



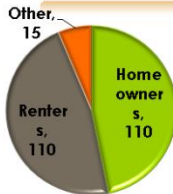
# POE Method

## Survey

- Quantitative research utilizing survey questionnaire
- Samples
  - Residents living in LEED-certified homes in the Midwest including Michigan, Minnesota, Missouri, Ohio, Illinois, and Indiana
- Data collection
  - Mail-in survey conducted from January through March 2012
  - 38.8% response rate
    - 605 surveys were sent out
    - 235 completed surveys were collected
  - \$10 gift certificated offered to all respondents

## Home Ownership

## Survey Participants

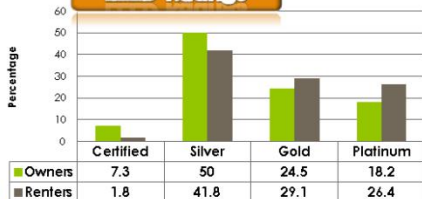


- 110 home owners
- 110 renters
- 15 unidentified

## Housing Types



## LEED Ratings



# Post Occupancy Evaluation of LEED-certified Home

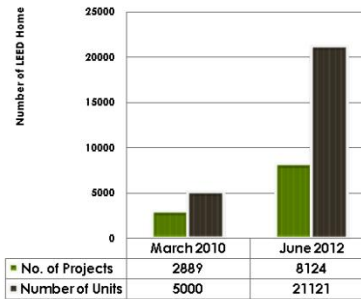
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## LEED for Home

- The number of LEED-certified homes increased tremendously over the past few years
- However, there is little information about the actual performance of LEED-certified homes from the occupants' perspective in terms of energy efficiency, health impact, indoor environmental quality, resident satisfaction, and well-being.

## LEED Home Today

Number of LEED Home



## Why Post Occupancy Evaluation?

### Purpose of Study

- The purpose of this Post Occupancy Evaluation was to identify the actual performance of LEED-certified homes in order to identify the benefits and shortcomings of green home practices and to provide feedback for future LEED home projects.

This project was funded by Institute for Public Policy and Social Research (IPPSR), Michigan State University. The survey Data was collected in collaboration with Alliance for Environmental Sustainability (AES).



School of Planning, Design and Construction

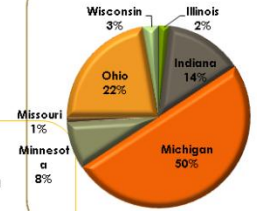
Institute For Public Policy and Social Research



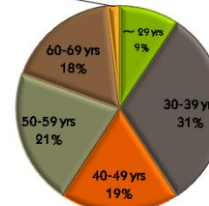
alliance for environmental sustainability



## Home Owner



## Age Distribution



## Demographics

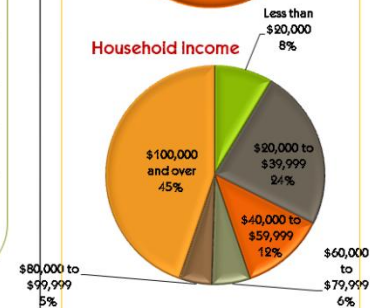
**Gender**  
51% Female, 49% Male

**Race**  
78% White, 12% Black, 4% Asian

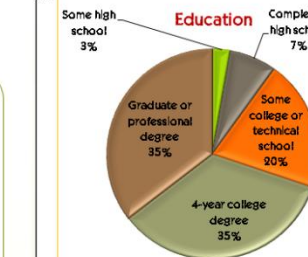
**Marital Status**  
62% Married, 19% Never Married

**Age**  
M = 51.97 (SD = 16.43)

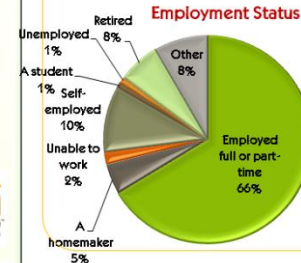
## Household Income



## Education



## Employment Status





## Health Impact

### Emotional Health

- ✓ **35.2%** of respondents who had anxiety reported decreased anxiety level.
- ✓ **30.0%** of respondents who had stress reported decreased stress level.
- ✓ **37.5%** of respondents who had depression indicated decrease in their depression.

### Physical Health

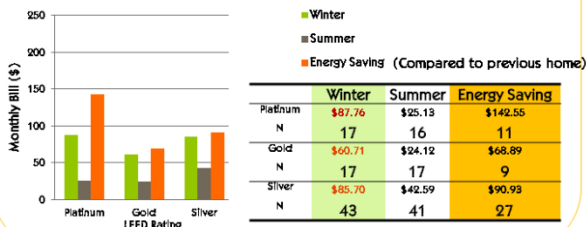
Respondents indicated decrease in their (or their family member's) physical health problems since moving into their LEED-certified home

- ✓ **73.3%** of respondents reported decrease in **asthma symptoms**
- ✓ **42.8%** of respondent reported decrease in **sensitivities to chemicals**
- ✓ **40.0%** of respondents reported decrease in **irritation in eye/nose/throat**
- ✓ **32.2%** of respondents reported decrease in **headache/fatigue/dizziness**

- ✓ **92.4%** of home owners (N=105) indicated their home was energy efficient.

- ✓ **Monthly savings on gas bill** (N=51) compared to previous home
  - ✓ **33.2%** of respondents saved **over \$100**
  - ✓ **31.3%** of respondents saved **\$41 - \$100**
  - ✓ **20.4%** of respondents saved **under \$40**

### Average Gas Bill & Energy Savings by LEED Rating



## Energy Efficiency

### Home & Neighborhood Satisfaction

- ✓ **91.5%** of all respondents (N=232) are satisfied with their LEED home.
- ✓ **53.0%** rated 7 point out of 7 for very satisfied with their home.
  - ✓ **LEED home owners** were significantly more satisfied with their homes than renters.
  - ✓ Residents of **single-family detached house** were more satisfied with their homes than those in condos, duplex, or apartment.
  - ✓ There was **no significant** difference in home satisfaction depending **on the LEED ratings**.

### Nearly 100% of LEED home owners rated high on their quality of life

- ✓ **96.2%** of respondents rated good or excellent on **Physical well-being**
- ✓ **97.2%** of respondents rated good or excellent on **emotional state**
- ✓ **97.2%** of respondents rated good or excellent on **enjoyment of life**
- ✓ **99.1%** of respondents rated good or excellent on **overall quality of life**

### Improvement in quality of life since becoming a residents of a LEED home

- ✓ **More than 80%** of LEED home owners indicated improvement in **their living condition and their quality of life**
- ✓ **More than half** of home owners agreed on the improvement in their **children's school performance, family member's health, and engagement with neighbors**.

## Quality Of Life

## Residential Satisfaction

## Perceived IEQ

LEED home owners were satisfied with their indoor environmental quality.

- ✓ More than 90% of respondents indicated their home as :
  - Comfortable, attractive, safe, pleasant, convenient, stimulating, sanitary, healthy, and sustainable**
- ✓ **Higher satisfaction on:**
  - ✓ **space layout, size of space, air quality, amount of daylight, and quality of artificial light**
- ✓ **Lower satisfaction on :**
  - ✓ **visual privacy, outside views humidity, acoustic quality**
- ✓ **87.3%** of home owners lived in **smoke-free homes**.

## Environmental Attitude

- ✓ **48.6%** of LEED home residents (including both home owners and renters) knew their homes' LEED ratings correctly.
  - ✓ **72.8%** of the home owners and **27.8%** of the renters knew their homes' LEED ratings correctly.
- ✓ **21.1%** of the home owners and **3.8%** of the renters indicated that they had attended LEED classes
- ✓ Home owners were more likely to participate in pro-environmental activities more than renters.