SCHOOL GREEN

A NEW COLOR FOR A NEW WORLD

IPRO 328
Project Plan

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Purpose and Objectives

Problem Statement

Private schools and places of worship are nonprofit institutions where their financial support comes from their patrons who use their facilities. Due to inefficient building systems and poor design, these institutions are losing money; in come cases literally throwing money out the window. For the schools, the loss inhibits their ability to improve their academic programs, create better facilities, and ultimately be competitive amongst other schools. For the religious institutions, the loss prevents them from creating new programs to improve their causes, give back to their community, and continue on with their own purpose.

Vision

"We School Green recognize the importance of institutions to fulfill their purpose for the betterment of their community; therefore every action taken and every decision considered will be done to aid our clients to reach their full potential in energy efficiency and optimizing their facilities."

Mission

"Represent the best interests of Illinois Institute of Technology. The actions of School Green will embody with the spirit of the institution, the IPRO Office, and the values of School Green: integrity, contribution, communication, collaboration, and commitment. By adhering to these values we commit to improving religious organizations and schools, and add to the prestige of Illinois Institute Technology and the philosophy of IPRO. "

The purpose of IPRO 328 is to develop and implement a self-help, self-sustaining energy program for use in churches and schools. The main objectives of the team are:

1) Set up a data monitoring system in selected churches and schools that will record real time energy usage. Then provide a structure for church and school administrators to carry out their energy projects

2) Research past churches and schools for successes and failures in attempted energy usage improvements. Then select the most appropriate methods and opportunities for projects.

3) Design a promotional and functional website that will process the energy usage data of the churches and schools. Then display this data for energy professionals to examine and suggest ways the projects can improve their energy efficiency.

4) Create a metric that can be used to determine possible candidates for the system that is developed. Then determine future candidates in the Bronzeville and Bridgeport neighborhoods.

Background

Customer/Sponsor

The project is being initiated by Vincent Cushing of Clean Urban Energy Inc. The main facility that will be addressed in this IPRO is Old St. Mary's Church and School S. Michigan Avenue Chicago, IL. The monitoring equipment to be used in Old St. Mary's is being furnished by McNally Engineers

User Problem

This project is 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, leaky windows, inefficient lighting, and little to no insulation.

This forces 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 fuel and electricity have increased dramatically. Many of the workers, parents, alumni and supporters of these organizations are unaware of how much money could be saved by reducing energy usage and/or lack the funds to implement solutions to these problems.

Technology and Science

The energy usage of these buildings can be monitored using equipment that measure 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. The team will be compiling a map showing older church and school buildings in the Bronzeville neighborhood and creating a list of criteria to determine if this technology could be used at each of the specific buildings

Historical

Vincent provided the team with select examples of previous projects he worked on in structures similar to Old St Mary's in which he was able to reduce the energy use of the facility. An example of savings from a previous project by Jim McNally of McNally Engineers can be seen following this link: http://www.squidoo.com/church_energy_conservation

Ethical Issues

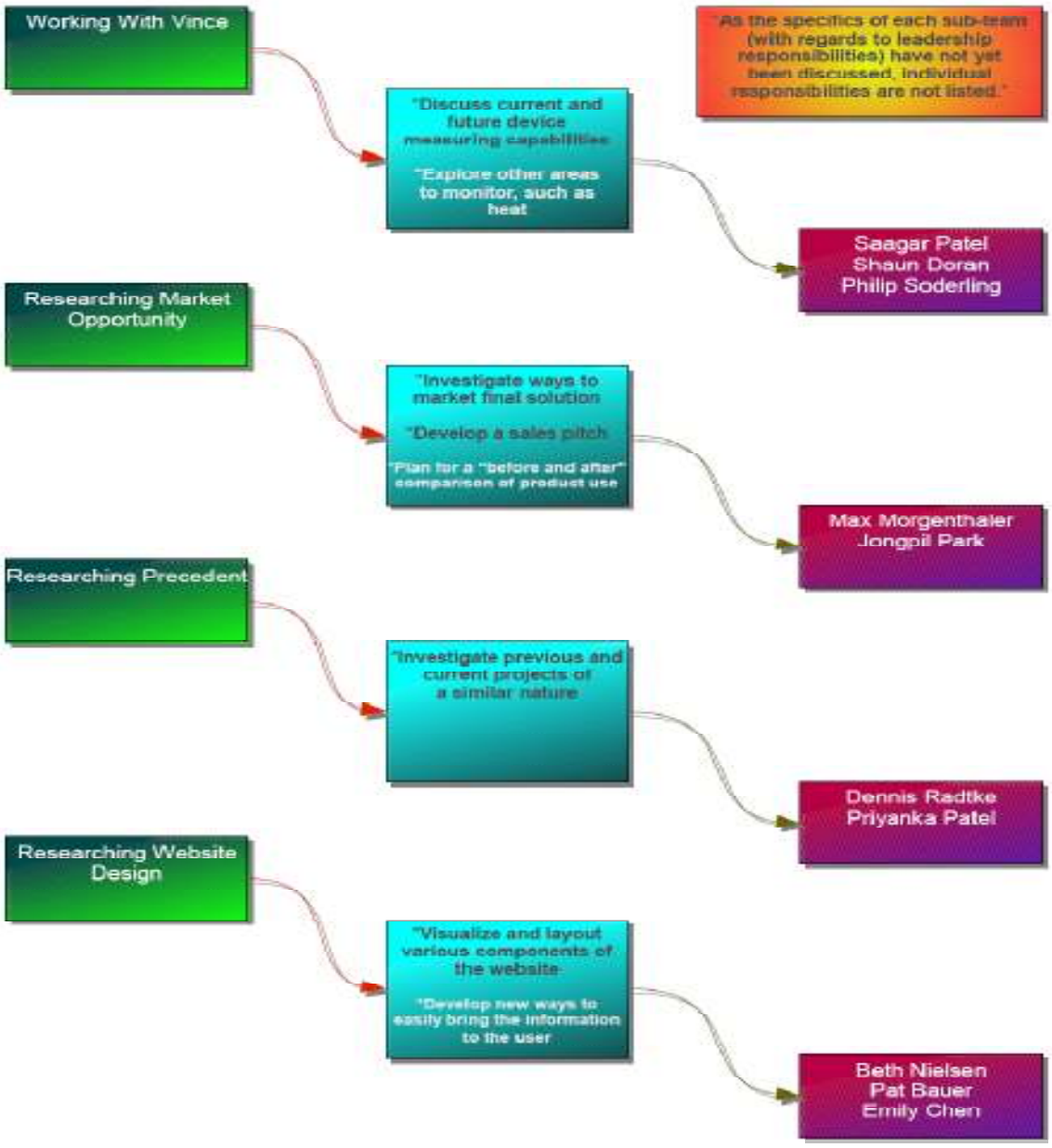
Like many other solutions to improve a building's energy efficiency many of the solutions associated with this program will take time to pay off their initial investment. The team must provide a clear picture to investors about how this program will work and offer clear calculations of the amount of money that can be saved through the reduction in energy usage. The team also must make sure that the workers at these institutions are educated about the solutions that are implemented at these facilities. While some solutions can save money without any outside support others need to be understood by the maintenance staff and workers at the facility to make sure they are used correctly

Business Costs

In order to gain funding for the installation of the energy monitoring systems, Vincent and the team is studying the use of the "intracting" model a program developed in Germany. This model is used to engage the faculty and parents of schools to become involved in improving the energy efficiency of their facilities. The investors in the program are offered a five percent return on their investment over five years and the money that the school saves by reducing energy use is used to fund other school programs that give both school officials and investors and incentive to put money into the project. The team are also looking into tapping existing local state and federal government and energy company grants for implementing energy efficiency solutions such as ComEd's Smart Ideas for Your Business program Holt bill H R (School Building Enhancement Act) and the Illinois Clean Energy Community Foundation.

Proposed Implementation

The team has divided up into four sub-teams to reach these objectives. The sub-teams are: Data Collection (working with Vince), Precedent, Website, and Market Opportunities. The teams were created to address the main objectives of the projects:



Research

The green building movement has been growing rapidly in the last few years and there are many examples of energy efficient church buildings. The Jewish Reconstructionist Congregation's synagogue in Evanston, IL is a LEED platinum building that was constructed in The St. John's Episcopal Church in Chicago has worked to reduce the energy use of their facilities and to conduct an energy audit of its church house.

Team Values

TEAM VALUES	ROLE MODEL	ACCEPTABLE	UNACCEPTABLE
1. COLLABORATION	-PROVIDES INNOVATIVE INSIGHT -HELPS TEAM IN MEETING GOALS -LEADS IN DISCUSSIONS -ENCOURAGE INVOLVEMENT AMONG TEAM MEMBERS	-PREPARED FOR CLASS -RESPECTFUL OF OTHERS -TAKES ON RESPONSIBILITY -PRODUCES RESULTS	-NO PARTICIPATION -NO KNOWLEDGE OF PROGRESS OF PROJECT -NO SIGNIFICANT CONTRIBUTION TO PROJECT
2. COMMITMENT	- ALWAYS VOLUNTEERS -COMPLETES TASKS ON TIME - TAKES RESPONSIBILITY -LEADS WITH CHARACTER - CONTRIBUTES VOCALLY - ATTENDS MEETINGS ON TIME	- COMPLETES TASKS ON TIME - TAKES ON RESPONSIBILITY - CAN BE RELIED ON - COMMUNICATES CLEARLY - ATTENDS MEETINGS ON TIME	- NOT PRODUCTIVE - OVERALL DISTRACTION TO TEAM - UNRELIABLE - LACK OF CONTRIBUTION - LACK OF RESPONSIBILITY - MISSES CLASS
3. COMMUNICATION	- ONE WHO DOES NOT HESITATE TO VOICE AN OPINION - ENCOURAGE DISCUSSION - SENSITIVE TOWARDS OTHERS - A GOOD LISTENER	-ABLE TO ADD TO CONVERSATION NO ONE IS RIGHT OR WRONG, ITS A MATTER OF FEEDBACK	- ONE WHO KEEPS TO THEMSELF -ONE WHO IS AFRAID TO MAKE SUGGESTIONS OR PROVIDE ANY POSITIVE FEEDBACK
4. CONTRIBUTION	- COMPLETES TASKS ON TIME - PARTICIPATES IN CLASS DISCUSSIONS - TAKES RESPONSIBILITY TO HELP OTHERS ACHIEVE GOALS - LEADINGS ROLE IN ACCOMPLISHING GOALS	- DOES ASSIGNED JOBS AND TASKS - OCCASSIONALLY HELPS OTHERS - OFFERS POSITIVE FEEDBACK	- LACK OF PARTICIPATION - DOES NOT COMPLETE TASKS -DOES NOT PROVIDE INSIGHT ON PROJECT - MAKES EXCUSES
5. INTEGRITY	- COMPLETES ALL TASKS ON TIME (HIGH QUALITY) - MUST COMMUNICATE TO TEAM ABOUT STATUS OF WORK OF ALL MEMBERS - AWARE OF TIME CONTRAINTS AND LIMITATIONS	- DELAY OF COMPLETING A TASK OCCASIONALLY - QUALITY OF WORK IS GOOD YET STILL PUTS FORTH EFFORT - INFORM GROUP OF ANY PROJECT COMPLICATIONS	- CONSISTENTLY MISS DEADLINES - LITTLE TO NO COMMUNICATION - COMES UP WITH EXCUSES "DOES NOT DO WHAT THEY ARE GOING TO DO"

Conflicts will be inevitable with a project of this size. The group welcomes positive and constructive conflict. With the utilization of sub-teams, it will be expected that many concerns be dealt at the sub-team level. Given the size of the sub-groups, the issues can be done by simple informal discussions. Time is precious; it would not prove productive for all concerns to be brought to the team. During the designated IPRO team meetings will be an opportunity to receive updates on all the sub-teams and provide a conduit for project issues to be presented. Those that concern the direction of the project and affect all the teams will be brought up in discussion and voted on by the team members during an IPRO team meeting by a simple majority.

Methodology/Brainstorm/Work Breakdown Structure

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. An even bigger surprise is that most schools and churches do not understand where exactly they are losing their money, and no funding to hire someone to evaluate their energy consumption.

The team will be responsible for providing a "service module", which is a systematic, user-friendly solution that is highly adaptive for universal use and helps identify the areas of inefficiency within the school or church. The team will be preparing six deliverables due throughout the semester, but the process will be divided into three phases in order to keep the team on track:

Phase I – Team Organization and Research – For the first five weeks of the semester, the team is responsible for organizing itself into subgroups to identify details of the solution, including site visits and proper documentation of research. Technical data will be gathered in a consistent way, and the subgroups will periodically inform each other of their work since the workload will overlap.

Phase II – Analysis of Research and Development of Solution – For the next seven weeks of the semester, the team will be summarizing their research and putting together all work completed in a coherent report. Details are sorted out and questions are answered during this phase.

Phase III – Presentation Preparation – For the last three weeks of the semester, the team will be working on the rest of the deliverables, as well as design and layout of the booth for IPRO day. Slides for the PowerPoint presentation will also be organized, and the website will be finalized for review and future maintenance.

Potential solutions are identified as a user-friendly website for public view, a "service module" (monitoring system) that collects technical data and accessible via the website, and a physical model of Old St. Mary's to show possible architectural energy efficient improvements. The goal is to allow for an engineer or equally certified professional to quickly analyze the data collected and identify the areas of energy inefficiency. Both solutions will be tested during Phase II, and presentable by Phase III. A monitoring system is already in effect in Old St. Mary's church, and the team will analyze the data. Prototypes will be built and tested in different schools to test the flexibility of the solution. The website is a compilation of this data in a coherent manner. The website also engages prospective candidates to quickly analyze the feasibility of this system,

and will involve features such as precedent examples and financial processes similar to that of intracting. Architectural improvements will be based on a set of drawings and added to the existing building. Budget and funding will be noted and included in the final report.

The progress of the solutions will be documented from research to presentation through iGroup files and a physical binder. Collected data will be printed, photos taken will be uploaded and printed, and website examples will be printed as screenshots. Any data that cannot be printed will be typed in detail by the researcher. Results from the monitoring system will be recorded in a log sheet and represented graphically in order to make the information easy to read for all audiences. For the architectural aspect of this project, drawings will be printed and uploaded as PDFs only, and CAD files will be made available upon request. The final model, with architectural improvements, will be represented in a physical form as well as renderings.

The team will collect all relevant data and share it with each other in order for everyone to gain a fair amount of knowledge into the project. Solutions will be tested based on this data, and information that can be used on the website will be represented graphically (in charts, graphs, etc.) for easier interpretation by the general audience. Each subgroup will be responsible for their own graphical elements, and a leader from each subgroup will collaboratively arrange these elements for final presentation. Subgroups are also responsible for weekly updates on progress and analysis.

The IPRO deliverables include six mandatory items:
Project plan
Abstract/Brochure
Midterm Report
Poster
Final Report
Final Presentation
All items will require a team effort to complete, and each deliverable will be divided by each subgroup. After successful review, one responsible team member will compile all information into one comprehensive packet. All team members will review it before submission.

Expected Results

The team's expectation is that the solution to many of churches and schools energy issues will first be ineffective systems and many outdated infrastructure and mechanical equipment. These issues are easily solved with various modeling and analysis techniques. It is the team's contention that the greatest hurtle will be a change in people's thinking when using their buildings. The team is already aware of the space utilization and the issues that arise from that. One example is the entire HVAC system is on in the building when for piano lessons, where there are only two to three people present. Finally, the issue will be the cost. The team can and will develop many great solutions, but they all will come with the cost. Utilizing the past success stories, having professionals use the website and submit their ideas, present the data of current usage and potential savings, and ultimately sell the idea of intracting to the parishioners the team believes that this project will prove to be a success. The team also wishes to develop a prototype for Old St. Mary's of the potential their complex would have if money were not a concern. The team would like to have a creative outlet, and allow not just the parishioners but all other future candidates to see what technologies and knowledge of buildings exist today.

Budget

The team is expecting to require funds for the following:

Item	Costs
Transportation to local churches and School	$50.00
Printing Materials (copies for meetings)	$25.00
Collection of ComED data	$80.00
Plots/Final Drawings	$120.00
Team Development	$200.00
Total	$475.00

Schedule of Tasks and Milestones

Objectives for Data Collection Sub-Team

Phase 1: Raw Data Collection
For the following tasks, anyone who wishes to pursue these tasks can do so. No special area of expertise is necessary. The collection of data should take at minimum 3 weeks; realistically a month to 5 weeks should be appropriate.

- Collecting real time data of Old St. Mary's with the new metering devices for at minimum of 1 week.

- Going through ComEd and finding past energy data in regards to Old St. Mary's energy usages.

- Determining feasibility of other data collection methods (infiltration and use of thermal camera as examples). If able to gather proper equipment, then coordinating efforts to gather respective data.

- Review current Mechanical, plumbing, electrical, and structural drawings and determine possible problem areas by looking at the plans.

Phase 2: Analysis of Raw Data/Solution
The sub-group must analyze the data and determine what is the most important to present. This part will require special areas of expertise and various time commitments.

- For all the meter data, the information must be made into a more digestible format. It will require one member to look at the data and create a scheme or set of algorithms that will take the data and produce into a well understood graphical form. An architectural or electrical engineer would be the most appropriate. This will take 3 weeks maximum.

- If other data was collected, then solutions to those problems must be created. If calculations need to be done then they must be done quickly. If solutions can be created just by the analysis of the data, then those should be primary. This will require at least 2 Architectural engineers, and someone familiar with heat and mass transfer. The time here will vary, 3 to 4 weeks should allow for optimal design.

Once a useable format is determined, a computer science or computer engineer would be appropriate to the feasibility of creating a website that can present the data. This will require a lot of the person's time and efforts and therefore will require at least 4-5 weeks. Finally, when a set of solutions are created, it will be the responsibility of the sub-team to do a cost-benefit analysis, and be presented to Old St. Mary's Church. It will also be the responsibility of the sub-team to determine levels of priority of improvements.

Objectives for Market Opportunity Objectives Sub-Team

There are three major categories of work associated with this sub-team:

Researching local buildings:

- Compile a list of church and school buildings in the Bronzeville neighborhood, which is defined as approximately bordered by 31st Street to the north, 51st street to the south, Cottage Grove to the east, and the Dan Ryan Expressway (I-90/94) to the west.
- Develop a database of the various structural, mechanical and operational qualities of these buildings.
- Develop a set of criteria to evaluate how beneficial an energy monitoring system would be to these facilities.
- Generate a map showing the facilities that we investigated and the results of the screening process.

Intracting:

- Create a clean explanation of the intracting program that can be shown to the people concerned with these buildings so that they aing an understanding of the program and its benefits. This material should assume that the audience has no prior knowledge of the intracting program.
- Develop a list of case studies showing the benefits and any risks or downfalls involved in the intracting program (work with precedent sub-team).

Equipment and data collection:

- Work with data collection and website sub-teams to learn details of the data collection equipment to determine how well it could be applied to potential sites.

Objectives of Precedent Sub-Team

Understanding the past is how people make advances in the future: the mission for the precedent team.

For approximately three weeks, the tasks are the following:

1: Research Past Technologies:

- "Past" technologies: The idea is to look into existing energy efficient technologies, and how they are being used today. The sub-team does not want to direct this only towards churches and school, but to focus on a broader spectrum. By researching with an open mind, the sub-team thinks it will help to be sensitive in finding more innovative solutions to the church and school energy efficiency issue.

2: Research Existing GREEN Churches and Schools:

- The goal of this task is mainly to what buildings in the local area are GREEN and how they achieved that goal. Analyzing the functionality of other neighboring buildings will aid in collecting knowledge to conquer the Old St. Mary's project.

- We will also try to use resources such as Leroy Kennedy, Joe Clair, and Vincent Cushing to help direct us in the right direction.

3: Work Side-by-Side with Marketing Sub-Team:

- The precedent team will also consider possibilities for the future. While the marketing team formulates a list of prospects for such an energy efficient system, the precedent team will work with them to determine what systems will be best suited for a building.

Objectives of Website Sub-Team

Phase 1: Website Research

- Look at other websites of a similar nature and see features they offer
- Talk with sponsor and discuss his opinions about the website

Phase 2: Team's Idea for Website

- Decide as a team what the website will include and its features
- Determine how the website should be set up

Phase 3: Gather Materials for Website

- Acquire pictures, text, and color scheme of site
- Design a mock set-up of site (PowerPoint slide or other imaging idea)

Phase 4: Build Website

- Meet with programmers on IPRO 320 and convene to them team's idea for the website
- Work with programmers to determine what can be done and what they need from us

Phase 5: Display Website

- Have an interactive and functional website for IPRO day that can also be used as promotional or educational tool. Will display website to team once it is complete, and continue to make improvements up to IPRO Day.
- Also find a way to market website and promote it as well. Possible answer is look for companies who would be interested in funding or for visibility purposes.

Individual Assignments

Instructor: Jim Braband

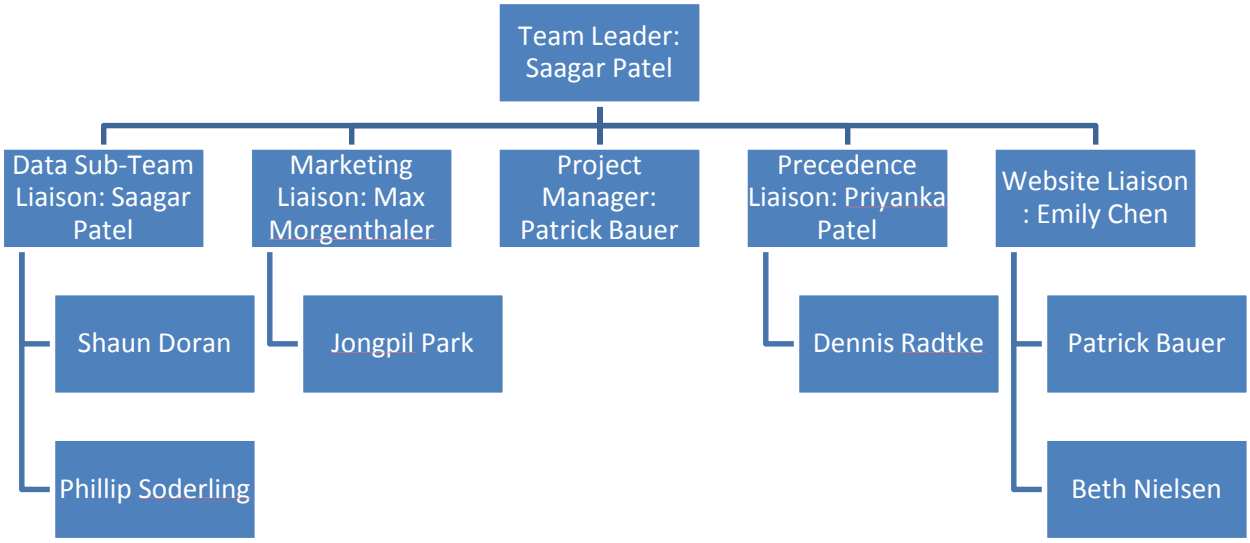
Team Member Information

Name	Major	Year	Email Address
Patrick Bauer	Aerospace Engineering	Senior	pbauer1@iit.edu
Emily Chen	Architecture	Junior	echen5@iit.edu
Shaun Doran	Electrical Engineering	Junior	sdoran@iit.edu
Max Morgenthaler	Architectural Engineering	Junior	mmorgent@iit.edu
Beth Nielsen	Architectural Engineering	Junior	bnielse2@iit.edu
Jongpil Park	Architecture	Senior	jpark81@iit.edu
Priyanka Patel	Architecture	Junior	ppate19@iit.edu
Saagar Patel	Architectural Eng. and Civil Eng.	Senior	patesaa@iit.edu
Dennis Radtke	Architecture	Junior	dradtke@iit.edu
Phillip Soderling	Computer Engineering	Junior	psoderli@iit.edu

Team member strengths, needs and expectations

Name	Strengths	Needs	Expectations
Patrick Bauer	Good organization skills, some experience using Microsoft office and good communication skills	To develop an understanding of websites	That the project will meet all of its goals
Emily Chen	Leadership and commitment	To develop better research skills	To help these schools save some money and have fun working in a team!
Shaun Doran	Electrical engineering skills	Team skills	To accomplish all the goals for IPRO day.
Max Morgenthaler	Knowledge of building construction and HVAC and an interest in improving energy efficiency in existing buildings.	Assessment of building construction and systems to determine ways to improve efficiency. Working with energy monitoring equipment and energy professionals. Marketing the idea	I would hope to educate the building owners and users about how important energy efficiency in their buildings is, and how much they can save by implementing simple solutions.

		to those with little knowledge of the issues.	
Beth Nielsen	Organization and communication	To develop better website design skills	To influence others to help schools and churches save money and help the environment.
Jongpil Park	Valuable skills in many necessary computer software programs	To develop research skills	To be a part of a project that will help many local schools and churches
Priyanka Patel	Patience	Learn more about technologies	I believe that come IPRO day we're going to have a well organized project and make a great presentation.
Saagar Patel	Leadership skills and familiar with Comcheck and HVAC Loader modeling systems. I am also very comfortable with AutoCAD, Lighting modeling, and EXCEL.	Have a good team experience	To learn a lot about energy efficiency and hopefully be able to use this in my future
Dennis Radtke	Experience that comes with my age	Uncertain	To gain experience working as a team on a project.
Phillip Soderling	Computer engineering skills	To develop team work skills	To reach all the goals



Weekly Meeting Designated Roles

Agenda	Saagar Patel
Time Keeper	Patrick Bauer
Meeting Minutes	Beth Nielsen
Paperwork (igroups Organizer)	Max Morgenthaler
Final Presentation/Architectural Groups	Dennis Radtke

Attachments

- Gannt Chart
- Old St. Mary's Energy Efficiency Review
- Old St. Mary's Efficiency Program
- Old St. Mary'

ID	Task	Week 1		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7		Week 8		Week 9		Week 10		Week 11		Week 12		Week 13		Week 14		Week 15	Week 16
		1/20	1/22	1/27	1/29	2/3	2/5	2/10	2/12	2/17	2/19	2/24	2/26	3/3	3/5	3/10	3/12	3/17	3/19	3/24	3/26	3/31	4/2	4/7	4/9	4/14	4/16	4/21	4/23	4/28	4/30	5/8
1	**Deliverables**																														
2	Project Plan				Deadline: February 14, 2009																											
3	Midterm Review														Midterm Review Week																
4	Abstract/Brochure																														
5	Poster																														
6	Final Presentation																														
7	Final Report																														
8	**Outline**																														
9	Project Introduction																														
10	Team/Project Organization																														
11	Establish team values																														
12	Establish main subgroups																														
13	Site visit																														
14	Research																														
15	**Data collection / Partnership with Vince Cushing**																														
16	Collect real time data of Old St. Mary's with new metering devices																														
17	Utilizing ComEd's database for previous energy data of Old St. Mary's																														
18	Determine feasibility of other data collection methods (i.e. infiltration and thermal cameras																														
19	Review current drawings of building to determine possible areas of energy waste																														
20	Analyze data / create graphs and charts																														
21	Analyze charts and graphs and create design solution from data																														
22	Prepare cost-benefit analysis																														
23	**Market opportunity**																														
24	Compiling a list of church and school buildings in Bronzeville																														
25	Developing a database in detail structural, mechanical, electrical & operational condition																														
26	Developing a criteria to evaluate collaborate with data collection team																														
27	Screening the buildings																														
28	Generating the results of screening process for IPRO Day, including creation of map of buildings																														
29	Creating a clean explanation of intracting																														
30	Developing a list of case studies collaborate with data collection team and prescient team																														
31	Applying marketing information to the project																														
32	**Precedent ideas and projects**																														
33	Investigate previous and current projects of a similar nature																														
34	**Architectural opportunity**																														
35	Compile blue prints and study for cost effective measures of conserving energy.																														
36	Produce floor plans for use of the team.																														
37	Produce 3d model of existing building.																														
38	Study the best avenues for expansion of existing building.																														
39	Develop new architectural schemes.																														
40	Make 3d model of new architectural schemes.																														
41	Begin animation.																														
42	Continue animation and other presentational components.																														
43	Integrate all information gathered from each team into a cohesive presentation																														
44	**Website presentation**																														
45	Research existing website for desired layout																														
46	Meet with IPRO 320 for website design possibilities																														
47	Collect data from marketing subgroup																														
48	Collect data from precedent/architectural subgroup																														
49	Collect data from technical subgroup																														
50	Compile/organize collected data according to subgroup																														
51	Determine amount of data to convey onto website																														
52	Propose layout to team																														
53	Update IPRO 320 of progress as necessary																														
54	Propose layout to IPRO 320 to program																														
55	Update website as necessary																														
56	**Final Preparation**																														
57	Determine amount of data for presentation																														
58	Prepare PowerPoint presentation																														
59	Design IPRO booth																														
60	Prepare architectural/visual elements for presentation																														
61	Team collaboration on final presentation for judges																														

Deadline: April 26, 2009
Deadline: April 27, 2009
Presentation: April 29, 2009
Deadline: May 8, 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.

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		

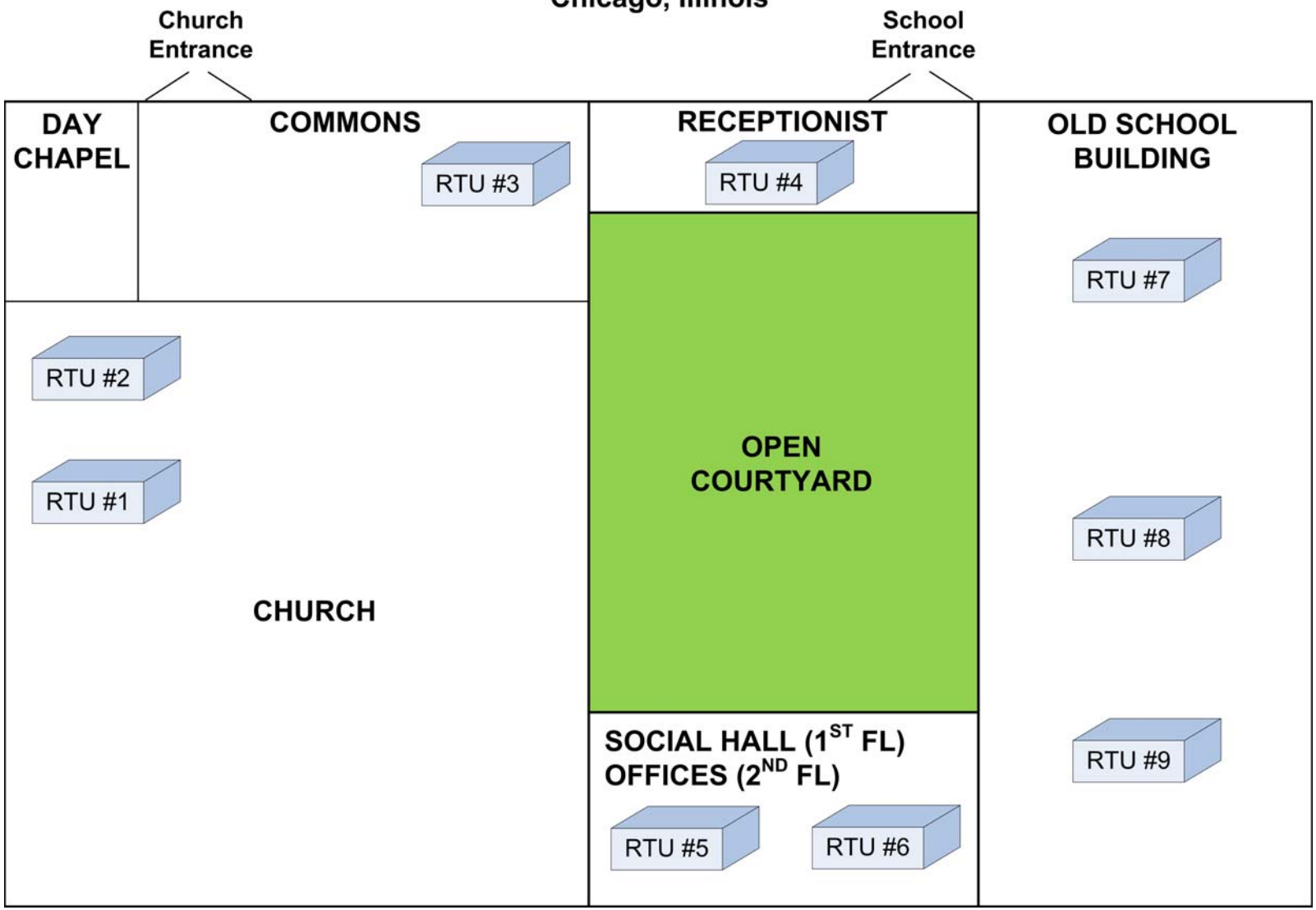
Panel in Electrical Room No. 3 (upstairs in office space)

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

Church/School Energy Efficiency Program

October 9, 2008

Problem Being Addressed

Churches and schools on the South and West side of Chicago are facing extraordinary energy expenses. Their buildings and their HVAC systems are typically dated, not well documented, and inefficient. Their energy operations and maintenance is typically poor because i) they lack the funds to afford a building engineer or a quality maintenance program and ii) church/school administrators have very little energy management expertise. Finally, these institutions do not have the capital or operating dollars to afford a fix. So these institutions:

- Are particularly affected by electric and natural gas prices that have risen dramatically in the last two to three years;
- Require a significant 3rd party time commitment to remedy their situation, especially an administrative time commitment; and
- Have several, small, quick payback energy investment opportunities, but lack the expertise and capital to execute.

Several church/school administrators have expressed a desire to cut their energy bills and improve their facility efficiency, but do not know how to proceed without leaning hard on the good graces of energy professional volunteers.

Similarly, many energy engineering professionals in the Chicago area have expressed a desire to help, but can't afford the significant, long-term time commitment – both engineering and administrative – to tackle these one-off project requests effectively.

Program Objective

Develop a self-sustaining, self-help, non-profit program for these church/school institutions that:

1. Gets energy professionals' attention to reviewing a church/school energy situation and identifying cost-saving options … using a web-based application to limit their time commitment, e.g. time administering studies, writing reports, or gathering site information (building construction, HVAC equipment, energy use pattern, etc.)
2. Provides structure for church/school administrators to execute their energy projects
    - Template or guide for self-managing an energy review and subsequent energy projects … aimed at unsophisticated energy managers.
    - Elementary guide and process for tapping existing local, state, and federal energy companies and programs for energy expertise and capital contributions. Examples include ComEd's Smart Ideas for Your Business program, Holt bill H.R. 3197, and the Illinois Clean Energy Community Foundation.
    - Funding and project management process to carry out identified energy efficiency opportunities … modeled after the "intracting scheme" used in Germany.

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Supporting Information

Old St. Mary's Data Monitoring Project

In anticipation of web-based application, a web-based energy data monitoring system is being installed at Old St. Mary's Church and School. This system:

1. Monitors 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.
2. Establishes 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.

Intracting

In Germany, the "intracting" model is used to incent and engage school principals and parents in identifying, managing, investing and executing energy efficiency projects. The principal retains – for discretionary use on other school projects – any energy savings after a return on and off capital to investors. Investors are offered a five percent return over five years on specifically identified school energy projects. What parent wouldn't invest in their child's school on those terms?

Clean Urban Energy, Inc. is engaged with German professors at the University of Colorado Boulder and the Technical University of Dresden in Germany who are familiar with and have used the intracting model. For more information on intracting see:

www.eceee.org/conference_proceedings/eceee/2001/Panel_5/p5_2/Paper/

http://www.stadtklima-stuttgart.de/index.php?id=643,753,1,1,1,0

http://www.stadtklima-stuttgart.de/index.php?climate_kliks_measures_06

http://six6.region-stuttgart.de/sixcms/media.php/773/19-Hettler_PracticalAspect.pdf

http://www.managenergy.net/products/R337.htm

http://www.wupperinst.org/FactorFour/best-practices/intracting-short.html

Holt Bill HR 3197

"ENERGY EFFICIENCY: Education bill would give grants for schools to make upgrades (05/01/2008)

Schools would receive funding to make energy efficient upgrades under a bill the House Education and Labor Committee approved today.

H.R. 3021 authorizes $6.4 billion for school construction over five years and would provide resources for state educational agencies to develop a school efficiency quality plan and would give local educational agencies technical assistance for energy efficient school building design, construction and renovation.

The bill would also require that states measure and report schools' carbon footprints.

Rep. Rush Holt (D-N.J.) has pushed the initiative. He sponsored a similar bill, H.R. 3197, which would provide schools with federal grant funding to invest in energy efficient upgrades.

Holt has said improving school's energy efficiency could save the nation $2 billion in utility costs (E&E Daily, Feb. 14).

"Much of the vast expenses schools spend on energy is unnecessary," Holt said in a statement. "More efficient use of energy could cut costs by 20 to 25 percent. Making those efficiency changes will enable school districts to save money that could instead be used to hire new teachers or purchase new textbooks."

H.R. 3021 requires funds be used for projects meeting Leadership in Energy and Environmental Design, Energy Star or Collaborative for High Performance Schools standards.

For more information, contact:

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Email: vcushing@CleanUrbanEnergy.com
www.CleanUrbanEnergy.com

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.

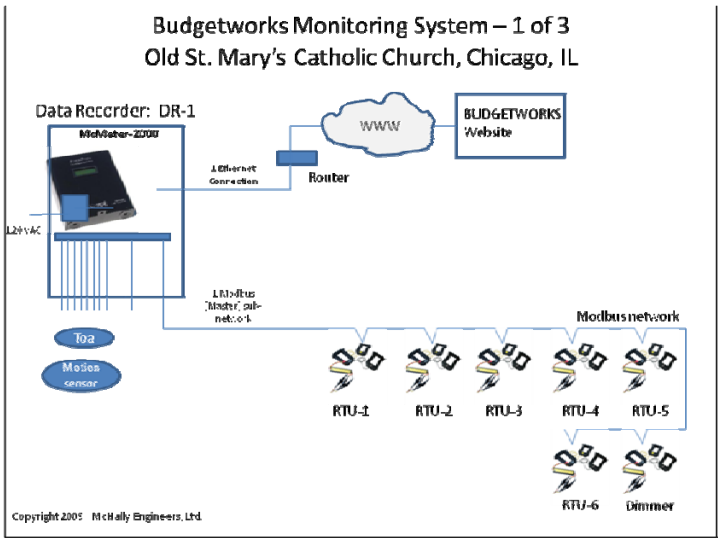
I. Highlights

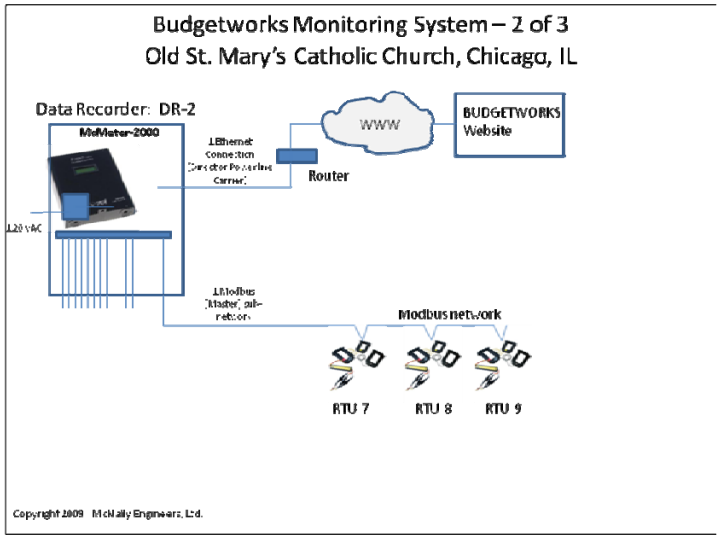
Highlights of this system are as follows:

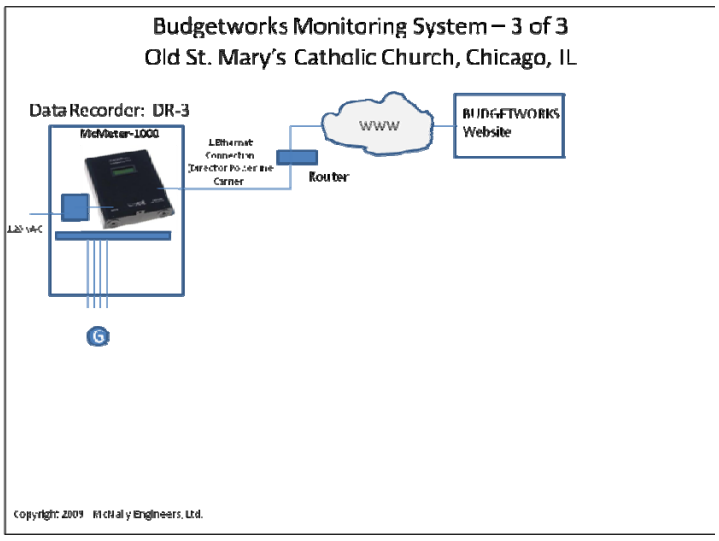
- Hardware
  - State-of-the-art data collection technology is used
  - Data collection hardware is modular and is designed to be portable.
  - Modular approach minimizes on-site wiring.
  - Data collection from the church and the school – 13 monitoring points.
  - Meters are connected via dedicated Modbus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

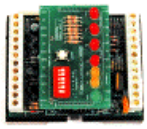
Data Recorders

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

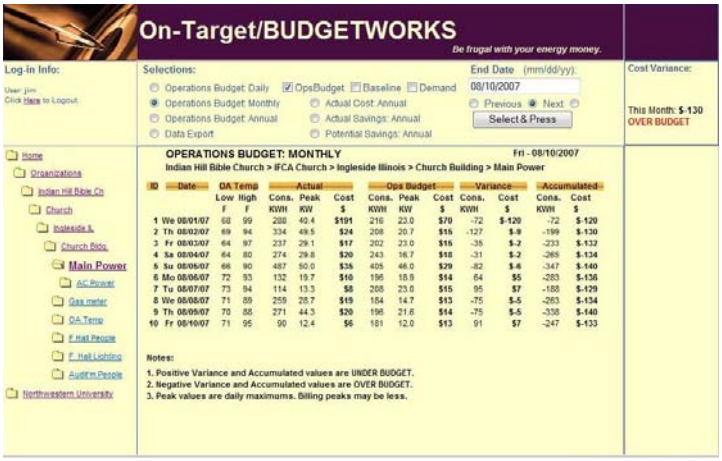
A two (2) year manufacturer's warranty applies to data recorder hardware.
A five (5) year manufacturer's warranty applies to watt meters and temperature sensors.

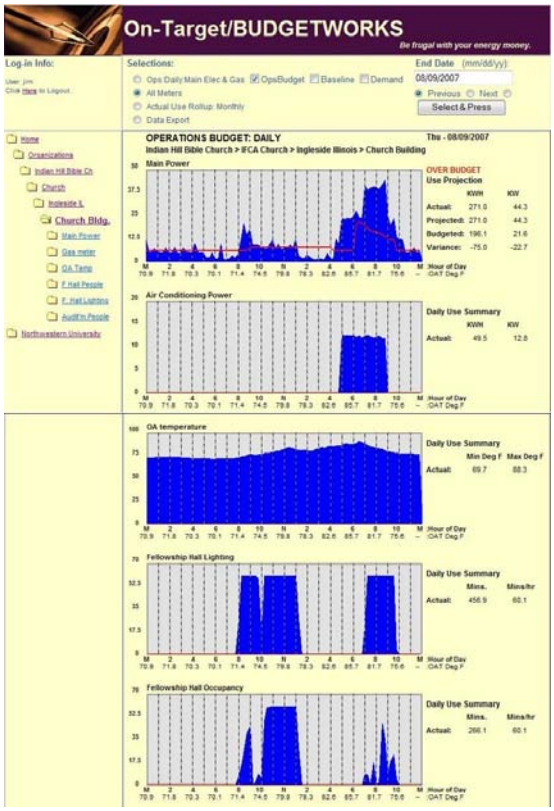
VI. Central Data Collection

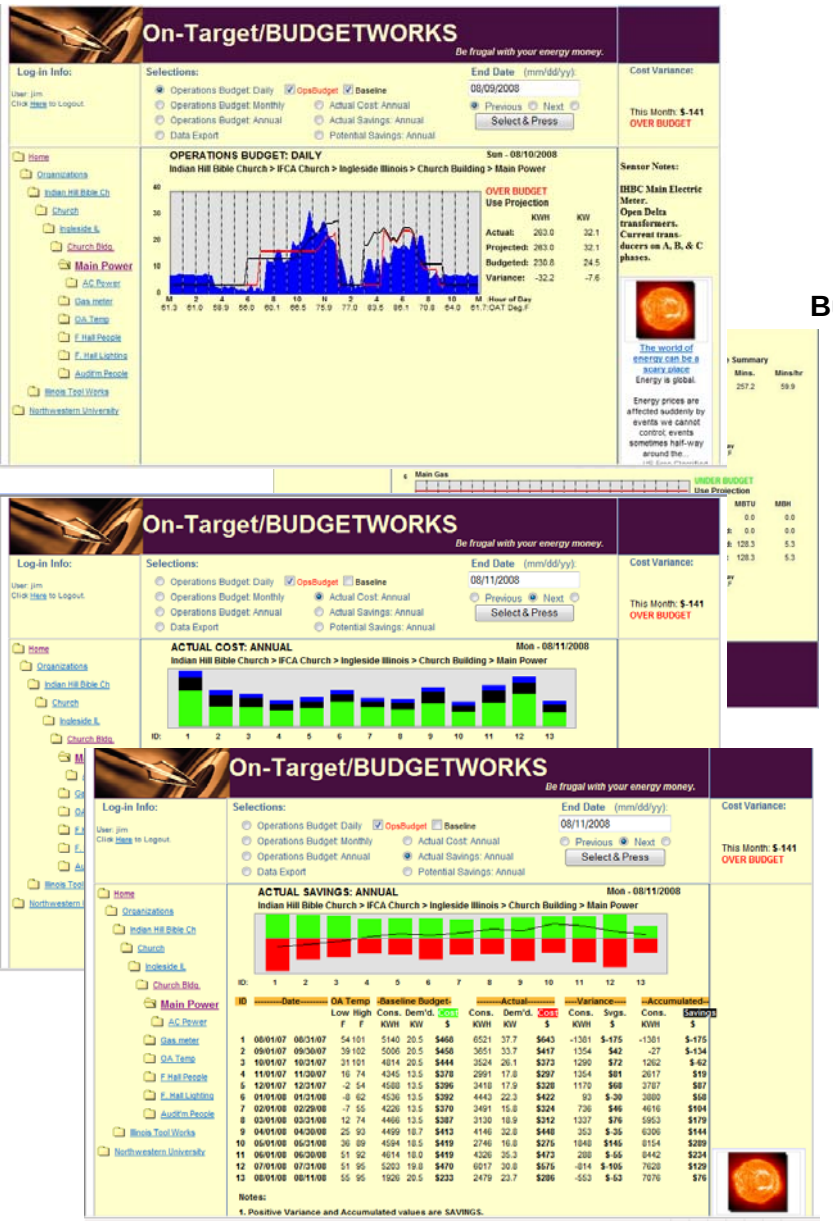
The *On-Target/BUDGET*WORKS™ System serves as the central point of collection. Data is uploaded every 15-minutes from AcquiSuite data collection devices. Quality Control checks are made for data integrity, data completeness, and reasonableness of data. Data is then stored in the Database, and available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