Oak Park seeks to reduce town-wide energy consumption and carbon emissions by 30%.

In order to become a more competitive and appealing community, the Village of Oak Park seeks to become more energy efficient.
Past Semester

- First semester for IPRO
- Researched history of Oak Park
- Energy audits
- Identified Strategies
  - Passive
  - Active
  - Community-wide
This Semester

- Develop basic energy efficiency package
- Evaluate Oak Park Building Typology
  - Frame/Stucco/Masonry
  - Age
  - Size
- Compile database of Oak Park building inventory
- Distribute Home Owner Survey
- Develop Website
The Village of Oak Park

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Funding Methods

- Tax Credits – many credit up to $1500
- Special Finance Rates – Green Bank

Potential emerging technologies

- Geothermal
- Solar Heating
- Spray Expandable Foam Insulation
- Home Energy Controllers
- Standby Power Reduction
Home Energy Controller

- Costs - $150 - $1500 per home (dependent on system type)
- Manage energy budget based on real-time energy costs and usage
- Control energy usage for large appliances
- Monitor conditions and remotely adjust heating and cooling
- Cisco, Google, Smart Home, and Microsoft

Spray Expandable Foam Insulation

- Insulates and Reduces air infiltration
- Acts as a vapor barrier
- Payback in 7-8 years
- BioFoam and Astro Insulation in Chicago
Standby Power Reduction

- Built-in or aftermarket products available
- Can operate on a timer and turn power off automatically
- Stops electric from being consumed for standby, reducing electric bill
- Relatively low initial cost for aftermarket products

Solar Heating

- Easily incorporated into a wide variety of heating systems
- Can provide most heating necessary for typical domestic hot water in Illinois homes
- Payback in 3-5 years for individual systems
- Oak Park has favorable weather conditions for Solar Heating
- Installers - Solar Energy of Illinois and Natural Dynamics
Geothermal

- Energy audits make sizing a system easy for future IPROs
- Systems have been installed and studied
- Systems have been installed in climate similar to Oak Park
  - Hartford, Connecticut and Sandusky, Ohio Case Studies
  - Each used deep wells, saved $400 - $500 per year
- Oak Park has several systems installed already
- Ground temperatures in Illinois work well with heating and cooling
- Typical Houses in Oak Park will need 2 tons of cooling & 500’ of vertical tubing
- Horizontal Systems are less efficient, but are cheaper
- Vertical Systems are more efficient, but cost more
Built a database containing details of every residential and commercial building/condominium in Oak Park

Obtained data from two sources: the Cook County Assessor’s Office and Geographic Information System (GIS) inherited from the preceding IPRO group

Data collection was performed through scripts written in Hypertext Preprocessor (PHP) and MySQL
Compiled a database table listing every PIN entry from the Cook County Assessor’s (CCA) database

A PHP script accessed the database PIN list to sequentially visit each PIN’s webpage to turn its contents into a document object model (DOM)

Each DOM was pruned and its contents were assigned to variables that were inserted into the fields of another database table
Database results from the Cook County Assessor’s PHP script were exported to Excel workbook format.

Geographic Information System (GIS) data was imported into the MySQL database and cross-referenced with existing CCA data by another PHP script.

Distinct addresses from the CCA & GIS databases were merged, totaling over 25,000 buildings.
Continually Build/Update Oak Park Database

Home Condition

Monthly Energy Bills

Peak & Off-Peak

Knowledge of Potential Energy Reduction Strategies

Interest Level in Retrofits
- Manual check of housing inventory
- Visual display of housing types/statistics by region
- Capable of housing oak park energy use statistics
  - In real time
  - Next step
Study of the other communities

- Research other communities that have similar purpose with our team
- Provide proven methods to improve the town

Research of Oak park

- Identify similar patterns among Oak Park Housing typologies
- Identify common issues and solutions, especially in historic buildings
Energy Audit

Survey of Energy audit reports of typical Oak park houses

Provide recommendations and Installation methods

Example

1910’s Stucco Bungalow

What type of insulation and how should it be installed
Gain a better understanding of current state of many homes

Built two wall sections

- Insulated with newspaper
- Foam Insulation

Used thermal imaging gun to view heat loss through walls
 Started development of a website

- Stores all findings done by IPRO team in accessible format
- Home improvement hub for Oak Park home owners
- Help home owners gain ideas and basic knowledge of energy efficiency
Smart Grid System

- Merge electricity with technology
- Real Time Pricing
- 70% improvement in reliability
- 50% improvements in energy conservation and carbon emissions.

In Conjunction with Home Automation Systems

- More conscious energy use
- Lower total use at competitive prices
Case study participants’ privacy

Accuracy and relevance of our information to the Village of Oak Park

Reliable and accurate source of research materials
With the current state of many homes in Oak Park, reducing energy usage per home is an important task.

Additional projects will have to be done with the town’s energy delivery to reach the desired reduction such as smart grids and home automation.
• Continue work on energy efficiency packages for case studies
• Expand database/GIS with more building information
  • Current energy use statistics per house
• Develop a basic home automation solution
• Marketing for Smart Grid system
• Continue work with Citizens Utility Board on generating peak energy graphs
QUESTIONS?