

This matter arising upon the motion of the Kentucky Natural Resources and Environmental Protection Cabinet, Department for Natural Resources, through its Division of Energy ("NREPC"), filed November 18, 1999, for full intervention, and it appearing to the Commission that the NREPC has a special interest which is not otherwise adequately represented, and that such intervention is likely to present issues and develop facts that will assist the Commission in fully considering the matter without unduly complicating or disrupting the proceedings, and this Commission being otherwise sufficiently advised,

IT IS HEREBY ORDERED that:

1. The motion of the NREPC to intervene is granted.

2. The NREPC shall be entitled to the full rights of a party and shall be served with the Commission's Orders and with filed testimony, exhibits, pleadings, correspondence, and all other documents submitted by parties after the date of this Order.

3. Should the NREPC file documents of any kind with the Commission in the course of these proceedings, it shall also serve a copy of said documents on all other parties of record.

Done at Frankfort, Kentucky, this 24th day of November, 1999.

By the Commission

ATTEST:

Helen C. Helton

Executive Director

COMMONWEALTH OF KENTUCKY
PUBLIC SERVICE COMMISSION
730 SCHENKEL LANE
POST OFFICE BOX 615
FRANKFORT, KY. 40602
(502) 564-3940

November 23, 1999

James B. Gainer
Legal Division
The Union Light Heat & Power Co
139 E. Fourth Street
Cincinnati, OH. 45202

Honorable Elizabeth E. Blackford
Assistant Attorney General
1024 Capital Center Drive
Frankfort, KY. 40601

RE: Case No. 1999-449

We enclose one attested copy of the Commission's Order in the above case.

Sincerely,

Stephanie Bell

Stephanie Bell
Secretary of the Commission

SB/hv
Enclosure

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE FILING BY THE UNION LIGHT, HEAT AND POWER COMPANY OF ITS 1999 INTEGRATED RESOURCE PLAN	)))	CASE NO. 99-449

<u>O R D E R</u>

This matter arising upon the motion of the Attorney General of the Commonwealth of Kentucky, by and through his Office of Rate Intervention ("Attorney General"), filed November 16, 1999, pursuant to KRS 367.150(8), for full intervention, such intervention being authorized by statute, and this Commission being otherwise sufficiently advised,

IT IS HEREBY ORDERED that the motion is granted, and the Attorney General is hereby made a party to these proceedings.

Done at Frankfort, Kentucky, this 23rd day of November, 1999.

By the Commission

ATTEST:

Executive Director

RECEIVED
NOV 1 8 1999
PUBLIC SERVICE COMMISSION

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE 1999 ELECTRIC LONG-TERM FORECAST REPORT OF THE UNION LIGHT, HEAT & POWER COMPANY	)))	**CASE NO. 99-449**

MOTION

Comes now the Kentucky Natural Resources and Environmental Protection Cabinet, Department for Natural Resources, through its Division of Energy, (hereinafter "NREPC"), by counsel, and pursuant to 807 KAR 5:001 Section 3(8), moves for leave to intervene in the above-styled case, and that it be granted full intervention status. In support of its motion, NREPC states as follows:

1. KRS 224.10-100(14) authorizes the NREPC to "advise, consult, and cooperate with other agencies of the Commonwealth";

2. KRS 224.10-100(28) authorizes the NREPC to "develop and implement programs for the development, conservation, and utilization of energy in a manner to meet human needs while maintaining Kentucky's economy at the highest feasible level";

3. The Division of Energy serves as the state energy office for Kentucky and administers a variety of programs designed to enhance the efficiency of energy production and use in all sectors of the economy;

4. In response to its legislative mandate, NREPC has worked for many years to maximize system-wide efficiency in the provision and use of electrical services through the mechanisms of integrated resource planning, least-cost planning, and demand-side management (DSM) programs offered through utility companies,

5. It has been the consistent goal of NREPC to minimize the total long-term societal costs of electric services;

6. If granted leave to intervene in this proceeding, NREPC can help ensure that the integrated resource plan filed by The Union Light, Heat & Power Company is consistent with the goal of minimizing the total long-term societal costs of electric services in its service area within Kentucky;

7. The NREPC has a special interest in this proceeding, its interest is not otherwise adequately represented, and with full intervention status, the NREPC will present issues and develop facts that will assist the Commission in fully considering this matter;

8. The NREPC being granted full intervention status will not unduly complicate or disrupt these proceedings;

9. The person designated to represent the NREPC in this proceeding is its Director of Energy:

John Stapleton
663 Teton Trail
Frankfort, Kentucky 40601
Telephone: (502) 564-7192

WHEREFORE, the NREPC respectfully prays for an Order granting it full intervention in this matter.

Respectfully submitted,

IRIS SKIDMORE
RONALD P. MILLS
Office of Legal Services
Fifth Floor, Capital Plaza Tower
Frankfort, Kentucky 40601
Telephone: (502) 564-6676

COUNSEL FOR NATURAL RESOURCES
AND ENVIRONMENTAL PROTECTION

CERTIFICATE OF SERVICE

I hereby certify that a true and accurate copy of the foregoing Motion was mailed, first class, postage prepaid, the 18th day of November, 1999, to the following:

James B. Gainer, Esq.
Legal Division
The Union Light Heat & Power Co.
139 E. Fourth Street
Cincinnati, Ohio 45202

David Brown Kinloch
Soft Energy Associates
414 South Wenzel Street
Louisville, Kentucky 40204

Carl Melcher, Esq.
Northern Kentucky Legal Services
302 Greenup Street
Covington, Kentucky 41011

Clint Hamm
Northern Kentucky Community Action Commission
13 West Seventh Street
Covington, Kentucky 41012-0931

David F. Boehm, Esq.
Boehm, Kurtz & Lowry
36 East Seventh Street
Cincinnati, Ohio 45202

Office of Attorney General
Division of Rate Intervention
P.O. Box 2000
Frankfort, Kentucky 40602-2000

Iris Skidmore

COMMONWEALTH OF KENTUCKY
PUBLIC SERVICE COMMISSION
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Paul E. Patton
Governor

Ronald B. McCloud, Secretary
Public Protection and
Regulation Cabinet

Helen Helton
Executive Director
Public Service Commission

November 18, 1999

John J. Finnegan, Jr., Esq.
Senior Counsel
Union Light, Heat and Power Company
107 Brent Spence Square
Covington, Kentucky 41011

RE: Petition for Confidential Protection
Case No. 99-449

Dear Mr. Finnegan:

The Commission has received your petition filed November 1, 1999, to protect as confidential the information contained in The Union Light, Heat and Power Company's Long-term Forecast Report. A review of the information has determined that it is entitled to the protection requested on the grounds relied upon in the petition, and it shall be withheld from public inspection.

If the information becomes publicly available or no longer warrants confidential treatment, you are required by 807 KAR 5:001, Section 7(9)(a) to inform the Commission so that the information may be placed in the public record.

Sincerely,

Helen C. Helton
Executive Director

NOV 15 1999

COMMONWEALTH OF KENTUCKY

BEFORE THE
PUBLIC SERVICE COMMISSION

IN RE THE MATTER OF:

THE INTEGRATED RESOURCE)
PLAN OF UNION LIGHT) Case No. 99-449
HEAT & POWER)

MOTION TO INTERVENE

Comes the Attorney General, A. B. Chandler, III, pursuant to KRS 367.150 (8) which grants him the right and obligation to appear before regulatory bodies of the Commonwealth of Kentucky to represent the consumers' interests, and moves the Public Service Commission to grant him full intervener status in this action pursuant to 807 KAR 5:001(8).

ELIZABETH E. BLACKFORD
ASSISTANT ATTORNEY GENERAL
1024 CAPITAL CENTER DRIVE
FRANKFORT KY 40601
(502) 696-5453
FAX: (502) 573-4814

NOTICE OF FILING AND CERTIFICATE OF SERVICE

I hereby give notice that the original and ten copies of the foregoing were filed this the 15th day of November, 1999, with the Kentucky Public Service Commission at 730 Schenkel Lane, Frankfort, Kentucky, 40601, and certify that on this same date true copies were served on the parties by mailing same, postage prepaid to:

James B. Gainer
Legal Division
The Union Light Heat & Power Co
139 E. Fourth Street
Cincinnati, OH. 45202