Appendices

Appendix A: Initial Measures

This is the table of measures and technologies that was assessed by RLW in the Illinois residential assessment. ID numbers shown in grey were measures or technologies prioritized by the Illinois DNR.

ID	Potential Situation	Improvement	Quantity
1	Refrigerant under charged	Add refrigerant	1 Lb R22
2	Refrigerant over charged	Remove refrigerant	1.5 hour
3	Low evaporator airflow A	Increase duct sizes or add new ducts	75 SF
4	Low evaporator airflow B	Increase blower speed	1.3 hour
5	High duct leakage (25%)	Reduce ductair leakage to 5%	2.83 tons
6	Oversized AC units A	Size AC units to 100% of Manual J	3.52 tons
7	Oversized AC units B	Size AC units to 100% of Manual J	3.52 tons
8	One inch insul. on ducts in attic	Add one more inch of insulation	2.83 tons
9	Gas heat and 10 SEER AC	Install AC SEER = 13	2.83 tons
10	Home has 10 SEER heat pump	Install Heat Pump SEER = 13	2.83 tons
11	Home has electric strip heat	Install Heat Pump SEER = 13	2.83 tons
12	Attic insulation = R-7	Add another R-23 attic insulation	1290 SF
13	Attic insulation = R-11	Add another R-19 attic insulation	1290 SF
14	Exposed walls not insulated	Add R-11 wall insulation	1770 SF
15	Floor over basement not insulated	Add R-19 Insulation to floor	450 SF
16	House infiltration = 0.8 ACH	Reduce infiltration to 0.35 ACH	2290 SF
17	Standard double pane windows A	Install Low E triple pane windows	203 SF
18	Standard double pane windows B	Add storm windows	203 SF
19	Standard double pane windows C	High Performance double pane windows	203 SF
20	Standard double pane windows D	Highest Performance double pane windows	203 SF
21	No E & W window shading A	Add solar screens to E & W glass	96 SF
22	No E & W window shading B	Plant deciduous trees on E & W sides	6 each
23	No Compact Fluorescent Lamps	Use 13 CFLs throughout house	13 CFLs
24	Refrigerator needs to be replaced	Purchase Energy Star refrigerator	1 each
25	Refrigerator early retirement	Purchase Energy Star refrigerator	1 each
26	Dishwasher to be replaced A	Purchase Energy Star dishwasher	1 each
27	Dishwasher to be replaced B	Purchase Energy Star dishwasher	1 each
28	Clothes washer to be replaced A	Purchase Energy Star clothes washer	1 each
29	Clothes washer to be replaced B	Purchase Energy Star clothes washer	1 each
30	No prgrammable thermostat	Install programmable thermostat	1 each
31	No faucet aerators	Install faucet aerators	1 each
32	No low flow shower heads	Install low fow shower heads	2 each
33	Hot water pipes not insulated	Insulate hot water pipes	1 each
34	Gas water heater not wrapped	Wrap gas water heater	1 each

Table 6: Initial Set of Potential Measures

Appendix B: Climate Zones

The illustration below shows the U.S. climate zones used by the Department of Energy for data analysis. Each zone shows the range of normal Cooling Degree Days and Heating Degree Days in each zone. As discussed, these zones are the primary factors in assessing heating and cooling loads in building simulation analysis. Missouri is in Zone 3. RLW has already developed a DOE2 model adjusted for the Zone 3 from the Illinois residential assessment.

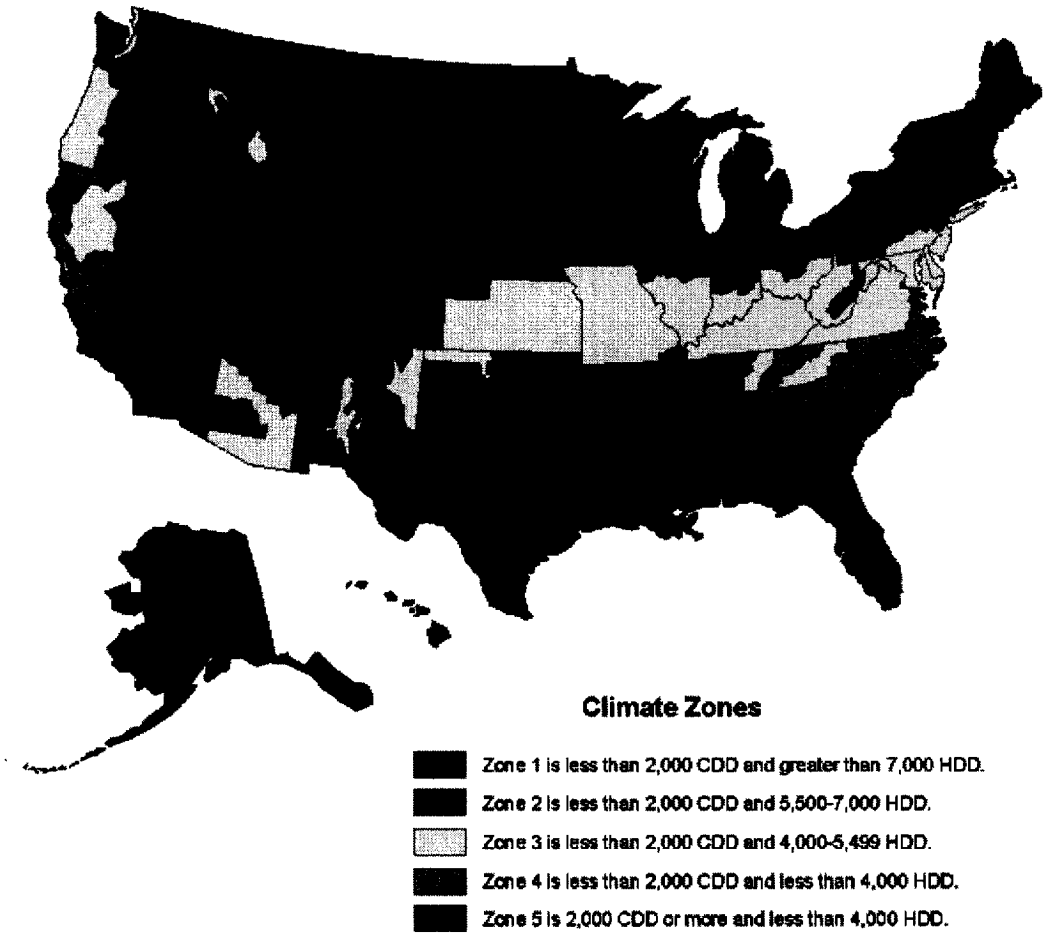

Figure 7: US Climate Zones

Appendix D: Potential Analysis

We plan to estimate the technical savings potential per home by using the primary and secondary data collected to run the DOE2 models previously prepared for the Illinois residential assessment.

Figure 8 provides a measure potential schematic. Potential is calculated by an application of ratios from a total marketplace. Moving from left to right, the total potential for the intended program can be defined as all single-family electric utility customers. The technical potential reflects the number of homes in which the measure can be practically applied, as derived from extrapolated saturation and measure penetration results, regardless of economic cost. The technical potential excludes homes in which the measure is impractical or impossible.

The economic potential is the ratio of the technical potential where an established threshold of economic rationalization is set. Simply speaking, this is the estimated number of homes that would economically benefit from the measure in terms of simple payback. This does not take into account any existing or foreseen market barriers.

The last is market potential. This is an estimated projection of potential that takes real life constraints (market barriers) into account – availability, consumer awareness, consumer paradigms and perceptions, and programmatic impact.

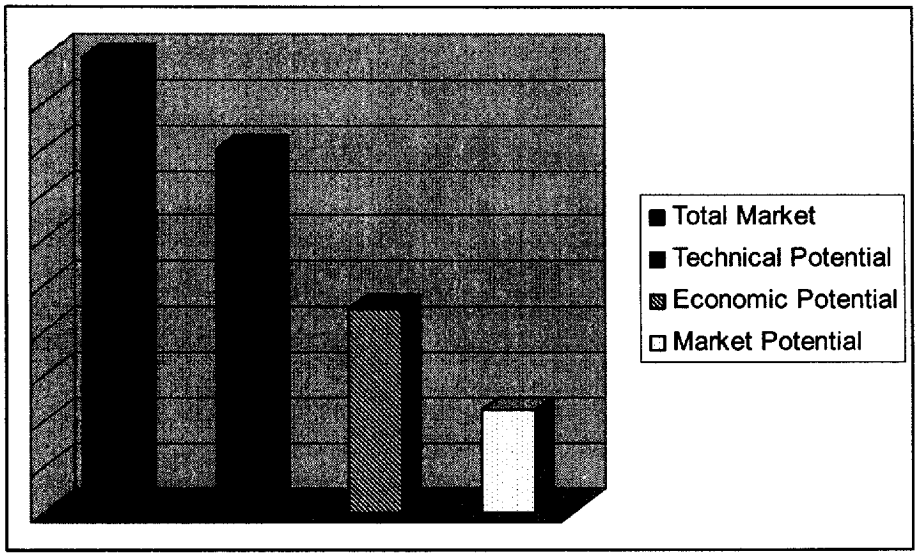

Figure 8: Measure Potential Schematic

The penetration rates under different program scenarios, or the market potential, involves the estimation of how many customers would actually participate in a specific program over a given time period. That is, the market potential indicates the number of homes that would install the measure under varying program structures and financial subsidies, ranging anywhere from informational services to a 50% subsidy level. The value depends on the measure, the length

of time the program is offered, the specific markets, numbers of customers targeted, estimated average payback, and finally the level of subsidy (if any).

This measure potential schematic will be applied to the single family residential population of Missouri as follows in this example:

(1) The total market is the total number of customers eligible for each measure type. Using programmable thermostats as an example, the total market (as established by program guidelines) may be all electric heat single family residential customers.

(2) The technical potential will be determined through analysis of the in-home audits to assess what percent of these customers could achieve savings through installation of the measure, e.g., a programmable thermostat. Those who already have programmable thermostats would be eliminated at this point.

(3) The economic potential downwardly adjusts the technical potential by screening out the estimated number of homes where the application would be not be economically acceptable.

Programmable thermostats would have a high economic potential because they are inexpensive and have little "unused" economic cost caused by the removal of the old thermostat. Compared to estimated savings, the total simple payback is often about one year.

Other measures will have a larger downward impact. Appliances such as refrigerators have a usable life span that has to be taken into account. For example, homeowner "A" may have a 2-year old "standard" refrigerator. An Energy Star refrigerator would use less electricity, but the unused value of the existing refrigerator, if tossed out and replaced, would greatly increase the differential cost of the high efficiency unit. For practical economic purposes, then, that appliance cannot be counted in the economic potential. In comparison, a homeowner "B" may have a 26-year old refrigerator. In this case, this appliance has well passed its expected life span and will need to be replaced soon; in addition, a 26-year old refrigerator is very inefficient compared to modern refrigerators, so the economic potential exists from the existing need to replace and the large leap in energy efficiency. Only the differential cost of the Energy Star refrigerator over an equivalent standard efficiency unit would apply in this case.

(4) The market potential can be estimated through existing utility research and past participation rates in other programs. For example, past research and prior program participation rates may indicate that 90% of customers that could use a programmable thermostat would take one if installed for free. However, past results might also indicate that only 60% of customers would install the measure with a 50% subsidy level. This is where the program design and implementation guidelines become predominant. These guidelines must be established and executed to effectively inform and motivate those included in the economic potential so that they will actually participate in the programs they are eligible for.

Assessing Potentials

The overall goal of this research project is to estimate the savings potential for energy efficiency products and measures for customers in the single family home market sector. This section of the proposal discusses the staged approach RLW proposes to accomplish this goal. The two key stages are to assess (1) technical potential and (2) market potential.

Technical potential can be thought of as *Pure* or *Practical* potential. This includes all technically feasible applications of a measure regardless of cost. In this analysis, we will analyze this more useful definition of practical technical potential.

The development of technical potential involves two steps:
(1) Identifying possible measures for analysis and conducting a qualitative screening to assess the appropriateness of these measures, and
(2) Analyzing the baseline characteristics and site conditions to develop the technical potential for each measure type.

Two DOE2.1E models from our past Illinois study for climate zone 3 has been created for 1) electric heated homes and 2) fossil fuel heated homes, respectively. If a significant number of electric resistance heated homes are found, RLW will also create a DOE2 model to uniquely represent these. These models will be tightly calibrated to average monthly billing histories from utilities throughout the state. For each house type the potential end-use savings for the most promising measures will then be calculated using the models.

Annual energy savings per home from the models described above will be multiplied by potential market penetration numbers for each measure to obtain total energy savings potentials for the state.

Economic potential will be derived by the means of a simple screening of each measure's technical potential against a reasonable payback period. We consider a 3-year simple payback as the threshold for most residential replacement/retrofit applications.

Assessing Market Potential

The primary sources of information for estimating the market potential of electric and gas saving equipment will be the previous data collected by RLW and all available utility DSM research. RLW intends to apply the market potential ratios that we used in the Illinois study.

Appendix D: Relevant Project Experience

RLW Analytics: Summary of Relevant Projects

Recent residential evaluation projects include baseline studies, market assessments, program evaluations, process evaluations, and impact studies. *RLW* has proven success in working on multi-utility and regional projects, a high level of expertise in evaluating the residential sector, including the performance of new construction baseline studies, ENERGY STAR market studies, and several impact and process evaluations, and vast experience in the performance of those tasks that are required in this RFP.

Company	Project	Residential On-site Audit (B = Blower door test)	Residential Telephone recruitment / surveys	Market Actor Survey	Regulator/ Program Admin. surveys	Market Assessment	Impact/Economic Evaluation
California Public Utilities Commission	1999-00 and 2004-04 Residential Saturation Assessment Studies	★	★			★	
New Hampshire Utilities	2003 Low Income Pgm/Process Evaluation		★		★	★	
Northeast Utilities ("NU")	2002 Residential Lighting Impact Evaluation		★			★	★
NU & United Illuminating ("UI")	Energy Star Homes Baseline – 2001-2	★ B		★		★	
NU & UI	Energy Star Homes Impact - 2002	★ B				★	★
Midwest Energy Efficiency Alliance	2002 Illinois Statewide Residential Assessment	★	★			★	★
Texas Utilities (Oncor)	2002 Energy Star Windows Baseline Assessment		★	★	★	★	
Texas Utilities (Oncor)	2001-2 Energy Star Homes Market Transformation Program Evaluation	★ B	★		★	★	
NGRID, NSTAR, UNITIL/FEG, IU, CL&P, WMECO	Technical assessment and market assessment of residential HVAC systems program – 2002	★ B	★	★		★	
DOER, NSTAR, NU, FEG, and NGRID	Study of remaining economic potential in the State of Massachusetts - 2001		★	★	★	★	★
NSTAR	Integrated Resource Management (IRM) Program – 1999		★	★	★	★	★
Eastern Utilities Associates	Energy Assistance Program (EAP) and Residential Efficiency Services (RES) Program – 1999		★			★	★

Table 7: Selected Key RLW Project Experiences to Missouri Study Needs

RLW - Project Descriptions

KEY CALIFORNIA PROJECTS:

1999-00, 2004-05 Statewide Residential Lighting and Appliance Saturation Study.
San Diego Gas and Electric Company, Sacramento Municipal Utility District, CPUC
In 2000 RLW collected baseline data on the saturation of lighting and major appliances in the residential sector to enable the California Public Utilities Commission to assess and the success of their conservation programs, guide public policy, and determine program planning. RLW Analytics and ASW Engineering conducted this study The study had three primary objectives:

Objective 1: Completion of 1,258 on-site surveys of single-family, multi-family and mobile homes throughout the service territories of PG&E, SCE, SDG&E and SMUD.
Objective 2: Development of a user-friendly database of residential lighting and appliance saturation by energy efficiency.
Objective 3: Determination of potential market barriers in the residential market to adopting energy efficient lighting systems.

The survey was implemented using palm-top mini-PC computers to gather the data directly in electronic format. A total of 1,258 on-site surveys were completed between December 1999 and March 2000. Surveyors collected nameplate data for eight major appliances. In addition to the lighting and appliance survey, a separate questionnaire was also designed to capture market barrier data on purchases of energy efficient residential lighting systems. Existing databases of appliance efficiency were acquired from the outside sources. MS Access queries were designed and written to link the on-site data to the appliance efficiency databases based on model number. Completed assessments were given to the CPUC on percentages and counts of appliances and products, which also included breakdowns in ages and levels of efficiency.

For 2004-05, RLW has been again selected to provide a similar scale project involving 850 on-site audits.
Project Manager, Rob Rubin, (858)654-1244

Statewide Evaluation of the California's Energy Star New Homes Program.
California Public Utility Commission (CPUC)
RLW was the evaluator of 2002 and 2003 statewide Energy Star New Homes Program. The work entails analysis of C-HERS measures, energy savings, on-site inspections, surveys and interviews with market actors, and analysis of the CHEERS Registry. The evaluation is providing a process and impact evaluation of the two program years.
Project Manager, Mary Kay Gobris, (415) 973-1319

Other California Projects:
Building Efficiency Assessment
California utilities
In 2000–2003 RLW conducted the impact and process evaluation of the Statewide Savings By Design (SBD) Program. The project includes telephone surveys of key decision makers, on-site surveys, DOE-2 modeling, and statistical analysis. RLW was also awarded the subsequent evaluation of SBD to provide a process and impact evaluation of the two program years.
Project Manager, Marian Brown, (626) 302-8281

The California Evaluation Framework.
California Public Utility Commission (CPUC)
As a subcontractor to TecMarket Works, RLW Analytics was responsible for Chapters 12 and 13, covering Uncertainty and Sampling respectively. The final report was delivered to the CPUC in February 2004.

OTHER RLW RESEARCH, EVALUATION, AND ASSESSMENT PROJECTS:

Macroeconomic Program Impact Study
NYSERDA
This 2003 project entailed gathering all program and contract expenditure data from NYSERDA to develop usable inputs into a macroeconomic model that would determine the direct and secondary economic impacts of the NYSERDA Energy$mart program expenditures to New York State. Mr. Smyth identified and collected the program and contract funding documentation, and conducted a thorough funding attribution analysis that identified how dollars flowed through the funding sources into specific labor and material categories.

Illinois Residential Market Assessment
Midwest Energy Efficiency Alliance
RLW conducted a comprehensive market assessment of technical, economic, and market potentials for residential energy efficiency opportunities in the state of Illinois in 2002. This study incorporated a thorough literature review of all available studies pertaining to Illinois residential energy use and on-site audits of 308 homes throughout the state of Illinois. Home data was collected on all aspects of lighting, HVAC, insulation, windows, and home construction. Data from these on-site audits were analyzed through DOE2 models and regional climate adjustments to determine 23 different energy efficient technologies or measures that promised reasonable potential opportunities for market transformation program support.

HVAC Market and Technical Assessment
Massachusetts, Rhode Island & Connecticut Electric Companies (National Grid, NSTAR Electric, Unitil/Fitchburg Gas & Electric Light Company, United Illuminating, Connecticut Light and Power and Western Massachusetts Electric Company)
In 2002, a consortium of utilities in Massachusetts, Rhode Island, and Connecticut sponsored a technical assessment and market assessment of residential HVAC systems in single-family existing homes. Specifically, this study sought to assess market actor and consumer practices in the selection and installation of residential central air conditioning systems. In addition, a technical assessment was performed to determine installation baseline parameters and resulting potential savings associated with improving installation practices. Data collection activities included interviews with consumers and HVAC contractors, HVAC distributors, and HVAC manufacturers in addition to extensive field audits that measured all operating characteristics of newly installed HVAC systems.

Baseline Evaluation of the Energy Star Home Program
Northeast Utilities and United Illuminating
In 2001, RLW conducted a baseline evaluation of Northeast Utilities' and United Illuminating's Energy Star Home Program in order to determine and establish a baseline for residential new construction practices in Connecticut. The Energy Star Home Program is a fuel-blind program designed to exceed the energy performance of homes built in accordance with current building codes. It incorporates a package of energy efficiency practices and standards that include: increased insulation levels, air tight construction, controlled continuous mechanical ventilation, high efficiency HVAC systems, efficient windows, passive solar strategies, efficient lighting, certain major Energy Star appliances, and proper construction detailing to maintain effectiveness of these measures. The program promotes energy efficiency in residential new construction through training and technical assistance to building professionals and other trade allies, quality assurance inspection, marketing to homebuyers and builders, and financial incentives. To establish a baseline reference home RLW conducted the following data collection activities:
- Builder/Developer Interviews
- Non-Participant Homeowner Telephone Surveys

- Other Residential Market Actor Interviews (Architects, Bank Lending Officials, State and Municipal Code Officials, Realtors, and Manufacturing and Installation Sub-Contractors (HVAC & insulation/windows).
- Residential New Construction On-Site Inspections

Contact: NU: Joe Swift: 860-832-4936; UI: Paul Grey: 203-499-3686

Impact Evaluation of the Energy Star Home Program
Northeast Utilities and United Illuminating
The impact evaluation of Northeast Utilities' and United Illuminating's Energy Star Home Program was performed concurrently with its impending baseline evaluation. The data collection activities included on-site inspections, participant homeowner interviews, and participant builder telephone surveys that developed a formal final report which addressed:
- The net energy savings that can be attributed to the Energy Star Home Program;
- The aggregate net value of program savings to the utility and its' customers;
- The effect on new residential construction of free ridership, spillover, and snapback resulting from the ESH program; and
- The effectiveness of incentive programs used for Energy Star appliances (refrigerator, and/or dishwasher), associated with Energy Star Home new construction and its related energy savings.
Contact: NU: Joe Swift: 860-832-4936; UI: Paul Grey - 203-499-3686

Residential Appliance Market Study
Northeast Energy Efficiency Partnership (NEEP)
From 1998 to 2000, RLW has conducted market assessments for the residential appliance market for NEEP. RLW performed an initial baseline and characterization of the market for high efficiency clothes washers and selected Energy Star Appliances in Vermont, Connecticut, Massachusetts, Rhode Island, New Hampshire and New York. Since the baseline study, RLW has performed two market progress reports and updates of all baseline market indicators. In addition, the study assisted in developing a high efficiency clothes washer market transformation program, and has evaluated the initial impacts of this market transformation effort. The project had three primary objectives in its duration:

1. Characterizing the baseline market for clothes washers, dishwashers, refrigerators and room air conditioners.

2. Developing a market transformation program for clothes washers.

3. Evaluating and updating the impacts of the market transformation initiatives on clothes washer sand Energy Star appliances through a regular set of data collection activities.

The first phase of the study used data from dealer onsite and telephone interviews, manufacturer interviews, participating utility resources and federal agency interviews. These first-phase data were analyzed to develop a baseline for the transformation programs and to support the design of the clothes washer initiative program. Following program implementation, the dealer and manufacturer interviews were repeated to assess changes in the market in order to measure market transformation effects. In addition, participating customers were surveyed to assess program effectiveness in preparation for subsequent Oncor offerings.

The Remaining Electric Energy Efficiency Opportunities in Massachusetts
Massachusetts Department of Energy Resources
From 2000-2001, RLW completed a study of remaining economic potential in the State of Massachusetts for both the residential and C&I sectors from the 2003-2007 horizon. This study included determining the remaining economic potential, potential that could be achieved with continued ratepayer funding, and

savings that would occur naturally without ratepayer funding. Interviews with customers and market actors (ESCO's, EESPs' and competitive retail suppliers) were also conducted to assess the future role of private enterprise in providing efficiency services and to assess barriers to the adoption of energy efficient products and services. The final report will be used to support the DOER decision-making process on whether to continue ratepayer funded efficiency programs beyond 2002.

The final report was used as documentation by the Massachusetts legislature to approve continued funding, which was further presented to, and approved by, Acting Governor Jane Swift.

SPECTRUM Residential Market Potential Study
Northeast Utilities
In 2000 RLW assessed the remaining market for the Single Family and Multi Family energy conservation programs. Specifically, the evaluation:

1. assessed the feasibility of marketing the program to past participants to for missed opportunities
2. determined the size and characteristics of the non-participant pool,
3. developed a strategy to market to the non-participants, and
4. determined any additional conservation measures or services that can be offered through the ratepayer-funded programs.

RLW surveyed 795 residential customers throughout Connecticut and Massachusetts by telephone to establish marketing potentials remaining for the SPECTRUM residential conservation program. Past participants were asked questions to establish their satisfaction with the program and determine the technical and real market potential remaining for a list of 14 existing conservation measures and several new measures. Non-participants in the program were also interviewed to assess their interest in existing as well as potentially new program conservation measures. Technical and market potential for each of these measures were also established.

RLW asked 75 questions with over 250 response fields, including customer demographics, customer energy and product preferences, customer knowledge and impressions of existing and new conservation measures, and customer responses to different levels of incentives for several program measures.

SPECTRUM Electric Heat Program
Northeast Utilities
RLW has performed a number of impact evaluations of NU's SPECTRUM Electric Heat Program. The Electric Heat Program is comprised of Single Family and Multifamily components. To date, RLW has performed comprehensive evaluations of:

- the 1996 multifamily component
- the complete programs in 1995, and again from 1997 to 2000

The objectives of these Single Family and Multifamily impact evaluations were to:

- Determine the net annual energy savings associated with each program
- Determine the levels of free ridership, spillover, snapback, and persistence
- Determine changes to customer behavior and usage patterns since measure installation
- Assess interactive effects between lighting, heating, and cooling systems
- Provide information on program and measure effectiveness, with conclusions and recommendations to improve program effectiveness and engineering estimates of savings

The programs offer direct installation of insulation, infiltration, efficient lighting, appliance maintenance, and hot water measures to buildings with five or more dwellings. The evaluations were done by telephone surveys and on-site visits for participating occupants and building managers, DOE 2.1 modeling, and lighting logger metering in common and individual spaces. The final products of the evaluation were net and gross kW and kWh savings estimates, an engineering algorithm and tracking system assessment and technical process information on measure performance and customer behavior.

Residential Program Impact and Implementation Analysis
Boston Edison Company (BECo)

In 1997, RLW completed an impact and implementation analysis for BECo's 1995 and 1996 residential program years. The three programs evaluated were Boston Edison's Home Energy Rebate Program, Electric Heat Program, and Multifamily Program. The evaluation effort included tracking database cleaning, a billing analysis, completion of over 600 participant phone surveys, and the analysis of net-to-gross attributes that included free ridership, persistence, spillover, snapback, and snapforward. Savings estimates were then disaggregated by several sub-segments of the participant population, including low income, elderly, renters, and facility type. The final task of the evaluation was the presentation of a reconciliation report for DPU filing.

SAVER Program Evaluation
Commonwealth Energy Company

In 1997, RLW Analytics performed a process evaluation of the Commonwealth Energy Big S.A.V.E.R. program. Within this program, the residential One-Stop Program, Low-Income Program, and Small C/I program were evaluated separately. Specific tasks included the evaluation of program operation, assessment of program net impacts, a market potential study for the COM/Energy service territory and market transformation study focusing on residential appliances. Tools utilized in the evaluation included over 500 participant, non-participant and deactivate phone surveys, interviews of company and contractor program staff, and on-site work to assess quality of program measure installation.

Market Potential and Load Research Study
Brooklyn Union Gas Company

In early 1995, *RLW* implemented a residential DSM Gas Load and Market Research study for Brooklyn Union Gas. The overall goal of the project was to determine which measures might be cost effectively offered through DSM programs in Brooklyn Union's residential market. RLW reviewed existing Brooklyn Union market research and conducted telephone interviews of 250 Brooklyn Union audit customers and seven gas utility professionals who managed residential DSM programs. Technical, economic and financial potential by measure were established for informational, audit and rebate-type programs. Brooklyn Union used the results of the market and load research, together with the evaluation results from the utility's pilot programs, to determine a residential DSM strategy.

Residential Appliance Market Study
Northeast Energy Efficiency Partnership (NEEP)

This 1999-2000 study characterized the market for high efficiency clothes washers and selected Energy Star Appliances in Vermont, Connecticut, Massachusetts, and New York. In addition, the study assisted in developing a high efficiency clothes washer market transformation program, and will evaluate the initial impacts of this market transformation effort. The project has three objectives:

1. Characterize the baseline market for clothes washers, dishwashers, refrigerators and room air conditioners
2. Develop a market transformation program for clothes washers.
3. Evaluate the initial impacts of the market transformation initiatives on clothes washers and Energy Star appliances

The study first used data from dealer onsite and telephone interviews, manufacturer interviews, participating utility resources and federal agency interviews. These first-phase data were analyzed to develop a baseline for the transformation programs and to support the design of the clothes washer initiative program. Following program implementation, the dealer and manufacturer interviews were repeated to assess changes in the market in order to measure market transformation effects. In addition, participating customers are being surveyed to assess program effectiveness in preparation for subsequent NEEP offerings.

Residential Programs Market Analysis
Northern States Power
In 1999, RLW collected market information for more than 2,500 residential customers in the NSP service territory. This was done in conjunction with the impact and process evaluation of three separate demand-side management programs. As part of the survey, the customers were ranked on a host of potential services and measures, which NSP used to develop a next generation of program offerings.

Vermont ENERGY STAR Baseline Study
Vermont Utilities
This 1999-2000 study characterized the market for *Energy Star* Appliances in Vermont to support future evaluation as well as program design. RLW utilized data from on site and telephone interviews with dealers, consumers, manufacturers, participating utility program managers and federal agency staff. This interview data, along with industry sales data, was analyzed to develop a baseline for the transformation programs and to support its design.

Residential Baseline Study Update
Texas Utilities
In 1997, RLW and SUMS completed a residential baseline study update when estimating the impacts of a new construction program. The baseline study was accomplished through the following tasks:

- Comprehensive review of 1994 baseline data,
- Predetermination of the measures and practices to study,
- Telephone-based "baseline practice" interviews with both participating and non-participating builders,
- Telephone-based "baseline practice" interviews with equipment dealers and contractors,
- On-site tract surveys to corroborate the telephone survey results, and
- New construction market assessment to explain the significance of the survey data.

The study began with a thorough review of 1994 baseline data collected by TU, to address any other methodological issues and to identify the most important measures of interest. The study focused on the changing and program-targeted practices, including: square footage, solar gain shading (sunscreens, overhangs, etc.), air infiltration, fireplaces, ducts, HVAC SEER/HSPF, DHW size/EF, and major appliance fuel type (HVAC, DHW, cooking, dryer).

Low-Income Market Assessment
Detroit Edison
In 1997, RLW contributed to a market evaluation of the Detroit Edison Company's low-income customers. The purpose of the evaluation was to investigate the demographics and energy-related product use, attitudes and behaviors of the low-income population. This market research study was designed to provide DECo information to:

- Identify important population characteristics relevant to energy products and services,
- Identify drivers of participation in the utility's Energy Management Program,

- Segment the low-income market on demographics and energy-related behaviors and attitudes as well as products and service needs and expectations, and
- Estimate the transformative effects of existing programs.

The data collection activities conducted for this evaluation included the completion of:
- 100 participant phone surveys, (participant sample)
- 200 identified non-participant phone surveys from the DECo CIS system, (DECo non-participant sample) and
- 250 not identified non-participant phone surveys (MicroVision sample).

The analysis of these and previously existing data include cluster segmentation analysis, discrete choice modeling to identify factors that increase participation. Four models examined the effects of customer demographics, housing characteristics, appliance saturation and information on bill payments on participation decisions. Non-participant surveys were further analyzed to assess market transformation, and the full range of low-income customer surveys were analyzed to characterize this market to support planning for future market transformation efforts.

SAMPLE MDI RESIDENTIAL PROJECTS:

ComEd: *Direct Load Control Pilot Program* - A pilot program involving approximately 300 homes. The objective was to evaluate the benefits of an air conditioning direct load control program within ComEd's service territory. This pilot later evolved into the popular *Nature First* program. Responsibilities included customer contact, scheduling installations, performing installations, initializing sites, site verifications and customer public relations.

Florida Power & Light: *Residential Demand-Site Management Program* - Mr. Dexheimer assisted with the on-site measurement plans and equipment installation at over 1500 residential sites for FPL's residential DSM programs. On this project, Mr. Dexheimer helped develop equipment specifications, recruited participants, managed field installations and maintenance, performed on-site audits, data collection, data validation and analysis.

ComEd: *Nature First Residential Direct Load Control Evaluation* – MDI installed over 300 NIALMS evaluation recorders - performing final hookup, placing internal temperature sensors, and gathering characteristic data on the homes. This included obtaining participation agreements from the homeowners. MDI also perform quality control audits on a small percentage of the installs in order to assure proper installation, quality workmanship, switch operation, and to examine customer perception.

Enetics: MDI installed multiple NIALMS units in rural Iowa in order to evaluate residential energy usage for Central Iowa Power Cooperative, (CIPCO.)

ComEd: MDI decommissioned over 300 NIALMS devices throughout ComEd territory. This involved removing the telemetry connections/junctions, returning the sites to "pre" conditions and gathering and performing inventory on the returning equipment.

Resumes

RLW Resumes

Roger L. Wright, Principal

Education
University of Notre Dame 1958-1960, mathematics.
The University of Michigan 1960-1965, mathematics and statistics.
Degrees: Ph.D. 1968, M.A. 1963, B.S. 1962: *The University of Michigan.*
Affiliations
Member, American Statistical *Association (ASA),*
Member, *Association of Energy Services Professionals (AESP),*
Member, *Institute of Electrical and Energy Engineers (IEEE).*
Employment
RLW Analytics and Roger L. Wright and Associates, 1970-the present.
The University of Michigan, 1965-1988, Professor of Statistics and Department Chairman, School of Business Administration.
Netherlands Econometric Institute 1976, Visiting Scholar.
U of M Survey Research Center, 1971-73, Statistical Consultant.

Dr. Wright has consulted with business and industry since 1970. In 1989, he founded *RLW Analytics* as a successor to Roger L. Wright and Associates. Wright and *RLW Analytics* are noted for implementing practical and progressive methodologies in demand-side management evaluations, end-use data collection studies, and load research in the gas and electric utility industries. Clients include more than fifty utility industry firms as well as more than a dozen firms in other industries.
At The University of Michigan, Dr. Wright taught business statistics, regression analysis, and sampling at all academic levels - BA, MBA, and Ph.D. For many years, Dr. Wright has been an instructor in the *AEIC Seminar on Advanced Sample Design and Analysis Techniques of Load Research.*
Research
Dr. Wright's research is in statistical modeling, data analysis, and model-based statistical sampling. Applications include demand-side management evaluation, end-use information, load research, cost estimation, cost allocation, market segmentation, financial analysis and inventory control. Sponsors of Wright's research have included EPRI, DOE, The U.S. Department of Justice, General Motors, DeLoitte, Haskins and Sells, Consumers Power Company, and Consolidated Edison of New York.
Wright's work has included the development and practical application of several innovative statistical sampling and analysis methodologies. At the forefront of this work is the Model-Based Statistical Sampling (MBSS^{TM}) methodology for design and analysis of energy marketing, demand-side management, and load research projects. Most recently, Dr. Wright has applied the MBSS methodology to market segment analysis and DSM evaluation using the Engineering Calibration Approach (ECA^{TM}). ECA is a technique to measure and understand the energy use of a group of sites or a market segment by building and calibrating nested samples of engineering simulation models. ECA can also be used to evaluate the total impact of a DSM program by integrating an intense evaluation of a small sample of projects with results of other impact methods undertaken in the program. The ECA methodology includes an algorithm for the optimum allocation of resources among the various data collection strategies.

Dr. Wright has published more than twenty-five articles in leading journals including The Journal of the American Statistical Association, The Journal of Business & Economic Statistics, Journal of Financial and Quantitative Analysis, Journal of Market Research, Auditing: A Journal of Practice and Theory, and the Journal of the Illuminating Engineering Society. Many of these publications deal with load research and demand-side information development. He is the author of two EPRI reports on load research, Model-Based Statistical Sampling for Electric Utility Load Research (1983) and Sample Designs for Load

Research: The Bootstrap Comparison Procedure (1985). Wright has contributed papers regularly to the ACEEE Summer Study on Energy Efficiency in Buildings.

PUBLICATIONS BY ROGER WRIGHT

"Daylighting Impact on Retail Sales Performance" (with L. Heschong and S. Okura), Journal of the Illuminating Engineering Society, Volume 31, Number 2, Summer 2002, pages 21-25.
"Daylight Impacts on Human Performance in School" (with L. Heschong and S. Okura), Journal of the Illuminating Engineering Society, Volume 31, Number 2, Summer 2002, pages 101-114.
"Measuring Accomplishments of Energy Efficiency in California's Nonresidential New Construction Market," (with M. Brost, R. Peet, C. Chappell, D. Mahone, and P. Jacobs.) ACEEE *2002 Summer Study on Energy Efficiency in Buildings*, American Council for an Energy-Efficient Economy, August, 2002.
"A Profile of a Refrigerator Recycling Program," (with C. Austin, C. Chappell, E. Hamzawi, and W. Lindeleaf.) ACEEE *2002 Summer Study on Energy Efficiency in Buildings*, American Council for an Energy-Efficient Economy, August, 2002.
"Daylighting and Human Performance," (with L. Heschone.) ACEEE *2002 Summer Study on Energy Efficiency in Buildings*, American Council for an Energy-Efficient Economy, August, 2002.
"The California Statewide Baseline Study of the Nonresidential New Construction Market," (with M. Brown, D. Mahone, R. Peet, and P. Jacobs.) ACEEE 2000 Summer Study on Energy Efficiency in Buildings, American Council for an Energy-Efficient Economy, August, 2000.
"Daylighting and Productivity: Elementary School Studies," (with L. Heshong and S. Okura), ACEEE 2000 Summer Study on Energy Efficiency in Buildings, American Council for an Energy-Efficient Economy, August, 2000.
"Skylighting and Retail Sales," (with L. Heshong and S. Okura), ACEEE 2000 Summer Study on Energy Efficiency in Buildings, American Council for an Energy-Efficient Economy, August, 2000.
"Load Profiling's Role in Deregulation: Today and Into the Future," DistribuTECH Europe, 28-30 September, 1999, Madrid, Spain.
"Load Profiling – Misses the Target," Power Value Magazine, March/April, 1999.
"Load Information in Open Power Markets", paper presented to the Western States Load Research Conference, Spring 1997.

Leveraging Limited Data Resources: Developing Commercial End-Use Information, Electric Power Research Institute, Palo Alto, TR-105841s, RP 3819-18, December 1995.
"Developing Commercial End-Use Information using DOE-2.1 Simulations and Transferred CEED Data", (with P. Chow, K. Petri, and R. Gilman), 1995 Energy Program Evaluation Conference, Chicago.
"Improving a Sampling Plan using Auxiliary Information," Proceedings of the International Statistical Institute 50th Session, Beijing, August, 1995.
"Evaluation of Commercial-Sector Lighting Retrofit Programs", (With D.M. Logan, R.E. Davis, T. Giffin, M. McGuire, R. Zumbrunnen and D.M. Violette), Electric Power Research Institute, Palo Alto, TR-104912, RP 3823-02, January, 1995.
"Double Ratio Analysis: A New Tool for Cost-Effective Monitoring", (With Marvin Horowitz, Ilene Obstfeld, and Susan Buller), Proceedings Panel #8, Measurement and Evaluation, ACEEE, Summer, 1994.
"Model-based Sampling For End-Use Metering", Electric End-Use Data Symposium; St. Louis, Oct. 27-29, 1993.
"A Methodology For Integration of Evaluation Studies", (With David Jacobson), EPRI Proceedings: 6th National Demand-Side Management Conference, Making a Difference; Miami Beach, March 24-26, 1993.

"Choosing Sample Sizes for Sample Designs with Auxiliary Information", Statistics Sweden workshop, Uses of Auxiliary Information on Surveys; Oct. 5-7, 1992.
"Development of Measured Savings for a Small Commercial/Industrial Lighting Program", (With Meredith Miller, William Blake, Sarah Dagher and Jeremy Schutte), Proceedings Panel #7, Program Evaluation, ACEEE, Summer, 1992.
"Using Ratio Estimation to Minimize Sample Size", Evaluation Exchange, Vol. 2, No. 1, Jan. 1992.
"Adventures in Sample Design For DSM Impact Evaluation", Northwest Public Power Association End-Use Metering Symposium; May 15, 1991.
"Northeast Utilities' Approach to C&LM Program Impact Evaluation", (with J. Amalfi), Proceedings from *1991 Energy Program Evaluation Conference,* Chicago, August 1991.
"Using Information in Addition to Book Value in Sample Designs for Inventory Cost Estimation", with (A. Roshwalb), *The Accounting Review*, April 1991.
"Innovations in Load Research: Challenging Conventional Wisdom," presented at the AEIC Northeast Load Research Conference, *RLW Analytics*, 1990.
"Measuring DSM Impacts: End-Use Metering and the Engineering Calibration Approach," (With M. W. Townsley), presented at the *End-Use Information and its Role in DSM* Conference, *RLW Analytics*, 1990.
"Developing Information for DSM Screening and Impact Assessment," *RLW Analytics*, 1989.
"A New Approach for Stratified Sampling in Inventory Cost Estimation," (with J. Godfrey and A. Roshwalb), *Auditing: A Journal of Practice and Theory*, 1987.
"Application of Model-Based Sample Design for the Sierra Pacific End-Use Metering Project," in *Commercial End-Use Metering Workshop*, Electric Power Research Institute, Palo Alto, EM 4393, 1986.
"A Note on Model-Based Stratification - Reply," *Journal of Business and Economic Statistics*, July 1985, 286-288.
"The Use of Multiple Information for Sample Design in Inventories," (with A. Roshwalb), *Proceedings of the American Statistical Association*, Business and Economic statistics
Section, 1985.

Sample Designs for Load Research: The Bootstrap Comparison Procedure, (with P. M. McCarthy), The Electric Power Research Institute, Palo Alto, EA 4232, 1985.
"Statistical Sampling in Load Research," (with C. D. Puckett), *Trends in Electric Utility Research*, C. W. Ballard and P. J. Womeldorft, eds., New York: Pergaman Press, 1984, 225-234.
"Model-Based Statistical Sampling: The 1816-3 Test of Its Effectiveness," *Midwest Regional AEIC Load Research Conference*, Chicago, 1984.
"Model-Based Statistical Sampling for Monthly Demands," *Report of the Load Research Committee, 1982--83*, Association of Edison Illuminating Companies, L 239 - L 268. 1984. (Also published in the EPRI Load Research Symposium Series, EA 3389, 1984).
"Cosmetic Form of Estimators in Survey Sampling," (with C. E. Sarndal), *Scandinavian Journal of Statistics*, 11, 1984.
"Model-Based Stratification in Inventory Cost Estimation," (with J. Godfrey and A. Roshwalb), *Journal of Business and Economic Statistics*, January, 1984.
"Finite Population Sampling with Multivariate Auxiliary Information," *Journal of the American Statistical Association*, December, 1983.
"A New Approach to Inventory Cost Estimation," (with J. Godfrey and A. Roshwalb), *Proceedings of the Business and Economic Statistics Section*, American Statistical Association, Washington, 1983.
Model-Based Statistical Sampling for Electric Utility Load Research, Palo Alto: The Electric Power Research Institute, EA 3286, 1983.
"Sample Design for Load Research Using MBSS™," *EPRI Load Research Symposium*," Chicago, 1983.
"Measuring the Precision of Statistical Cost Allocations," *Journal of Business and Economic Statistics*, Vol. 1, No. 2 (April, 1983), pp. 93-100.
"Robust Estimation in Survey Sampling Using Multivariate Auxiliary Information", (with C. E. Sarndal), *Proceedings of the Business and Economic Statistics Section*, American Statistical Association, Washington, 1982.

"Electric Utility Load Research Using Model-Based Statistical Sampling," *Proceedings of the 1981 DOE Statistical Symposium*, J. Van Ryzin and D. Barietta, eds. Long Island, NY:
Brookhaven National Laboratory, 1982, 47-64.
"Better Management Data through Model-Based Statistical Sampling," *Midwest AIDS Proceedings*, Detroit, 1981.
"Sample Design with Multivariate Auxiliary Information," *Proceedings of the American Statistical Association*, Business and Economics Section, Detroit, 1981.
"Efficient Inference in Random Coefficient Models with Multicollinearity in the Time Series Regressions" (with R. K.Rayner), *Proceedings of the American Statistical Association*, Business and Economics Section, Houston, 1980.
"Robust Sample Designs Using Several Auxiliary Variables," *Proceedings of the American Statistical Association*, Business and Economics Section, Houston, 1980.
"Price Effects of Stock Repurchasing: A Random Coefficient Regression Approach" (with Terry Dielman and Timothy J. Nantell), *Journal of Financial and Quantitative Analysis*, 1980, 50, pp. 175-89.
"Profit-Oriented and Decision Time Segmentation" (with Claude R. Martin, Jr.), *Journal of the Academy of Marketing Science*, Spring, 1977.
"Optimal Antithetic Sampling Plans" (with William L. Roach), *Journal of Statistical Computation and Simulation*, 5, 1977, pp. 99-114.

"Sims II: Profit Oriented Market Segmentation for Decision-Time Implementation," *Journal of the Market Research Society*, 18, 3, 1976, pp. 143-57.
"Interface between Data Management Software and Statistical Software" (with Alan G. Merten), *Proceedings of the Computer Science and Statistics Ninth Annual Symposium on the Interface*, Harvard University, 1976.
"Profit-Oriented Data Analysis for Market Segmentation: An Alternative to AID" (with Claude R. Martin, Jr.), *Journal of Marketing Research*, 11 (August, 1974), pp. 237-42.

ED SMYTH, Senior Consultant/Project Manager

Education.
College of St. Rose, 1996, MBA, 3.9 GPA – graduate portfolio in utility industry economic, financial, and strategic analyses
College of St. Rose, 1984, BA, Public Communications

Affiliations.
Association of Energy Engineer (AEE)
Association of Energy Service Professionals (AESP)
New York State Business Council, Energy Committee, 1999-2000
Guilderland Chamber of Commerce, Chairman of the Board, 1998 – 2000
Literacy Volunteers of Rensselaer County, President of the Board, 2004

Certifications.
Certified Energy Manager, AEE, 2001 – present
Certified Energy Procurement Professional, AEE, 2003 - present

Employment.
RLW Analytics, Inc., Senior Consultant/Manager, 2000 – present.
LaCorte Companies, Energy Consultant, 1998 - 2000
AllEnergy Marketing Company, Account Representative, 1997 - 1998
Pyramid Corporation, Marketing department management, 1990 - 1995.

Experience.
Mr. Smyth's internal responsibilities at *RLW Analytics, Inc.* encompass managing and conducting consulting and business tasks for the Connecticut and Troy, NY offices. In his consulting work at *RLW*, Mr. Smyth has focused on commercial and residential marketing and DSM programs, market research, and assessment projects. As of late, Mr. Smyth has focused on market research and transformation in the residential and commercial markets, and professional support of market transformation programs for NYSERDA.

For residential marketing and DSM programs, his projects have included impact and process evaluations employing on-site audits, customer surveys, and survey analysis. Specific projects comprise conducting REM Rate data collection for Energy Star homes, managing a on-site residential assessment study for the Midwest Energy Efficiency Alliance, and technical support for the NYSERDA Residential Energy Star Products and Appliances Marketing Program. Mr. Smyth has also recently supported a process evaluation of the low income energy assistance program for the New Hampshire utilities.

On the commercial side, he has been involved in process evaluation studies for lighting, HVAC, comprehensive retrofit, and new construction programs. These projects have required project management, sample design and survey development, manipulation of survey data, statistical integration of various data sources, and comprehensive reporting.

In addition to his work in program design and evaluation, Mr. Smyth has implemented market research projects involving planning and analysis for primary and secondary market research studies. Mr. Smyth has designed and managed a number of telephone survey and personal interview projects in support of customer and program research. The emphasis has been on careful survey design and intensive quality control to ensure comprehensive and quality results. His strengths have been in assisting utilities and agencies in making fullest use of existing information to better understand their customers and continue development of customer services and products.

Mr. Smyth also conducts business development work for RLW Analytics, which incorporates client relations, competitive research, and research and networking for identifying new business opportunities.

In summary, Mr. Smyth's consulting projects at RLW encompass market research, load research and program performance measurement evaluation for all customer market segments. A description of his work in each of these areas are:

Market Research and Assessment: Data collection and analysis to provide **marketing strategy** recommendations for energy service providers. **Market segmentation and characterization** to support marketing program design. **Baseline and market potential studies** for market transformation. Technical support of **marketing plans** to guide market research and promotion.

2004:
- Vermont DPS, C&I baseline evaluation and update
- New England ISO, Program and Process evaluation
- New Hampshire utilities, impact evaluation of Small Business Solutions program
- Southern California Gas, community programs evaluation
- Southern California Edison, Smart Thermostat evaluation

2003:
- NYSERDA, Macroeconomics Impact Study (Neenan Associates, prime contractor)
- New England ISO, Program and Process Evaluation
- Southern California Gas, community programs evaluation
- New Hampshire utilities, Process Evaluation of the Low Income Energy Assistance Program
- NYSERDA, Small Business Audit Program

2002:
- NYSERDA, Residential Energy Star Appliances and Products Marketing Program
- Midwest Energy Efficiency Alliance, Illinois Residential Assessment
- Oncor, Energy Star Windows Baseline Study
- Massachusetts HVAC Market Study

2001:
- Massachusetts Energy Star Appliances Marketing Study
- MA-DOER, Remaining Technical and Economic Potentials

Energy Conservation Projects. Comprehensive **impact, process and market evaluations** of the full range of program offerings, including audits, comprehensive measure installations, technology studies, and new construction design assistance; **Engineering design and installation of lighting projects; analysis of electrical and natural gas loads. Implementation of energy cost reduction programs.**

- NYSERDA Small Business Energy Audit Program – Marketing, outreach, and evaluation, 2002-present
- New Jersey Utilities Working Group, C&I Program Evaluation, 2002-3
- CL&P, Energy Star Homes Baseline Study, 2002
- Northeast Utilities, Energy Star Homes Impact Study, 2002
- Chicago Energy Cooperative, Program Evaluation, 2001
- NYSERDA, schools benchmarking and efficiency program, 2000-1.
- Charter One, Key Bank, Troy Savings Bank, Cohoes Savings Bank – Outdoor ATM lighting assessment, upgrade design, installation project management, 1998 - 2001
- K-Mart, Key Bank, Trammel Crow, Picotte Companies – Energy efficient lighting assessment, savings analysis, design, and upgrade project management, 1998 – 2001
- Albany-Colonie Regional Chamber of Commerce – natural gas member benefits program, 1999 - present
- Fuji Processing – electrical load and rate analysis, 1999
- Natural gas load analyses for customer contracts, AllEnergy, 1997-8

Matthew P. Brost, Western Regional Manager

Education.
Sonoma State University, Spring 1996, BA, Environmental Studies and Planning
Sonoma State University, Spring 1996, CA Certificate in Energy Management and Design
Certified Energy Manager (CEM), Summer 2000
Affiliations
Associate Member, Golden Gate Chapter ASHRAE
Association of Energy Engineers (AEE)
Illuminating Engineering Society of North America (IESNA)
Employment
RLW Analytics, Inc., 1995-present
Gabel Dodd and Associates, 1994
Current Responsibilities
Mr. Brost is currently a consultant and staff manager at *RLW's* Sonoma, California office. His responsibilities include project and office management, proposal and report writing, survey instrument design, on-site audits/surveys, end-use metering and building simulation techniques. Continuing a long history of RLW work and expertise in the Non-residential new construction sector, Mr. Brost is managing the Statewide Building Efficiency Assessment (BEA) study. The BEA study is a impact and process evaluation of the IOU Non-residential New Construction program Savings By Design. In another project, Mr. Brost is the project manager for the 2002 and 2003 Energy Star New Homes Program. At the same time, Mr. Brost is also managing a portfolio evaluation for SCG and SDG&E, which includes EM&V of five local programs, including the 2003 Hard to Reach Lighting Turn in Program.
Mr. Brost is also acting Project Manager on an exciting new area of business for RLW. Doing business as (DBA) the Small Business Energy Alliance, RLW is implementing a local energy efficiency program serving small-underserved businesses in counties local to RLW. The program provides customers with incentives for lighting and HVAC measures, along with free energy audits. Mr. Brost is managing day-to-day activities as this program is implemented.
Outside of client work, Mr. Brost is the manager of RLW Analytics west coast office, where he manages 17 employees. Mr. Brost recently became a principle in the company, where he now enjoys minority ownership. In this role Mr. Brost is responsible for all aspects of company business, including staffing, financial reporting, and business development to name only a few.
Relevant Experience
In addition to day to day project management, Mr. Brost also has extensive project experience in the following areas:

- On-site energy audits and analysis of industrial and commercial facilities,
- building simulation and analysis using DOE2 and its variants,
- installation and analysis of power monitoring equipment,
- survey instrument design,
- Database design and analysis,
- gross and net analysis
- report writing

Mr. Brost has extensive knowledge of California's Building Energy Standards for both residential and non-residential applications and is experienced in the application of California's Title-24 software tools. Mr. Brost has also worked internally with RLW programming staff in the development of RLW's software tools. Compare-IT, Visualize-IT and Shape-It are three such tools Mr. Brost has been involved with. Mr. Brost's knowledge of DOE2 building descriptive language and macros helped to incorporate DOE2 functionality into RLW software packages.
Papers & Presentations
"Calibration of DOE2 Models Using Data Visualization Techniques" 1997 ASHRAE Winter Meeting. McCray, Bailey, Brost
"Program Evaluation Using Calibrated Engineering Models" 1999 LBNL, USAID. Brost, Okura, Koperwhats

"The California Lighting and Appliance Saturation Study" 2001 International Energy Program Evaluation Conference Proceedings
"Measuring the Accomplishments of Non-residential New Construction in California" Proceedings from the 2002 American Council for an Energy Efficiency Economy Summer Study in Buildings.
"A Comprehensive Approach to Program Information and Evaluation – Nonresidential New Construction" Proceedings from the 2001 International Energy Program Evaluation Conference, Salt Lake City, UT. Session 1A From the Leading Edge: New Evaluation Designs Addressing Tough Questions. (with Douglas Mahone and Catherine Chappell, Heschong Mahone Group and Marian Brown, Southern California Edison Co.)
"Does It Keep The Drinks Cold and Reduce Peak Demand? – An Evaluation of a Vending Machine Control Program" (with C. Chappell) Proceedings from the 2002 American Council for an Energy Efficiency Economy Summer Study in Buildings.
"The California Statewide Outdoor Lighting Baseline Assessment" (with R. Peet, C. Higgins) Proceedings from the 2002 American Council for an Energy Efficiency Economy Summer Study in Buildings.
"Contrasting Approaches to Estimating Program Net Savings in Non-Residential New Construction" Proceedings from the 2003 International Energy Program Evaluation Conference, Seattle, WA. (co-authors Douglas Mahone and Catherine Chappell, Heschong Mahone Group, Pete Jacobs, AEC and Roger Wright, RLW)

GLENN HAYNES, Senior Engineering Consultant

Education.
Mississippi State University (MSU), 1968, B. S. in Nuclear Engineering.
MSU, Coursework for M.S. in Nuclear Engineering, Minor in Computer Science, 1978.
MSU, Coursework for Ph.D. in Mechanical Engineering, Minor in Computer Science, 1978-1979.

Accreditation.

EIT License, 1977. Registered Professional Engineer, Texas, 1990-1993.

Affiliations.

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE): member and past chapter treasurer.

Association of Energy Engineers (AEE): member and past chapter treasurer.

Employment.
RLW Analytics, Inc. 1999- present. Senior Engineer. Project Management, Modeling, Engineering Analysis
Florida Power Corporation (FPC), 1992-1999. DSM Project Engineer.
City of Austin, 1987-1992. DSM Program Evaluation Engineer.
Bovay Engineers, Inc., 1980-1987. Mechanical Department Manager, Mechanical Design Engineer.
Mississippi State University, 1977-1980. Graduate Research Assistant.
F.H. Hofheins and Associates, 1974- 1977. HVAC Design Engineer.
Oak Ridge National Laboratory, 1972-1974. Nuclear Shielding Analyst.
USAF, 1968-1972. Reached rank of temporary Captain.

Mr. Haynes is Senior Engineer and technical lead for a team of engineers and technical staff members responsible for data collection, building analysis and simulation, metering, monitoring, and load shape development projects

Work Experience Highlights
RLW Analytics:

- Lead engineer for a MA market baseline study on unitary HVAC sales by size and efficiency category
- Conducted a demand and energy impact analysis for two interior lighting programs for Northeast Utilities
- Performed a market coordination study for a residential utility DSM program
- Designed a spreadsheet energy auditing tool specifically for school buildings throughout New York State
- Performed an energy code and literature review to determine potential impacts of the current and new (effective January 1, 2000) Massachusetts building code.
- Performed an hourly demand and energy impact evaluation of the C/I Better Business Program for FPC using tracking and hourly end-use data with calibrated DOE2 modeling of twenty prototypical buildings.

Florida Power Corporation:

- Evaluated residential end-use data and integration of end-use load shapes into DOE2 models to estimate the demand and energy impacts of the company's residential conservation programs
- Designed and managed a 350 site residential walk-through audit program to create and calibrate (monthly) six average building DOE2 computer models representing all FPC residential customer types
- Created a 20-building library of monthly calibrated commercial buildings; applied models to estimate the demand and energy impacts of the company's commercial conservation programs.
- Designed, implemented and managed a 50-site commercial end-use metering project to measure hourly commercial end-use load shapes for the hourly recalibration of the 20 DOE2 models; provided

training to two new assistant engineers; designed the sampling plan, recruited customers, purchased and installed field equipment, designed monitoring plans, maintained equipment, collected, analyzed and corrected 15-minute interval end-use data, and recruited and managed engineering consultants
- Selected/installed all sensors for monitoring of a residential solar demonstration project (SUNWORKS) at the University of Florida
- Designed and installed sensors, then collected and evaluated data for an evaporative condenser retrofit of a 25-ton commercial rooftop air conditioning unit in a feasibility study of a conservation technology.
- Performed the field data collection and analyses of a residential gas heat pump demonstration project to determine its applicability to FPC's portfolio of DSM program measures. This included the creation and hourly calibration of a detailed DOE2 model of the monitored site, including hourly electric and natural gas consumption for whole premise and all major end-uses and indoor temperatures
- Performed field data collection and analyses of a commercial gas regenerated desiccant system to estimate electric energy, demand,and total cost savings against a standard electric reheat system for indoor humidity control; created an hourly spreadsheet model to replace an inadequate representation in DOE2

City of Austin:
- Designed and performed impact evaluations of residential energy conservation programs using computer models calibrated to averaged billing data, interfaced with statistical analyses and benefit/cost analyses
- Performed impact evaluations of existing and new construction commercial programs using billing data and computer modeling techniques with BETA (Building Energy Thermal Analysis) and DOE2
- Designed and implemented a two-year residential end-use metering project in cooperation with W.S. Fleming and Associates (now a division of SAIC). Responsibilities included project management, data-logger and sensor purchase, participant recruitment, assisted field equipment installation and maintenance, and data collection
- Member of a design team for a city-wide residential end-use metering project to provide on-going data for demand side management programs design and evaluation
- Designed an auditing program to collect field data on prototypical commercial buildings for the creation of calibrated DOE2 models for future commercial energy program impact evaluations
- Worked with staff econometrician to combine statistical (SAS) analyses of pre- and post-retrofit billing data calibrated computer models for the evaluation of the Low Income Weatherization Program; made it possible to estimate the relative energy savings versus increased comfort levels (a form of "take-back") for the participants
- Provided training to two other staff engineers in residential DSM program evaluation techniques and application of BETA and DOE2 to create and calibrate building models
- Responsible for the drafting of the City's annual Performance Measures Report summarizing the costs and savings of all DSM programs, with historical, current and future scenarios; coordinated Energy Services and Fiscal staff to determine participation, costs and savings of all the City's energy conservation programs

Bovay Engineers, Inc:
- Designed and specified HVAC systems for residential, commercial and industrial projects
- Designed and specified fire protection systems for commercial and industrial projects
- Computerized analyses of life-cycle-costs and energy optimization for HVAC systems for commercial buildings.

Mississippi State University:
- Created computer-aided design of heat exchangers and other components for DOE research project. Instrumentation application, calibration and design for engineering research.

Oak Ridge National Laboratory. Computer programming for nuclear cross-section data file management and manipulation. Computer-aided analysis of nuclear radiation shields

Computer Skills

Proficient and articulate in FORTRAN, LOTUS123, DBASE3, EXCEL, MS WORD, WINDOWS, DISPLAY WRITE 3, WORD PERFECT, DOE2.1 E, BETA, SPF386, VAX VMS, and others. Skilled in relational database management using ORACLE techniques. Served on ORACLE data base design team for residential DSM programs. Able to use PROSCREEN II for cost-effectiveness analysis of DSM programs.

MDI Resumes

Joseph M. O'Malley, President - MDI

Mr. O'Malley has 13 years of experience with residential, commercial, and industrial projects that involve end-use metering. Mr. O'Malley's relevant expertise includes project management, before-and-after retrofit studies, monitoring of complex commercial, industrial and residential sites as well as specialized equipment for DSM evaluation projects and case studies. His responsibilities have included design of on-site monitoring setups, survey of sites, installation of monitoring equipment, training and supervision of personnel. He received his technical degree from the DeVry School of Technology in Chicago, IL.

Karl Immenhausen, Operations - MDI

With over 25 years in service related businesses Mr. Immenhausen has both field experiences in installation and repair as well as a strong background in operations, project management, administration and technology. Mr. Immenhausen has held senior positions in both large corporate and small entrepreneurial environments. Mr. Immenhausen brings the Six Sigma quality rigors to MDI to help drive execution and continuous process improvement. Mr. Immenhausen has developed a number of partner Integration process's to insure MDI maintains its high level of quality performance. Mr. Immenhausen earned his MBA from Loyola University.

Tom Kilvinger Lead Project Manger-MDI

Mr. Kilvinger has over 4 years experience in electromechanical applications and custom fabrications. He has been involved with project management and energy audits for major Sprint facilities in the U.S., working in close propinquity with Automated Energies to evaluate and assess energy usage and work towards superior energy management. In addition, Mr. Kilvinger has been actively working with ComEd and the Key Alert program; and most recently been involved with testing and simulating full curtailments of supplied power in the interest of energy conservation. He has preformed site installs, developed monitoring procedures, troubleshooting and resolution. Mr. Kilvinger received a Bachelor of Science in Mechanical Engineering from Northern Illinois University in Dekalb, IL. Mr. Kilvinger is a licensed engineer in the State of Illinois.

Ryan Moss, Senior Field Engineer - MDI

Mr. Moss' assignments have entailed troubleshooting and repair of AMR systems, installation and maintenance of Enetics brand NIALMS recorders, and installation of Scientific Atlanta brand residential and commercial Direct Load control switches including the *SuperStat.* Mr. Moss has developed several of our installation procedures, as well as our employee-training manual. Mr. Moss is involved with the troubleshooting and repair of Siemens and Allen Bradley brand energy monitoring systems and some custom fabrication. Mr. Moss has most recently been involved with Power quality equipment installation and Ethernet connected data recording systems. Mr. Moss has grown to be our communication expert, proficient in the use of short and long haul modems, fiber optic and radio systems as well as Ethernet data converters. Mr. Moss graduated with an Associate of Applied Science in Electric Engineering Technology from ITT.

Gary Dexheimer, Senior Field Engineer - MDI

Mr. Dexheimer has extensive experience with end-use monitoring hardware used at commercial, residential and industrial customer sites. Mr. Dexheimer has conducted both commercial and residential

on-site audits. More specifically, Mr. Dexheimer has experience in industrial applications where he has metered lighting, water flows, temperatures, compressed air, HVAC, and industrial process loads for a variety of facilities including a printing plant, a steel foundry, and various manufacturing facilities. Mr. Dexheimer's duties have included, coordinating the work of outside contractors, scheduling customer appointments, and performing equipment repair and calibration. Mr. Dexheimer received his technical training in the United States Navy.

Roy LeSage, Senior Field Coordinator-MDI
Mr. LeSage has 8 years of experience with residential, commercial, and industrial projects that involve end-use metering. Mr. LeSage has extensive experience in the supervision of Field Operations for over 1500 EUM installations and 400 on-site audits including commercial, industrial, and residential customers. Mr. LeSage has extensive experience with telemetry for EUM sites. Mr. LeSage has performed meter inspections as well as the installation of metering and monitoring equipment for residential, commercial and industrial sites. Mr. LeSage's duties have included coordinating meter shop personnel with outside contractors, scheduling customer appointments, and the repair and calibration of equipment. Prior experience includes installing, verifying and troubleshooting the operation of analog and digital data collection equipment. Mr. LeSage received an A.A.S. in Electrical Engineering Technology from Michigan Technological University in Houghton, Michigan.

Colin Chapman, Field Engineer
Mr. Chapman has over 4 years experience in service and support of electronic devices including instrumentation, and metering, Electro-mechanical equipment and Alarm systems. Mr. Chapman has experience in the "trades" which has proved very beneficial in the field. Since joining MDI Mr. Chapman lends his experience in the installation and programming of energy monitoring systems including, Siemens Brand PLC's, UPS's and Power Quality Equipment. Mr. Chapman knowledge base includes, monitoring equipment, installation procedures, mechanical systems and carpentry.

MidAmerican Energy Company
EEP-03-1 - Electric
Excerpts for Year to Date - March 2004 Report

Iowa Plan 2004

Program Name	Expenditures	%	kWh Savings	kW Load Reduction	Cost per kW Reduction	
Residential Equipment	$ 1,644,000	8%	4,743,194	5,348	$ 307	*
Commercial New Construction	$ 3,459,000	16%	21,132,981	3,744	$ 924	*
Nonresidential Equipment	$ 1,166,000	5%	17,109,127	2,463	$ 473	*
Residential New Construction	$ 1,257,000	6%	4,462,288	4,467	$ 281	*
Residential Audit	$ 730,000	3%	2,613,285	1,122	$ 651	*
Small Commercial Energy Audit	$ 315,000	1%	1,175,312	635	$ 496	*
Nonresidential Energy Audit	$ 569,000	3%	-	-		
Nonresidential Custom	$ 342,000	2%	1,632,127	831	$ 412	*
Efficiency Bid	$ 939,000	4%	-	-		
Residential Load Management	$ 2,941,000	14%	864,513	46,927	$ 63	Δ
Nonresidential Load Management	$ 6,685,000	31%	3,407,831	125,177	$ 53	Δ
Trees	$ 200,000	1%	-	-		
Low Income	$ 436,000	2%	229,064	92	$ 4,739	*
Assessments	$ 994,000	5%	-	-		
Total	$ 21,677,000		57,369,722	190,806		

Company Data

	MEC	KCP&L
Iowa Customers	601,059	
MO & KS Customers		490,000
Peak Load		
20-Aug-03	3478 MW	
21-Aug-03		3610 MW

* Annual kWh Savings and kW Load Reductions will occur over the life of the measure.

Δ KWh Savings and kW Load Reduction for Load Management Programs will occur only in the year of the incentive payment.

Data from MidAmerican Energy Company
EEP-03-1 - Electric
Excerpts for Year to Date - March 2004 Report

Program Name	*Program Cost Allocation*	*Cost per kWh Saved*	*Cost per kW Reduction*
Low Income	2%	$ 1.90	$ 4,739
Residential New Construction	6%	$ 0.28	$ 281
Residential Equipment	8%	$ 0.35	$ 307
Residential Audit	3%	$ 0.28	$ 651
Commercial New Construction	16%	$ 0.16	$ 924
Nonresidential Equipment	5%	$ 0.07	$ 473
Nonresidential Custom	2%	$ 0.21	$ 412
Small Commercial Energy Audit	1%	$ 0.27	$ 496
Nonresidential Energy Audit	3%		
Efficiency Bid	4%		
Trees	1%		

Annual kWh Savings and kW Load Reductions will occur over the life of the measure.

Data from MidAmerican Energy Company
EEP-03-1 - Electric
Excerpts for Year to Date - March 2004 Report
Cost of kWh Saving and kW Reductions

Program Name	*Program Cost Allocation*	*Assumed Life in Years of Measure*	*Cost per kWh Saved*	*Cost per kW Reduction*
Low Income	4%	15	$ 0.1269	$ 4,739
Residential New Construction	11%	30	$ 0.0094	$ 281
Residential Equipment	15%	15	$ 0.0231	$ 307
Residential Audit	7%	5	$ 0.0559	$ 651
Commercial New Construction	31%	25	$ 0.0065	$ 924
Nonresidential Equipment	11%	10	$ 0.0068	$ 473
Nonresidential Custom	3%	7	$ 0.0299	$ 412
Small Commercial Energy Audit	3%	5	$ 0.0536	$ 496
Nonresidential Energy Audit	5%		unknown	unknown
Efficiency Bid	8%		unknown	unknown
Trees	2%		unknown	unknown

Energy Efficiency and Demand Response Programs Research

Utilities and other organizations

Utility programs reviewed	Energy Efficiency	Demand Response
Alliant	X	
Ameren	X	X
APS	X	
Austin Energy		X
CILCO		X
Cinergy	X	X
Colorado Springs Utilities		X
ComEd	X	X
Duquesne Light		X
Empire	X	
Entergy	X	
FP	X	X
FP&L	X	X
Georgia Pwr		X
Gulf Power		X
IPALCO	X	X
ISO-New England		X
LG&E		X
MidAmerican Energy	X	X
NY State G&E		X
OG&E	X	X
OPPD	X	
Progress Energy	X	
PG&E	X	X
PSNH	X	
SCE	X	X
SDG&E	X	X
SMUD	X	X
Wisconsin Energy	X	
Xcel		X

Other organizations' programs reviewed	Energy Efficiency	Demand Response
ACEEE	X	
AEG	X	
AESP	X	X
Apogee	X	
Barrett and Associates	X	X
Calmac	X	X
CEC	X	X
Chartwell	X	X
EEI	X	
Energy Trust of Oregon	X	
EPA/Energy Star	X	
EPRI	X	X
E Source	X	X
Focus on Wisconsin	X	
IEA	X	
LEEDs	X	
MDNR	X	
MPSC	X	
NEXUS	X	
Platts	X	X
PLMA		X
RMI	X	
Summit Blue	X	X

Energy Efficiency and Demand Response Programs Research

Programs and end uses investigated

Energy Efficiency

Residential

- Air conditioning rebates
- Heat pump rebates
- HVAC maintenance
- Advanced thermostats
- Energy Star program
- Heat pump water heaters
- PAYS
- Trees
- High performance glazing
- Home energy audits
- High efficiency lighting rebates
- Duct sealing

Commercial

- Customized building systems
- High-efficiency heat pump systems
- High efficiency chillers
- High efficiency lighting
- Packaged rooftop units
- Evaporator fan controls
- HVAC maintenance
- Commercial new construction
- Cool roofs
- Advanced thermostats
- High performance glazing
- Business energy audit
- LED traffic signals
- Outdoor lighting controllers

Industrial

- High efficiency process chiller
- High efficiency process refrigeration
- Premium efficiency motors
- Adjustable speed drives
- Compressed air
- Industrial process optimization
- Process/efficiency/environmental improvements
- Process heat recovery
- Welding equipment
- Furnaces and kilns

Affordability

Residential

- New construction
- Weatherization

Demand response

Residential

- Air Conditioning Cycling
- Critical Peak Pricing
- Time of Use

Commercial & Industrial

- Load Curtailment
- Real Time Pricing
- Voluntary Load Reduction
- Demand Bidding

Reference sources reviewed

- Research papers
- Direct contact with program managers
- Organizations' websites
- Program reports
- Regulatory filings
- Presentations
- Organizations' promotional materials
- RFI responses

Demand Side Management

Customer type	General Catagories	Specific measures
Tier 1 & 2 C/I	Curtailment	curtailment programs
	Direct impacts mfg	high efficiency process chiller
		high efficiency process refrigeration
		premium efficiency motors
		adjustable speed drives
		compressed air
		industrial process optimization
		process heat recovery
		welding equipment
		furnaces and kilns
		process/efficiency/environmental improvements
Tier 1, 2 & 3 Commercial	Direct impact non-mfg	load management
		customized building systems
		high efficiency chillers
		packaged rooftop units (should be considered, see E Source report ER-03-17)
		evaporator fan controls
		high efficiency lighting
		high-efficiency heat pump systems
		advanced thermostats
		HVAC maintenance (dropped, not effective, see E Source report ER-02-07)
		commercial new construction
		cool roofs
		high performance glazing
		Energy Star
Tier 3	Inforamtion	business energy audit
All commercial and industrial	Outdoors	LED traffic signals
		outdoor lighting controllers
Residential		load management
		high efficiency air conditioning and heat pumps
		heat pump water heaters
		advanced thermostats
		HVAC maintenance (dropped, not effective, see E Source report ER-02-07)
		high performance glazing
		duct sealing
		high efficiency lighting
		Energy Star program
	Information	home energy audits
	Low Income	high efficiency heating systems
		weatherization
	Other	trees

Demand Side Management

Customer type	General Catagories	Specific measures
Tier 1 & 2 C/I	Curtailment	curtailment programs
	Direct impacts mfg	high efficiency process chiller
		high efficiency process refrigeration
		premium efficiency motors
		adjustable speed drives
		compressed air
		industrial process optimization
		process heat recovery
		welding equipment
		furnaces and kilns
		process/efficiency/environmental improvements
Tier 1, 2 & 3 Commercial	Direct impact non-mfg	load management
		customized building systems
		high efficiency chillers
		packaged rooftop units (should be considered, see E Source report ER-03-17)
		evaporator fan controls
		high efficiency lighting
		high-efficiency heat pump systems
		advanced thermostats
		HVAC maintenance (dropped, not effective, see E Source report ER-02-07)
		commercial new construction
		cool roofs
		high performance glazing
		Enegy Star
Tier 3	Inforamtion	business energy audit
All commercial and industrial	Outdoors	LED traffic signals
		outdoor lighting controllers
Residential		load management
		high efficiency air conditioning and heat pumps
		heat pump water heaters
		advanced thermostats
		HVAC maintenance (dropped, not effective, see E Source report ER-02-07)
		high performance glazing
		duct sealing
		high efficiency lighting
		Energy Star program
	Information	home energy audits
	Low Income	high efficiency heating systems
		weatherization
	Other	trees

REQUEST FOR QUALIFICATIONS/INFORMATION

FOR AN EVALUATION PARTNER

Kansas City Power & Light (KCP&L) has proposed a portfolio of pilot Demand-Side Management programs for implementation in the states of Missouri and Kansas. A brief description of the programs and the estimated participants for each year for the 3-year pilot is provided as Attachment A.

Each program must be submitted to each state Commission for approval. No program has been approved as yet. The proposed rollout of the programs is provided as Attachment B.

In the state of Missouri, a Customer Program Advisory Group (CPAG) has been established to provide input and guidance into program design, implementation plan and evaluation plan. In addition, for the energy efficiency programs, CPAG will provide guidance on additional pre-implementation evaluation (cost effectiveness). In the state of Kansas, no such advisory group will be established and KCP&L will work with Commission staff and other signatory parties to a Stipulation and Agreement to finalize the program design, implementation plan and evaluation plan for each program.

It is KCP&L's desire to work with one evaluation partner throughout this pilot. The evaluation partner will participate, to the extent timing allows, in detailing the evaluation plan and ensuring the program is properly designed and implemented to allow for evaluation. The evaluation partner will identify all data collection needs and assist KCP&L in ensuring the appropriate data is collected. The evaluation plan will be fairly well but not inflexibly designed so as to allow additional analysis to be completed. KCP&L has a limited evaluation budget. It is anticipated that between $150,000 and $200,000 will be justified for the total evaluation effort.

Each program will be evaluated on its own and not as part of an overall portfolio. Therefore, there will be numerous program evaluations, not one portfolio evaluation. KCP&L has agreed to evaluate each impact program within six months after the program's 2nd full year of implementation. KCP&L has further agreed to run each program as a pilot for 3 years.

The goal of this RFQ/RFI process is to develop a shortlist (3-5) of potential partners who will receive a Request for Proposal (RFP). It is requested that information be provided in the following format to facilitate comparison and analysis. The total response should be no longer than 10 pages total, using Arial or Comic Sans MS 10 pt font with 1-inch margins on top, bottom, right and left margins.

I. Qualifications (See attachment C for format)
   a. Past experience in evaluating demand-side management programs by type of program and type of evaluation.
   b. Names and short bios of key personnel who will oversee and/or perform the evaluations

c. Names and short bios and past experience of any subcontractors with whom you are submitting your qualifications/information.

II. Broad brush proposed evaluation plan for portfolio (See attachment D for format)

a. A broad brush evaluation plan that lists, by program, the type of evaluation you recommend for the program,
b. Why you recommend each type of evaluation, and
c. The range of dollars you estimate the evaluation would cost.
d. If you propose not to perform an evaluation for a specific program, please state why.

III. Questions should be directed to:

Don Russell
Purchasing Department
Kansas City Power & Light
P. O. Box 418679
Kansas City, MO 64141-9679
816-242-6443
don.russell@kcpl.com

IV. Responses can be sent by hard copy or electronically to arrive at KCPL no later than 4:30 pm, October 24, 2006.

Attachment A

Proposed Programs for

Affordability, Energy Efficiency, and Demand Response

Affordability

LOW-INCOME AFFORDABLE NEW HOMES PROGRAM

The Low-Income Affordable New Homes Program will be a partnership between KCP&L and non-profit organizations, including Habitat for Humanity and local government community development organizations, to achieve energy-efficient affordable new housing for the low-income community. Incentives will be available for high efficiency CAC, heat pumps and refrigerators. Financial incentives will be set at the full incremental cost for CAC and heat pumps. A incentive will be available towards the purchase of an ENERGY STAR® rated refrigerator and towards the purchase of ENERGY STAR® rated lighting fixtures.

Anticipated participation:
Year 1 - 20
Year 2 - 40
Year 3 - 40

LOW INCOME WEATHERIZATION AND HIGH EFFICIENCY PROGRAM

Qualifying lower income customers can get help managing their energy use and bills through KCP&L's low income weatherization and high efficiency program. The program will work directly with local CAP agencies that already provide weatherization services to low income customers through the DOE and other state agencies. KCP&L will provide supplemental funds to the CAPs to cover the cost of weatherization measures. This program will be administered by the CAP agencies and follows the protocol under current federal and state guidelines. Participants can be a KCP&L owner-occupied residential customer in a one to four-unit structure and have an income that is up to 185% of the federal poverty guidelines. Renters will also be allowed to participate if the landlord pays 50% of the weatherization cost and agrees not to raise the rent for pre-agreed period of time.

This program helps low income customers reduce their energy costs at no cost to the customer. CAP agencies offer a cost effective implementation capability, which allows most of the funds allocated to this program to go directly to the purchase and installation of energy efficiency measures.

Anticipated participation:
Year 1 - 287
Year 2 - 320
Year 3 - 354

Residential

ONLINE ENERGY INFORMATION AND ANALYSIS PROGRAM

The online energy information and analysis program allows all residential customers with computers to access their billing information and comparisons of their usage on a daily, weekly, monthly or annual basis. This tool will analyze what end uses make up what percent of their usage, and provide information on ways to save energy by end use through a searchable resource center. This tool also allows the user to analyze why their bill may have changed from one month to another. A home comparison also displays a comparison of the customer's home versus an average similar home via an Energy guide label concept.

Anticipated participation:
Year 1 - 4,500
Year 2 - 4,800
Year 3 - 4,900

HOME PERFORMANCE WITH ENERGY STAR® PROGRAM - TRAINING

Home Performance with ENERGY STAR® is a unique program which enhances the traditional existing home energy audit service. This program uses the ENERGY STAR® brand to help encourage and facilitate whole-house energy improvements to existing housing. This program focuses on the private-sector contractors and service professionals who currently work on existing homes - replacing HVAC systems, adding insulation, installing new windows, etc. The Missouri Home Performance with ENERGY STAR® Initiative requires contractors to be accredited under Building Performance Institute (BPI) standards. Technicians must possess appropriate skills and are field-tested to obtain certification, further lending credibility to services offered.

The program strives to provide homeowners with consumer education, value and a whole-house approach. Contractors are trained to provide "one-stop" problem solving that identifies multiple improvements that, as a package, will increase the home's energy efficiency. While the program goal is saving energy, its market-based approach and message focus on addressing a variety of customer needs - comfort, energy savings, durability and health and safety. It also encourages the development of a skilled and available contractor/provider infrastructure that has an economic self-interest in providing and promoting comprehensive, building science-based, retrofit services.
Anticipated participation:
Year 1 - 500
Year 2 - 700
Year 3 - 1,000

CHANGE A LIGHT, CHANGE THE WORLD

Changing the world starts with simple actions. When you replace a light bulb or fixture in your home with one that has earned the U.S. government's ENERGY STAR rating, you contribute to a cleaner environment while saving yourself energy, money and time buying and changing lights in your home. Lighting that has earned the ENERGY STAR® rating prevents greenhouse gas emissions by meeting strict energy efficiency guidelines set by the US Environmental Protection Agency and US Department of Energy. ENERGY STAR®

encourages every American to change out the 5 fixtures they use most at home (or the light bulbs in them) to ENERGY STAR® qualified lighting, to save themselves more than $60 every year in energy costs.

Every fall, ENERGY STAR® partner retailers, manufacturers, utilities, and state organizations come together to make this change even easier. These partners are working to bring more energy-efficient lighting choices to store shelves than ever before. ENERGY STAR® qualified lighting uses two thirds less energy and lasts 6 to 10 times longer than traditional lighting. When you save energy, you not only save money on your utility bills, you also help to protect our environment. KCP&L will contribute funds annually to the state agencies that are working with the EPA and Energy Star to promote this program in the KCP&L service territory. KCP&L expects most of the funds to be used for point of purchase rebates for CFLs.

Anticipated participation:
Year 1 - 15,000
Year 2 - 15,000
Year 3 - 15,000

COOL HOMES PROGRAM

The Cool Homes Program will encourage residential customers to purchase and install energy-efficient central air conditioning and heat pumps by providing financial incentives to offset a portion of the equipment's higher initial cost. The program's long-range goal is to encourage contractors/distributors to use energy efficiency as a marketing tool, thereby stocking and selling more efficient units and moving the entire CAC and heat pump market toward greater energy efficiency. Incentives will be set at approximately 50% of incremental cost. SEER 13.0 and higher efficiency equipment will be rebated in 2005. Since federal standards are set to be increased from 10 SEER to 13 SEER in 2006, KCP&L will modify the 2006 incentives to only rebate SEER levels at 15.0 and above.

One important feature of the program that will begin immediately is to offer training in Manual J calculations and System Charging and Airflow for HVAC contractors. Manual J is the industry standard residential load calculation method. The training offers step-by-step examples of properly sizing equipment and also addresses principles of heat transfer. The training teaches HVAC contractors to accurately perform and document cooling load calculations and reduces over-sizing. The System Charging and Airflow course addresses airflow and charging procedures and standards and includes hands-on training in the use of testing equipment. Once enough contractors have undergone this training, KCP&L may mandate that these calculations take place in order to qualify for the incentive.

Anticipated participation:
Year 1 - 2,000
Year 2 - 3,000
Year 3 - 3,000

ENERGY STAR® HOMES – NEW CONSTRUCTION

This program will require that new homes be constructed to a standard at least 30 percent more energy efficient than the 1993 national Model Energy Code. These savings are based on heating, cooling, and hot water energy use and are typically achieved through a combination of building envelope upgrades, high performance windows, controlled air infiltration, upgraded heating and air, conditioning systems, tight duct systems, and upgraded water-heating equipment.

Homes are qualified as an ENERGY STAR® with use of the Builder Option Packages (BOP). BOPs represent a set of construction specifications for a specific climate zone. BOPs specify performance levels for the thermal envelope, insulation, windows, orientation, HVAC system and water heating efficiency for a specific climate zone that meet the standard. The ENERGY STAR® Homes program will offer technical services and financial incentives to builders while marketing the homes' benefits to buyers. Scaled incentives will be provided to homes that are qualified as ENERGY STAR®.

Anticipated participation:
Year 1 – 500
Year 2 – 1,000
Year 3 – 1,000

Commercial and Industrial

ONLINE ENERGY INFORMATION AND ANALYSIS PROGRAM

The online energy information and analysis program allows all business and non-profit customers with computers to access their billing information and compare their usage on a daily, weekly, monthly or annual basis, analyze what end uses make up what percent of their usage, and access ways to save energy by end use through a searchable resource center. Targeted case studies provide ideas relevant to the customer's industry. This tool also allows the user to analyze why their bill may have changed from one month to another. A business comparison also displays usage benchmarking data versus similar types of businesses.

Anticipated participation:
Year 1 – 600
Year 2 – 600
Year 3 – 600

C&I ENERGY AUDIT

KCP&L will offer rebates to customers to cover 50% of the cost of an energy audit. In order to receive the rebate, the customer must implement at least one of the audit recommendations that qualify for a KCP&L C&I custom rebate. The energy audit rebate will be set at 50% of the audit cost up to $300 for customers with facilities less than 25,000 square feet and up to $500 for customers with facilities over 25,000 square feet. Energy audits must be performed by certified commercial energy auditors. Customers may choose their own auditor or KCP&L can recommend one. Customers with multiple buildings will be eligible for multiple audit rebates.

Anticipated participation:
Year 1 - 200
Year 2 - 200
Year 3 - 200

C&I CUSTOM REBATE - RETROFIT

The C&I Custom Rebate Retrofit program will provide rebates to C&I customers that install, replace or retrofit qualifying electric savings measures including HVAC systems, motors, lighting, pumps, etc. All custom rebates will be individually determined and analyzed to ensure that they pass the Societal Benefit/Cost Test. Any measure that is pre-qualified (evaluated prior to being installed) must produce a Societal Benefit/Cost test result of 1.0 or higher.

Custom rebates are calculated as the lesser of the following:

- A buydown to a two year payback
- 50% of the incremental cost

One customer may submit multiple rebate applications for different measures. Each individual measure will be evaluated on its own merits. Similar measures that are proposed in different facilities or buildings will be evaluated separately. However, no customer, including those with multiple facilities or buildings, may receive more than a maximum amount in incentives for any program year.

As noted in the C&I Energy Audit program description, that program is designed to encourage customers to implement audit recommendations that would qualify for rebates under the C&I Custom Rebate Program.

Anticipated participation:
Year 1 - 200
Year 2 - 300
Year 3 - 300

C&I CUSTOM REBATE - NEW CONSTRUCTION

The C&I Custom Rebate New Construction will provide rebates to C&I customers that install qualifying electric savings measures including HVAC systems, motors, lighting, pumps, etc. All custom rebates will be individually determined and analyzed to ensure that they pass the Societal Benefit/Cost Test. Any measure that is pre-qualified (evaluated prior to being installed) must produce a Societal Benefit/Cost test result of 1.0 or higher.

Custom rebates are calculated as the lesser of the following:

- A buydown to a two year payback
- 50% of the incremental cost

One customer may submit multiple rebate applications for different measures. Each individual measure will be evaluated on its own merits. Similar measures that are proposed in different facilities or buildings will be evaluated separately. However, no customer,

including those with multiple facilities or buildings, may receive more than a maximum amount in incentives for any program year.

Another component of this program is an online new construction guide that will provide information to commercial builders and developers on energy efficiency in new construction. It first allows the builder or developer to identify the type of new construction building that is being planned, i.e. office building, community center, fire station. It then lists a variety of environmental and energy efficiency options and guides the builder or developer in prioritizing investments for the best results. A sample of this software is available for viewing at http://seattle.bnim.com/. KCP&L proposes to build a similar site for the Kansas City metropolitan area but enhance it with features that tie into our rates and will allow developers and builders to plan buildings that can maximize our rates.

Anticipated participation:
Year 1 - 50
Year 2 - 75
Year 3 - 75

BUILDING OPERATOR CERTIFICATION PROGRAM

The Building Operator Certification (BOC) Program is a market transformation effort to train facility operators in efficient building operations and management (O&M), establish recognition of and value for certified operators, support the adoption of resource-efficient O&M as the standard in building operations, and create a self-sustaining entity for administering and marketing the training. This program requires a lot of effort and manpower. KCP&L cannot accomplish the program objectives alone. In year one of this program, KCP&L will work with the Missouri Department of Natural Resources to build a partnership with other Missouri stakeholders (sponsors). Once this has been accomplished, the program will begin to offer customers the Building Operator Training and Certification (BOC) program. The program will use a portion of its sponsor's funds (including the funds provided by KCP&L) to license the BOC curriculum from the Northwest Energy Efficiency Council (NEEC), its developer. Building operators that attend the training course will be expected to pay the cost of the course, less a $100 rebate that will be issued upon successful completion of all course requirements. The program is expected to attract customers with large facilities (over 250,000 sq. ft.) that employ full time building operators.

Anticipated participation:
Year 1 - 100
Year 2 - 100
Year 3 - 100

Demand Response Programs

Residential and Small Commercial

AIR CONDITIONING CYCLING

The Air Conditioning Cycling (ACC) is a program by which KCP&L can reduce residential and small commercial air conditioning load during peak summer days. The company achieves this load reduction by sending a paging signal to a control device attached to the customer's air conditioner. The control device then turns the air conditioner off and on over a period of time depending on the control and load reduction strategy establish by the company.

Anticipated participation:
Year 1 - 4,077
Year 2 - 4,692
Year 3 - 4,064

Commercial and Industrial

THE ALLIANCE, AN ENERGY PARTNERSHIP PROGRAM

The Alliance, an energy partnership program, is a curtailment and distributed generation program designed to be a partnership with commercial and industrial customers. It is comprised of three coordinated programs. These are MPower, Distributed Generation and Commercial Lighting Curtailment. The program provides incentives to customers to reduce their load or add customer generation to the grid to offset the higher costs KCPL would incur without the reduced load or added customer generation.

MPower is a contracted load curtailment program for large commercial and industrial customers that provide a capacity and energy payment to participating customers to curtail their usage during summer months when high electric demand occurs. Customers are eligible for participation in the program by providing a minimum load reduction of 200 kW during KCP&L's high usage/high cost periods. The Missouri Public Service Commission and the Kansas Commerce Commission have approved the program tariff, currently known as Peak Load Curtailment Credit (PLCC). A new tariff will be filed as this two-part incentive program becomes finalized. The customer contract could extend over several years.

Distributed Generation is a program in which KCP&L contracts with a customer that has on-site generation to use their generator when needed. This program captures additional value from the customer's generator and provides support to the utility grid. The customer contract is expected to be over several years.

Commercial Lighting Curtailment is a program in which KCP&L contracts with commercial customers to reduce their lighting load when requested. This is accomplished by permanently installing control devices that either reduce the voltage to the lights or turn off perimeter lighting in office buildings. In either case new equipment will be installed to achieve this load reduction. The load curtailment contract will extend over several years.

Proposed participation is unknown and irrelevant.

Attachment B

When reviewing the anticipated participation by year, it is important to review the following chart that provides anticipated start years. Therefore, a program description with anticipated participation in year 1 may be 2005 in some cases, 2006 in others, and 2007 in yet others. This will affect when the actual impact evaluations may be completed.

	New Prop	
Program	**Roll-out**	
Affordable New Homes	Year 1	2005
Low Income Weatherization	Year 1	2005
Online EE Info/analysis - Res	Year 1	2005
Home Performance - Training	Year 2	2006
Change a Light Change the World	Year 1	2005
Cool Homes Programs	Year 2	2006
Energy Star Homes	*Year 2	*2006
PAYS type program	*Year 2	*2006
Online EE Info/analysis - Com	Year 2	2006
C&I Energy Audits	Year 1	2005
C&I Custom Rebates - Retrofit	Year 1	2005
C&I Custom Rebates - New Const	Year 1	2005
Building Operator Certification	Year 2	2006

*The first year of Energy Star Homes is researching best practices and working with one or two builders to plan the program. The first year of the PAYS type program is also researching other ways to overcome market barriers without becoming a bank.

Please use the following charts to provide the requested information. Insert more rows if needed.

Main Vendor

Program	Type of Evaluation and brief description of evaluation	Year Completed	Client (optional)

Key Personnel of Main Vendor

List key personnel and their past experience (no more than ½ page per person)

Subcontractor (if any)

Program	Type of Evaluation and brief description of evaluation	Year Completed	Client (optional)

Key Personnel of Subcontractor

List key personnel and their past experience (no more than ½ page per person)

Attachment D

Please use the following chart to provide the requested information. Insert more rows if needed.

Program	Type of Evaluation (if any)	Why	Range of Costs

You may list more than one type of evaluation for any particular program.