Energy auditing proposal

Paul Parham
Bonnie Bachman
Missouri University of Science and Technology, bachmanb@mst.edu

Follow this and additional works at: http://scholarsmine.mst.edu/faculty_work
Part of the Business Commons, and the Computer Sciences Commons

Recommended Citation
http://scholarsmine.mst.edu/faculty_work/668

This Technical Report is brought to you for free and open access by Scholars' Mine. It has been accepted for inclusion in Faculty Research & Creative Works by an authorized administrator of Scholars' Mine. For more information, please contact weaverjr@mst.edu.
Missouri University of Science and Technology

Energy Auditing Proposal

2011 | Paul Parham and Dr. Bonnie Bachman
Table of Contents

1 Executive Summary ........................................................................................................................................ 2
  1.1 Objectives .................................................................................................................................................. 2
  1.2 Problem statement ..................................................................................................................................... 2
  1.3 Consumers .................................................................................................................................................. 2
  1.4 High Level Solution .................................................................................................................................. 2

2 Introduction ....................................................................................................................................................... 3

3 Proposed System .............................................................................................................................................. 4
  3.1 Product and Service Overview .................................................................................................................. 4
  3.2 How Technology is used ............................................................................................................................. 5
    3.2.1 Website .................................................................................................................................................. 5
    3.2.2 iPad App ............................................................................................................................................... 6
    3.2.3 User interface ....................................................................................................................................... 7
  3.3 Future Products and services ..................................................................................................................... 8

4 Competition ....................................................................................................................................................... 9
  4.1 Recurve ....................................................................................................................................................... 9

5 Strategy and Implementation Summary ........................................................................................................ 10
  5.1 Value Proposition ....................................................................................................................................... 10
  5.2 Competitive Edge ....................................................................................................................................... 11
  5.3 Marketing Strategy ..................................................................................................................................... 11
  5.4 COSTS ....................................................................................................................................................... 12
  5.5 Pricing Strategy .......................................................................................................................................... 13
  5.6 Revenue ..................................................................................................................................................... 13
  5.7 Distribution Strategy .................................................................................................................................. 14
  5.8 Strategic Alliances ...................................................................................................................................... 14
  5.9 Critical Success Factors .............................................................................................................................. 14

6 Conclusion ....................................................................................................................................................... 15

References ............................................................................................................................................................ 16
1 Executive Summary

1.1 Objectives

Develop a business case for an energy audit software application that can be used on portable devices such as the iPad and reduce the time needed to complete an audit report by 50%.

1.2 Problem statement

A professional energy auditor is required to perform an audit on a home in order to receive an energy tax credit. A typical energy audit takes about two hours to collect home data. An additional two to three hours are spent in the office quantifying the collected data and creating a report. Then the auditor must arrange a time to review the report with the homeowners.

1.3 Consumers

The target audience is BPI and other professional energy auditors. Other effected parties include subcontractors, the homeowner, local auditors and curious homeowners.

1.4 High Level Solution

The auditor can enter data directly into an iPad application while on site, this application can then automatically generate a report, reducing the auditor’s time by at least 50%. This system also integrates with the auditor’s subcontractors and generates contracts based on the audit data. The proposed system would bring together data from multiple energy algorithms including geographical weather patterns and energy tax credits. The main technology components of the product will consists of a server, website, and a tablet application interface.
2 Introduction

Energy audits are increasing; their growth is driven by current energy tax credits. Tax credits range from huge breaks in the millions for large corporations to a few hundred dollars to a family for buying efficient appliances. Under the 2011 Stimulus Plan A 10% Federal Tax Credit is available to all homeowners and statewide programs range from 20% to 75%. Some states are currently proposing that an energy audit is performed before a home can be sold. An income tax credit worth up to $500 is available for all homeowners who weatherize their home and make it more energy efficient. These are just a few examples of the abundance of tax breaks for adhering to a more sustainable lifestyle. A majority of these federal and state tax credits require an energy audit done by a certified Building Performance Institute (BPI) auditor. BPI is a non-profit organization that develops standards and certifies professionals in the energy audit field. BPI even offers courses to just about anyone that would like to be certified. Among other things, students can:

- Learn basic principles of building science & 'house-as-a-system' approach
- Learn how to use a blower door fan & other diagnostic equipment
- Help homeowners save money on their energy bill
- Train to become a certified BPI professional

There are currently around 6,000 certified BPI auditors. Typically, it takes about two hours to collect home energy data for an audit. An additional two to three hours are spent in the office quantifying the collected data and creating a report. Once a report is created the auditor must then arrange a time with the homeowner and review the report. Audits typically cost about $250-$500, but a significant portion of the auditor’s income comes from
subcontracting the work for the energy remodeling. Software is available and the auditor must manually reenter all of the data gathered at the audit site. Software is often complex and specialized knowledge or programming is required. Occasionally, an auditor must use two different specialized programs, such as a home modeling and HVAC program, to complete a report.

With the rising price of energy and the availability of tax credits, companies and consumers are becoming more and more “green” every day. It is clear that the market for green and sustainable products and services is booming and will continue to do so.

3 Proposed System

3.1 Product and Service Overview

The proposed product to be developed is an energy software application centered around a mobile device. An auditor will enter data into the software, in real time, while at the audit site. The software will then compile the data and generate an interactive report and contracts. The backend of this software will be licensed from Energy Plus and an intuitive user interface as well as other enhancement features will be built on top of it. The backend of the software will be hosted on cloud servers that can be assessed at any time. The main technology components of the product will consists of a server, website, and a tablet application interface. Currently the iPad has the largest tablet market share and it is suggested that the iPad market be targeted first with other tablets being supported down the road. The server, provided by Amazon, will compile all of the auditor’s data. The server also communicates with the website and mobile application. This allows the user to view and edit data from the website that was entered on the iPad and vice versa.
3.2 How Technology is used

The target audience is the BPI and other energy auditors. Other affected parties include subcontractors, the homeowner, local auditors and curious homeowners. The cloud server is not used directly by any of the parties. The server serves as a data processing and communications hubs that compiles information from the website and the iPad. Appendix 1, list the flows of how each party interacts with the system. A complete flow chart is available in the attached PDF or can be accessed online from the link in the reference below. Below is how each party would use the website and iPad application.

3.2.1 Website

**ENERGY AUDITOR:** The auditor will first create an account and log into the website. From there the auditor can customize their page with their company’s logo, colors and personal settings. These changes will also appear when the auditor logs into the iPad app. After a report is generated it will also appear on the website which auditors may go back to and edit any information if needed. The website also provides an easy way for auditors to manage their customers and subcontractor contacts. Payment information, locations, notes, useful stats and more will be provided to the auditor from the website. Auditors may also use the website to connect with homeowner or subcontractors whom are looking for an auditor nearby.

**SUBCONTRACTOR:** The website is used by the subcontractor to network with local energy auditors. Potentially, an auditor may post open contract online and subcontractors may bid on these. However, this is not a Phase I priority and may be implemented later.
**HOMEOWNER**: The homeowner uses the website to learn about energy audits and find tax credits in their areas. After an audit has been performed, by using the system, the homeowner receives a custom URL where they can view their home energy report. This custom URL will also include the auditor’s company logo and other settings making it appear as if the website is part of the auditors company. Later versions of the website may include the ability to rate the auditor and an online store of energy reducing appliances.

### 3.2.2 iPad App

**ENTERGY AUDITOR**: The auditor will use the iPad to generate a report, on-site, which results in a 50% increase in productivity. The iPad benefits the auditor in the data collection process. First it is easy to use. The interface is more or less a digital clipboard that auditors are accustomed to and they are entering the same data in more or less the same process.

Secondly, an auditor can choose which type of audit they are doing. For example, an auditor performing an audit for the IRS would select the “IRS report” and an auditor performing an audit for the state of California would select the “CA report.” The data needed to be gathered for each report would be unique to the report and the app would only display the data fields that needed to be entered. An information icon is available next to each data field, when clicked on, it will display step-by-step instruction. This dramatically reduces the specialization knowledge required. Third, the App is able to take advantage of the iPad features, such as location based services, connectivity, or being able to take a picture or video of problem areas. Lastly and most
importantly, once the auditor has entered all of the required data a report is generated.

The auditor can then go over the energy report with the homeowner on-site. The report will have the auditors information entered from the website such as logos, colors, contact information and the information compiled from the data collection such as pictures and notes. The auditor would also use the app to create contracts for subcontractors or even post open contracts on the website for bidding. Furthermore, the generated report is interactive and data variables can be changed in real time.

**LOCAL UTILITIES/CURIous HOMEOWNER:** Local utility companies do perform audits and often at little or no cost. However, these audits are basic and typically not certified for energy tax credits. The proposed app will offer a free, basic, energy report. This ‘free’ report is targeted to local auditors, curious homeowners, or professional auditors who may want to preview the program. Local utilities would benefit from using the app because it standardizes the process, offers step-by-step instructions, a report is still generated, and it’s free. In addition to the free report being limited, the end of the report will display tax credits available in the homeowner’s area and the contacts for certified auditors required to get these tax credits.

### 3.2.3 User interface

Figures one and two show a wire frame drawing outlining the report selection and data entry screens. The report screen displays different reports that can be selected, allowing the user to purchase only the report he or she desires. This also creates an easy path to add new report in the future. Furthermore, the report system makes it easy to display only relative data fields. The end interface must be clean and
simple looking but not too different from the standard clipboards that are used today.

More wire frame drawings are shown in Appendix 2.

3.3 Future Products and services

The first iteration of the product will focus mainly on generating a report for the IRS and the state of California. Future iterations will include a wider variety of audit reports such as LEED, Energy Star, etc and include updated users features such as the bidding on open contracts. Global expansion is another future goal, the system is designed to be flexible and global versions of the software can be achieved with only minor alterations. Lastly, the
framework of this product and underlining concept may be applicable and expandable to other areas such as home inspection or financial audits.

4 Competition

Current competition includes established software that is currently being used by auditors. These include DOE-2, Energy Plus, MicroPas, eQuest, Energy Pro and others. Note that most of these software programs are based off DOE-2 and add their own improvements and interfaces. Some of these programs are free and some require an upfront cost. However, none will generate a report and some are limited to one specialization. An auditor will sometime have to use several different software solutions to complete a report. Furthermore, feedback from auditors indicated that these programs are difficult to use and lack a comprehensive intuitive user interface. Currently Recurve, is the only competitor that is capable of generating reports and is by far the largest competitor to the proposed systems.

4.1 Recurve

Since the company was founded in 2004 as a home performance company, they have completed over 2500 home energy audits and completed over 1500 home retrofit projects, mainly undertaking projects ranging within $10k - $15k. Rockport Capital, a leading venture capital firm, has financially backed Recurve. Recurve has been developing their windows based platform since 2009 and has received the prestigious “Flex Your Power” award for its efforts. The company is also rated as the 24th Top energy Company by Inc. 5000 (2010) and the 3rd most innovative energy company by Fast Company (2010).
However, Recurve has yet to release a final product and has not been able to stabilize itself in the software market. Many small business auditors have been trying to acquire a beta version with little success. The entry price is a $500 startup fee and a $40 per use price with minimum of 10 audits per month required. Larger companies are reporting that Recurve will not work with them on a price break and that their per month cost is too high. Smaller businesses that do get to trial the software cannot always meet the minimum of 10 audits per month. The company’s strategy is focused on larger auditing firms and their software is only capable of generating a generic type or report. The software requires windows operating system and flash. A computer can be brought into the audit home but the targeted process is to reenter data gathered from the home, much like the current software solutions.

5 Strategy and Implementation Summary

5.1 Value Proposition

As outlined above, this system will reduce the time it takes to complete an audit by 50%. This is a major impact in the industry. Currently auditors can only complete about two audits per day with this system, it can be doubled to four. Furthermore, less specialized knowledge is required and an auditor could potentially hire people to do the data collection. The system automatically generates reports that both the auditor and homeowner can view online. Contracts are also generate, which help support the auditors main source of income. All of this is available at a reasonable price per audit. There are no setup fees or commitment requirements.
5.2 Competitive Edge

Differencing features include, report section and generation, inputting data on site, scalability, and pricing. The biggest competitor by far is Recurve. However, their strategy is focused on larger firms and currently is limited to the state of California. The Recurve system is not mobile, not available on tablets (it is based on flash and cannot be ported to the iPad without significant recoding) and their software is only capable of generating a generic report. The proposed system is truly mobile and based around the iPad. This system can be brought into the home, via the iPad, and a report can be generated on site. Giving the user the choice to select which report to generate is a major feature. The data fields presented in the data collection process are only relevant to the type of report to be generated. Having a reports selection page and using Apple’s App Store makes it easy for developers to add new reports in the future. The system integrates with the auditor’s subcontractors information (contacts, prices, times, who does what) and can generate contracts for subcontractors, saving the auditor even more time. Finally, Recurve is in debt. The proposed system can be developed at low cost within a few months. This lower cost results in the ability to offer the product at a far lower price than the competitor is financially capable of.

5.3 Marketing Strategy

Marketing will be done by incorporating the product in the classroom. All professional auditors must take a BPI certification class before they can conduct audits. The free version or a trial version can be offered to incoming students. Not only would the app be free to try but the information ‘help bubbles’ would be beneficial to a new auditor learning the process. A referral program or collaborating with an audit firm would complement the classroom strategy.
A user who signs up other users may be rewarded with free reports, or cash back. In addition, a presents at energy trade shows and events would be a low cost way of promoting the product. This system will be available nationwide on day one, but marketing will focus on certain geographical areas. California is a natural first target market, which currently offers the largest and most aggressive tax credits. California also has the strictest compliance requirements; an approval from California will most likely supersede any other states requirements.

5.4 COSTS

The main costs associated with developing the product are listed below. These costs are unique to the product and do not take into account computers, office space, and other overhead cost that a company may or may not already possess.

LICENSING: This system is based upon approved energy algorithms. Licensing the proven software saves thousands of development hours and streamlines the certification process. The software to be used on the backend is Energy Plus. This software is proven, affordable, and already certified for many energy functions. Energy Plus requires a one-time fee of $1,800 for the source code and $1,200 for a distribution license. Tax data can be licensed from the Database of State Incentives for Renewable & Efficiency (DSIRE) for a setup fee of $3,550, an annual fee of $3,250, and a zip code search fee of $3,000. The tax data is used to find local and federal tax credits in the homeowner’s area. The last licensing fee required is for an Apple developer account at a fee of $99 per year.

CERTIFICATIONS: Certification is required for energy software. These certifications are with the California Energy Commission (CEC) and Internal Revenue Service (IRS). The costs will
be one-time investments at $2,000 and $1,000 respectively. Energy Plus is certified in by the IRS and may not need to be certified again provided that the proposed system does not change data processes. However, this was not immediately clear.

**CLOUD SERVICES:** An internal server can be used however; it is recommended that Amazon Cloud server be used. The Amazon Cloud server is fast, secure, affordable, and will be able to handle major fluctuations in user’s data. The cost of the server is $0.085 per hour.

### 5.5 Pricing Strategy

The pricing for each type or report will be different. A more complex report may cost more while a basic report would cost less. In general, the strategy is to start out below or match Recurve’s price of $40 per use and require no set up fee or minimum. This price can be easily adjusted through the Apple App Store. In addition a free basic report is available. This ‘free’ report is targeted to local auditors, curious homeowners, or professional auditors who may want to preview the program. In addition to the free report being limited the end of the report will display tax credit available in the homeowner’s area and the contacts for certified auditors that are required to get these tax credits.

### 5.6 Revenue

Revenue is equal to (Price)*(Audits done per day)*(% of Market shared)*(Total Auditors).

There are about 6000 BPI auditors in the field today and they typically preform about two audits per day. The systems can double that to four audits per day. The revenue is difficult to determine due to these variables. A revenue of at least a million dollars is achievable with a sales price of $5, averaging 1.5 audits per day (assuming 240 work days per year), and a 10% market share. Revenue of $5-$10 million is an achievable goal for the first year of operation.
5.7 Distribution Strategy

The software will be distributed thru the Apple App Store. The App Store provides an easy way to distribute and manage software. This centralized hub provides an easy way to send out software updates and adjust pricing if needed.

5.8 Strategic Alliances

Relationships with BPI auditors and the BPI organization are critical. This system must meet all of BPI standards and perform within each auditors expectations. A partnership with a major audit-training firm, such as Ever Blue, would provide a great starting point for the service. An audit-training partner could potentially receive a royalty for each software activated thru them.

5.9 Critical Success Factors

Critical success factors are listed below. The above sections outline how the product can mitigate each of these risks.

- Certification from the IRS and the state of California.
- Adoption rate. The software is new and innovative compared to current software and some users may not prefer change.
- Flexibility. The system and the development must be able to adapt quickly to new energy policies and requirements.
- Low price and better software. To gain market share and fend off competition the system must be easy to use and work well at an affordable price.
6 Conclusion

The need for energy audits is growing. Auditors have more work to do and require better, more productive software. Competition is limited and thus far, no one competitor has been able to deliver a comprehensive system that is mobile, generates reports on site, intergrades with subcontractors, and at an affordable price. This proposed system should exceed users’ needs and expectation. This product can be developed at relatively low cost in a short time frame. Furthermore, the system is designed for easy scalability. Future expansions including a quick global expansion are all easily achievable. The system outlined above meet outlined above there are many advantages to creating this system
References

Data Process Flow – Online Master flow chart
https://docs.google.com/a/idesignco.org/viewer?a=v&pid=explorer&chrome=true&srcid=0B_tc-KGYtmm-NTI2ZWtM4OTAtYjNjN00NDk0LWI4MjktNTBkYzZiNTcwYjNk&hl=en

BPI home page
www.bpi.org

Business Insider – Apple iPad market

California Energy Commissions – California’s energy polices
http://www.energy.ca.gov/

Database of State Incentives for Renewable & Efficiency – Tax data
http://www.dsireusa.org/

Department of Energy
www.energy.gov

DOE-2 – Energy data
http://www.doe2.com/

Energy Plus software page
http://apps1.eere.energy.gov/buildings/energyplus/

Energy Start appliance program
www.energystar.gov

Ever Blue – Major BPI certification school
http://www.everblue.edu/

IRS qualified sotware
http://www1.eere.energy.gov/buildings/qualified_software.html

IRS tax certification and standards
www.resnet.us

National energy audits
http://www.nationalenergyaudits.com/credits.php

Nevada proposal requiring audits performed before selling of a house
http://www.nevadaenergyaudit.com/

Recurve home page
www.recurve.com
Appendix 2. Wireframes of User Interface

Home Screen

Report Selection Screen
Appendix 2 cont. Wireframes of User Interface

General Data Entry Screen
Appendix 2 cont. Wireframes of User Interface

Main Report View

Packages Options Displayed Inside the Report View
Appendix 2 cont. Wireframes of User Interface

Package Selected and more details are show

My Reports Screen, accessed from the home screen