IPRO 328
Final Report

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Abstract

The Problem:

Private schools and religious institutions lack the convenience of targeting their spending on energy concerns. Many of these facilities are in older buildings that bleed and lack the knowledge to properly address their energy issues. Our plan is to help these institutions save money on their energy bill.

Objectives:

Under the guidance and support of Clean Urban Energy with Vince Cushing, IPRO 328 developed several goals:

- To develop an interactive website and database that:
  - Enables energy professionals to point out changes that schools and churches can make to improve their energy efficiency. This is accomplished by providing the necessary data and calculations for this analysis.
  - Educates users on energy efficiency, especially ideas that are low in cost and effort but offer high rewards.
  - Guides users concerning available and appropriate funding options.
- Study Old St. Mary's church/school complex as a prototype for other church/school complexes.
  - Gives the team a trial location to both investigate the logistics of installing an energy monitoring system, as well as observe how the system could be utilized to reduce the energy consumption of the facilities.
    - 12 monitors were installed in the church and school, which allowed us to monitor the individual energy consumption from the various heating and air conditioning systems, lighting, and gas usage, as well as outdoor temperature.
- Investigate the intracting scheme and evaluate its practicality.
- Research past attempts to save energy and target our findings toward the current project, Old St. Mary's.
- Create a metric that can be used to determine possible candidates for the system that is developed.
- Address and connect with the many stakeholders involved in the project.

Basic Organization and Tasks:

To achieve out goals, IPRO 328 organized into six corresponding sub-teams:

- Precedence
- Marketing
- Website
- Data collection
- Stakeholders
- Architecture

Accomplishments:

- IPRO 328 with collaboration from IPRO 320 created a functional and interactive website that:
  - Incorporates gas and electric usage from recently installed monitors at Old St. Mary's Church and School with helpful graphing capabilities.
  - Contains an extensive list of other local school and churches that can benefit from the program.

    - Displays a concise yet informative collection of tips for energy efficiency improvement.
- IPRO 328 also explored the intracting scheme and found it to be a very viable funding option for schools and churches.
    - Intracting occurs when people invest in a project that improves the school/church's energy efficiency and the money saved gets redistributed to them with interest. Any extra money returns to support the programs of the school/church.
    - In addition to the intracting scheme, research was done regarding other funding options such as grants.
- Taking into account the current state of Old St. Mary's, IPRO 328's architectural sub team created ideal situations for Old St. Mary's composing of detailed plans and drawings.
- Furthermore, IPRO 328 accomplished tasks along the way that weren't foreseen in the beginning of the year.
    - Addressed and connected with the many stakeholders involved in the project.
    - Developed a plan for a future IPRO team that tackles the long-term aspect of the program. This well thought out plan calls for training of the IPRO team members to give energy audits.

Critical barriers and obstacles:

IPRO 328 encountered several barriers and obstacles.

- The most critical obstacle was the unforeseen delay in the installation of the new gas and electric monitors at Old St. Mary's.
- None of the team members had ever designed a website.
- Finding examples of intracting was extremely difficult.
- The team had very little past examples to work with, so we had to develop our own methods for several parts of the project

Conclusion:

Considering that this was a new IPRO, there were many aspects that needed to be determined and continuously reevaluated. The team handled it well and developed comprehensive steps for the continuation of this IPRO in the summer and/or fall semesters at IIT.

Next steps:

- A program to train the IPRO members to conduct energy audits as needed.
- Establishing intracting as a viable funding source.
- The website can be utilized for multiple purposes.

Faculty & Advisors: Vince Cushing and Jim Braband

Team Leader: Saagar Patel (ArchE and CE)

Student Members: Patrick Bauer (AE), Emily Chen (Arch), Shaun Doran (EE), Max Morgenthaler (ArchE), Beth Nielsen (ArchE), Jongpil Park (Arch), Priyanka Patel (Arch), Dennis Radtke (Arch), Phillip Soderling (CPE)

Background

A. The project was initiated by Vincent Cushing of Clean Urban Energy, Inc. The main facility that was addressed in this IPRO was Old St. Mary's Church and School, 1500 S. Michigan Avenue, Chicago, IL 60605. The monitoring equipment that was installed in Old St. Mary's was furnished by McNally Engineers.

Mr. Cushing's company works with large commercial office buildings to reduce their energy use through various methods, including the use of the thermal mass of the structure to shift cooling use away from peak demand periods. Mr. Cushing wanted to help churches and schools in the Bronzeville neighborhood by creating a website that could be used by the organizations to find the resources and consultants that could help to reduce their energy use.

B. This project was meant to address a common problem that is facing many older church and school buildings, primarily those located in poorer neighborhoods on the South and West sides of Chicago. Many of these facilities have older, inefficient HVAC systems, as well as leaky windows, inefficient lighting, and little to no insulation. This forces these already often cash strapped organizations to pay high electrical and fuel bills to run their facilities, which has become even more of a problem in recent years as the prices of natural gas and electricity have increased dramatically. Many of the workers, parents, alumni, parishioners, and supporters of these organizations want to reduce their energy bills, but are unaware of how to address their energy usage, and/or lack the funds to implement solutions to these problems.

C. The energy usage of these buildings can be monitored using equipment that measures the electrical and gas consumption, as well as indoor and outdoor temperatures. This data can be transmitted to a website where it will be presented in such a way that viewers with little or no knowledge of building systems can see how much energy the building is using, and demonstrate the cost savings that can be achieved by implementing energy efficiency programs. The website can also offer more technical information that energy professionals can view and use to make recommendations on how to correct some of the building's energy usage problems. This system is to be designed so that it can be installed in other buildings with similar uses as Old St. Mary's with little adaptation.
Additional information and tips posted on the website will help local schools and churches address easily implementable, low cost solutions that can generate large energy and monitory savings for their facilities without requiring a large upfront investment.
Our team has compiled a map showing older church and school buildings in the Bronzeville neighborhood, and created a survey to ascertain more technical details of these facilities, such as the materials of construction, and type of HVAC systems. This is information that can be utilized by future semesters of this IPRO to determine additional sites to address.
Our team has attempted to research the past attempts at church and school energy efficiency improvement programs. We were not able to find details of similar projects in the Chicago area.
In order to fund this project, we have investigated intracting method, which is a form of peer-to-peer lending that was developed in Germany. This program is detailed in the attached brochure. We have also compiled a list of federal, state, local, and private grants that could be applied to the type of projects we have investigated for this program, and created a document that helps explain the process of applying for a grant.

D. This was the first semester of this IPRO, it will be continuing in the Fall 2009 semester. Vincent provided our team with examples of previous projects he worked on, in

structures similar to Old St. Mary's, in which he was able to drastically reduce the energy use of the facility.

E. One of the ethical issues encountered in the research of solutions to our problem was the acceptance of a program like this by the building engineers. It has been suggested that the engineers might not accept the concept of others examining their building and making suggestion about how it should be run. It was suggested that this might happen at Old St. Mary's, however we found that once the energy monitoring system had been installed in the facility, the maintenance engineer decided that he wanted to learn more about the system, and expand his field of expertise. Mr. Cushing related to our team that the maintenance engineer at Old St. Mary's was now checking the real-time online data daily, and learning how to rectify any abnormalities he notices.

F. Attached is a brochure that details the Intracting funding program.

We also experienced a two month delay in the installation of the energy monitoring system at Old St. Mary's, which delayed our efforts to analyze the data and make recommendations for how they could reduce their energy consumption. Due to the delay in the installation of the monitoring system, we were not able to develop the real-time data monitoring interface for the website as completely as we had hoped. This is another element of the project that can be elaborated on in the next semester.

Objectives

In our IPRO for the spring semester, we set up six objectives. Our first objective was to set up a data monitoring system in selected churches and schools that will record real time energy usage. Our sponsor, Vince Cushing from Clean Urban Energy, had made arrangements with Old St. Mary's, a local church and school near IIT, to provide us with their facility for monitoring. Vince also volunteered to provide and install the monitoring equipment from McNally at his expense.

Our second objective was to design a promotional and functional website. This idea was suggested by Vince, and we had to outsource the website to IPRO 320, since none of our team members had computer engineering knowledge. The design and layout of the website was a collaborative effort between our IPRO and IPRO 320, and the data and content was provided by our IPRO as we gathered our information.

Our third objective was to research funding options for energy efficiency programs, including intracting. This was an important objective because many of our potential candidates had limited resources. By providing potential sources of funding, we hope that the churches and school will feel more comfortable in implementing energy saving solutions in their facilities.

Our fourth objective was research past churches and schools for successes and failures in attempted energy usage improvements. Through this research we hoped to establish a general pattern from the solutions that schools of similar size and resources had tried, and to apply and customize this pattern for churches and schools in the Bronzeville area.

Our fifth objective was to create a metric that can be used to determine potential candidates. We realized that the Bronzeville area was a fairly diverse part of Chicago, and our goal was to identify the churches and schools that really need our help in helping them save money. We started by sending out surveys to prospective churches and schools based on their location in Bronzeville, and received 13% feedback. These surveys helped us to identify the

types of HVAC systems currently used, as well as the fenestration and overall construction. Using this gathered information we were able to fine-tune our metric.

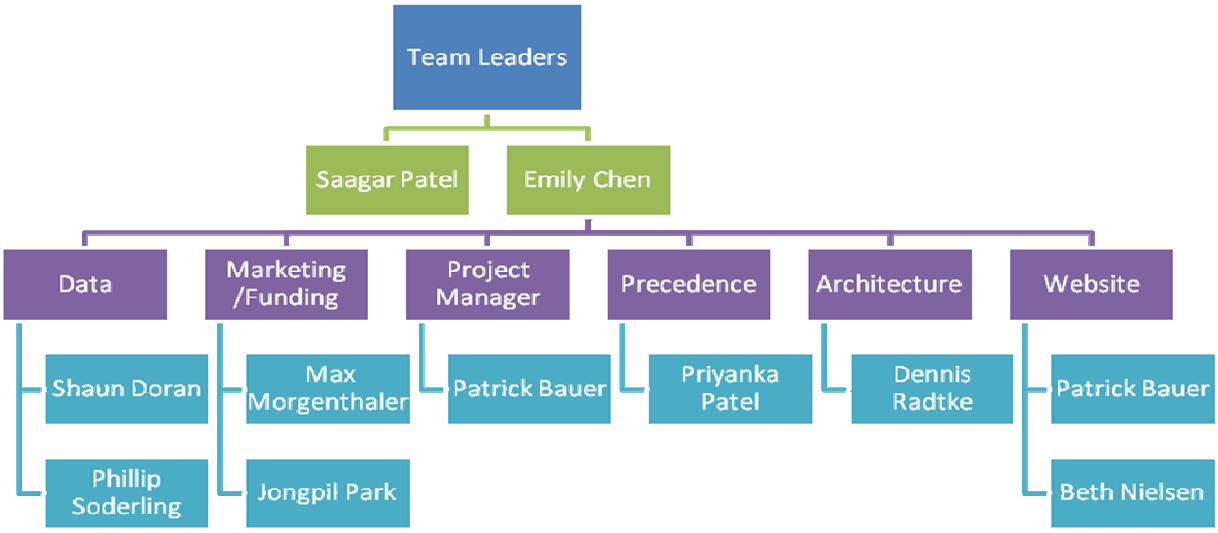
Our sixth objective was to identify low-cost, easily implementable solutions for facilities that can generate energy savings. Realizing that even with our funding options, some churches and schools are more likely to ignore our program if they don't see immediate results first, so we researched numerous applicable solutions that offer "quick-fixes", such as changing the light bulbs or replacing inefficient fenestration. These short term solutions are meant to encourage churches and schools to change their habits and the way they see energy efficiency – not as something out there but right here.

Methodology

The team looked at its Gannt chart after the mid-term report, both to review and check our progress, as well as to add the new tasks that had come up during the semester. The Gannt chart can be found in the attachments for the project. There were several time changes made to the original Gannt chart. The team had expected to be receiving the data from the sensors early in the semester, but since the sensors were not installed until late March, any task involving analyzing the data and distributing it to the team was pushed back to the end of the semester. The website team also added tasks involving the discussion board and the upkeep of the website once the semester was over, since these were not concerns at the start of the website construction. The research of additional funding came from our mid-term report. The team had focused on intracting to this point, and now needed to see what other options could be used besides intracting to fund similar projects. The attachment section has an updated Gannt chart attached as well as a copy of the surveys sent out to various schools to see if there was interest in our project in the Bronzeville area

Team Structure and Assignments

Team Structure and Assignments



Changes to Team Structure

In order to more effectively carry out our objectives, the IPRO 328 added two more sub-teams, Architecture, and Project Manager. The architecture team was involved with the high end energy saving solutions such as replacing windows or over-cladding to make Old St. Mary's more energy efficient. Besides just exploring simple "low hanging fruit" type solutions, we wanted to see what large scale projects could be taken on and so this sub-team was created. The Project manager was involved with the development of the website as well as collaborating with the other sub-teams to determine what information would be shown on the website. Finally, team leaders were established in order to make sure each sub-team was working together collaboratively and that all tasks were completed in a timely manner.

Team Member Contributions

Data Team

- Shaun Doran – Analysis of past Com-Ed data, Scheduled transfer of meter information to FTP site, Research into benchmarking and establishing a baseline of Old St. Mary's energy usage

- Phillip Soderling – Created graphical software for website to view and analyze current meter data, collaborated with IPRO 320 on putting this software on the website

Marketing/ Funding Team

- Max Morgenthaler – Researched funding options for project such as intracting, federal grants, and loans, Created brochure and survey to explain new concept of intracting

- Jongpil Park – Created list of local churches and schools in the Bronzeville area eligible for energy analysis and improvements like at Old St. Mary's

Precedence Team

- Priyanka Patel – Researched past energy efficiency programs as well as churches and schools currently employing energy saving technology, Created a list of simple solutions that can be implemented to reduce energy costs

Architecture Team

- Dennis Radtke – Explored high end energy saving solutions that could make Old St. Mary's more efficient, Created drawings and diagrams showing possible architectural modifications to the church and school

Website Team

- Patrick Bauer – Worked with IPRO 320 to help design the website, collaborated with other sub-teams to retrieve information that would be shown on the website

- Beth Nielsen – Helped design the visual layout of the website, researched other websites related to energy efficiency and green technology

Team Leaders

- Saagar Patel – Worked closely with data and precedence teams, Contacted various energy professionals to gather information on implementing energy savings solutions as well as conducting data analysis

- Emily Chen – Worked closely with website and marketing teams, helped manage development of website as well as research into the various funding options, developed an overview of a training program for next semester so students can perform energy audits

Budget

Budget
List of Expenditures:
2/25/2009 - Purchasing ComEd data for past energy usage of Old St. Mary's – $90.00
4/7/2009 – Lunch Meeting Jimmy Johns - $45.00
4/9/2009 – Lunch Meeting with IPRO 320 Pizza – $60.00
4/29/2009 – Freddies Pizza for Final Presentation Run-Through - $19.00
5/1/2009 – Fresh Fruit for IPRO Day - $45.00
4/30/2009 – Printing Expenses for IPRO Day(Posters, Brochures, Handouts) - $145.00

Code of Ethics

IPRO 328 Code of Ethics

Overarching Principle: To develop an energy monitoring program that aids schools and churches in lowering their energy costs and providing them the necessary training and knowledge to maintain a high level of efficiency.

Law
The team will ensure that any and all interactions within a school or church will be done with highest standard of safety and precaution.

Contracts
Any agreements made with a client will be honored and fulfilled.

Professional Codes
The team will abide by the highest of codes set by state or union.

Industry Standards
All methods of installments or use of materials will be guided by the highest of industry standards.

Community
The rights and privacy of those within the cliental community will never be compromised.

Personal Relationships

The team will show the highest level of respect to each other, as well as the clients.

Personal/Moral Values
The team will not impose or infringe upon the values of one its members or clients.

Results

Website Sub-Team Results:
The website sub team designed a website that can be used by professionals and church members to see how they can save energy. In collaboration with IPRO 320, the website currently has the public section completed with a home page, an interactive google map of churches and schools within a mile radius of IIT, a list of ten simple solutions or "green tips", a page that describes intracting and provides links to funding information, and an "about us" page. The log in for a private section is set up and real-time gas, electric, and temperature data is sent to the site and can be viewed in graphical form. The website team foresees room for additional data to be added to the private section including a discussion board.

Marketing Sub-Team Results:
The marketing team was concerned with two major goals for the project:

1. To create a database of churches and parochial schools in the Bronzeville neighborhood. This database was intended to serve as a reference for energy professionals as well as future IPRO courses to quickly identify candidates for an energy efficiency program.

Surveys were issued to the churches and schools that had been identified asking for more detailed information about their buildings and operations, such as occupancy data, past energy usage, type of building construction and HVAC systems, as well as any of their own future energy efficiency improvement plans.

We have assembled the database of churches and schools into an interactive Google map that can be accessed on the website.

2. To research the current ways that energy efficiency projects like this can be funded, as well as to look into the feasibility of implementing the intracting concept.

Intracting is a way to support an organization without having to give the money away. The money you contribute to the organization is used to pay for an energy efficiency program, such as upgrading light fixtures. The money that the organization saves by reduced energy use is used to pay back the people who offered the money and offer a return using a current market interest rate. The program is set up to allow the organization to same more in energy than it has to pay back to the contributors, so it can use the additional savings for more energy efficiency projects, community development, and other projects. We created a survey to give to parishioners at local churches and schools to ascertain how interested they would be in participating in an intracting program at their organization.

We also have assembled a list of applicable federal, state, local and privately-funded grant programs that would apply to the type of projects that this program is concerned with. Through input from professionals, we have determined how much of the cost of a project we can expect to be able to fund with these various options. Generally, incentive programs from utilities can account for 25-30% of the total cost of an energy efficiency improvement program. Grants

can offer a slightly higher percentage, but one should expect to never receive more than 50% of the needed funds.

We have researched more conventional ways of funding energy programs at facilities, mainly the performance contracting method. We have found while this method may work well for large-scale facilities with many similar buildings, such as a school district, it would be ill suited for smaller churches and complexes, due to the unusual usage patterns of and extremely inefficient design and construction of the buildings. An independent study has found that the medium B/C ratio for performance contracting was lowest for K—12 projects (1.0) and highest for health/hospital (2.3).

Precedence Sub-Team Results:

The precedence team spent the semester researching similar projects to develop the best direction for our project. Toward the end they determined that establishing "low hanging fruits" or energy saving ideas that are low in cost and effort but offer high rewards was the way to go. The result was a list of carefully picked ten simple solutions that are available on the website.

Architectural Sub-Team Results:

Our initial thoughts for the architectural team were to develop floor plan modifications as possible solutions of spatial efficiency that would best utilize energy consumption. After some considerations and studies it was determined that this would not be cost efficient. Focus was then put towards finding other construction methods and simple adjustments to cut down on thermal transference and heat gain. Per our sponsors' request, we also sought to develop options for possible expansion to the existing building. In the end, it was determined that each school and church is unique and that it would be extremely difficult to find universal solutions to their energy problems, so therefore any architectural considerations would have to be tailored on a case by case basis.

Data Sub-Team:

The data team collected data on Old St. Mary's energy usage, both through past data they collected from ComEd as well as from the sensors installed at Old St. Mary's. The team set up an FTP server to collect the data as well as store the data until it could be analyzed. Using this data, the data team then developed a program to analyze the data to find possible times and ways for the church to save money. Once the data team looked at the data, they implemented the green savings the entire team developed and checked the savings these would incur. From this, the data team determined how much money Old St. Mary's would save if they had used these tips for this year. Finally, the data team designed its analysis program to be usable on the website so the energy data for the church could be displayed and viewed by the administration of the church.

Obstacles

For IPRO 328 the greatest obstacle for the team was due to the fact that much of the team's work was contingent on other people that were not a part of the IPRO. This included Vince Cushing, McNally Engineers, and Old St. Mary's Church. The greatest difficulty was arranging times to meet because students' schedules and professional schedules vary so much. The team ensured that these groups were always included on the emails sent out to ensure they were in the loop. Much of the work was done through email exchanges, so it was imperative that there be a point person within the IPRO with these people. The next obstacle was the delay of the

installation of the meters. This was a major setback since it was difficult to create a program to analyze the data if no data was present to be used. Therefore the program was developed using data from the ComEd energy insights program. Once information began to be gathered from the meters, it was combined with the past data, and then a solid program was developed. The final barriers for the IPRO will be to continuing the efforts of getting in touch with Church's in the area and getting them to fill out the surveys. Responses have been sent back to the group, therefore people are interested in the program, but continuously contacting with the churches is necessary.

Recommendations

Being dependent on so many outside sources for information is never a benefit for any organization. The IPRO needs to become self-reliant and be able to collect information about energy usage in the church on their own. The issue is that many students do not possess the knowledge to do said work.

A curriculum/training program has been developed that will provide students with the proper education to be able to do an energy audit and interpret the data properly. It should be arranged as the following:

The goal of the training program is to provide new students with education and experience in order to prepare them for in-field work with Clean Urban Energy in various churches across Chicago.

The first 6 weeks (up to midterm week) will be focused on training students to be familiar with energy efficient procedures, as well as monitoring devices and meters. The second half of the semester will be focused on recording data and energy usage from at least two different schools in the Chicago area.

The structure of the Training Program is as follows:

Week 1, 2, 3	**EDUCATION**: Students will be familiarized with data (graphs, terminology, basic information) as well as energy efficient advice ("green tips").
Week 4, 5	**EQUIPMENT STUDY**: Equipment as required will be provided by IIT's Engineering Dept. and McNally Engineers, Ltd. Students will be familiarized with the functions and capability of the equipment, as well as analyzing the recorded data.
Week 6	**IN FIELD STUDY**: At this point students will have the opportunity to study two buildings on the IIT campus: Keating and Main Building. Students will apply their knowledge and skills learned in the past 5 weeks to prepare for actual studies in churches later on in the semester.

MIDTERM WEEK

Week 8, 9	Students will split into 2 or more teams and pick one church/school per team in the Chicago/Bronzeville area to apply their knowledge and skills.
Week 10, 11, 12, 13	Students are recording data while advising the church on energy efficiency based on what they've observed.

Week 14, 15, 16 Students will be preparing a proposal for the church/school they've picked. Based on their analysis, students will provide a before/after scenario that highlights what the church/school can do to promote a sustainable as well as comfortable environment for their occupants.

Many people are in support at IIT are in support of this IPRO, it is imperative that attempts to engage them with the iPRO. Two main people are:
Leroy Kennedy- VP of Community Outreach
Joseph Clair- Director of sustainability and energy at IIT
Garnering their support will allow you to make contacts with people that will provide additional contacts, information, and create a support group for the success of the IPRO.

References

The team consulted and worked with the following people or organizations and would be useful contacts for continuing this project:

- Vince Cushing of Clean Urban Energy – Email: vcushing@CleanUrbanEnergy.com
- George Malek of ComEd's Care program
- Joe Clair with IIT's Office of Campus Sustainability and Energy
- Leroy Kennedy with the Office of Community Outreach
- Nancy Hamill of IIT
- Elizabeth Cushing of Clean Urban Energy
- Dr. Mary Calihan, Principal of Old St. Mary's
- On-Target/BudgetWorks Energy Monitoring
- McNally Engineering, LTD
- IPRO 320

Resources

The time that each team member put into the project is shown in the following table:

Team Member	Time (hr)
Patrick Bauer	29
Emily Chen	39.5
Shaun Doran	26
Maximillian Morgenthaler	35.5
Beth Nielsen	40.8
Jongpil Park	54.4
Priyanka Patel	15
Saagar Patel	37.3
Dennis Radtke	39.5
Philip Soderling	50.5
Total	367.5

Team Time Table

The money spent on the ComEd data was used to build a computer-analyzing program to analyze the data from the sensors installed at ComEd. The funds spent on food for team meetings were for meetings when the team would have either guests or IPRO 320 in for class time to discuss aspects of the project, such as the impact of the project on the community or discussing the

website. The funds spent on printing materials were tied to creation of the brochures and poster for IPRO day. This allowed the team to display the work done during this semester.

Acknowledgments

Churchgreen would like to thank the following people for their contributions to this project:
Vince Cushing of Clean Urban Energy
Nancy Hamill of IIT
George Malek of ComEd Care
Joseph Clair with IIT Office of Campus Sustainability and Energy
Leroy Kennedy with the Office of Community Outreach
IPRO 320
IPRO Office

Attachments

- Gannt Chart
- Intracting Brochure
- Survey to Prospective Schools
- Old St. Mary's Energy Efficiency Review
- Old St. Mary's Efficiency Program
- Old St. Mary's Proposal
- Key Tips about Grant Writing

About School Green:

Our mission is to develop and implement a self-help, self-sustaining energy program for use in churches and schools.

The problem is that schools and churches are using too much energy to heat and cool their buildings.

Inefficient HVAC systems, poor insulation, incorrect application of schedules, and inefficient fenestration are just some of the factors multiplying the cost of energy bills.

Most schools and churches do not understand where exactly they are losing their money, and lack to hire someone to evaluate their energy consumption.

Another picture

For more information, please visit our website:

[web addesss]

School Green

A New Color For A New World

Intracting

How to make money saving your school and the planet

How can I help my school?

The Problem:

One of the major obstacles in instituting a plan to improve the energy efficiency of a building is obtaining funding to make the improvements.

The payback period for most building upgrades will take at least several years, and many organizations cannot afford to spend such a large amount of money at one time, even with the promise of future savings.

Picture of school building

Picture of classroom

The Solution:

A system that has been developed in Germany to help facilitate energy efficiency improvements is the "intracting" or "internal contracting" model.

Intracting allows one to support an organization, but not have to give the money away.

Instead, the money is invested in a program to improve the building's efficency and the benefactor is offered a 5% return on their investment, to be paid through the energy savings.

The Benefits:

For example, a school starts a program to replace its windows with more energy efficient units. A gruop of parents offers the required funds.

The payback from the energy savings goes towards paying back the interest on the loans, but the school can save more on energy than they need to pay back the loans.

That additional money can then go towards paying for additional improvements in the school, such as classroom supplies, trips, or more energy improvements.

Another picture

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School Green

A New Color For A New World

What is...

Intracting?

Or how to make money saving your school and the world

SCHOOL GREEN

A New Color For A New World

Brief Survey on Intracting

For more information, visit www.schoolgreen.org

Please look over the brochure and give your opinion on the following questions.

Do you feel that this program would work here?

- ☐ Would work well
- ☐ Could possible work
- ☐ Would not work
- ☐ No opinion

Would you be inclined to participate in this program?

- ☐ Very likely
- ☐ Possibly
- ☐ Not likely
- ☐ No opinion

How long of a loan period would you be interested in?

- ☐ 5 years
- ☐ 2 – 4 years
- ☐ 1 year
- ☐ No opinion

What is the minimum interest rate would you like to receive?

- ☐ 5% or greater
- ☐ 2 – 4 %
- ☐ 1 %
- ☐ No opinion

Any additional comments?

SCHOOL GREEN

A New Color For A New World

Brief Survey on Intracting

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Any additional comments?

Energy Efficiency Review

Old St. Mary's Church and School
1500 S. Michigan Avenue
Chicago, Illinois 60605

Review Objectives

1. Analyze the energy use by the church and school in order to identify energy and expense savings opportunities, especially for the HVAC system equipment and operations.
2. Recommend a funding and project management process to carry out the identified opportunities.
3. Establish a standard process for similarly analyzing energy use at other south/west-side churches and schools. This includes designing and deploying a modular/portable energy monitoring system for reuse at multiple churches and schools from year to year.

Data Monitoring Objectives

1. Monitor sub-hourly consumption of significant end uses of electrical and natural gas, including:
    a. kWhs at three electric service panels.
    b. kWhs to each of the nine RTU's and the Church lighting panel.
    c. Therms at the natural gas meter.
    d. kWhs and kW at utility electric meter (online access arranged through ComEd).
2. Establish a graphical presentation of this data on the web for access and review by energy professionals, school administration, parishioners, students, parents, and others who may want to contribute their expertise or funding … at Old St. Mary's, especially important for educating everyone in advance of the design and construction of the new school building.

Significant Energy Uses

Panel in Electrical Room No.1 (All installed in 2002)

Energy Use	Zone	Brkr Amps	Btu (tons)	Model No.
RTU #1	Church	175	800,000 (50)	Trane YCD600A4H
RTU #2	Day Chapel	35	205,000	Trane YCD600A4H
RTU #3	Commons	40	250,000	Trane YCD120B4H
RTU #4	Receptionist	25	130,000	Trane YSC060A4R
RTU #6	2nd Floor Offices	60	205,000 (7.5)	Trane YCD102C4H
XFMER Dimmer	Church/Commons	175		

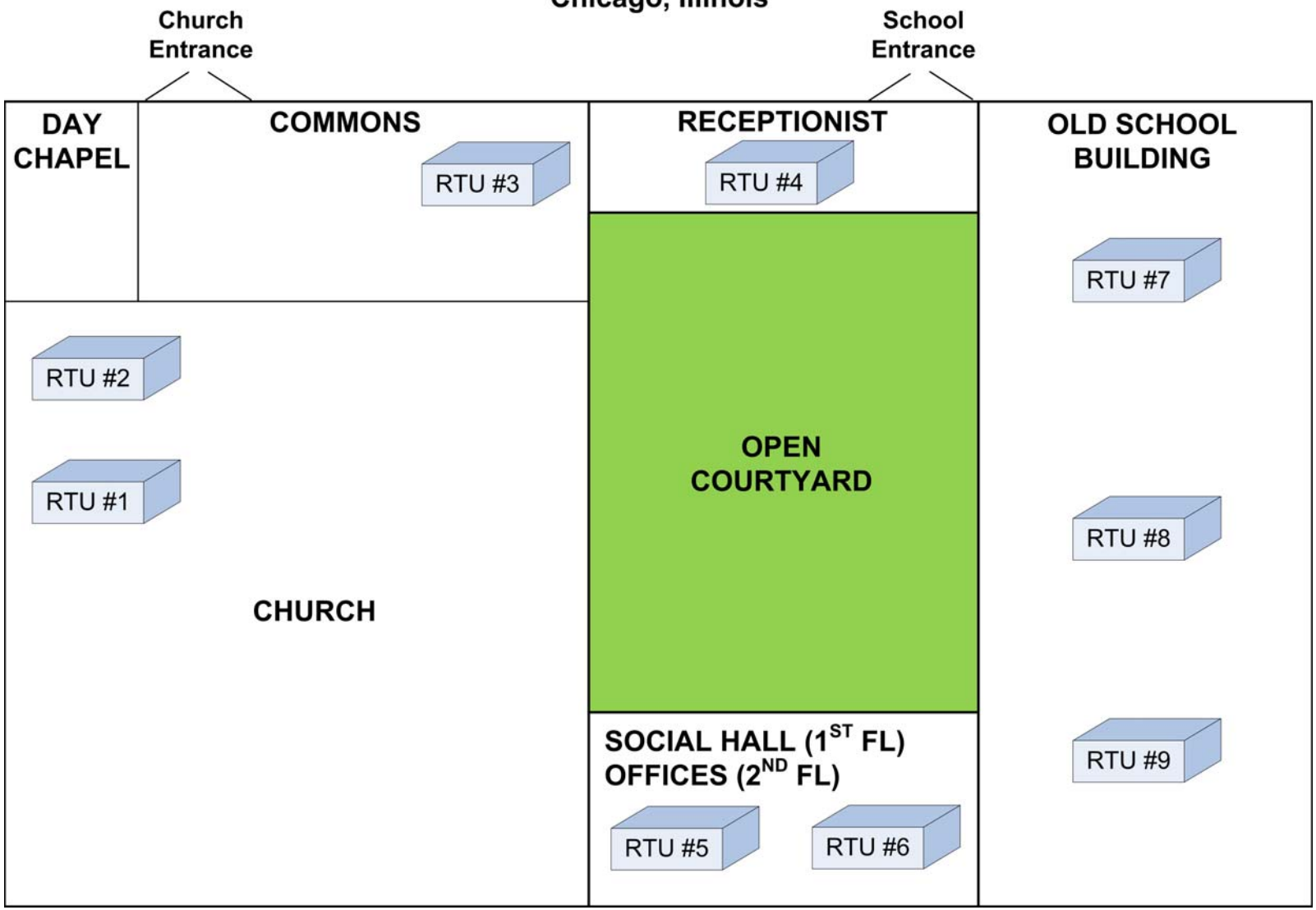
Panel in Electrical Room No. 3 (upstairs in office space)

Energy Use	Zone	Brkr Amps	Btu (tons)	Model No.
RTU #5	Social Hall	125	350,000	TraneYCD210C3H

Panel in Electrical Room No.2

Energy Use	Zone	Brkr Amps	Btu (tons)	Model No.
RTU #7	1st Floor School	70	400,000 (40)	York D2CG240N3202
RTU #8	2nd Fl School	100	245,000 (10)	York D3CG120N2002
RTU #9	2nd Fl School	50	245,000 (10)	York D3CG120N2002

Old St. Mary's Church and School
1500 S. Michigan Ave
Chicago, Illinois



VJC; Updated January 9, 2009

Energy Efficiency Review

Old St. Mary's Church and School
1500 S. Michigan Avenue
Chicago, Illinois 60605

Review Objectives

1. Analyze the energy use by the church and school in order to identify energy and expense savings opportunities, especially for the HVAC system equipment and operations.
2. Recommend a funding and project management process to carry out the identified opportunities.
3. Establish a standard process for similarly analyzing energy use at other south/west-side churches and schools. This includes designing and deploying a modular/portable energy monitoring system for reuse at multiple churches and schools from year to year.

Data Monitoring Objectives

1. Monitor sub-hourly consumption of significant end uses of electrical and natural gas, including:
    a. kWhs at three electric service panels.
    b. kWhs to each of the nine RTU's and the Church lighting panel.
    c. Therms at the natural gas meter.
    d. kWhs and kW at utility electric meter (online access arranged through ComEd).
2. Establish a graphical presentation of this data on the web for access and review by energy professionals, school administration, parishioners, students, parents, and others who may want to contribute their expertise or funding … at Old St. Mary's, especially important for educating everyone in advance of the design and construction of the new school building.

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RTU #6	2nd Floor Offices	60	205,000 (7.5)	Trane YCD102C4H
XFMER Dimmer	Church/Commons	175		

Panel in Electrical Room No. 3 (upstairs in office space)

Energy Use	Zone	Brkr Amps	Btu (tons)	Model No.
RTU #5	Social Hall	125	350,000	TraneYCD210C3H

Panel in Electrical Room No.2

Energy Use	Zone	Brkr Amps	Btu (tons)	Model No.
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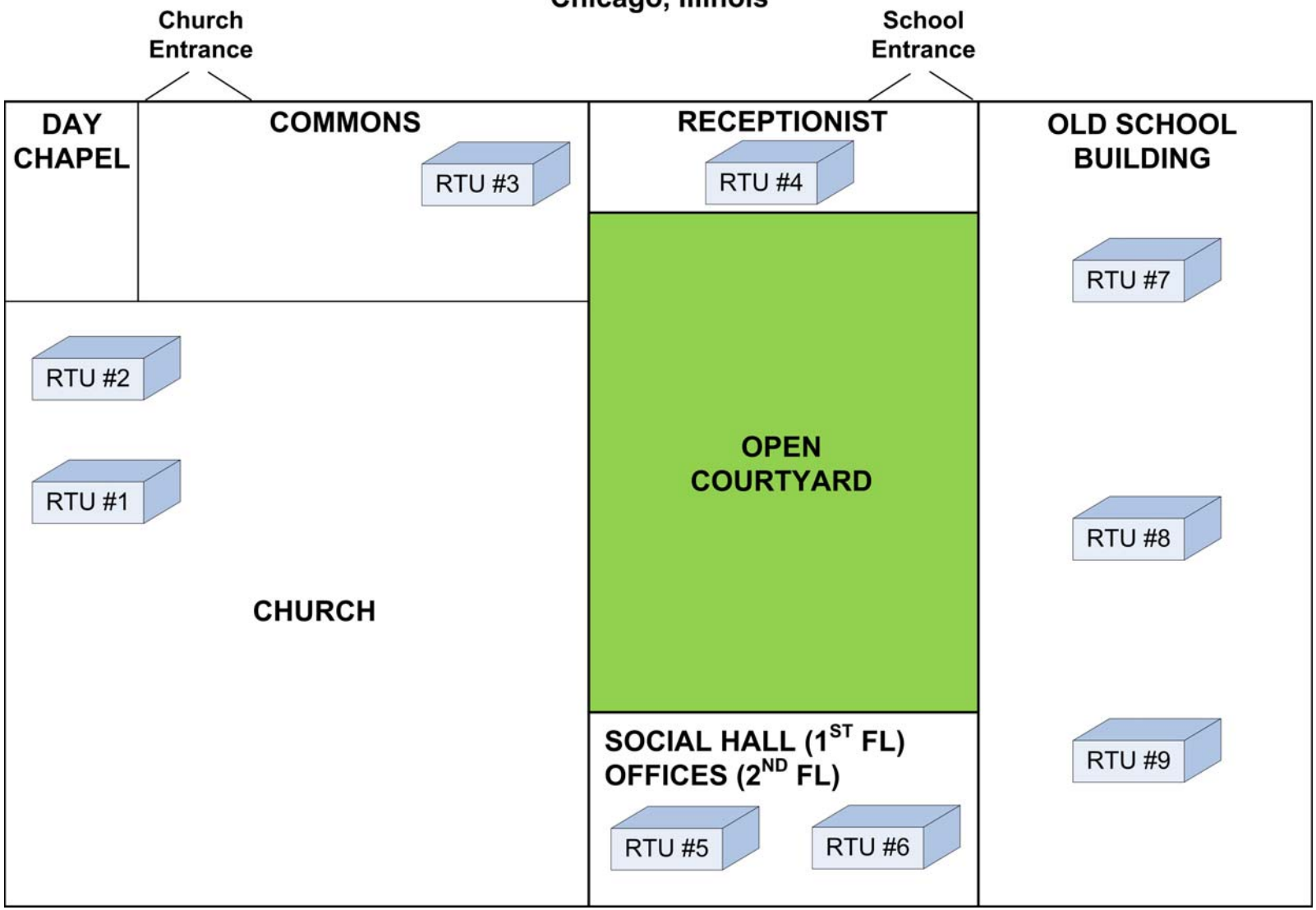
RTU #8	2nd Fl School	100	245,000 (10)	York D3CG120N2002
RTU #9	2nd Fl School	50	245,000 (10)	York D3CG120N2002

Old St. Mary's Church and School
1500 S. Michigan Ave
Chicago, Illinois



VJC; Updated January 9, 2009

Proposal
BUDGETWORKS –
Energy Monitoring System
for
Old St. Mary's Catholic Church
1500 S. Michigan Avenue
Chicago, Illinois
January 3, 2009

The *On-Target/BUDGET*WORKS™ Energy Monitoring System is a utility monitoring system focused on assessing performance. Because of its focus on energy cost, it really is an energy *finance* system. *The System* conducts data updates four times each hour. Outside air temperature is also sensed and displayed with energy use profiles making it easier for managers and operators to stay on top of their operation.

McNally Engineers, Ltd. is pleased to present this proposal for a data collection, monitoring, and information system for Old St. Mary's Catholic Church, church and school complex in Chicago, Illinois.

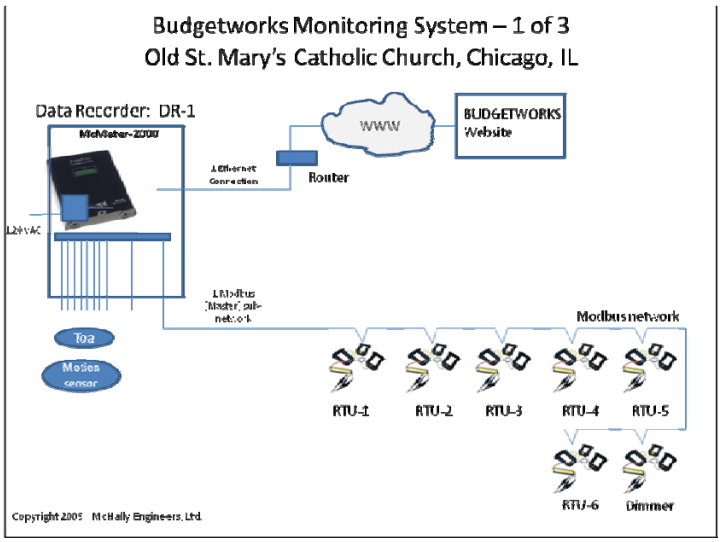
I. Highlights

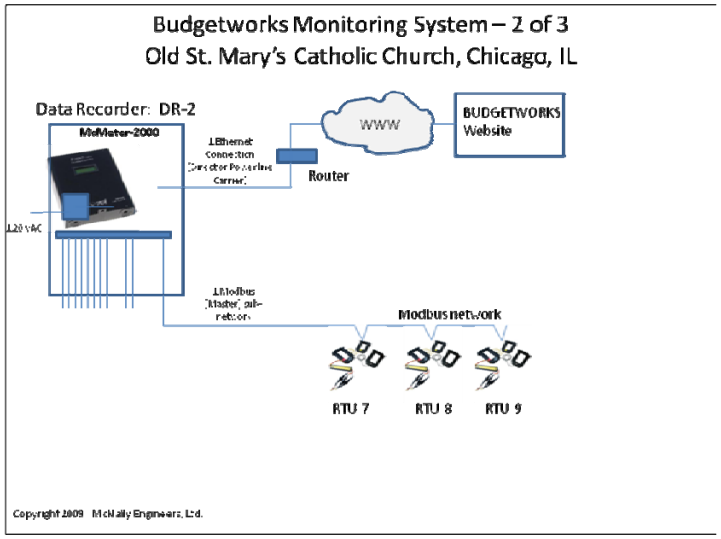
Highlights of this system are as follows:

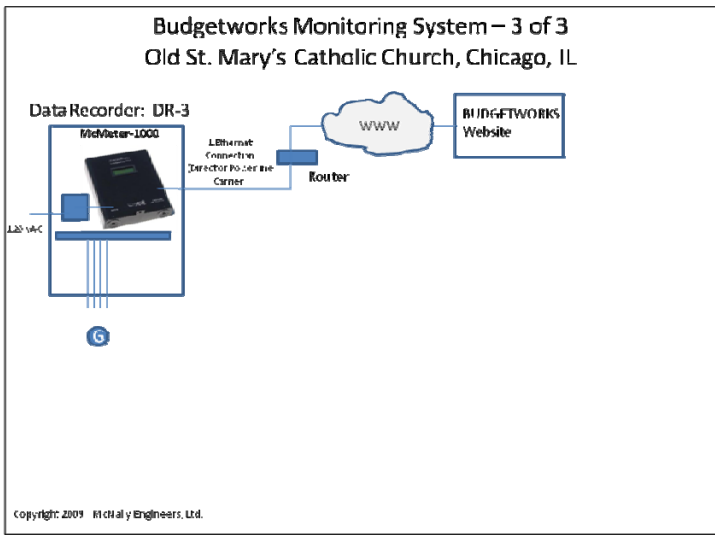
- Hardware
  - State-of-the-art data collection technology is used
  - Data collection hardware is modular and is designed to be portable.
  - Modular approach minimizes on-site wiring.
  - Data collection from the church and the school – 13 monitoring points.
  - Meters are connected via dedicated Modbus network.
  - Central collection of energy use data

- *On-Target/BUDGET*WORKS™ Application
  - Daily energy use profile displays with accompanying outside air temperature
  - Monthly energy use and cost summaries
  - Annual energy use and cost summaries
  - Virtual meters to summarize the site energy use
  - Energy cost calculations
  - Data Quality control
  - Secured Internet access
  - Data back-up

II. Configuration







III. Point List

NO.	Description	Sensor	Communication
1	RTU-1 (Church)	Wattmeter	Modbus
2	RTU-2 (Church)	Wattmeter	Modbus
3	RTU-3 (Church)	Wattmeter	Modbus
4	RTU-4 (Church)	Wattmeter	Modbus
5	RTU-5 (Church)	Wattmeter	Modbus
6	RTU-6 (Church)	Wattmeter	Modbus
7	RTU-7 (School)	Wattmeter	Modbus
8	RTU-8 (School)	Wattmeter	Modbus
9	RTU-9 (School)	Wattmeter	Modbus
10	Dimmer Panel (Church)	Wattmeter	Modbus
11	Gas Meter-1 (All)	Utility meter	DI
12	Outside Air Temp. Sensor	Temperature	AI
13	Motion Sensor	Motion	DI

IV. Wattmeter Schedule

				Wattmeter specification				
Unit Monitored	Serves	Service (Amps)	Volts/ Phase	Size (Amps)	Frame Size	Nom. Size	Comm'n.	Data Output
RTU-1	Church	175	480/ 3ph	300	Small	3.8"x3.9"x1"	Modbus	kW, kWh
RTU-2	Day Chapel	35	480/ 3ph	100	Small	3.8"x3.9"x1"	Modbus	kW, kWh
RTU-3	Commons	40	480/ 3ph	100	Small	3.8"x3.9"x1"	Modbus	kW, kWh
RTU-4	Receptionist	25	480/ 3ph	100	Small	3.8"x3.9"x1"	Modbus	kW, kWh
RTU-5	Social Hall	125	208/3ph	300	Small	3.8"x3.9"x1"	Modbus	kW, kWh
RTU-6	2nd Floor Offices	60	480/ 3ph	100	Small	3.8"x3.9"x1"	Modbus	kW, kWh
Dimmer	Dimmer Panel	175	480/ 3ph	300	Small	3.8"x3.9"x1"	Modbus	kW, kWh
RTU-7	1st Floor School	70		100	Small	3.8"x3.9"x1"	Modbus	kW, kWh
RTU-8	2nd Floor School	100		100	Small	3.8"x3.9"x1"	Modbus	kW, kWh
RTU-9	2nd Floor School	50		100	Small	3.8"x3.9"x1"	Modbus	kW, kWh

V. Hardware

Portable and Modular System Approach

McMeter-1000 This basic module features four digital inputs. It is ideal for limited utility meter monitoring needs. Ethernet/Internet connectivity. Wall-mounted steel cabinet, lockable hinged door.

McMeter-2000 For larger metering needs. This module has 8 universal inputs on-board. Additionally, there is a Modbus sub-network that can have up to 32 devices attached. Ethernet/Internet connectivity. Steel cabinet, lockable hinged door.

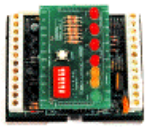
Data Recorders

On-site collection hardware is based on AcquiSuite data collectors. This state-of-the-art technology directly addresses the data quality/reliability issues of even well-known product offerings. The data recorders are powered by robust Linux operating systems. Failsafe aspects of the devices ensure data transfer to the central station even in situations with poor connectivity.

Data recorder Model #7801 has 4 on-board digital inputs, and Ethernet connectivity The recorder communicates to BUDGETWORKS over the internet.

Data recorder Model #8812 has 8 on-board "flex" inputs, a Modbus sub-network, and Ethernet connectivity. Up to 32 additional devices may be connected using the Modbus sub-net. The on-board flex inputs may be any mix of analog or digital signals. The recorder communicates to BUDGETWORKS over the internet.

I/O Modules



I/O Module, # A-8923-4 has four digital inputs and four analog inputs. The analog inputs can be configured as either 0-10v or 4-20mA. The I/O module is connected to the data recorder by means of a Modbus sub-network.

Wireless Mesh Network. The option to use a robust wireless mesh network for one or more of the remote sites may present itself. Wireless Module # R-9120-1 is wireless Modbus. Each wireless Module has two digital input points and a Modbus network connection.

Outside Air temperature sensor Accurate outside air temperature sensing is critical to the Baseline and Operations Budgets of BudgetWorks. Accordingly, the TO series thermister with solar screening is used.

Equipment Warranties

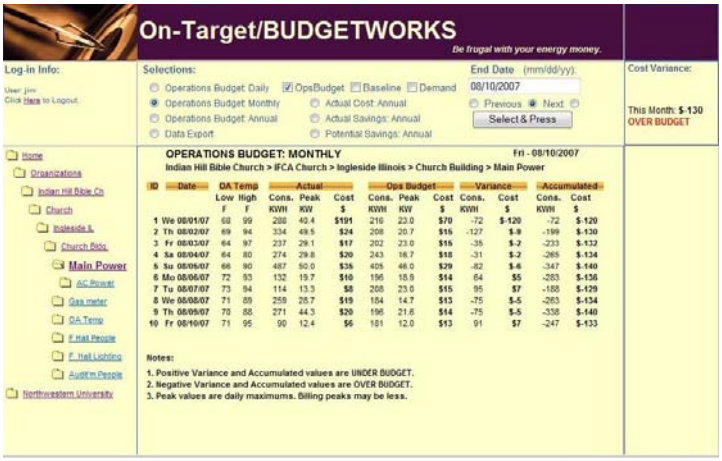
A two (2) year manufacturer's warranty applies to data recorder hardware.
A five (5) year manufacturer's warranty applies to watt meters and temperature sensors.

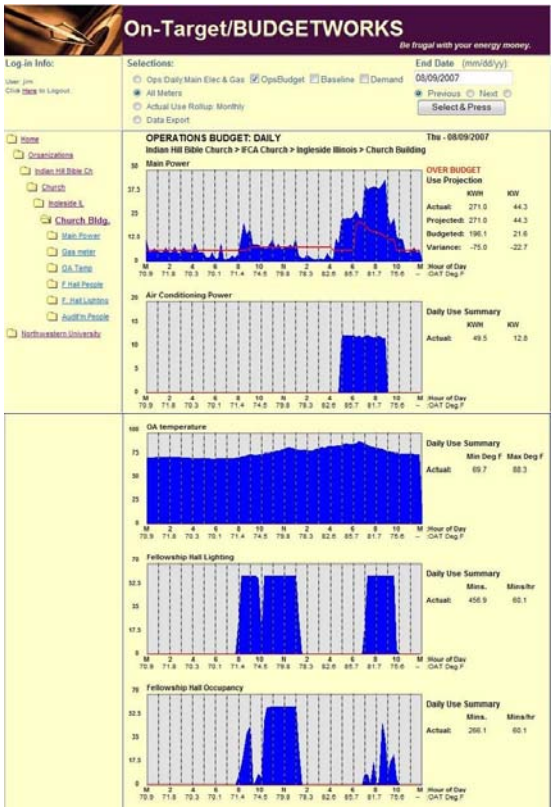
VI. Central Data Collection

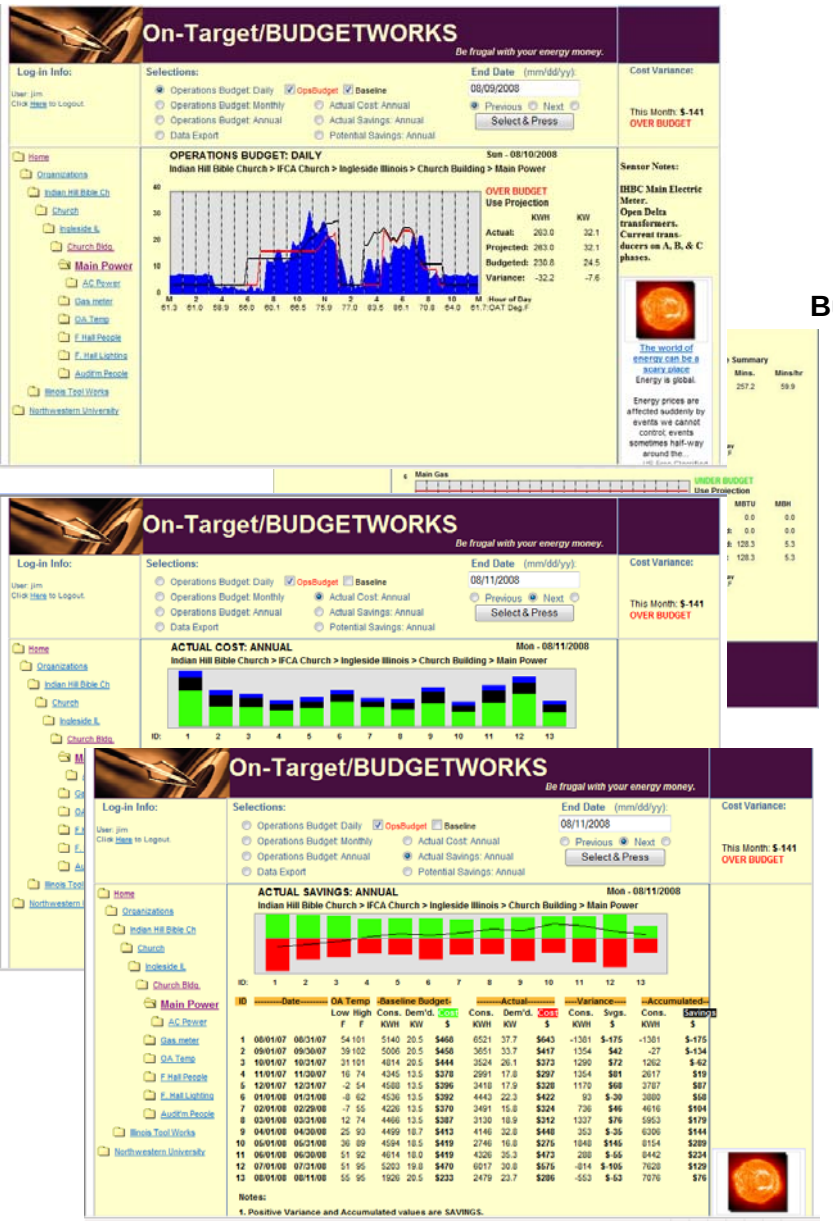
The *On-Target/BUDGET*WORKS™ System serves as the central point of collection. Data is uploaded every 15-minutes from AcquiSuite data collection devices. Quality Control checks are made for data integrity, data completeness, and reasonableness of data. Data is then stored in the Database, and available to the User.

VII. On-Target/BUDGETWORKS Application

Sample Views and Reports







Budgetworks Reports Provided.

- Budgetworks Classic Report
- All Meters Report
- Operations Budget: Daily
- Operations Budget: Monthly
- Operations Budget: Annual
- Actual Cost: Annual
- Actual Savings: Annual
- Potential Savings: Annual
- Data Export

VIII. Features and Services Included

1. Automatic collection of data from 15 meters, 1 motion sensor, and 1 outside air temperature sensor.
2. Installation drawings for the data collection system.
3. Manufacturers' literature
4. Data collection system commissioning.
5. Hosting services.
6. Interval data collection occurs every 15 minutes.
7. Daily load profiles are available for each meter.
8. Outside air temperature data is aligned with energy use profiles for comparison.
9. Meter profile graphic displays may be grouped for comparison.
10. The actual energy use and cost at each meter point is immediately available.
11. The data collection system uses current technology. It solves many data loss issues of other approaches.
12. While much has been done to prevent data gaps, if they should occur they will be filled using accepted techniques. Allow up to 3 incidents per year.
13. Program updates will be provided as they become available..
14. The Help Desk Service is available during normal business hours.
15. Training. Staff will be trained in the use of the system.
16. Documentation. Hardware documentation and a system User Manual will be included.

17. Data Export. Data will be automatically exported periodically (i.e. every hour, every 24 hours) to an agreed upon FTP site.
18. Data is collected to a secure location. Data is backed-up daily.
19. The Budgetworks site is accessible only to those with valid credentials.
20. Wiring drawings.
21. Professionally constructed control panels.
22. System installation and start up

IX. Responsibilities of Others or Provided for Elsewhere

1. Customer is to provide site access to Contractor during business hours.
2. Provide Ethernet/ Internet access to Contractor during installation.
3. IT assistance as needed to enable remote communications.
4. Provide continuous access to the internet for data recorders.
5. Provide pulse from utility gas meter.
6. Provide building permits, if required.

X. Terms and Conditions

1. Sixty-percent of the price is due at start of project.
2. The remaining forty percent is due within 30 days of project completion.
3. If project completion is delayed through no fault of the contractor, progress payments will be submitted. Progress payments will be due within 30 days of submission.
4. This Agreement shall be governed by and enforced in accordance with the laws of the State of Illinois.
5. The Services shall be performed during normal working hours, Monday through Friday inclusive, excluding holidays, unless otherwise agreed to by both parties.
6. Any Customer request to change the Agreement or the nature of the Services must be in the form of a mutually agreed change order, effective only when executed by all parties hereto.

XI. Price

The cost for the complete installation and commissioning of the Budgetworks Energy Monitoring System is……..……**$22,300.00**

XII. Acceptance

Submitted by,

_____ Date: _____,

Jim McNally, PE

Principal
McNally Engineers, Ltd.
Lindenhurst, Illinois

Accepted by,

_____ Date:_____.
Old St. Mary's Catholic Church
Chicago, Illinois

Key Tips about Grant Writing for Churches:

Have a clear vision and consider all the different components.

A clear vision is important because grant writing can be long process lasting a few months and requiring lots of research. It is valuable to look into how much the grant has given in the past 2 -5 years and to what kind of organizations it gives more to (i.e. religious institutions, churches, or non-profit organizations). Most grants require a clear inquiry. There may be a grant that does not directly serve the vision but serves one of the components. In considering all components, look into matching grants, grants that are connected to a member of the congregation's specific company

There are two types of grants typically used by churches.

1. Directly for their church
    a. These grants meet the church's vision completely even religious goals. They are often difficult to find.
2. Separate for a non-profit organization that reaches their ministries.
    a. This type of grant is more profitable when the church is less apt for a grant since the grant excludes religious institutions. Basically, the church creates a Community Development Corporation (CDC) which obtains a separate 501CC Status, yet is able to carry out the church's goals.
    b. Grants for building improvement and energy conservation are key phrases for looking for grants that want to initiate this type of program.

Visit the Donors Forum.

The Donors Forum is "the premier resource for networking and education, information and knowledge, and leadership on behalf of philanthropy in Illinois. As a nonprofit membership association of grantmakers, individual donors, and advisors, Donors Forum advances philanthropy by serving its members and by promoting an effective and informed nonprofit sector." The Donors Forum also has a book that is updated every year which includes a listing of all the religious grant funding available and how to obtain them.