IPRO 329: -oak park energy efficiency -carbon reduction

ILLINOIS INSTITUTE OF TECHNOLOGY

IPRO It takes a team!

Problem: Many homes in Oak Park are inefficient and their owners are unaware of the long-term benefits of making them more efficient.

The Village of Oak Park would like to become a more energy efficient community with a smaller carbon footprint.

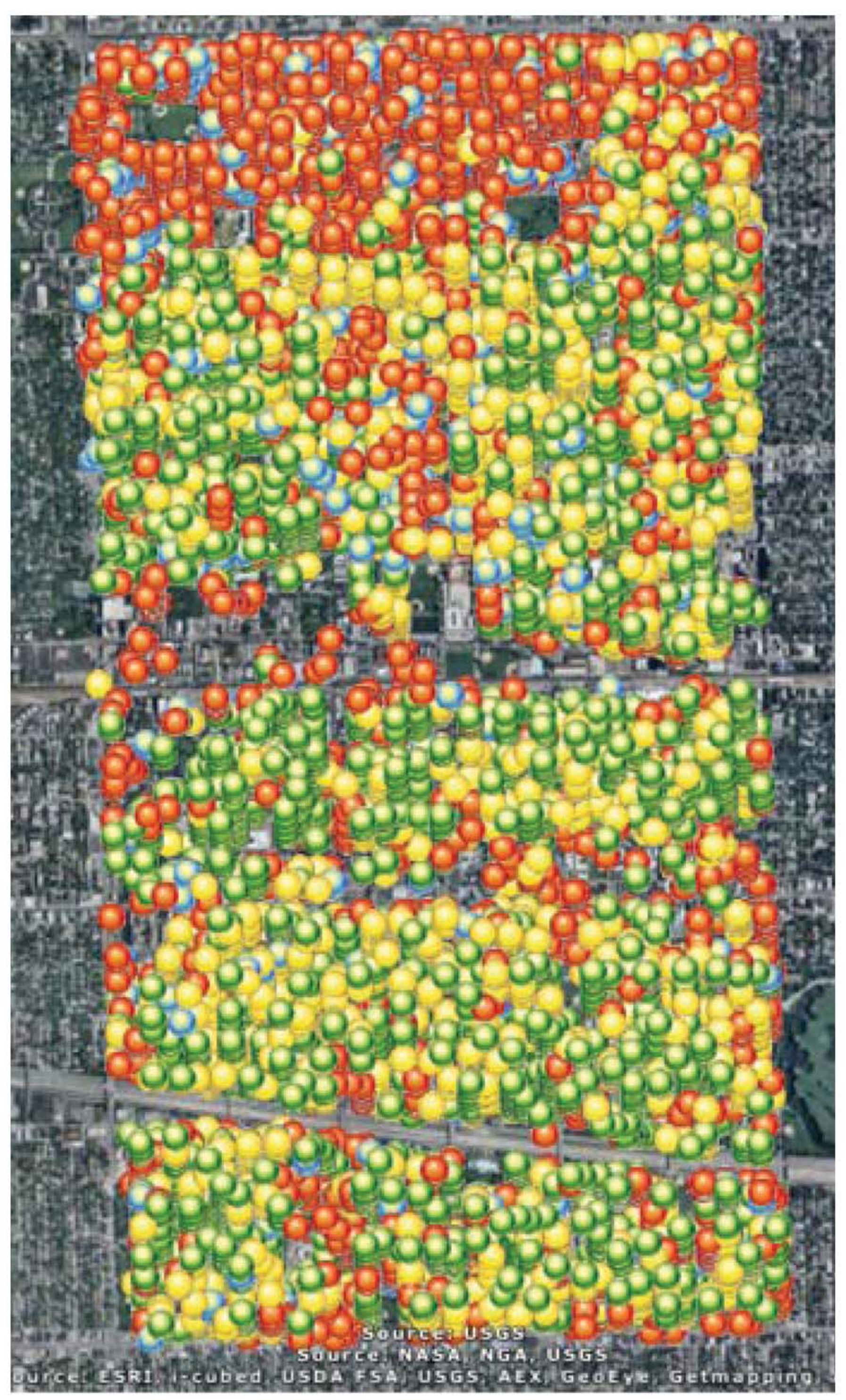
Background: Currently, over 80% of homes in Oak Park date to 95+ years. Many of these homes are not up to date with renovations. Oak Park, along with IPRO 329 seeks to create a long term community financing and education program for its residents, resulting in a 20% decrease in energy usage and carbon outputs.

Goals: Evaluate Oak Park's building typology

Create a comprehensive database reflecting the total building count and relevant data

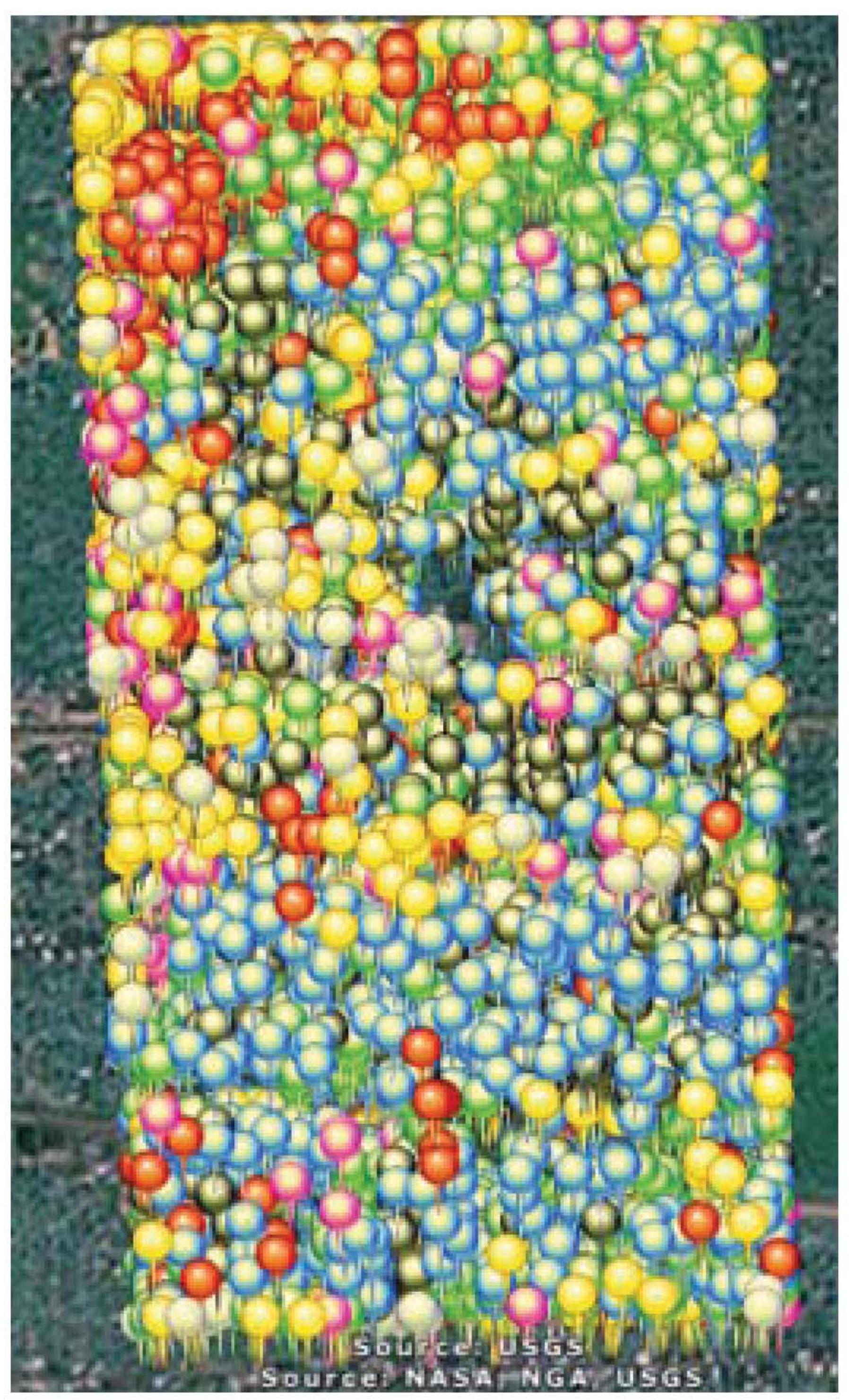
Perform energy audits and recommend suggestions for energy improvement

Database Results:



House Type

- Frame/Masonry
- Masonry
- Stucco
- Frame



House Age

- 0-19
- 20-39
- 40-59
- 60-79
- 80-89
- 90-99
- 100+

House Size

- 500-1499 sf
- 1500-2250 sf
- 2251-2999 sf
- 3000+ sf

Case Studies and Audits:

Oak Park, IL
Land Square Footage: 8,900
Building Square Footage : 2,208
Cost : $567,590 in 2010
Age : 110 years

The 1918's two story, east-facing, frame house with stucco exterior and concrete foundation walls

Insulation Conditions and Recommendations

Surface to be Insulated	Location	Recommended R-Value USDOE**	Existing R-Value	Cavity Insl R-value & Type & Depth	Cavity Depth, in.	Recommended Cavity Insulation	Continuous Insl, Type & Thickness	Recommended Continuous Insl	Est % Defective Insl Placement	Correct Defects?	Priority
Pitched Roof, Rafter Cavities	Main Attic	49	19	Bfg, 5.5"	5.5		none	Action Plan	10%	Yes	A
Attic Floor, Below Flooring	Main Attic	49	0		7.5	Action Plan	none	Action Plan			A
Attic Space, No Access	Rear Mudroom	49	19*	Bfg*, 5.5"	5.5*			Lcl, R-30			A-
Wall, Frame w/ Stucco	1st and 2nd Floors	18	0		3.5	Dcl, 3.5"					A
Floor above Unheated	2nd Fl Bedrm- SW	25	0*		7.5						
Floor above Unheated	3 season porch - S	25	19	Bfg, 5.5"	5.5						
Floor above Unheated	W. porch/mudrm	25	19	Bfg, 5.5"	5.5						
Floor Cavity Perimeter	Basement	18	0			Rxps, 2"					A
Floor Cavity Perimeter	Crawl Spaces	18	19			Action Plan					
Basement Wall	Unfinished Bsmt	11	0					Action Plan			B/C
Crawl Space Wall	South & West Crawls	11	0					Rxps, 2"			A

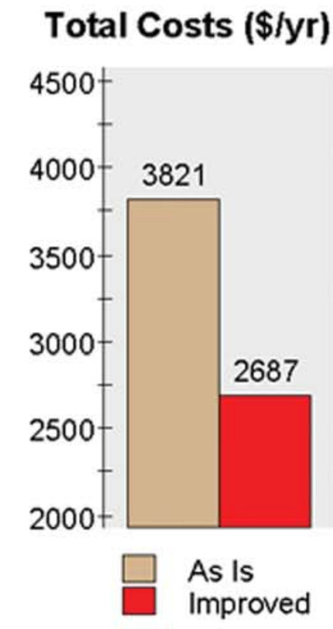
Oak Park, IL
Land Square Footage: 8,900
Building Square Footage : 2,208
Cost : $567,590 in 2010
Age : 110 year

The 1890's 2 ½ story, 4 bedroom frame house

Energy Costs ($/yr)

End-Use	As Is	With All Improvements	Savings
Heating	2212	1035	1177
Cooling	146	191	-44
Hot Water	249	229	20
Lights and Appliances	1011	1029	-19
Photovoltaics	-0	-0	0
Service Charge	206	206	0
TOTAL	3824	2690	1134

Total Costs ($/yr)

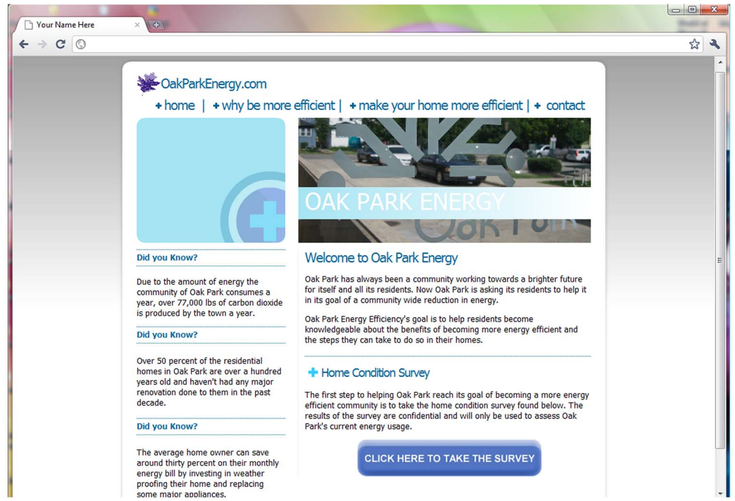


IPRO 329: -oak park energy efficiency -carbon reduction

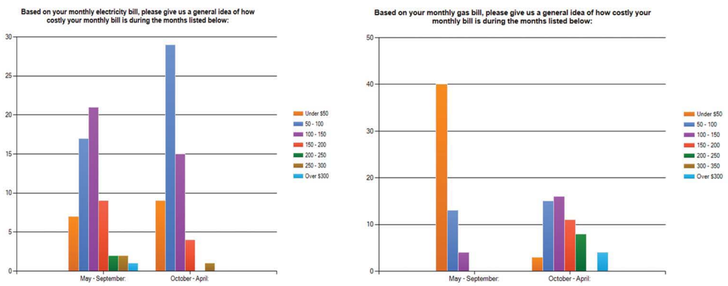
ILLINOIS INSTITUTE OF TECHNOLOGY

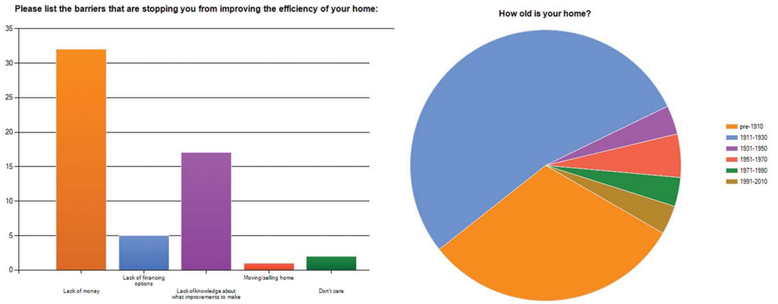
IPRO It takes a team!

Website:

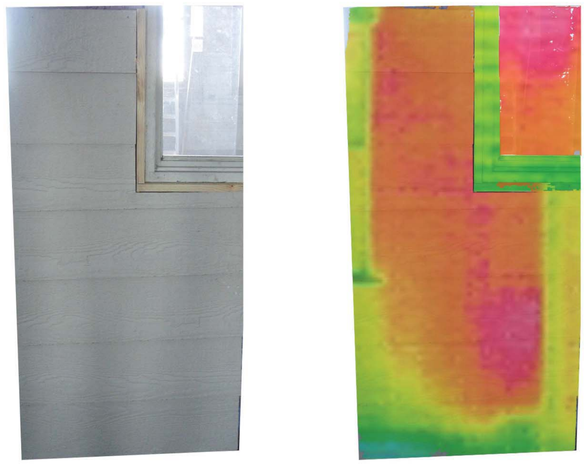


Survey:

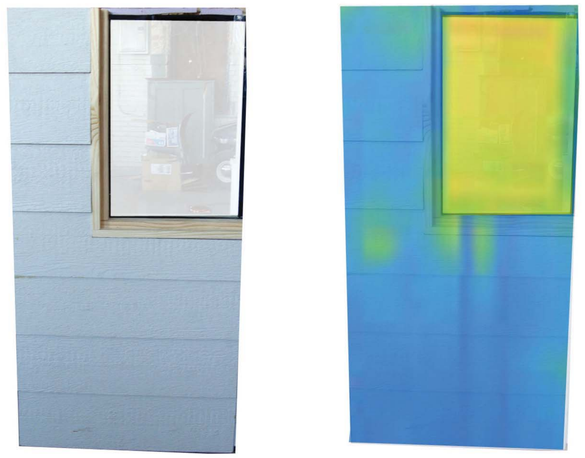




Wall Sections: *Thermal Imaging*



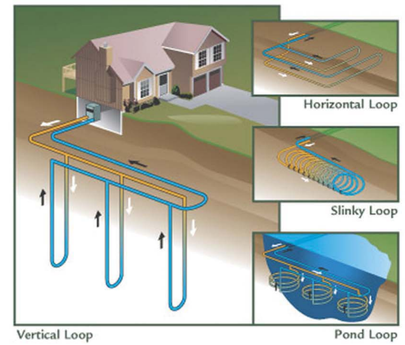
Old Construction Practices



New Construction Practices

Technologies:

Home Energy Monitoring



Geothermal Heating and Cooling

Future IPRO work::

The Village of Oak Park is seeking to dramatically reduce electricity costs while improving reliability, conservation and environmental impacts . This IPRO will involve developing innovative design solutions and tools that provide a path to Perfect Power.

- ***Reliability*** *- Baseline modeling and System boundaries*
- ***Clean generation*** *- Research ethical costs of implementing wind, bioenergy, hydro, recycled energy, geothermal, etc.. energy sources*
- ***Home automation*** *- Create home automation systems includes apps which can control the system from remote devices*