“Offering a customized and comprehensive service that enables homeowners to reduce personal energy usage and spending.”

Program Briefing
Fall 2009
Why Improve Home Energy Efficiency?

- Reduce home energy costs
- Reduce environmental impact or “footprint”
- Increase home value
- To take advantage of available tax credits and banking incentives
- 20.8% of all greenhouse gas emissions by end use in the US come from residential buildings

Homeowners have limited integrated service options to assist them.
Home energy audits diagnose problems but do not prescribe solutions.
Marketplace is placing positive values on green homes and buildings.
Homeowners are looking for cost-effective ways to improve their homes while being sensitive to the recession.
Business Overview

VERSION 1.0 (SPRING 2009)

- 3 stage business model
  - Stage 1: Home Energy Audit
  - Stage 2: Opportunity Assessment
  - Stage 3: Project Consultation
- Team of three senior chemical engineers working on Stage 1

VERSION 2.0 (FALL 2009)

- All-inclusive expanded home energy audit (Stages 1 and 2 combined)
- Team of seven senior chemical engineers and one graduate student working on all-inclusive home energy audits
Energy Audit Equipment

BLOWER DOOR INFILTRATION
- Provides auditors with a measure of a building’s leakage rate
- Results given as:
  - Air Changes per Hour (ACH)
  - ASHRAE standard 62-1999 gives a minimum for indoor air quality (0.35 ACH)
  - Effective Leakage Area (ft²)

INFRARED IMAGING CAMERA
- Allows auditors to literally “see” imperfections in:
  - Insulation
  - Building Envelope
  - Sources of infiltration
Energy Audit Protocol

- Review Preliminary Home Profile and complete audit questionnaire with homeowner
- Visual Inspection
- Infiltration test and IR camera inspection
- Perform Assessments (as described on next slide)
- Attic and basement assessments
- Wrap-up meeting with homeowner

Elapsed Time, approximately 1.5 hours

Audit Protocol diagram from homeowner handout
Energy Audit Dashboards

Table of contents from Audit Report

- Infiltration p.3
- Solar Potential p.4
- Windows p.5
- HVAC p.5
- Insulation p.5
- Hot Water p.5
- Insulation p.5
- Appliances p.6
- Electronics p.6
- Lighting p.6
- Carbon Footprint p.6
Scaling of Dashboards

- Each assessment that we perform will receive a numerical score on a scale from 0-100.
- All the dashboard scores will then be compiled to develop an overall home score in the green, yellow, or red range.

![Insulation](image1.png)  ![Windows](image2.png)

95
60

95 65 35
## In-depth Recommendations

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<th>Cost</th>
<th>Skill Level</th>
<th>Savings (per year)</th>
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<tr>
<td>$</td>
<td>Do it yourself</td>
<td>$0-$50</td>
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<tr>
<td>$ $</td>
<td>Do it yourself, but some skill required</td>
<td>$50-$200</td>
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<td>$ $ $</td>
<td>Professional help required</td>
<td>$200+</td>
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<td>$ $ $ $</td>
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<table>
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<th>Recommendation</th>
<th>Cost</th>
<th>Skill Level</th>
<th>Savings</th>
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<tbody>
<tr>
<td>Apply weatherstripping to attic door</td>
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<td></td>
<td>$</td>
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<tr>
<td>Buy new ENERGY STAR rated refrigerator</td>
<td>$$$$</td>
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<td>Add insulation to attic</td>
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<td>$</td>
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<tr>
<td>Etc.</td>
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Future of PowerHouse

- Version 2.0 pilot audits throughout Fall 2009
- Integration of VU School of Business students to assist with marketing and finance
- Introduction of Social Entrepreneurship model, where revenue from audits will be reinvested for new equipment and to perform audits for low-income housing in the area