

GREENSBURG GREEN NEIGHBORHOODS

MEETING THE NEEDS OF SENIORS, CHILDREN, AND NON-NUCLEAR FAMILIES

*GREENSBURG, KANSAS
NOVEMBER 2010*



PLANNING STUDY FOR SUSTAINABLE NEIGHBORHOOD INFILL:

THREE SITES:

GREEN VILLAGE: 2 ACRES, 34 DWELLINGS

GREEN YARDS: @ 8-12 DU/ACRE

GREEN MARKET: 1/2 ACRE MAIN STREET SITE



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Greensburg is a farming town on the high plains of south central Kansas. Its population was 1,400 persons at the time it was devastated by a tornado in May 2007. Greensburg is being rebuilt as a model green town, with green jobs, green infrastructure, and a culture of stewardship.



SCOPE:

- Planning Study for Sustainable Neighborhood Infill Development for Greensburg, Kansas. Study is also relevant to other high plains farming towns that have been losing population for 50 years. Sustainable development patterns could help small farming towns to improve public health and reduce their CO2 emissions per capita while sustaining their local communities, economies, and population.

CLIENT:

- Greensburg GreenTown, a non-profit coordinating the sustainability efforts for Greensburg, Kansas, that was destroyed in a 2007 tornado and is being rebuilt as a model green town.

SCHEDULE:

- 2009 Site Reconnaissance, Site Analysis, Review existing planning documents, meetings and communications with Greensburg GreenTown and city staff.
- 2010 Planning study. Complete summer, 2010.

SUSTAINABILITY GOALS:

- Provide neighborhood development patterns that better meet the needs of children, seniors, young adults, and a variety of types of families.
- Support community and local stewardship while sustaining people's need for privacy.
- Connect daily life with natural processes and resource conservation including ecology, water, sun, energy, and food production.
- Improve public health by supporting urban agriculture, access to and consumption of local food, and neighborhood walkability.
- Provide neighborhood infill development patterns that make it easy for people to reduce their CO2 emissions, dramatically conserve energy and water.
- Provide neighborhood development patterns that make it easy to achieve net-zero energy: Optimize perfect passive solar orientation with neighborhood design and plan for modular, air tight home construction that can utilize "passive house" strategies to achieve net-zero energy.

THREE SITES

1) GREEN VILLAGE:

- A small town within the town: intergenerational and sustainable.
- 2 Acre City Block, 17 DU/AcreNet
- 34 dwelling units ranging in size from 800 to 2,000 sf for seniors, families, couples, and singles.
- 4,000 sf Common House including dining/meeting space, café, kitchen, lounge, childrens' play room/daycare, and 900 sf accessible guesthouse.
- 1,400 sf Eldercare center and clinic
- Community garden and greenhouse.

2) GREEN YARDS:

- Net-zero energy, passive solar, modular homes with vegetable gardens and outdoor living.
- 5-8 dwellings at 8-12 DU/AcreNet
- 1,700 average sf, with optional 600 sf granny flat

3) GREEN MARKET:

- Residential mixed-use building with farmer's market hall, community garden, and net-zero energy solar condos.
- 0.5 acres, 28 DU/AcreNet
- 21,600 sf
- 14 dwellings at average size of 900 sf, plus 9,000 sf commercial space.

SUSTAINABILITY AND COMMUNITY

- Meet the needs of children, seniors, extended families, single-parent families, singles.
- Walkability.
- Connect daily life with natural processes.
- Make it easy for people to be stewards.
- Support both community and privacy.

CHILDREN AND FOOD

- Safe places to wander and play that are close to home and close to vegetable gardens and healthy food.

SENIORS AND NEIGHBORS

- Interesting places for aging in place.
- Variety of homes with accessible, ground-level bedrooms.
- Connected to neighbors.
- Opportunities to get out of the house and help take care of things.

AFFORDABILITY

- Green features are cash flow positive: Energy and tax savings offset additional \$45,000 cost per home.

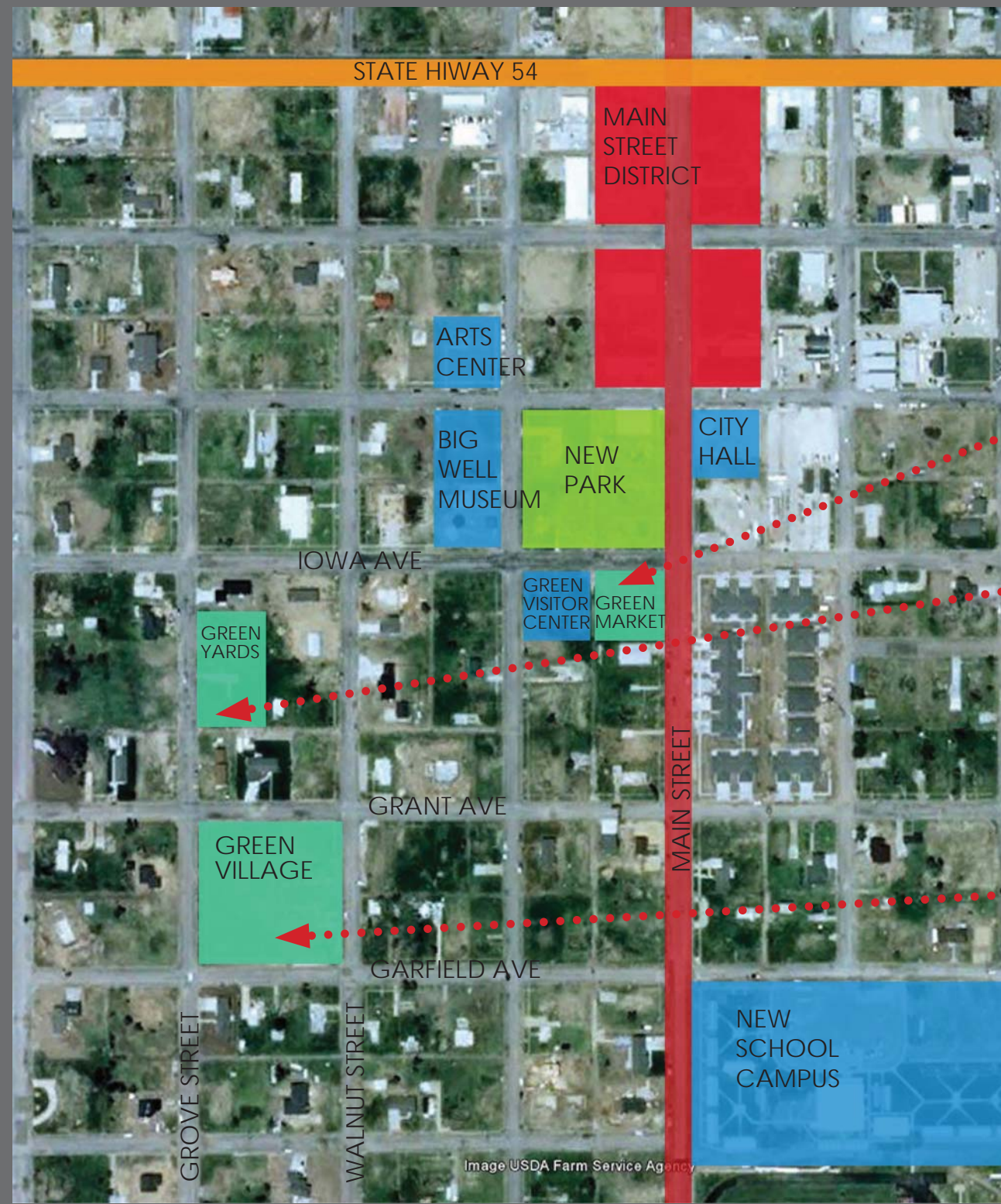
NET-ZERO ENERGY: THE PASSIVE HOUSE

- Net-Zero means that energy produced equals or exceeds energy consumed.
- Passive solar orientation for homes reduces heating and cooling demands by 1/3.
- High performance, air tight, building envelopes reduce heating and cooling demands by 1/3.
- With such small loads, a geo-assisted Energy Recovery Ventilator (ERV) replaces the furnace and AC. No natural gas is needed.
- A grid-tied five-kilowatt photovoltaic system per home offsets all electricity consumption.

WATER AND GARDENS

- Yards and greens are depressed to receive and percolate stormwater runoff.
- Street tree rain gardens naturally irrigate street trees.
- Rain barrels on residential downspouts collect and redirect water to depressed yards, vegetable gardens, windbreak hedgerows, and fruit and shade trees.

PROGRAM



THREE INFILL SITES/TYPES

GREEN MARKET:

- Farmer's market hall on Main Street facing the new city park.
- Living over the store: with upstairs condos.
- Passive solar and net-zero energy.
- Community Garden and outdoor living in the back.

GREEN YARDS:

- Net-zero energy, passive solar, modular homes.
- Vegetable gardens and outdoor living protected from wind by hedge rows.
- For medium, large and extended families.
- Room to expand. Accessible ground level bedroom. Granny Flat out back.

GREEN VILLAGE:

- A town within the town: a city block rebuilt as an intergenerational, sustainable community.
- Seniors, extended families, single moms, young folk.
- Common and private vegetable gardens.
- Community Building, Elder Care Center, and play areas.
- Net-Zero energy, passive solar, modular homes.

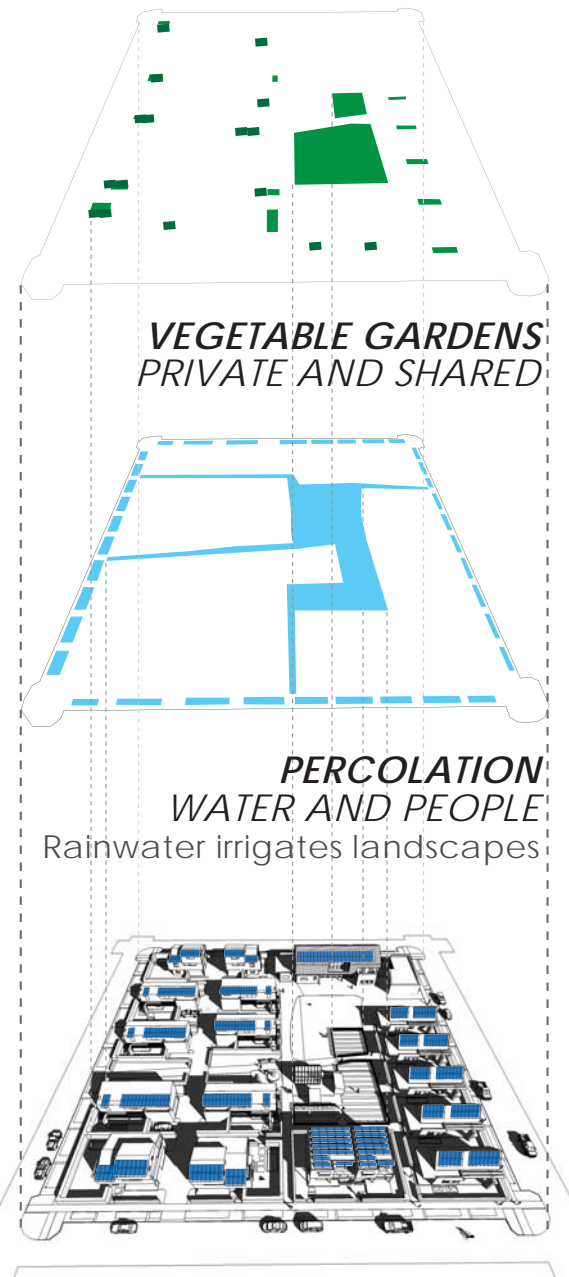
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GREENSBURG GREEN NEIGHBORHOODS

GREEN VILLAGE

FRUIT GROVE
GREENHOUSE
AND FARM YARD
PLAYGROUND
FRUIT GROVE
LANE HOUSE
LIVE/WORK
HOME

COMMUNITY BUILDING
ELDER CARE CENTER
COMMON GREEN
COMMUNITY
GARDENS
STACKED FLATS
SENIOR COTTAGE
PERSONAL
GARDEN
PLOT



SOLAR
PASSIVE AND ACTIVE
Buildings spaced and oriented for
passive heating and cooling

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GREENSBURG GREEN NEIGHBORHOODS



The community garden, greenhouse, and farm yard support the growing of local healthy food. A 4-H club is encouraged to team with interested community members in managing the farm as a Community Supported Agriculture (CSA) project. Food can be snacked on by kids while they play, consumed by families on the block, or sold at the Green Market on Main Street.

GREEN VILLAGE

WHAT'S MISSING FROM THE TYPICAL NEIGHBORHOOD?:

- Great places for small kids to roam close to home.
- Common spaces, places, and amenities that bind you into a friendly and helpful relationship with your neighbors.
- A mix of generations.

THE GREEN VILLAGE:

- The Green Village is arranged around paths, fruit groves, vegetable gardens, lawns, and social spots. Homes have privacy within, and a village atmosphere all about.
- Hedgerows shelter outdoor spaces from the wind. Yards are more private, and front porches are more public.
- Cars are tucked away or parked on the street, leaving a pedestrian world safe for kids and chance encounters.

COMMUNITY GARDENS AND GREENHOUSE:

- Vegetables grown close to home taste the best. They also have the lowest carbon footprint of any food and are the healthiest thing you can eat.
- Not everyone has to garden. But a local 4H club could kickstart the enterprise, with interested locals, kids, and retirees pitching in.



The community garden is nestled around the common green, making gardening a social activity. A child's playground is nearby, making it easy for kids to get involved with agriculture. Fruit orchards cut through the block. Fruit can be eaten on the spot by kids, baked into pies, or canned for the winter.

GREEN VILLAGE

COMMUNITY BUILDING:

- Provides amenities not available in single family homes, and amenities that can be a catalyst for building a strong community. These amenities could include:
- A cafe that might be run by seniors and young folk.
- A lounge/social sitting room; a kitchen for neighborhood banquets; a dining room that can be the meeting place for larger community events.
- Play room or daycare room.
- Guest house for when your home is not large enough for visitors.
- Small rental apartments can be upstairs.

ELDERCARE CENTER:

- Exercise classroom.
- A few weight machines.
- Clinic room for physical therapist or nurse visits.
- Small sitting room & social space.

The Eldercare Center and Community Bldg frame a north entrance to the Green Village.





The SENIOR COTTAGE is for folks who like to sit on the porch and be part of the action. A 900 sf 1BR home with an accessible bedroom, this home is small enough to be easy to maintain, but has a basement making it suitable for small families or for guests. Seniors in the Green village can partake in the work of the community, or keep to themselves. There are neighbors nearby who know them if they are ever in need.



The street tree rain gardens filter stormwater runoff while irrigating street trees. A decomposed granite walking surface makes it easy to get out of one's car and walk to the sidewalk. The root ball of the tree is raised high enough relative to the rain garden to prevent the tree from suffocating in the moisture. A french drain wicks excess moisture away.

GREEN VILLAGE

- INTEGRATED STORMWATER MANAGEMENT:**
- Rain and snow melt passively irrigate all landscaping.
 - Downspouts lead to rain barrels so that water can be stored and re-directed to hedge rows and gardens.
 - Yards are slightly depressed so that they can receive and percolate large storm events.
 - Swales run through the block, irrigated the fruit tree groves, and sending flood waters toward the common green.
 - The common green and community garden are slightly depressed to further retain and percolate large storm events.
 - Street Tree Rain Gardens between the sidewalk and curb filter runoff from front yards and streets, while irrigating street trees. (See Inset)

FAMILIES



CHECKERBOARD HOMES:

- For families and extended families
- 1,700 sf 3-4BR
- Optional Ground Level Bedroom
- Extra bedrooms in basement
- Optional Granny Flat in Back Yard



SENIOR COTTAGE:

- For couples, singles, small families.
- 900 sf 1BR, plus basement
- Ground level bedroom
- Extra bedrooms in basement



LANE HOUSE:

- For families including single parent families
- 1,600 sf 3BR
- Extra bedrooms in basement



LIVING OVER THE STORE:

- For small families, singles, couples, seniors.
- Second and Third story condos upstairs from the Green Market, and the Community Building on the Green Village.
- Average size 900 sf 1 & 2BR.



STACKED FLATS:

- For singles, couples, seniors, small families
- 800-1,000 SF 1BR



GRANNY FLAT:

- For relative, caregiver, or young singles.
- 600 sf 1 BR
- Flat over garage behind Checkerboard Home



LIVE/WORK HOME:

- For families with work at home parent
- 2,000 sf 3BR
- 400 sf Ground level work space can also be used as guest suite or family room.

HOMES FOR ALL TYPES OF HOUSEHOLDS

NOT EVERY HOME IS TWO-PARENTS AND TWO-KIDS:

- Single parent families need support from relatives and neighbors.
- Extended families: the grandmother moves into help, or the grandmother moves in to be helped.
- Ground level bedrooms support aging in place, and people who can not climb stairs.
- Singles and seniors want smaller homes that are easier to maintain.
- Live/work homes eliminate commutes, and keep working parents close to the kids.
- All families may seek support from other families.

THE "NOT-SO-BIG HOUSE":

- New American houses doubled in size in the last 50 years, due to cheap oil and a subsidized housing market.
- Smaller, smarter homes significantly save energy, save money, and can bind a loving family closer together.
- Greensburg Green Neighborhoods have homes that range in size from 400sf to 2,000 sf and have one to 6 bedrooms including those in basements.
- Basements provide affordable flex space, a safe haven from tornadoes, and room for a growing family.

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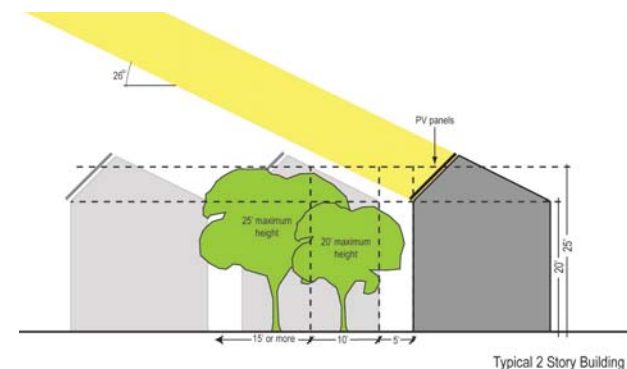
GREENSBURG GREEN NEIGHBORHOODS



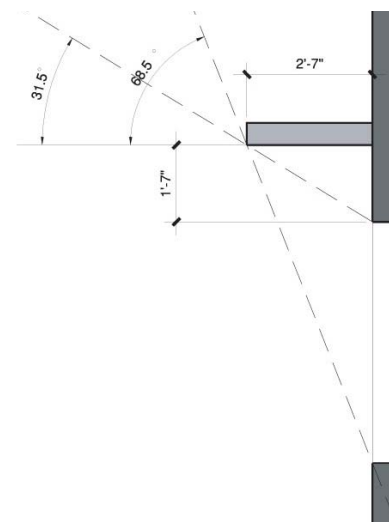
PASSIVE SOLAR SITE PLANNING: Stretch buildings out east to west. Space buildings for winter passive solar gain. Shade east and west sides with deep porches and deciduous shade trees.



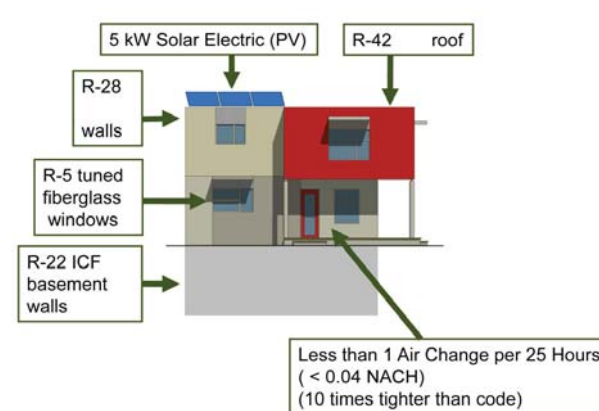
PASSIVE SOLAR BUILDING PLANS: Minimize doors and apertures to the north. Shade south facing windows from summer sun. Shade east and west windows with deep porches. Service spaces to the north, living spaces to the south. Air lock mud room entries.



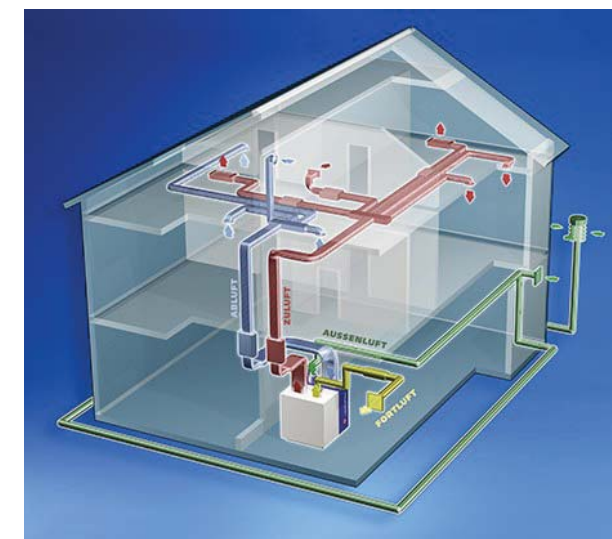
COORDINATE ROOFTOP ACTIVE SOLAR ACCESS WITH LANDSCAPE DESIGN. Photovoltaic panels must stay clear of small mid-day shadows even in winter.



OPTIMIZE OVERHANGS OVER SOUTH-FACING WINDOWS TO BLOCK SUMMER SUN, BUT LET IN WINTER SUN.



HIGH PERFORMANCE, AIR-TIGHT BUILDING ENVELOPES. Factory-built, modular construction is air-tight, combining glue with fasteners.



GEO-ASSISTED ENERGY RECOVERY VENTILATORS (ERV) can replace the furnace in a home with such small heating and cooling loads. Incoming air is tempered by earth tubes. A ground source loop provides cooling in summer, and heating in winter with assistance of a heat pump.

NET-ZERO ENERGY HOMES

Over a year, the home generates as much energy as it consumes.

PASSIVE SOLAR REDUCES ENERGY DEMANDS BY 1/3

- Coordinate passive solar site planning and passive solar building planning.

HIGH PERFORMANCE BUILDING ENVELOPES REDUCE ENERGY DEMANDS BY ANOTHER 1/3

- Must be Air-Tight. Factory construction can achieve less than one air change per 24 hours.

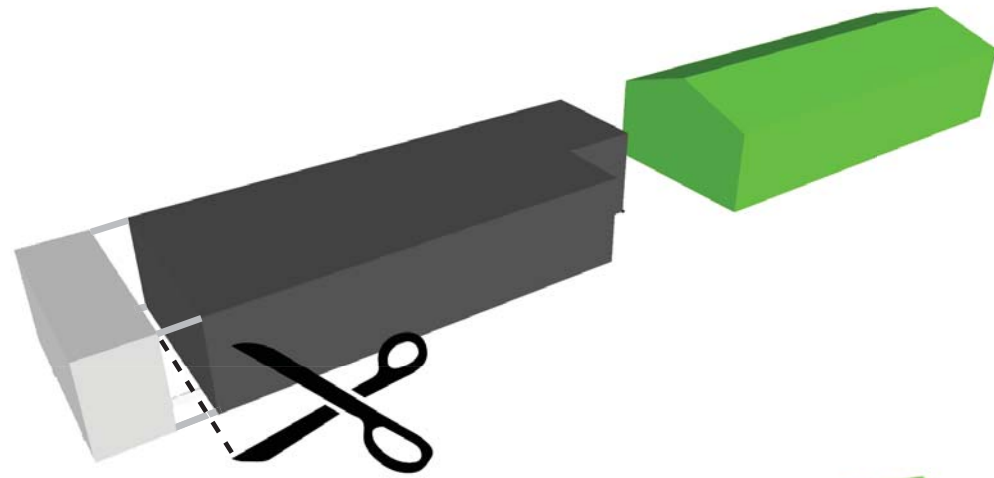
SMALL, "NOT-SO-BIG" HOUSES FURTHER REDUCE ENERGY DEMANDS

- Only 1/5 of a mechanical system is needed.

THE NET-ZERO ENERGY PASSIVE HOUSE:

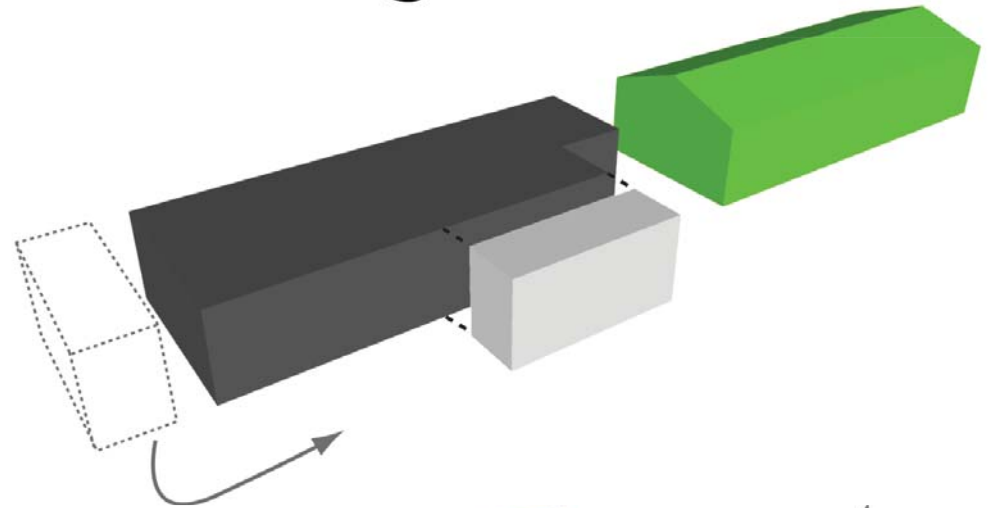
- No furnace, air conditioning, or natural gas hookup is needed.
- A fresh air system called an ERV (Energy Recovery Ventilator) becomes the mechanical system.
- It is supplemented by earth tubes to temper incoming air.
- A ground source loop field tied to a heat pump provides the heating and cooling element.
- Electricity consumption is 65% of a standard home, and is offset by a grid-tied, 5KW rooftop photovoltaic panel system.

MODULAR



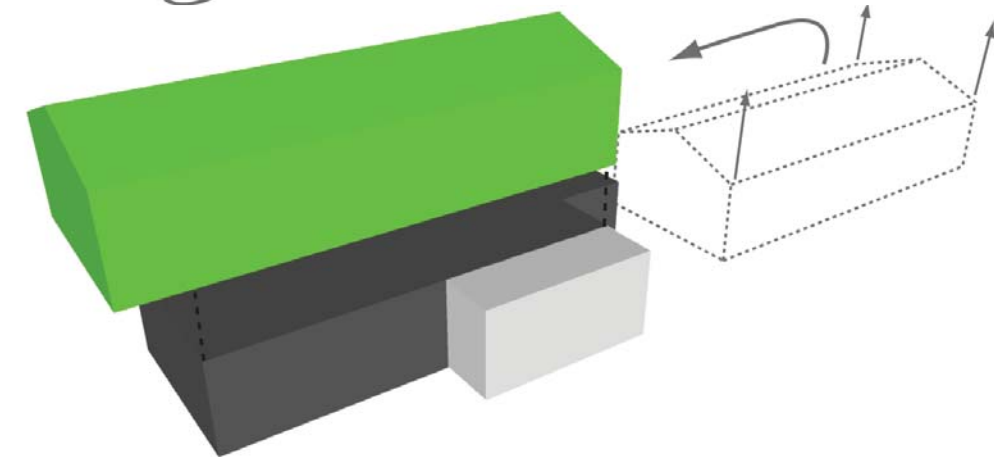
1

DELIVERY BY TRUCK:
TWO 18'-WIDE BOXES



2

CUT + STITCH:
*RELOCATE SIDE-BEDROOM
MODULE*



3

LIFT + STACK:
*TOP BOX OVERHANGS,
SHADING GROUND LEVEL
OPENINGS*

GREENSBURG GREEN-BUILT MODULAR HOMES

AIR-TIGHT CONSTRUCTION:

- Net-Zero Energy homes require air-tight construction. In a modular factory, sheathing and drywall is glued and fastened to studs making the homes noticeably more air tight.

REDUCED WASTE:

- Factory methods drastically reduce the material waste that is common with site-built construction.
- Trips to the job site by subcontractors is also drastically reduced, saving on the fuel and commute time.

BRINGING JOBS TO GREENSBURG:

- The time is right for net-zero energy modular homes. It requires the coordination of site planning with building design, and a new approach to mechanical systems.
- Greensburg could provide the brand that sets this new industry in motion. A net-zero energy modular plant could locate in Greensburg and use the rebuilding of the town for its pilot projects.
- Greensburg could provide energy efficient homes for communities across the high plains.

GREEN YARDS



GREEN YARDS

- GRANNY FLAT
- CLOTHES LINE
- FRUIT TREES
- OUTDOOR EATING
- PORCH LIFE
- COMPOST AND POLLINATING BEES
- WIND-BREAK HEDGE ROWS PROTECT OUTDOOR LIVING FROM THE WIND
- VEGETABLE GARDEN
- OUTDOOR EATING
- PV PANELS
- PORCH LIFE
- WIND-BREAK HEDGE ROWS
- FRUIT TREES
- STREET TREE RAIN GARDENS

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GREEN YARDS



The Green Yards have homes located in a checkerboard layout for solar access. The alley houses have a landscaped “foyer” at the front of the lot that supports a “Front Porch” style of socializing. Fruit trees are accessible for picking from the sidewalk. A Street Tree rain garden filters stormwater between sidewalk and curb.

GREEN YARDS

GETTING OUT DOORS:

- Kansans like to sit on the porch in summer and cool off.
- Spending time outdoors, summer and winter, acclimates one to outdoor temperatures, and reduces demands on indoor temperatures - saving energy.
- Green Yards are designed to embrace year round outdoor living, with access to winter sun and shade protection from summer sun.
- Placing homes at one end of the lot leaves more usable room for outdoor living and outdoor play. These yards are framed by hedge rows to cut down the wind, provide privacy, and make them feel like outdoor rooms.
- And clothes lines close to the house make it easy to forego the dryer.

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GREEN YARDS



The Green Yards contain convenient and usable outdoor spaces and amenities: Child's play areas, vegetable gardens, outdoor dining areas, front porches that act like living rooms, and places for drying laundry, hives for pollinating bees, and the compost bin. Shade trees keeps the porch spaces and house cool. Fruit trees provide seasonal snacks.

GREEN YARDS

GROWING FOOD:

- Front yards and side yards can become wasted, unused space. This acreage can be better utilized if reconfigured as an outdoor room or courtyard with a sense of enclosure. Such yards can contain areas for child play and vegetable gardens.
- Locally grown food has a much lower carbon footprint than transported food, and is healthier than processed food. Intentionally designing yards for vegetable gardens makes it easier to be sustainable.
- Vegetable gardens can connect kids with healthy food, and teach habits of stewardship.

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GREEN MARKET

NEW PARK

*PHOTOVOLTAIC
PANELS*

*PASSIVE SOLAR
APARTMENTS*

*FARMERS' MARKET
HALL AT GROUND
FLOOR*

PLAY AREA

GREEN

*COMMUNITY
GARDEN*

*GARDENER'S
COTTAGE*

*FAMILY
APARTMENTS*



GREEN MARKET

SELLING FOOD:

- Healthy local produce should be available on Main Street. The Green Market faces the new City Park and is full of local farmers' market stalls and healthy food vendors.
- Market stalls spill out onto the sidewalk facing the park. The market complements the other buildings around the park including the museum and City Hall.
- Tourists from the highway can stop for a sustainable and nourishing meal, and buy some produce to go.
- Because it is centrally located, Greensburg residents can walk to the Market to buy their groceries and then walk home.

LIVING ABOVE THE STORE:

- Small and mid-sized apartments are above the store. These are ideal places for seniors and singles to live, as everything in town and on Main Street is within walking distance.
- A few apartments are large enough for families, and a playground and garden are located in the courtyard.

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GREEN MARKET



View looking West down Iowa Ave from Main Street. The Green Market anchors the spot where Main Street meets the south edge of the new Memorial Park. It is a general store for town residents, but also marks the south end of the commercial and tourist district. In addition to selling farmers' produce, the Market has food stalls, butchers, bakers, a cafe. Food stands and cafe seating spill out onto the sidewalk and give life to the urban edges of the new Memorial Park.

GREEN MARKET

COMPACT BUILDINGS:

- Small, High Plains towns are low in density and have been losing population for generations.
- Compact, dense, residential mixed-use buildings still make sense in this context because they promote walkability -- providing walking customers close to Main Street amenities and businesses.
- There is a lot to walk to in the future of Greensburg: Main Street, the Art Center, Schools, the Museum, City Hall. Add to this places to buy healthy local food, places to work, places to socialize.
- In most of the world, seniors live where they can walk to everything -- and this is often over the store and close to main street.

The Green Market spills out onto the street facing the new Memorial Park.



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Gardens and Kids everywhere -- even on Main Street.

GREENSBURG GREEN MARKET

REDUCING CO2:

- Attached dwelling units consume the least energy. People who live in denser buildings emit the least CO2 emissions, and also live the longest. Much of this is because they walk a lot.
- Living in compact buildings on Main Street is a sustainable choice.

THE BACKSIDE:

- While the Market Hall fronts on the the new park, and is frequented by tourists, the backside opens to a semi-private courtyard shared by the building's residents. Here, seniors, singles, and families from the building mingle by the vegetable garden and play area.
- Gardening is easiest when the job is shared with others, and the garden is just outside the door.
- The passive solar apartments look out over the courtyard, and connect to it with doors and outdoor stairs.

Greensburg formerly had a three story building on Main Street as shown in the photo at right. Taller buildings get more customers close to Main Street businesses. By bringing people closer to services, they enable walking over driving.



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