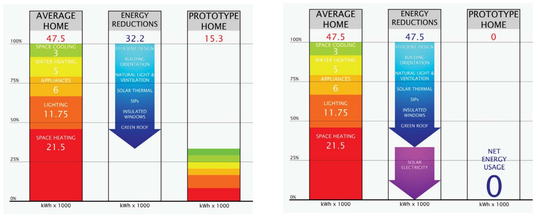
IPRO 323
ZERO ENERGY COMMUNIITY

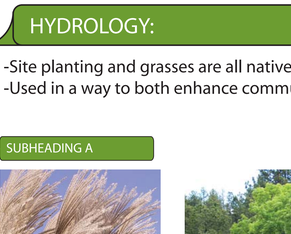
ENERGY & COST IMPACT:

ENERGY REDUCTIONS:



COST REDUCTIONS:

ANNUAL ELECTRIC CONSUMPTION
15,300 kWh
ANNUAL GAS CONSUMPTION
0 kWh (converted from Btu)



AVERAGE VS. PROTOTYPE
AVERAGE ANNUAL USAGE
47,600 kWh
PROTOTYPE ANNUAL USAGE
15,300 kWh

SAVINGS
32,300 kWh
@ $0.107
$3,456/year
OVER A 30 YEAR MORTGAGE
$183,680

ENVIRONMENTAL IMPACT:

CARBON FOOTPRINT

A carbon footprint is "the total set of GHG (greenhouse gas) emissions caused directly and indirectly by an individual or household."

*Based solely on energy consumption.

Average Home Carbon Footprint
95,742 lbs of CO_2

Prototype Home Carbon Footprint
45,465 lbs of CO_2

HYDROLOGY:

-Site planting and grasses are all native and drought tolerant
-Used in a way to both enhance community and educate

SUBHEADING A

SITE PLANS:

Full Site Plan

Module Site Plan

Site Features
-Checkerboard building layout

-Passive solar thru shadow elimination

-Reduced footprint: increased green-space

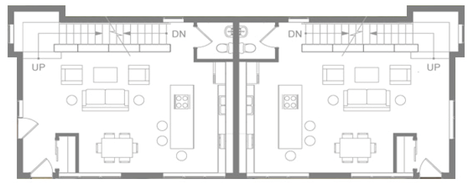
-Eliminate alley: gain central green corridor

-Reduced footprint: Double density

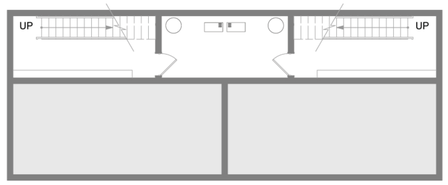
-Shared drives reduce impervious surface

-Shared spaces on site enhance community

FLOOR PLANS



First Floor



Basement Plan

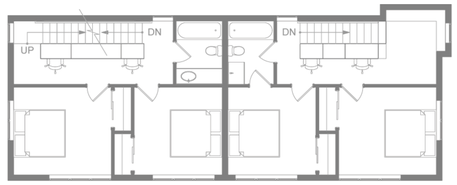
Unit Features
-Reduced square footage

-Shared plumbing wall

-Shared basement

-Shared infrastructure

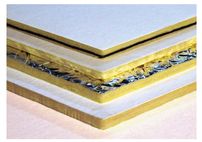
Third Floor



Second Floor

BUILDING MATERIALS

- SUSTAINABLE FLOORING

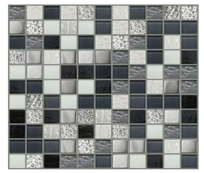


- ACOUSTIC CEILING TILES

- LOW VOC PAINT

- RECYCLED CARPET

- RECYCLED COUNTERTOP



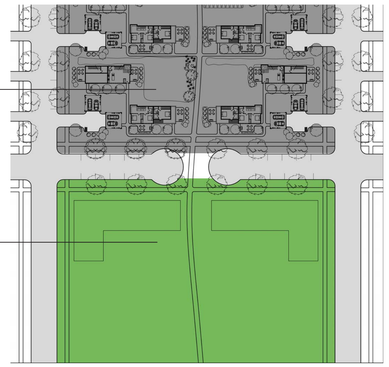
- RECYCLED TILES

FUTURE PLANS:

PROJECT STATEMENT:

This semesters project was to define and develop a net zero energy community. That community was a block of residential duplexes. Next semester will expand on this idea and develop live/work structures on the adjacent block to z the sense of community.

LIVE/WORK DIAGRAM:



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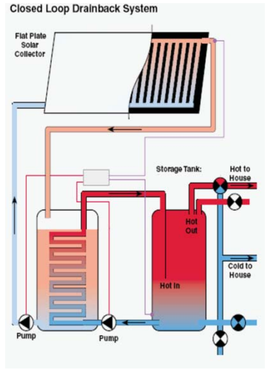
ZERO ENERGY COMMUNIITY

SOLAR THERMAL:

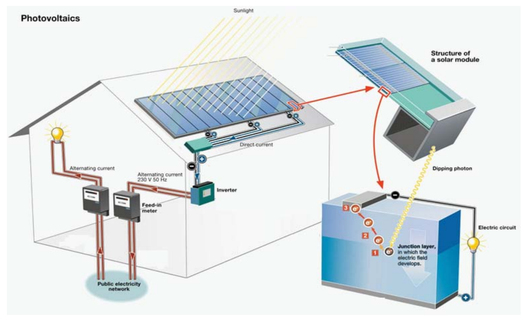
-provides financial savings since the energy used is not coming from the utility company

-are aluminum panels with copper tubes laid on their surfaces located on the roof

-don't use fossil fuels, thus reducing greenhouse gases

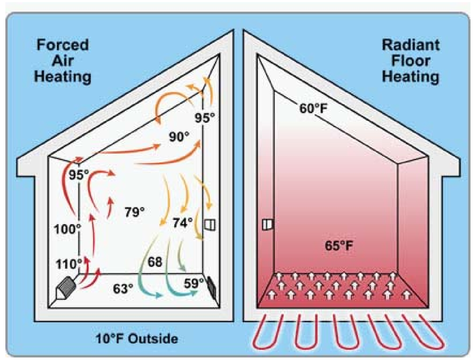


PHOTOVOLTAICS:



- Solar panels located on roof of carport
- Utilizes net metering to buy and sell back to grid based on usage
-Long life span with moderate payback time

RADIANT FLOORING:



- Hot water circulated under the floor
-Saves up to 40% on energy costs compared to forced air
-Payback period under 7 years

PASSIVE SYSTEMS:

SOLAR GAIN:
-winter: south-facing glass provides heat gain, designed around winter solstice
-summer shading devices blocks intense sun, designed around summer solstice

NATURAL VENTILATION:
-operable windows at floor and clere-stories in bedrooms allow fresh air
-open-riser stair welll with chimney releases air by stack ventilation

LIGHT SHELF:
-during day, light shelf brings light deep into spaces

INSULATING SHUTTER:
-during night, light shelf turns into insulating shutters, reducing heat

VIEW OF MODULE FROM STREET

PROBLEM STATEMENT

THE PROBLEM:
The IPRO's problem is to utilize technology as a design tool in the development of a zero-energy residential community. In the current economic climate, the private sector will not likely be invested in such an endeavor. Energy usage is becoming an ever increasing concern and if communities can share infrastructure and share energy generated on-site, Zero CommunIITy may become a reality. This is an opportunity for the IIT community to establish guidelines for approaching forward thinking community planning in our near future. Current municipal zoning codes do not take into account the every changing technologies and methods used in construction and planning.

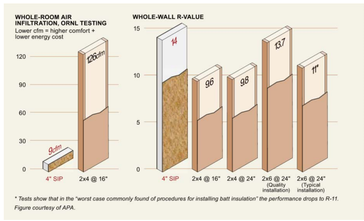
OUR MISSION:
-create a zero energy community
-encourage Chicago suburbs to reassess standards
-influence planning of future communities
-community with a higher density than the typical
-community which collectively uses its available resources to produce energy unlike the typical.

STRUCTURAL INSULATED PANELS:

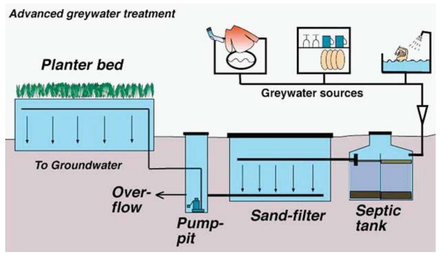
THERMAL BRIDGING OF STANDARD STUD WALL:

-Provides higher R-value energy to produce than fiberglass insulation

PERFORMANCE:



GREY WATER RECYCLING:



-Reuses shower, laundry water to irrigate landscaping
-Reduces amount of water sent off site