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SPECS/DIMENSIONS

CIT304GM

30" INDUCTION COOKTOP WITH SILVER MIRRORED FINISH

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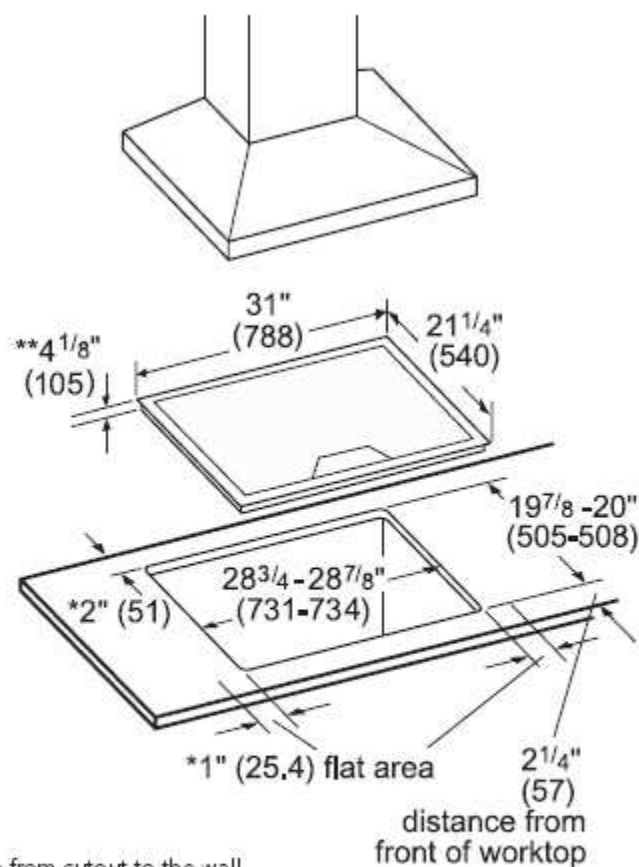
UPC code	825225866428
Main color of product	Stainless steel
Energy source	Electric
Gas type	
Alternative gas type	
Watts (W)	7200
Current (A)	40
Volts (V)	208-240
Frequency (Hz)	60
Approval certificates	CSA
Power cord length (in)	37
Plug type	No plug
Required cutout size (HxWxD) (in)	4" x 28 7/8" x 19 7/8"
Minimum distance from counter front (in)	2 1/2"
Minimum distance from rear wall (in)	2 3/8"
Overall appliance dimensions (HxWxD) (in)	1/4"+4" x 31" x 21 1/4"
Product packaging dimensions (HxWxD) (in)	7.08 x 26.65 x 36.61
Net weight (lbs)	39
Gross weight (lbs)	49
Total number of cooktop burners	4
Knob Material	
Sealed Burners	No
Burners with booster	All
Type of grate	
Number of Single grates	
Number of Double grates	
Cutout Width	28 3/4" - 28 7/8"
Height	3 1/8"
Minimum air clearance	1"
Total Cut out Height (incl. air clearance)	4 1/8"
Cutout Depth	19 7/8"- 20"
Minimum distance from counter front	2 1/4'
Minimum distance from rear wall	2"
Left Front Element (Size/ W / W with PowerBoost™)	9" / 2,200 W / 3,300 W
Right Front Element (Size/ W / W with PowerBoost™)	6" / 1,400 W / 1,800 W
Left Rear Element (Size/ W / W with PowerBoost™)	6" / 1,400 W / 1,800 W
Right Rear Element (Size/ W / W with PowerBoost™)	11" / 2,600 W / 3,400 W

Center Element (Size/ W / W with PowerBoost™)

Outer Ring	
Middle Ring	
Inner Ring	
Electrical Supply	240/208V AC, 60 Hz
Required Circuit Breaker	40 Amp
Conduit	39" Flexible 3 Wire
Shipping weight (lbs)	49
Included accessories	
Optional accessories	
Construction type	
Number of gas burners	0
Number of electric cooking zones	4
Number of induction elements	4
SKU	CIT304GM
SERIES	

Diagrams

30-INCH



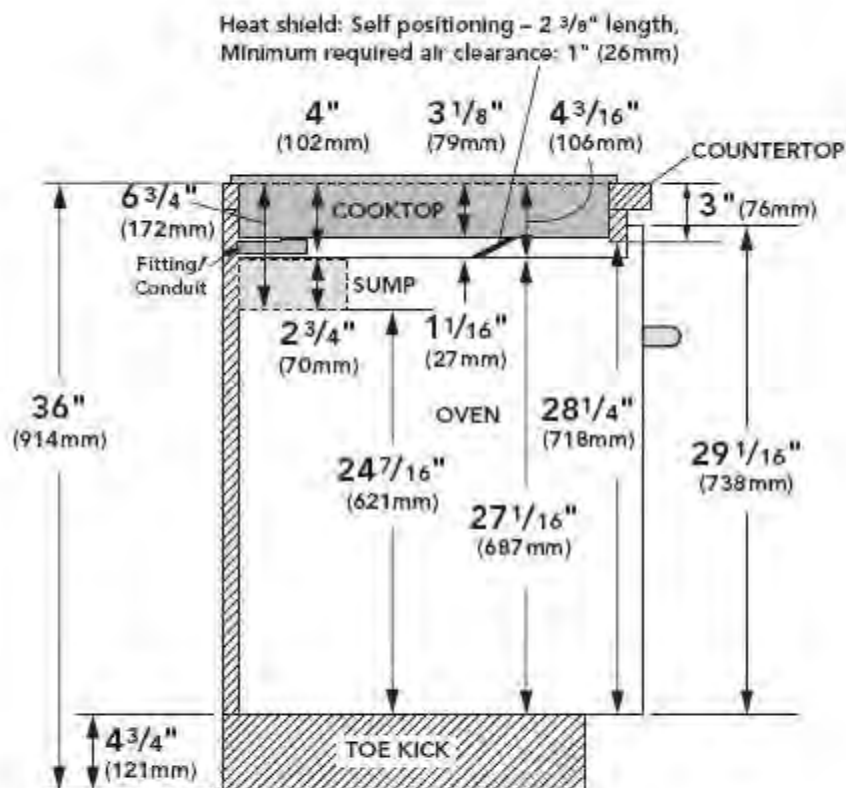
*Minimum distance from cutout to the wall

**Recessed depth (includes 1" air clearance)

Measurement in inches (mm in brackets)

Note: The work surface should be horizontal and level. The stability of the countertop should be confirmed even after making the cutout.

INSTALLATION ABOVE A THERMADOR BUILT-IN OVEN



Note: Dimensions based on standard countertop height (36" with 4 3/4" toe kick including base plate).

The built-in oven can be installed below the induction cooktop as long as there is an air clearance of 1" between the bottom of the cooktop and the top of the oven.

[Click Here to View Features](#)

Notes: All height, width and depth dimensions are shown in inches. *Represents wattage of PowerBoost® setting. Some localities may require a 40A circuit breakers for 30" cooktops and 50A circuit breaker for 36" cooktops. Refer to local building codes. **Please refer to installation instructions available on thermador.com, prior to making cutout. Countertop must be 26" wide overall for best fit. When the cabinet measures 24" front to back (outside dimensions), it must be positioned so the countertop has a 1" overhang. The countertop must have a 25" flat area so that no problems can occur with a backsplash. It is important to measure from the front edge of the countertop. All cutouts start at 2 1/2" from the front edge of the countertop. BSH reserves the absolute and unrestricted right to change product materials and specifications, at any time, without notice. Consult the product's installation instructions for final dimensional data and other details. Applicable product warranty can be found in accompanying product literature (or you may contact your account manager for further details).

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COMMUNICATION PLAN

EXECUTIVE SUMMARY

In 2010, competitors will gather in Spain for the first Solar Decathlon Europe. This competition, while modeled after its American counterpart, will include mostly European schools, with only two American schools competing out of the 19 competitors. It allows for students to gain experience in innovative new technologies which are both vital to their future careers and the future of the environment. Further, through the exhibition and the press coverage attained prior to the competition each team is able to positively influence broad audiences of their respective countries.

In the past two years in the United States 72% of energy consumption can be attributed to buildings (Environmental Information Administration, Annual Energy Outlook, 2008). Additionally, buildings account for 38% of all CO₂ emissions in the U.S. and are one of the heaviest consumers of natural resources (Energy Information Administration, Assumptions to the Annual Energy Outlook, 2008). Based on these statistics, the University of Florida team and the Project RE:FOCUS house hope to show the viability of constructing and designing “green” houses, without sacrificing basic comfort or financial security to a variety of publics. Therefore, the awareness of the house and the education regarding sustainability and its viability are key goals for the competition, requiring a strong communications effort.

In order to achieve this goal, the house took cues from the past to influence the future, choosing to design a new, innovative Florida Cracker House that combines historic precedent with current technology to help create an accessible and sustainable house. The design and technique of the team illuminates the past in hopes of sustaining the future by using historic precedents to inspire new innovations in building technology. These messages will serve as key messages in communicating with the identified target audiences.

First, “green” organizations are targeted due to their clear interest in sustainable products and established influence in social and political arenas. Additionally, through these organizations Project RE:FOCUS will extend its reach from the local level up to the national organizations. This will be accomplished through interpersonal communication and will be leveraged into media tactics that include but are not limited to print and broadcast feature stories, partnerships with green organizations, collaboration with local and state government and a national social media awareness campaign.

For government support, Project RE_FOCUS will attempt to reach local, state and national politicians through direct, in-person lobbying of each particular group. By starting locally and moving up, the team will use the local contacts to drive the campaign up the political ladder.

To promote social awareness, students and young alumni will be reached through an extensive social media campaign. This campaign will include a Facebook page, blog, Twitter, Flickr, Web site and YouTube Channel. Additionally, a viral marketing campaign that asks the audience to “Make a Change, Not a Footprint” will be conducted to spread the message of the house to students, locally, nationally and internationally.

The campaign’s success will be measured by the achievement of outlined measurable objectives, quality of media coverage and influence, and with environmental scanning.

SITUATION ANALYSIS

INTRODUCTION

As many parts of the world struggle through a recession, there has been a movement back towards the basics of human needs. People have begun to value simplicity, comfort and sustainability more highly than materialism and wealth. Solar Decathlon Europe will help address how the everyday person can change the way they live and drastically increase sustainability in lifestyle. This competition highlights the innovations institutions of higher learning are utilizing in response to this growing global phenomenon. Teams from around the world will compete in 10 competitions testing the environmental impact, comfort, sustainability and market viability of their solar powered, “green” houses.

STRENGTHS

The University of Florida, a leader both in sustainability research and practice, also contains a diverse set of disciplines necessary to the success of a project of this scale. Thanks to the size of the university, students from vastly different disciplines are able to collaborate on the project to excel in the different skill sets the 10 events require. As well, the University of Florida's highly developed sustainability programming on campus adds to the strength of the team, with the university adopting Leadership in Energy and Environmental Design (LEED) criteria for construction of all major building and renovation projects since 2001, a practice that inspires our team's approach to design and construction.

WEAKNESSES

Though the team has many strengths, it also faces some weaknesses. The university's entry into the competition without a collaborating team, combined with the fact that it is the university's first time in the competition, limits the network of knowledge and resources from which the team can pull. As the competition takes place in Spain the team has an additional unique time constraint, having to allow three to four weeks of shipping time in addition to the time it takes to rebuild the house on-site in Madrid. Finally, the team faces a huge cultural barrier in communicating. Whether it is the geographical distance, the language barrier or the cultural differences, the team must account for and address each complexity to ensure that the message is correctly distributed and communicated.

OPPORTUNITIES

The 2010 Solar Decathlon Europe marks the first time the competition will take place outside of the U.S., providing several unique opportunities to the team. University of Florida is one of only two schools from the United States to compete and the only school from the state of Florida. Because of this, the team can lead the way in the discussion and implementation of environmentally friendly and market viable technologies both state- and nation-wide. Furthermore, the team will be one of the pioneers in representing America in a largely European competition. As well, the faltering economy has created a need for “back to basics” living, which the team's overall design and messaging directly addresses, making sustainable living trendy and prompting the need for innovation from institutions of higher learning.

THREATS

Despite the many opportunities presented by Solar Decathlon Europe, there are also several limitations. There are many public misconceptions about green and sustainable technologies the team will have to combat. The general public associates sustainable living with both high expense and inconvenience, and is further unaware of the benefits of green construction. Also, the competition guidelines fail to delineate a specific public for whom the house should be designed, leaving an incredibly wide spectrum of audiences to consider. This allows for great creativity in targeting a variety of audiences but also permits a greater margin of error. Finally, the world-wide economic recession has limited monetary and in-kind funding opportunities as both private and public sector organizations choose to spend money internally. Therefore, communications could be limited in reach due to the cost of materials, travel and other necessities. Also, the European Solar Decathlon is six months shorter than its American counterpart, giving the teams even less time to complete their building and fundraising. The state of the economy makes procuring materials and money by donation difficult as both private and public sector business focus funds

internally rather than donating externally. Therefore, communications efforts must be extremely flexible, preventing some tactics.

TARGET AUDIENCE

First Primary Audience

- "Green" Organizations
 - Psychographics:
 - Environmentally conscious
 - Work with government
 - Seek to influence "green" consumers (second primary audience)
 - Have special interest or focus on sustainability and solar power
 - Geographics:
 - National offices with state/local branches
 - Often based in political towns
 - Special emphasis on capital cities
 - Demographics:
 - Some form of higher education
 - Between the ages of 23-63

Second Primary Audience

- "Green" Consumers
 - Psychographics:
 - Environmentally conscious
 - Consumers of sustainable products
 - Some disposable income
 - Have a special interest or focus on sustainability and solar power
 - Geographics:
 - Often based in large cities
 - Have access to stores offering "green" products
 - Demographics:
 - Between the ages of 18-50
 - Some higher education

Secondary Audience

- Government (legislators)
 - Psychographics:
 - Concerned with retaining voters
 - Receptive to trends of voting public
 - Geographics:
 - City, local and national politicians
 - Demographics:
 - Ages: 30-70

Tertiary Audience

- Students
 - Psychographics:
 - Future "green" consumers
 - Environmentally conscious
 - Participate in social media
 - Geographics:
 - National and International
 - Highest interest, local UF
 - Demographics:
 - Ages: 18-25
 - Some form of higher education

OBJECTIVES

INFORMATIONAL

Goal 1: To promote the efforts of the UF team to Green Organizations

- To create awareness of UF Solar Decathlon Team and the house among 25 percent of in-state Green Organizations by April 30, 2010.
- To create awareness of UF Solar Decathlon Team and the house among 25 percent of national Green Organizations by April 30, 2010.

Goal 2: To gain backing of Florida State legislature

- To gain an audience with 10 percent of Florida House representatives by April 30, 2010.
- To gain an audience with 15 percent of Florida state senators by April 30, 2010
- To gain an audience with Florida Governor Charlie Crist by April 30, 2010.

Goal 3: To promote the market viability of “green” technologies among “Green” consumers

- To create awareness of the “green” technologies in the house among 30 percent of local “green” consumers by April 30, 2010.
- To create awareness of the “green” building techniques used in the house among 30 percent of local “green” consumers by April 30, 2010.

MOTIVATIONAL

Goal 1: To achieve placement in state media

- To attain coverage of UF Solar Decathlon Team and/or the house in two print papers in each geographic area of the state (Keys, South Florida, Central Florida, North Florida and the Panhandle) by April 30, 2010.
- To attain coverage of UF Solar Decathlon Team and/or Project RE:FOCUS, two feature stories in each of three specialty or trade magazines with state-wide distribution (i.e. Construction, architecture, interior design, etc.) by May 15, 2010.
- To place three stories about UF Solar Decathlon Team and/or Project RE:FOCUS on broadcast news in each geographic area of the state (Keys, South Florida, Central Florida, North Florida and the Panhandle) by May 15, 2010.

Goal 2: To achieve placement in national media

- To place stories of UF Solar Decathlon Team and/or Project RE:FOCUS in three national print papers by April 30, 2010.
- To attain coverage of UF Solar Decathlon Team and/or Project RE:FOCUS in three specialty or trade nationally distributed magazines by April 30, 2010.

-To place two segments about UF Solar Decathlon Team and/or Project RE:FOCUS on national broadcast shows by April 30, 2010.

-To achieve placement of UF Solar Decathlon Spokesperson or Team on national talk show by April 30, 2010.

STRATEGIES

KEY MESSAGES:

MESSAGE CONTENT STRATEGIES

1. RE:FOCUS

- Change the way we live
- Changing social and environmental contexts
- Changing priorities to achieve higher energy efficiency
- Incorporate historic elements of Florida Cracker House to create innovation in a solar house
- "Illuminate the Past: Sustain the Future"

2. Illuminate the Past: Sustain the Future

- Florida Cracker House Elements incorporated
 - Porch
 - Breezeway (dogtrot)
 - Porous Skin
- Using aspects from what was once "innovative" to help fuel new thinking and "RE:FOCUS" the way we see design, construction and living
- By using these historic precedents, we can help sustain the future

3. Old Inspiring New (Innovation inspired by historic precedent)

- Design based on lessons from our ancestors
- Basic needs merged with advanced technology
- Vernacular Influence in design
- "Back to Basics"

4. Make a Change, Not a Footprint

- Sustainable design and construction
- Sustainable living
- Taking the initiative to make a positive change
- RE:FOCUSing how you live your life
- Making a small change to help make a big difference

MESSAGE DELIVERY STRATEGIES

1. Direct Contact with Target Audience

2. Media Content Strategies

- Local
 - Promote the inspiration of a historical Florida Cracker House
 - Emphasize the cooperation between different colleges within UF
 - Compare features of a local Cracker House with RE:FOCUS house
 - Highlight UF as the only school in the state and the only school in the southeast to be competing
- National
 - One of only two schools in the country competing
 - Serving as a representation of the U.S. abroad
 - Incorporating a unique viral campaign to help make changes nationally
 - Media Delivery Strategies

3. Media Delivery Strategies

- Work with city commission, local and national legislature to promote Project RE:FOCUS and the sustainable building techniques and technology associated with it
- Create media coverage by highlighting uniqueness of the UF team in the first Solar Decathlon Europe
- Create media coverage by innovative viral marketing campaign
- Promote Project RE:FOCUS House as sustainable and market viable
- Encourage media coverage by events and viral marketing campaign

TACTICS

LOCAL

Partnership with Environmental Clubs: The UF Solar Decathlon team will form a partnership with clubs on campus which support environmental issues, sustainable living and clean energy. Through this partnership we will be able to make presentations to one of our target audiences, students. Also, through this partnership we will be able to tie-in further on-campus awareness events with the prominent environmental speakers. Further, we will be able to use the organizations' contacts with other national environmental organizations to advance our messages to a larger audience.

Guerilla Marketing: Guerilla marketing tactics are used to further promote the "Make a Change, Not a Footprint" campaign locally. Three days of strategic events raised awareness of the campaign in the Gainesville community. First, a 600-square-foot footprint made of brown tarp was placed in the busiest plaza on campus, where daily foot traffic is more than 5,000 people. The footprint was left unmarked, which generated a buzz on campus. This buzz was capitalized upon the next day, when the team placed footprints and the words, "Make a Change, Not a Footprint" leading to a plaza on campus where the team held an expo of the project. Included was a step-by-step of the design process, the floor plan of the house roped off, an example of the vertically mounted Solyndra panels and more. To create tie-in, the 600-square-foot footprint was placed in the house. On the last day of the campaign, the team painted the 34th street wall, a quarter-mile long stretch of wall on one of the busiest streets in Gainesville. The wall is a local gem known for its graffiti, therefore a mural entirely dedicated to the campaign made a strong impression on the nearly 10,000 people who pass by daily.

Open House: The open house serves a dual purpose, as a way to thank the donors for their contributions to the project and as a way to introduce the nearly finished house to the general public. During the open house mock-ups of the signage to be used in Spain are also displayed to communicate information about the house to those in attendance. The RE:FOCUS team is stationed around the house answering questions and interacting one-on-one with the publics.

City Commission: To bring further awareness to the project, the Gainesville City Commission issued a proclamation to RE:FOCUS team proclaiming one day in Gainesville as RE:FOCUS team solar decathlon day.

Potential Story Angles:

- Announcement of participation
- Giving tours with local tours guides from local cracker houses
- Cooperation between colleges
- Event story
- Progress updates
- Sponsor a team member for Spain

STATE-WIDE

State Legislature: Informational meetings will be arranged in order to establish awareness, build credibility, and garner support of state legislators. Some key legislators to target include Representative Larry Cretul, Senator Mike Haridopolis, Senator Steve Oelrich and Representative Chestnut. Other influencers to target will include lawmakers who represent Gainesville, are UF alumnus, or are members of the Committee on Environmental Preservation and Conservation.

- A joint resolution can be declared supporting the sustainable efforts of UF's Solar Decathlon Team.
- The team can sponsor a "Solar Day" or "Sustainability Day" in the capitol, in which senators and representatives would wear a pin or ribbon indicating their support.
- Gainesville-area representatives will be invited to RE:FOCUS events and tours as honored guests. They may speak about the importance of sustainable building technology to Florida's future economy and environment.

Media Outlets: Both newspaper and magazine print media are targeted. In order to reach the largest segment of our target audience at least two newspapers will be targeted in each region of Florida. These regions are: Keys (Keys Weekly and Key West Citizen), South Florida (Miami Herald and Sun-Sentinel), Central Florida (Orlando Sentinel and the Tampa Tribune), North Florida (Florida Times-Union and Northwest Florida Daily News) and the Panhandle (Tallahassee Democrat and Pensacola News Journal). Broadcast media will also be used, targeting specific news programs in each geographic area of Florida. These include, but are not limited to: WSVN-7 (Florida Keys), CBS-4 (South Florida), Central Florida News-13 (Central Florida), WWSB ABC-7 (North Florida), WTVT-7 (Florida Panhandle).

Potential Story Angles:

- Historic Florida Cracker House inspires Solar House
- UF only school in state to compete in either competition (US or Europe)
- Legislative support/events

NATIONAL

Blog: The blog is used as an online diary on the progress of the house. It not only tracks building milestones, but competition milestones and reports on all aspects of the competition, including appropriate information from Spain as the competition draws nearer. As well, each blog entry provides a tip on how you can make a change, not a footprint. Additionally, the RE:FOCUS team continues to correspond with our audiences while in Spain by blogging about the competition everyday we're in Spain.

Website: The website is used as a way to communicate information about Solar Decathlon Europe, the RE:FOCUS team and the way to live a more sustainable life to all target audiences and beyond. It contains links to the other social media tactics, including the Facebook and Twitter pages, as well as the Solar Decathlon Europe main website. As well, it serves as the center for media information, complete with a press room online that will contain all promotional materials necessary for media while the team is in Spain.

Facebook: This will be used primarily as a tool to reach our primary audience, students. It contains tips and tricks about how to live a more sustainable life, updates fans on the team and the overall competition's progress, and it is another medium to promote local events and new opportunities to get involved in the project.

Twitter: A Twitter account mirrors the Facebook page as another medium in which engaged social media audiences can monitor the progress of the project and get tips on sustainable

living.

Make a Change, Not a Footprint: This campaign, which was launched locally, now targets a national audience. Alumni members of various local Gator organizations will be contacted and encouraged to participate in the campaign, by posting comments to the Twitter and Facebook accounts. From these outlets, an organization will be chosen bi-weekly to be highlighted on the team website and to receive pins, which indicate their participation with the project. Additionally, upon the return of the house, the organization that provides the most support to the team will receive a large-framed picture of the house to display within their organization's headquarters.

Media Outlets: Specifically targeted media outlets will be used to communicate the messages of the UF team and Project RE:FOCUS nationally. Nationally circulated newspapers will be targeted with the goal of attaining placement of stories in three of them, including but not limited to: USA Today, New York Times, Los Angeles Times, Washington Post and Chicago Tribune, with possible placement opportunities in more outlets via AP/Reuters wire services.

Additionally, nationally circulated magazines will be targeted with the goal of attaining placement of stories in three of them. These include, Better Homes and Gardens, Time, Newsweek, Popular Science and Popular Mechanics.

Several nationally viewed broadcast news shows will also be targeted with the goal of placing a story on one of them. These shows include, The Today Show, Good Morning America, The Early Show, and American Morning.

In order to reach our tertiary audience several nationally viewed broadcast talk shows will also be targeted with the goal of placing a story on one of them. These shows include, The Daily Show, the Colbert Report, Ellen, The Oprah Winfrey Show, Regis & Kelly.

Potential Story Angles:

- 1 of 2 schools in country to compete
- Representing US abroad
- Viral campaign
- Earth Day
- Environmental trends in the US
- Market viability of living this way

INTERNATIONAL

Bi-Lingual Materials: Targeted printed materials and signage will be presented in both English and Spanish. By doing this in specific materials, the UF team is representing the international nature of the competition throughout their preparations. Further, bi-lingual materials will allow the communications team to easily contact both English and Spanish speaking media and publics.

Potential Story Angles:

- U.S. students travel to Spain for first time
- Difficulties of getting materials and equipment to Spain

MEDIA KIT

- Background
- Fact Sheet
- Frequently Asked Questions
- Brochure
- Web site
- Pitch Memo
- Media Releases

PROGRESS IN MEDIA DISSEMINATION

Our media dissemination plan is in place, however, as dictated by the plan, hasn't been launched yet. By design our media coverage will begin closer to the actual event. The team has decided that by waiting to attain coverage until closer to the competition the audience would be better able to recall information and would be less likely to lose interest. Further, by achieving coverage close together and in quick succession the team feels the audience will build a strong foundation of knowledge over a short period of time. This prevents the audience from forgetting the messages they received.

TIMELINE

December 2009

- Assign agency members with completing media kit tactics
- Senior agency members create first media release announcing start of UF Solar Decathlon project
- Create twitter titled: @notafootprint to tie into "Make a Change, Not a Footprint" message
- Assign agency member task of keeping Facebook page and twitter account updated
- Assign either professional or student with completing new Solar Decathlon Web site
- Create a UF Solar Decathlon YouTube Channel
- Take over blog from Communication Sub-Committee

January 2010

- Final edit of all media kit tactics by senior members of team
- Make contact with UF Student Government and Accent for possible partnership with their speakers
- Create list of on-campus "green" organizations
- Begin contacting on-campus "green" organizations
- Assign agency member with task of keeping blog updated
- Completed logo delivered (End of January)

February 2010

- Officially announce UF's participation in the Solar Decathlon Europe
- Upload "Make a Change, Not a Footprint" pictures to Twitter and Flickr
- Begin viral marketing campaign for "Make a Change, Not a Footprint"
- Pitch local media story about inspiration of RE:FOCUS House
- Completed Web site delivered
- Upload "Make a Change, Not a Footprint" videos to YouTube Channel
- Pitch local media story about UF being one of two U.S. schools to compete
- Begin pitching national broadcast and talk shows
- Attend City Commission Meeting to raise project awareness in the community

March 2010

- Pitch story about legislative backing
- Pitch story about UF team Representing U.S. abroad
- Continue pitching national broadcast and talk shows

April 2010

- Media release about break down and packing up of the house
- Pitch national legislature
- Continue pitching national broadcast and talk shows
- Begin cultivating contacts with media (print and broadcast) in Spain

May 2010

- Continue pitching national broadcast and talk shows
- Pitch international media story on the house, one of only two American teams, traveling in Spain

- Pitch local and national media story about the house traveling to Spain
- Begin planning event for arrival of the house back in Gainesville at Florida Museum of Natural History

June 2010

- Re-print any additional media kit tactics (brochures, fact sheets, etc.) for use in Spain
- Pitch local, state and national media story about Project RE: FOCUS house arriving in Spain
- Competition: June 18-27

July 2010

- Tours of the house in Spain
- Begin planning event for arrival of the house back in Gainesville at Florida Museum of Natural History
- Create media release for return of house

August 2010

- Hold event celebrating the return of the house at the Florida Museum of Natural History
- Distribute media release prior to event
- Hold tours for general public
- Conduct campaign evaluation

EVALUATION

Results of the campaign will be determined by the degree of accomplishment of the measurable objectives. As well, evaluation technique for the program will also contain social media response and environmental analysis.

To evaluate social media response, several different things will be measured. First, the amount of active followers Project RE: FOCUS has on twitter, as well as the quantity of times Project Re: Focus was re-tweeted by others. Also, we will measure social media response by number of hits to the Project RE: FOCUS YouTube channel and Web site. Additionally, number of Facebook friends will be measured and number of wall posts and direct messages. These friends will also be analyzed for geographic region to help determine reach.

Environmental scanning evaluation will include analyzing media coverage locally, nationally, and internationally as well as considering competitors' performances and media coverage. The media stories will be analyzed by their reach, message and content.

All evaluation sectors will be compiled into a complete evaluation report that will convey the degree of success based on the measurable characteristics described above.

INDUSTRIALIZATION and MARKET VIABILITY REPORT

The current economic situation in the United States has impacted many markets, none more so than the housing market. While there have been negative effects as a result of the recession, the University of Florida team sees the opportunity for a positive change within American culture. Americans are stereotyped as being wasteful and living excessively, and with justification. In 2007, the United States was responsible for 21 percent of the total global CO² emissions and had the highest emissions per capita. Of that total, buildings were responsible for 38 percent, and are one of the heaviest consumers of natural resources.¹ There is hope for change, however, because the recession has forced more Americans to think about how they live and search for ways to save money. Important, constructive questions are raised, such as, 'How much does it cost to heat and cool my house?' 'How can I conserve energy and ultimately save money?' 'How can I get more out of my house?' It is a critical time in U.S. history and Americans can go one of two ways--either RE:FOCUS their lifestyle and become more sustainable or revert back to old ways of wastefulness and unsustainable living.

Project RE:FOCUS is the team's strategy to promote a movement within American communities. Rather than simply branding a house the team is branding a new, more sustainable lifestyle. The house acts as a platform to advance knowledge on passive design strategies and cutting edge technological systems that yield high energy and material efficiency. The house being brought to Madrid is a prototype, a paradigm, displaying how that change in lifestyle can be conveyed in the design of a house. For the competition, the team has employed systems and strategies that will be advantageous to the target market.

For the purposes of the competition, the UF team chose a primary market to target, however the flexibility of the design offers the potential for the market to expand in the future. With the help of professionals and faculty from The Bergstrom Center for Real Estate Studies and The Shimberg Center for Housing Studies, both part of the university, the team identified a viable market for the house (see Table 1.0). The ideas instilled in the Project RE:FOCUS house will take time and the team acknowledges that change may not happen quickly. There needs to be time allotted for the dissemination of these new ideas and lifestyle. Keeping this in mind, the team has developed a marketing plan outlining different phases of the project and production.

Phase One: The marketing plan begins with the dissemination of Project RE:FOCUS to the targeted audiences set forth by the Communications team (see Communication Plan), using the prototype house as a means to spread knowledge about sustainable living.

Phase Two: The marketing of the house begins in the second phase, targeting Florida's empty-nesters and newly retired people. Due to the economy, development is not a feasible option currently, so production levels will be low to begin with, 1-2 houses. The house would be flat-packed and assembled on-site on a customer's lot. The cost of the prototype house (\$150,000-\$250,000) was used to generate the target market for the competition, but will adjust as production levels rise.

Phase Three: This phase expands the production and fabrication to Arizona, still targeting empty-nesters and newly-retired people. This allows for the versatility of the house to be tested; the necessary modifications are made to the design, or 'kit of parts,' in order for the house to perform efficiently in the Arizona climate, and incorporate local vernacular and culture.

Phase Four: As the economy improves the goals would include developments,

industrialization, and mass production, which would drive down the cost of production, yielding more profit. This would also allow the market to expand to new income brackets. Ultimately, the team sees the potential for the module to grow to larger scales, such as an apartment building or retirement home, creating a place for it in an urban context.

The Project RE:FOCUS house is an economically feasible alternative to traditional housing types. Using a flexible modular, manufactured housing unit with possibilities for multiple users in various settings it can be manufactured for affordable housing. According to *Florida Realtors*, in 2008 there were 124,215 houses sold at a median price of \$187,800. When one considers the capture rates, or the portion of total sales sold by one entity or one project, high production levels (100-1,000 houses per year) become feasible, with the likelihood for success and further mass production.

Target Market Parameter	
Location	Miami, FL
Housing Type	single family
# of Occupants	2
Occupant Demographic	empty-nesters or newly retired, age 50-65
Homeowners Annual Income	\$68,642–82,371 per year
# of Bedrooms	1 - 2

IDENTIFYING A TARGET MARKET

There were certain challenges the team faced when selecting a target market. Initially, the seemingly most obvious market to go after was of a much younger demographic, recognizing that the younger generations normally initiate the sort of change that Project RE:FOCUS introduces. However, there were many factors that made this an unviable option, such as the fact that many young people in the U.S. move frequently, and unfortunately, in today's market, would not see the immediate payback from the investment in a solar-powered house.

To begin the process of identifying the best target market, the team estimated the cost of the house. Then, working with the Shimberg Center for Housing Studies, a dataset of household characteristics using the 2008 American Community survey (ACS) was produced.

The methodology consisted of using the 2008 American Community Survey (ACS) Public Use Microdata Sample (PUMS) to estimate the number of households with characteristics indicating that they might be part of the target market for the Project RE:FOCUS house. The ACS dataset included these variables and assumptions:

Geographic area: State of Florida; Broward County, Florida; and Orange County, Florida

Household size: The team included only households with 1-2 persons.

Tenure: Owner-occupied or renter-occupied households.

Ages: This refers to the age of the householder. The team used two ranges: 28-39, to capture young, smaller households such as singles and couples, roommates, or single parents with one child; and 50-64, to capture younger "empty nest" households.

Price of the house: The team used this to calculate a household income range for which the given home price would be affordable. It was assumed that households

could qualify for mortgages of no more than 25% of household income. First, the incomes of households who might be targets for the highest home price, \$250,000 was determined. Then the team calculated the minimum end of the range by calculating the annual income a household would need in order to spend exactly 25% of its income on housing costs if it obtained a 30-year mortgage with a fixed rate of 6.04% and down payment of 5% for a \$250,000 house. The maximum end of that range was calculated by assuming that people who could afford \$300,000 for a house, using the same assumptions regarding mortgage costs, might be willing to purchase a \$250,000 home. Thus, the team determined the target income range for a \$250,000 house was \$68,642-82,371 per year.

For the lower home prices (\$150,000 and \$200,000), the minimum end of the income range was calculated using the same method (i.e., determining the annual income necessary to pay exactly 25% of household income for a \$150,000 or \$200,000 mortgage). The maximum end of the range was left at \$82,371 per year, under the assumption that a higher income family able to afford up to \$300,000 for a home might still be interested in purchasing a \$150,000 or \$200,000 solar home.

In sum, the annual household income ranges corresponding to each home price are as follows:

\$150,000 home: \$41,185-82,371 per year

\$200,000 home: \$54,914-82,371 per year

\$250,000 home: \$68,642-82,371 per year

\$150,000			
Age	28-39	50-65	50-65
	owners	renters	owners
Household estimate	104,922	72,198	384,494
\$200,000			
Age	28-39	50-65	50-65
	owners	renters	owners
Household estimate	61, 879	34,743	227,151
\$250,000			
Age	28-39	50-65	50-65
	owners	renters	owners
Household estimate	29,234	13,061	101,746

TABLE 1.0 Number of households in the state of Florida that have the necessary income to buy a house in the price range of \$150,000-250,000.

The “household estimate” for each set of assumptions is the estimate from the 2008 ACS PUMS of the number of households that meet all of those assumptions for the given geographic area.

ECONOMIC FEASIBILITY STUDY

Three scenarios for house production were analyzed. Each case involves assumptions about the expected sale price, the investment in equipment, manufacturing facilities, and overhead such as advertising and management costs. The projected sale price for the house was investigated through selected market analysis. As described earlier, the target market is empty-nesters in Florida. The projected sale price for the house is \$250,000 in the custom home market, which is a small scale homebuilder in a low-production scenario of one to two units of this type per year. In this scenario, the investment is low. The investment in equipment is low because very little specialized equipment would be needed. Most of the specialized work would occur in suppliers' manufacturing facilities. The investment in manufacturing infrastructure is zero, as the house would be site built. The investment in advertising is minimal because the majority of sales in this market comes through word of mouth. The cost of producing the house would be \$200,000.

The next two scenarios require investment in equipment and facilities. The second scenario is a medium production scenario that builds up to 100 units per year. This scale of production would require an investment in facilities such as plant buildings and equipment. We estimate these costs to be about \$2,000,000. There would also be overhead costs such as management and advertising. It is assumed that the cost of producing the house would also be reduced to \$155,000 and have a sales price of \$200,000.

The third scenario is a high production scenario of about three homes per day or 1,000 per year. The investment in facilities increases to \$8,000,000 in this scenario. We assume that the cost to produce the house will be reduced to \$120,000 and the sale price will be reduced to \$150,000.

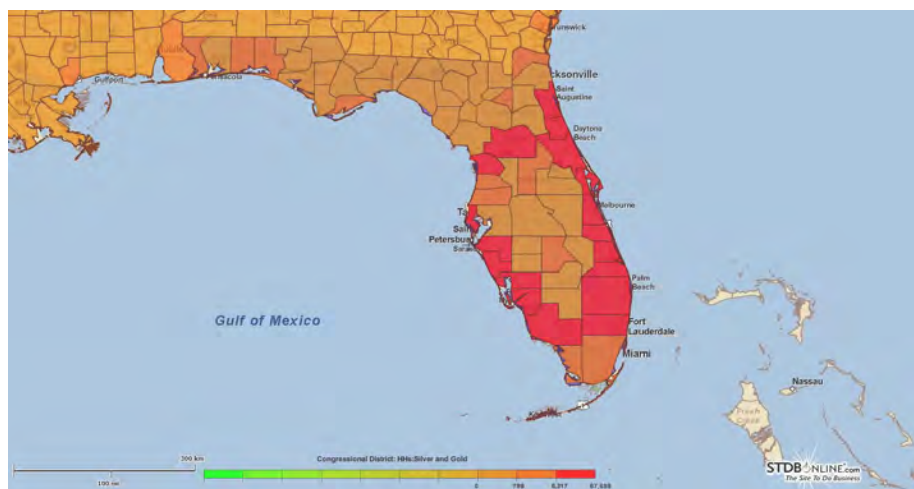
Given the assumptions made, all three scenarios have a good internal rate of return (IRR). The IRR ranges from around 30% for the production scenarios to around 50% for the low production, custom homebuilder scenario.

STUDYING THE MARKET

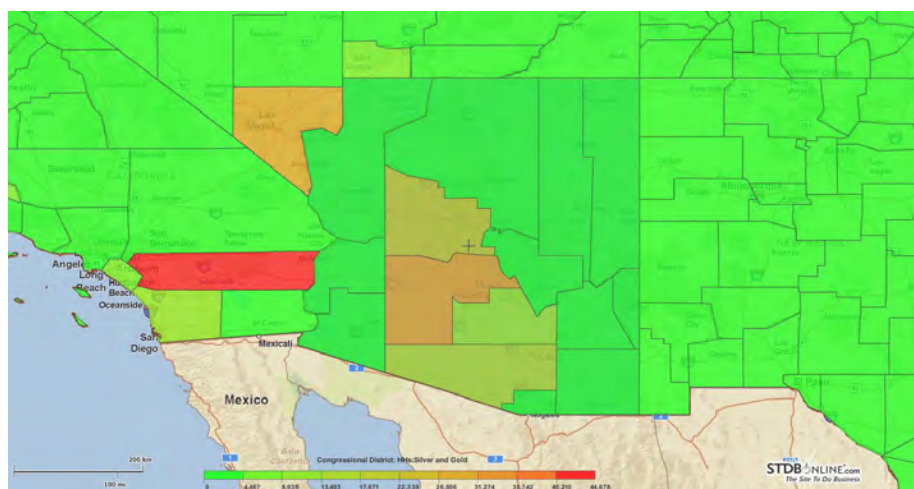
Florida's geographic location and warm climate make it a popular state to migrate to, especially for empty-nesters (parents whose children have grown up and left home) and newly-retired people. This market is also growing rapidly as the baby-boomers are nearing retirement age. Using the 2000 Census of Population and Housing from the U.S. Census Bureau, the ESRI (Environmental Systems Research Institute) forecasts that in 2014, people 50 and over will make up 39.8 percent of the total population.² That is a significant number of people that the team recognized as a potential market to target, while also realizing the challenges that would come along with addressing affordability, livability, and adaptability. First, it was necessary to break that large group of people into smaller groups in order to study their behavior and adjust the design accordingly. The team, with the help of real estate professionals, used ESRI Tapestry Segmentation to get a better understanding of the lifestyle and tendencies of this growing market. This segmentation system "combines the 'who' of lifestyle demography with the 'where' of local neighborhood geography to create a model of various lifestyle classifications or segments of actual neighborhoods with addresses—distinct behavioral market segments."³ Essentially, it is used to segment groups based on their behavior and characteristics.

According to the findings, there are three segments that would be viable for the team's house (maps are included showing segment density by county for Florida and Arizona, which is included in a later phase of the marketing plan):

Silver and Gold “is made up of affluent seniors, many of whom have retired from professional occupations. The median age of this group is 59.7 years. More than 60 percent of these households are in the South, mainly in Florida. One-fourth are located in the West, mainly in California and Arizona. Neighborhoods are exclusive, with a median home value of \$286,746 and a homeownership rate of 84 percent. Because these seniors have moved to newer single-family homes, they are not living in the homes where they raised their children.”⁴ (see maps 1.1 and 1.2)

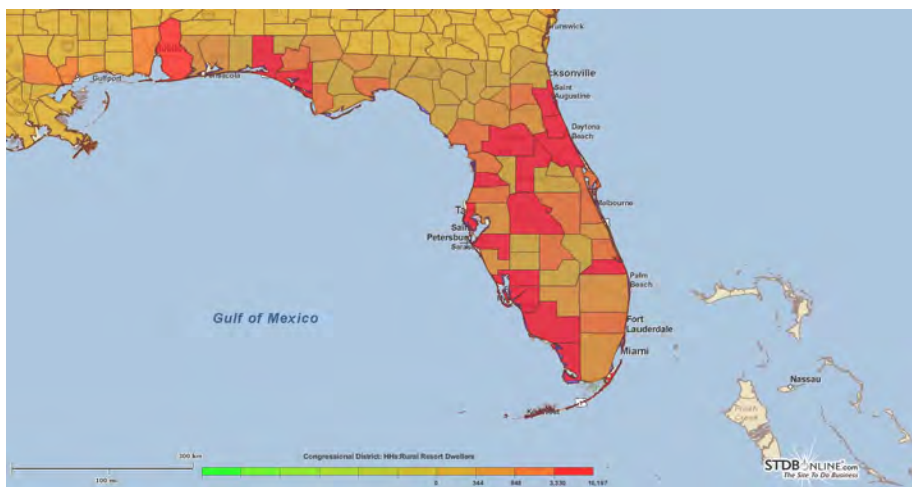


Map 1.0 Silver and Gold segment density by county (Florida)

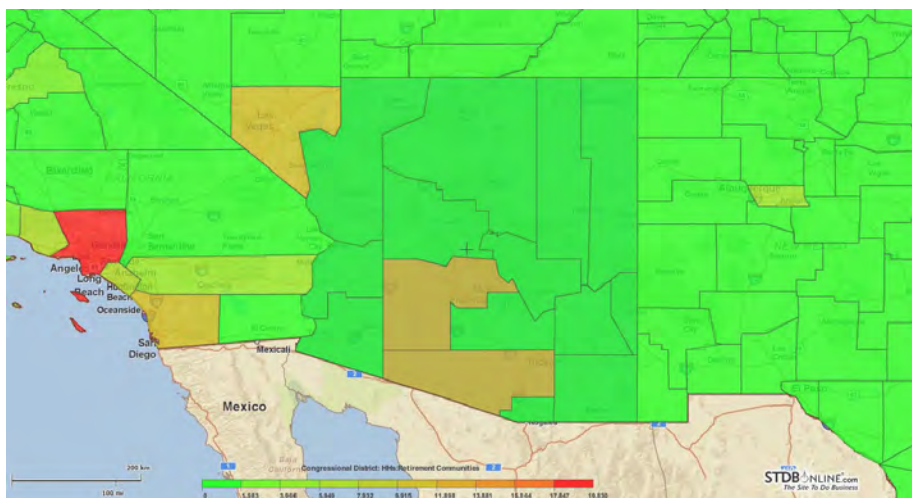


Map 1.2 Silver and Gold segment density by county (Arizona)

Rural Resort Dwellers “These neighborhoods are found in pastoral settings in rural nonfarm areas throughout the U.S. Household types include empty-nester married couples, singles, and married couples with children. The median age is 47.2 years; more than half are aged 55 and older. These residents live modestly and have simple tastes. They are active participants in local civic issues...residents also belong to environmental groups, church and charitable organizations, fraternal orders, unions, and veterans’ clubs. They go hiking, boating, canoeing, hunting, fishing, horseback riding, and golfing. Homeownership is at 81 percent; the median home value is \$189,032. Of the Tapestry segments, Rural Resort Dwellers has the highest percentage of seasonal housing, 16 times higher than the national level.”⁵

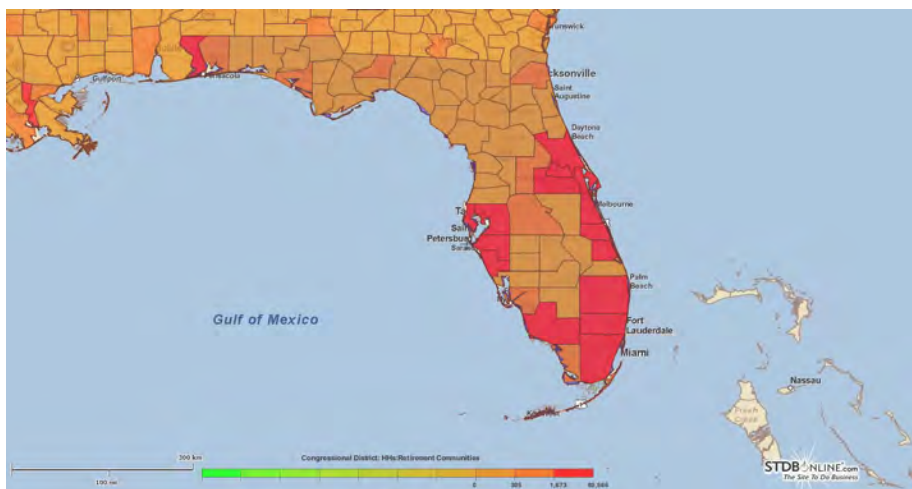


Map 2.0 Rural Resort Dwellers segment density by county (Florida)

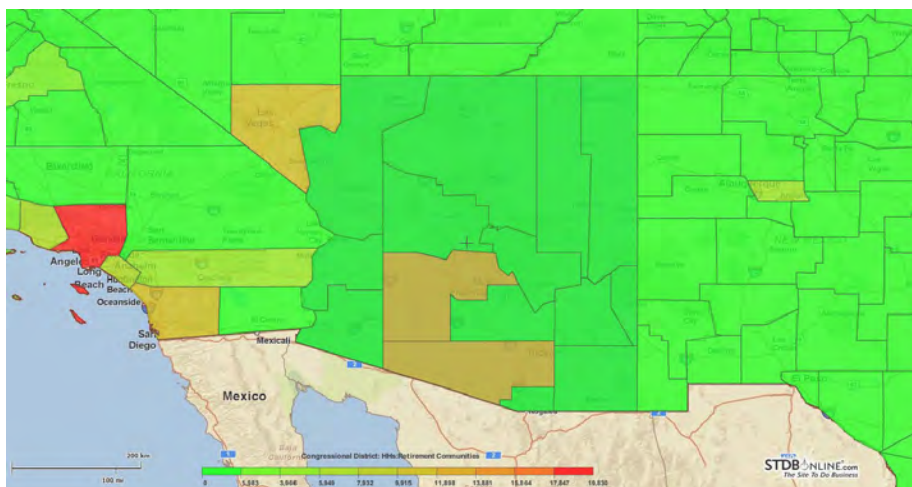


Map 2.1 Rural Resort Dwellers segment density by county (Arizona)

Retirement Communities “These neighborhoods are found mostly in cities scattered across the United States. The majority of households are multiunit dwellings. Congregate housing, which commonly includes meals and other services in the rent, is a trait of this segment dominated by singles who live alone. This educated, older market has a median age of 51.4 years. One-third of residents are aged 65 years or older. Although the median household income is a modest \$48,045, the median net worth is \$170,490. Good health is a priority; residents visit their doctors regularly, diet and exercise, purchase low-sodium food, and take vitamins. Home remodeling projects are usually in the works.”⁶



Map 3.0 Retirement Communities segment density by county (Florida)



Map 3.1 Retirement Communities segment density by county (Arizona)

LIVABILITY

The house design adopts simple principles from the Florida Cracker house (see architectural narrative for full explanation). The Project RE:FOCUS house binds the new and the old, embracing the Cracker House's use of poetic sensibility and the humble celebration of utility, and couples them with some of the most advanced technological systems currently on the market. The University of Florida team carefully considered comfort, aesthetics, utility, flexibility, accessibility, convenience, and sustainability in the design to assure the house is tailored to fit the target market.

The degree of control, adaptability, and automation between the occupant and module systems serves as a link between the home owner and their energy consumption. Remaining aware of natural energy cycles, the occupant is able to manually control passive and active comfort conditions as desired through the manipulation of shading devices, operable rain screens, and innovative sustainable technology.

A highly-efficient mini-split HVAC system offers the homeowner flexibility and allows them to adjust temperatures to assure comfort. Furthermore, "zones" are created in the house by the insertion of the breezeway, allowing control of temperatures by zones. When one zone or pod isn't being used the homeowner can adjust the temperatures accordingly and save money.

The landscape and exterior spaces of Project RE:FOCUS have been designed to be a flexible extension to the interior spaces using similar proportions to the house into 4' x 8' modules. The specific site chosen for the house can help to determine the exterior spaces, which can be increased or decreased in size depending upon the users' needs. If a site is chosen with pre-existing trees or vegetation they can be incorporated into the exterior living spaces with the decking modules placed around them as long as the canopy of the trees does not shade the PV panels. In warmer climates shading from existing vegetation might be useful to reduce the solar heat load, but these needs should be addressed on a site specific and individual occupant need basis.

Some of the features of the house include:

- open floor plan
- heart pine wood floors, salvaged from a late-19th century house in Micanopy, FL
- operable windows
- operable exterior screen
- breezeway--promotes passive natural ventilation, reducing energy consumption, and creates an outdoor living space.
- ADA accessible
- large porch for outdoor living and cooking
- dim lights for adjustable light levels
- large doors on the north create an extension of living space to the exterior, visually and physically.
- office space
- private and public pod to separate functions within the house and create privacy, also creates "zones" so the homeowner is able to control and vary temperatures of the spaces (saves the homeowner money on electricity)

MARKETABILITY

The four key components in marketing this house are its environmentally sustainable use of local materials, the versatility of its design, the ease and speed of construction due to its 'kit of parts' assembly, and its energy efficiency.

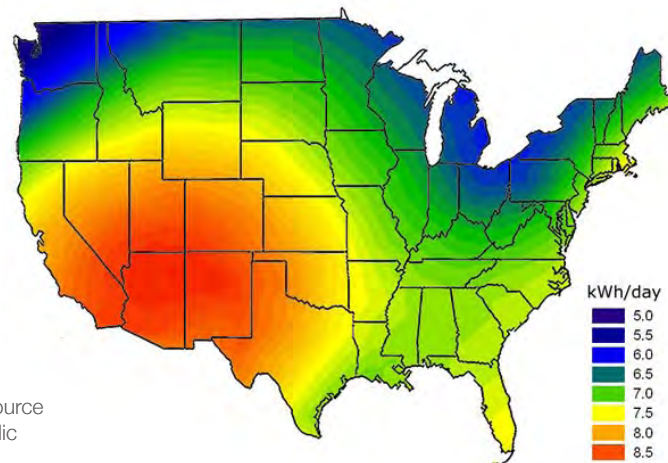
In the U.S., Florida has been a leader in creating policy changes and incentives that are necessary to encourage Americans to live more sustainably. Governor Charlie Crist and the Florida legislature created the Florida Energy & Climate Commission in 2008, to administer financial incentive programs and complete annual assessments of Florida's Energy and Climate Change Action Plan. That same year, the Florida Public Service Commission (PSC) adopted rules for net metering and interconnection for renewable-energy systems up to two megawatts (MW) in capacity. "Customer net excess generation (NEG) is carried forward at the utility's retail rate (i.e., as a kilowatt-hour credit) to a customer's next bill for up to 12 months."⁷ Locally, Gainesville Regional Utilities' (GRU) Solar Rebate Program, established in early 1997 as part of GRU's demand-side management initiatives, provides rebates of \$500 to residential customers of GRU who install solar water heating systems. GRU has also offered its customers a rebate of \$1.50 per watt to install PV systems, with a maximum rebate of \$7,500 for residential customers.⁸ Incentives, such as these, are critical in the future success of solar energy, and will help make the Project RE:FOCUS house more marketable.

INDUSTRIALIZATION / BUILDABILITY / GROUPING

Industrialization is a key component to the design of the house and marketing strategy. Its modular design allows it to be fabricated efficiently and quickly. It is marketed as a 'kit of parts,' allowing the consumer to customize the house to meet their needs.

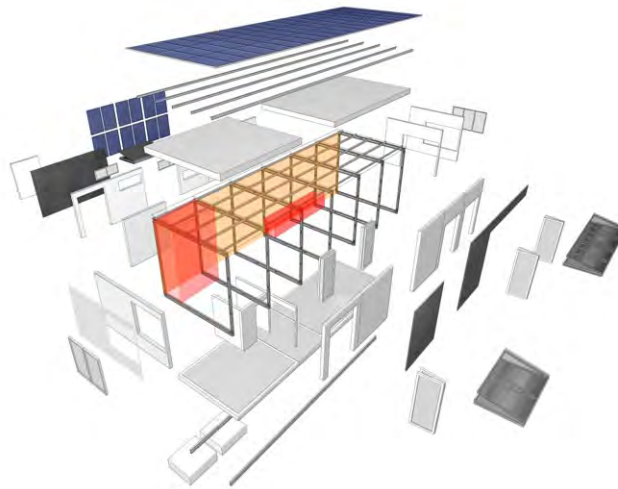
A major goal of the team is to produce a house that can be locally fabricated using the local vernacular and materials, thus minimizing the carbon footprint; providing jobs, revenue, and business for communities; and creating a connection to the place and culture. The 'kit of parts' accommodates and encourages changes according to context, culture, and climate. For example, the "breezeway" module in the UF team's design is commonly found in Florida vernacular architecture, however this module would most likely shift to the end of the house to become a "porch" module, or be taken out completely if it were located in a northern state. The wood used for the screen, another example of a "part" within the 'kit of parts' could be substituted for a material that is found locally (or imported, if absolutely necessary).

As a new, more sustainable lifestyle takes hold through Project RE:FOCUS, there will be more demand and potential to expand to other areas of the country. In Phase Three of the marketing plan the project expands to Arizona, another state many people migrate to because of its dry, hot climate. It also happens to be the sunniest place in the U.S. making PV systems ideal for use in this area. (see Map 4.0)



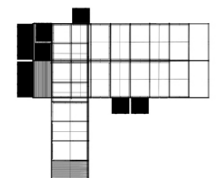
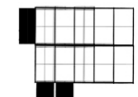
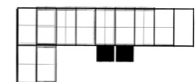
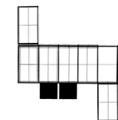
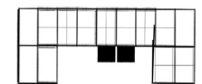
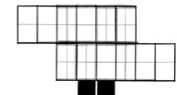
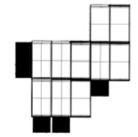
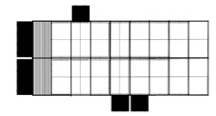
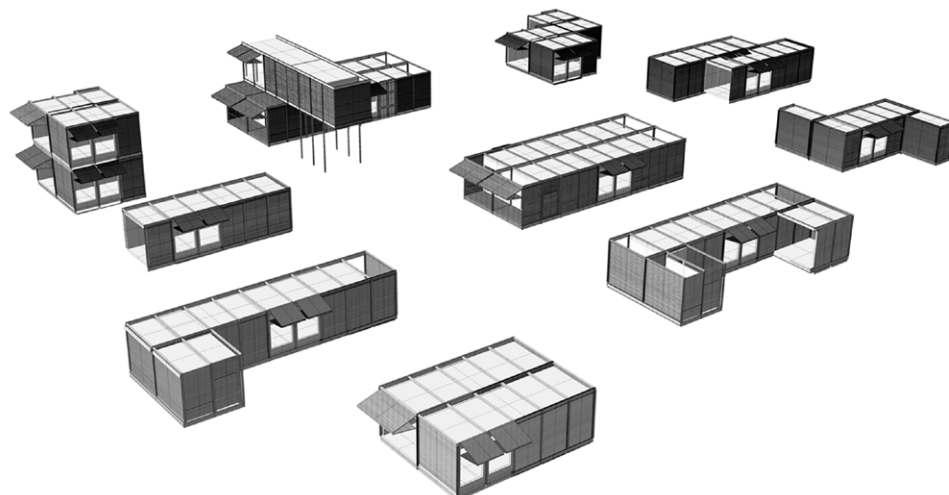
Map 4.0 Comparison of the the solar resource for 2-kilowatt photovoltaic residential applications across the entire U.S.⁹

An 8' x 16' module was developed from the standard U.S. 8-foot dimensioning system. The module is prefabricated off site to ensure quality and efficiency in on-site construction. Each module is designed as a panelized system that can be broken down and flat packed in order to be safely and efficiently delivered to the site. This method also simplifies assembly, reducing labor costs and on-site waste. A module is considered to be structurally independent allowing for spatial flexibility to accommodate different customer's needs and adjust to site conditions. The electrical and mechanical systems are organized into a single element that helps to unify the house. Centralizing these systems also reduces construction costs. A mechanical chase can be extended or reduced should the house increase or decrease in size.



The modular structure allows for future growth both horizontally and vertically. The prototype is a single unit that can be part of a vertically stacked, "urban" system in a structural framework (see Rendering 1.0 and 2.0) or a series of attached horizontal housing units, or "suburban" condition (see Rendering 3.0 and 4.0). The design allows for a variety of materials, which provides local craftsmen the opportunity to apply their knowledge of local materials and joinery, not only integrating the house with the context but also possibly improving its durability and maintainability while providing local employment opportunities. The design of the single modules creates opportunities for smaller companies to be able to manage the construction of individual units without the need for large and expensive equipment.

Examples of multiple configurations of 'the module.'



Renderings exploring grouping in a suburban context.



Renderings exploring grouping or “stacking” in an urban context.



1 Energy Information Administration, Assumptions to the Annual Energy Outlook, 2008.

2 STDBonline (<http://www.stdb.com/>)

3 ESRI Tapestry Segmentation (www.ESRI.com/Tapestry)

4 *ibid.*

5 *ibid.*

6 *ibid.*

7 <http://www.dsireusa.org/incentives/>

8 <http://www.dsireusa.org/incentives/>

9 http://www.fsec.ucf.edu/en/media/enews/2007/2007-04_Sunshine_state.htm

SUSTAINABILITY REPORT

1. CONCEPT OF SUSTAINABILITY

Our vision of sustainability is embodied within the design and concept of the Project RE:FOCUS house. The house is a platform to advance knowledge on industrialized solar-powered houses with high energy and material efficiency. The house fulfills this objective through its environmentally sustainable use of local materials, the versatility of its design, the ease of construction due to its modular assembly, and its industrialized, highly energy efficient shell.

The house is a blend of vernacular Florida architecture and industrialized modularity. Three primary architectural elements are consistent in this type of vernacular architecture: a covered open porch, a breezeway oriented to the prevailing wind, and a porous, breathable skin. The function of each of these elements can be viewed individually, however, these elements offer greater potential when combined, each playing a complementary role while retaining its individual expression and purpose.

Concepts of industrialization and flexibility are manifest in the design, the assembly, and the potential for future expansion. The “kit-of-parts” building approach promotes sustainability on numerous levels, reducing the number of shipped elements and encouraging the use and reuse of local building materials which accommodate different climates, cultures, and contexts.

The house has the ability to be reconfigured and/or expanded at multiple scales. The modules establish a standard unit promoting the addition of living modules for growing families or for vertical modular additions in an urban context. Within the house, smaller modular components in the walls and/or interior fixtures can be refitted with new pieces, shifting the potential use, role and material. The apertures in modular infill panels can be precisely designed in scale and size to alter the energy performance of the home and adapt to the local climate.

The degree of control, adaptability, and automation between the occupant and module systems serves as a link between the home owner and their energy consumption. Remaining aware of natural energy cycles, the occupant is able to manually control passive and active comfort conditions as desired through the manipulation of shading devices, operable rain screens, and innovative sustainable technology.

2. BIOCLIMATIC STRATEGIES

Strategies to ensure a good fit between a building and the local climate include consideration of the building configuration or geometry; the extent of its solar exposure and wind protection; as well as the physical properties of its construction materials, including their potential for creating thermal mass and insulation; and its external surface qualities of color and texture.

The point of departure for the bioclimatic strategies used in the Project RE:FOCUS house is the site selection. Upon its return to Gainesville the house site will be exposed to winter sun and summer breezes, while being protected from summer sun and unfavorable winds, with well drained soil. Additional bioclimatic strategies employed in the house are described in the table below:

	Building Massing	Flat Roof Design	Wall Design	Floor Design	Window Design
Geometry	Compact forms minimize heat loss	Prevent overheating with a double roof. The structure allows easy placement of solar panels and also provides space for a green roof		SIP provides structure and insulation	Low U argon fill Double pane low E coating with thermally broken aluminum frame
Shading	Protected openings for windows and doors. Minimized openings. When returned to Gainesville, FL, the house will be located relative to appropriately tall trees to cast shade onto the home. Choose deciduous trees for summer shading only.	PV panels will help with shade the roof surface.	Shading minimizes heat gain.		Overheating prevented by operable and fixed shading.
Solar Exposure	Proportions and orientation optimized to take advantage of sun and wind				Windows used for passive heating and day lighting
Wind Protection	Natural vegetation will be used as wind breakers and/or create a rain-screen	Structure is rated for 130 mph wind loads			Tempered glass used to protect against damage from storms
Ventilation	Mechanical HVAC ventilation determined by ASHRAE Standard 62.2. Natural ventilation to take advantage of wind direction, pressure differences, and the stack effect				Located according to wind direction for natural ventilation
Thermal Mass	Ideally placed within the building and situated where it can be exposed to winter sunlight but insulated from heat loss. When returned to Gainesville, FL, water storage tanks to be part of the thermal mass system		Enhance thermal inertia for use as storage		
Insulation	Structural Insulated Panel (foam core-polyurethane, OSB skin with no thermal breaks from studs)	Green roof plantings provide greater insulation and reduction of cooling loads	Minimize heat exchange	Minimize heat exchange	Low E glass minimizes heat transfer
Color	High albedo to reflect heat	TPO roof can reflect up to 90% of the heat from the sun			Dark hues which increase absorptance avoided
Texture	Consider glare, especially with a high albedo surface	Texture optimizes drainage and water damage			

Table 1.0 Bioclimatic components of the house

3. WATER

Strategies for the Reduction of Consumption

In order to conserve water, efficient appliances, faucets, showerheads and toilets will be used, in addition to an efficient HVAC system and a grey water strategy. The US Environmental Protection Agency has developed a guideline to ensure conservation of water through their WaterSense certification program. The WaterSense program guarantees that the products independently certified with its label are 20% more efficient in water consumption than other similar products.¹

There are many options when picking out a toilet. Older toilets (manufactured before 1978) consumed 4-6 gallons per flush. Toilets manufactured between 1978 and 1990 used an average of 3.5 gallons per flush. These toilets can be modified to become more efficient in simple ways. Installing a displacement device can help to reduce the water consumption. A half of a gallon can be saved by such devices. This averages out to a savings of 12 gallons per day per household. Hardware stores sell displacement devices in the form of plastic or rubber bags that can be filled with water and hung from the side of the tank. Another alternative to buying a product is to place pebbles in an empty half-gallon milk jug (or other recycled, durable container) and fill it with water. A third device is a toilet dam which works by blocking off an area of the tank to decrease the amount of water per flush. An early closure device is another way to help conserve water. It works by causing the flapper to close early which releases a reduced amount of water per flush.²

Low consumption toilets that meet the EPA WaterSense standards are another option to reduce water consumption. Low consumption toilets come in both single flush and dual flush models. The single flush models use 1.28 gallons per flush. The dual flush toilets do not exceed 1.28 gallons for the effective flush. The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush.³ WaterSense toilets save an average of 4,000 gallons of water per year, \$90 in utility bills, and \$2,000 over the life of the toilet.⁴ There are many brands which offer WaterSense, low consumption toilets including American Standard, AquaSource, Briggs, Caroma, Kohler, TOTO, ProFLO and many more.⁵

There are also composting toilets available which don't use any water at all. Instead, they use the process of decomposition and evaporation to break down the waste. It is very similar to an average garden composter and produces a useful fertilizer which can replace commercial fertilizers while ensuring the preservation of local water quality.⁶ There are several brands of composting toilets including Sun-Mar, Excel, Envirolet, BioLet, Clivus, and EcoTech.⁷

Water use reduction in the Project RE:FOCUS house is achieved by use of water efficient sanitary equipment. The K-3797 Reve toilet from Kohler features dual flush option (1.6 or .9 gallons). It meets strict flushing performance guidelines established by the EPA's WaterSense program that qualifies it as an HET (High-Efficient Toilet) thus allowing homeowners to take advantage of consumer rebates available in certain municipalities

Showerheads are another way to help conserve water. A conventional showerhead uses 3-10 gallons per minute of water.⁸ Although WaterSense doesn't currently have labeling for showerheads, the program is working on developing the specifications and has come out with a preliminary document which will separate the efficient showerheads from those less efficient ones. The standard WaterSense has already set includes showerheads that are fixed and handheld. Fixed showerheads are defined as fittings that are permanently attached to the shower wall or ceiling or are attached to a pivotal arm. Handheld showerheads are defined as fittings that are connected to the wall through a flexible tube or hose. This type of showerhead can either screw directly into the shower arm, into a diverter valve between the standard showerhead and the shower arm or onto a deck-mounted diverter on the bathtub. The rate of flow for WaterSense showerheads will be between 1.5 and 2.0 gallons per minute (measured at 80 pounds per square inch (psi) of pressure).⁹

The showerhead provided in the Project RE:FOCUS house is the K-997 Purist 1.75 gpm model from Kohler. As claimed by its manufacturer, it provides LEED compliance with 30% reduction in water consumption without sacrificing shower performance by means of its three-function spray engine, which delivers an eco-friendly 1.75 gallons per minute, saving up to 30% water consumption over a conventional hand shower.

Faucets are also important in the conservation of water. A faucet manufactured before 1978 uses 3-6 gallons per minute of water.¹⁰ The WaterSense program has ensured the most efficient lavatory faucets. These specifications do not cover metering faucets, lavatory faucets in public use or residential kitchen faucets. The flow rate for the more efficient lavatory faucets is 1.5 gallons per minute at a pressure of 60 pounds per square inch at the inlet (where water is flowing).¹¹ By installing a WaterSense faucet, households can save an average of 500 gallons of water per year.¹² Flow regulating aerators help to ensure all sinks use between .5 and 2.5 gallons of water per minute.¹³ Some brands which offer efficient faucets and aerators include American Standard, AquaSource, Delta, Gerber, Moen, TOTO and Kohler.¹⁴

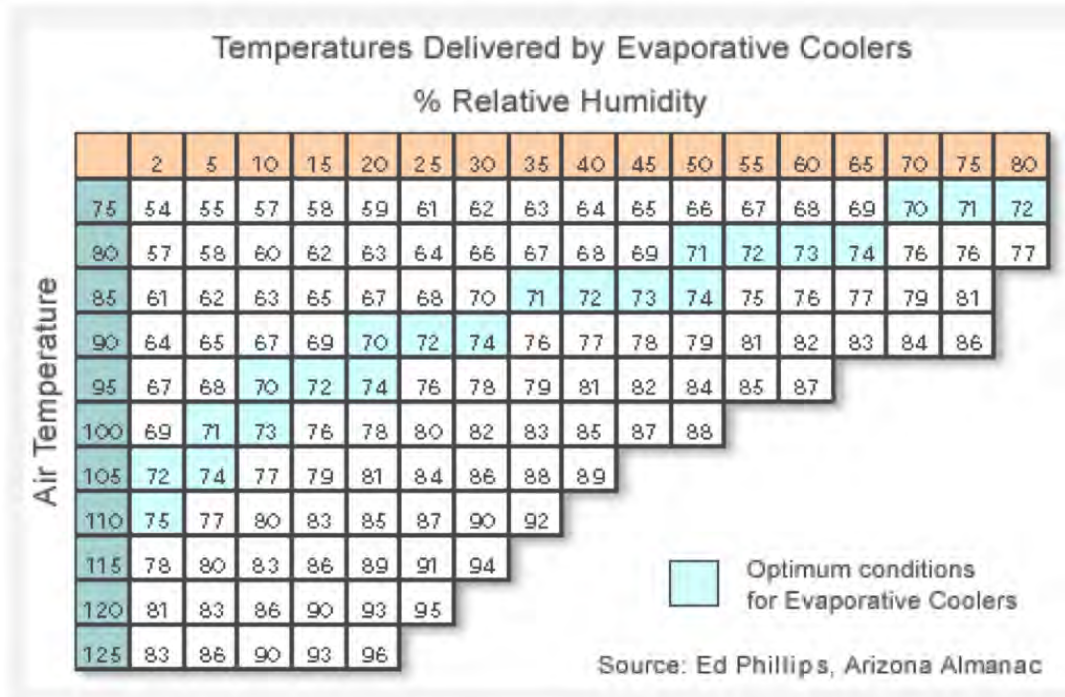
Appliances are another way to make a significant impact on the conservation of water. Dishwashers use an average of 8-12 gallons of water per load. The efficiency of the dishwasher is ensured by washing full loads rather than partial.¹⁵

Top loading clothes washing machines use anywhere from 40-55 gallons of water per load compared to front loading washers which only use 22-25 gallons of water per load.¹⁶ WaterSense defines efficient washing machines as those which have a wash factor of less than or equal to 6.0 gallons of water per cycle per cubic foot capacity.¹⁷

The Project RE:FOCUS house features the Model # WCVH4815KMS front-loading washer from General Electric. This is a high efficiency, 24" under-counter, free standing unit, with 2.6 cu ft capacity. The dishwasher is Model # DD24SDFTX6 24" from Fisher & Paykel, an ultra efficient built-in, under-counter, automatic dishwasher, with 9 wash cycles and hot-air and heat-off drying cycles. It uses as little as 1.95 gallons of water per wash and is Energy-Star approved. Evaporative cooling systems can also achieve high efficiency of water use. WaterSense accredited systems use a maximum of 3.5 gallons of water per ton-hour of cooling when adjusted to maximum water use. Blowdown is based on time of operation and cannot exceed three times in a 24-hour time period (every eight hours).¹⁸

There are two types of evaporative coolers: direct and indirect. A direct evaporative cooler uses a blower to force air through a water-soaked pad. As the air passes through the pad, it is cooled and humidified as well as filtered. This can drop the temperature as much as 20 degrees.¹⁹ The pad can be made of wood shavings which absorbs the moisture of the water without creating a mold problem (Aspen wood is most commonly used). Small distribution water line delivers small drips to the pad regularly (using anywhere from 3-15 gallons of water per day). A recirculating pump directs the water back to the top of the pad. The water lost in evaporation requires that water added to the system and is controlled by a float valve (similar to toilets). This valve adds water when the amount drops too low.²⁰ An indirect evaporative cooler uses the same mechanism but has the additional component of a secondary heat exchanger which prevents the humidity from entering the building. Many times, an evaporative cooler can be used as the sole coolant system for a home but are also compatible with a refrigeration system. Although it should be noted; both systems cannot operate successfully simultaneously.²¹ Evaporative coolers work because the air is dry. The larger the difference between the humidity of the outside air (dry bulb) and the humidified, cooled air (wet bulb) the more effective the cooling will be.²²

This system of cooling is less expensive than traditional air-conditioning units and use 1/4 of the electricity. Evaporative coolers also improve the indoor air quality by bringing in large quantities of fresh air from outside. The air indoors is completely changed every one to three minutes as opposed to traditional air-conditioner units which constantly re-circulate the air inside.²³



Evaporative Cooling. California Energy Commission ²⁴

There are many manufacturers of Evaporative coolers. AdobeAir, Inc, Coolerado, LLC, EVAPCO, Inc, McQuay International and Phoenix Manufacturing are some of the companies which offer a wide range of products for all size spaces.²⁵

The efficient use of the heating, ventilation, and air conditioning, or HVAC system is also crucial to the reduction of water usage. The traditional HVAC system accounts for % of the household energy usage, which translates into the use large amounts of water. The house features the Mitsubishi Daikin Multi Split HVAC System, which allows for independently-controlled zones of house, reducing the heating and cooling loads for both spaces (see Engineering Narrative.)

RECYCLING, REUSE STRATEGIES

Recycling and reuse of water is a very important aspect of a sustainable home. Gray water is defined as water that comes from sources in the home such as dishwashers, showers, sinks and the laundry. This residential “waste” water comprises 50-80% of outgoing water.²⁶ Water from toilets is considered black water and is not used in this system. In order to install a grey water system in new construction, a parallel wastewater system is needed. The only change in design is to allow enough space for the larger components such as the holding tank and filters. The systems require a three-way diverter valve, a treatment assembly such as a sand filter, a holding tank, a bilge pump and irrigation or leaching system.²⁷



pre-filtration



storage



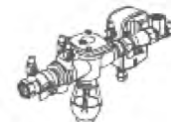
pumping



post treatment



control



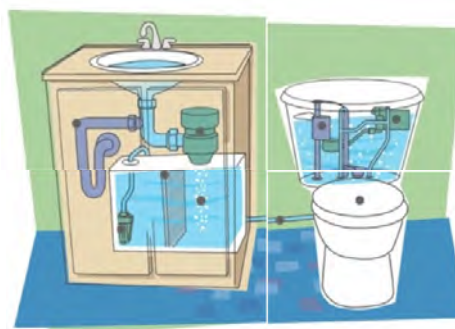
backup

*Rainwater Harvesting. Conservation technology*²⁸

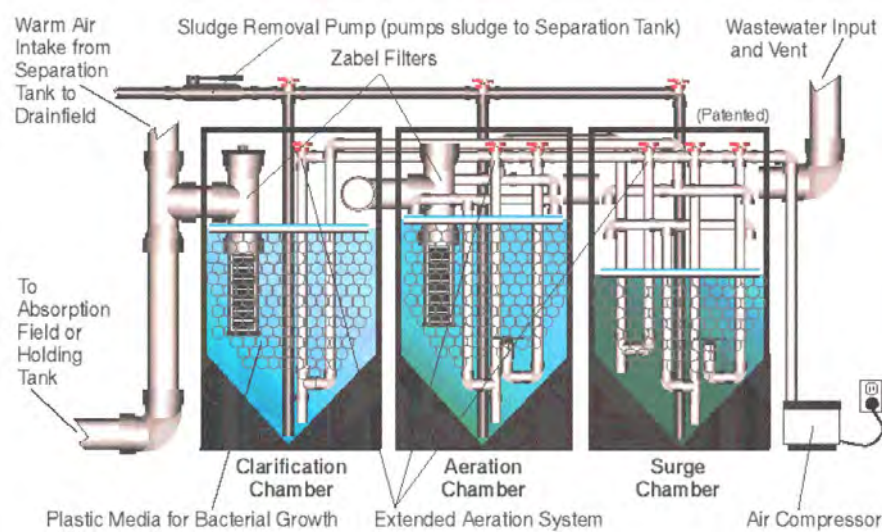
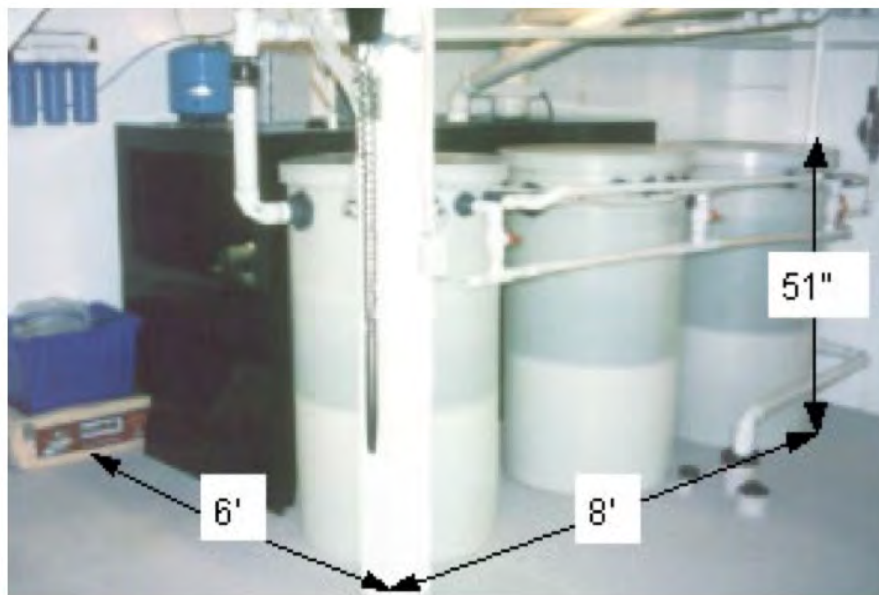
The benefits from the grey water system are extensive. Valuable potable water is saved for drinking and reduces the demand on nature. It also saves money for the consumer and increases efficiency in supply. The system will also increase the useful life and capacity for septic systems while municipal treatment systems will increase in efficiency while reducing costs. Grey water, released as irrigation, will have the chance to be purified at the upper, most biologically active region of the soil which will help protect the quality of ground water while at the same time increasing the supply. Using grey water as irrigation will also allow for a more lush landscape in areas that are more prone to reduced potable water supplies. This system will also decrease the amount of chemicals used to treat wastewater and potable water since gray water will reduce the amount of both potable and waste water.²⁹ There is also the unseen benefit of connecting humanity back to the local environment. Grey water systems help the homeowner directly see the impact of resource conservation.

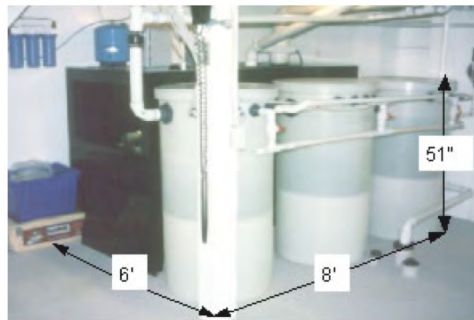
There are many different manufacturers of grey water systems. Oasis design is a company that offers the basic materials to create your own grey water system. The Real Goods Company also offers the basic materials required to establish a grey water system.

WaterSaver Technologies offers the AQUUS Greywater System which is a small scale grey water recycling system which uses water from the bathroom sink to flush the toilet. It has two parts including the Fill Control Unit and the Vanity Tank. The Fill Control Unit attaches to the back of the toilet and holds the fill valve in the off position which allows the Vanity Tank (located under the sink) to fill the tank with treated, recycled sink water. This system is convenient since it doesn't require the fresh water supply to shut off or be cross connected but simply adapts to the current system. It is also compatible with most toilets, although not dual flush or one piece toilets.³⁰

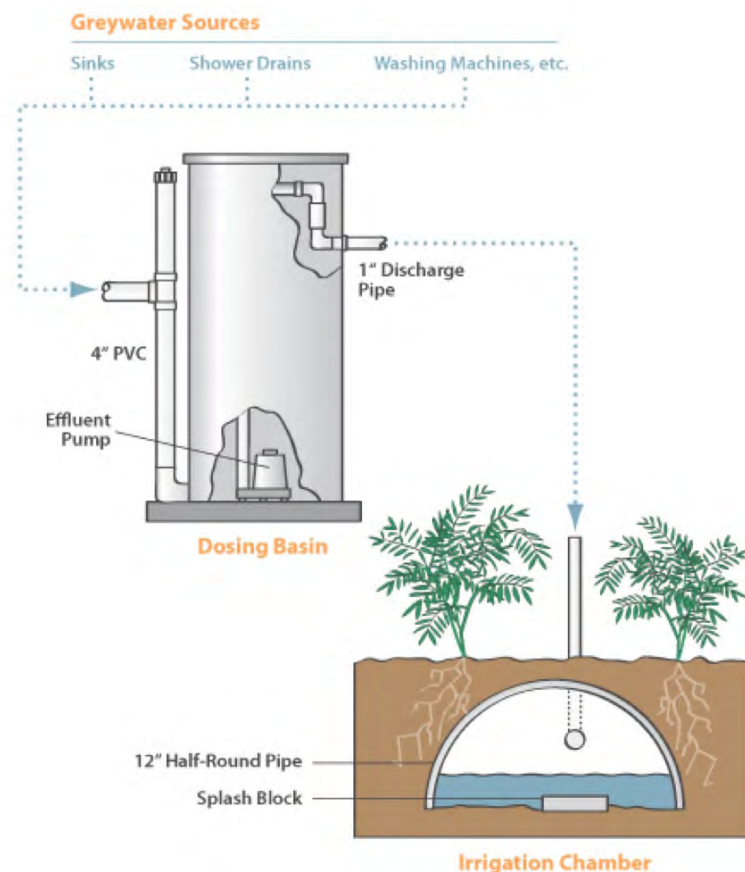


The Equaris Greywater Treatment System consists of three separate tanks. The first is the Surge Tank for flow control. The second tank is an Aeration Tank while the third tank is used as a Clarification Chamber. An efficient air compressor allows the continuous flow wastewater. The water is aerated which encourages the growth of bacteria on the interior surface of the walls of the tanks. As the wastewater flows, it is naturally being filtered by natural, biological processes. The treated water is of a high enough quality to be reused. The estimate for water conserved is 40 gallons of wastewater per person per day. The system itself sits in a rectangular footprint of six feet by eight feet and reaches a height of 51 inches.

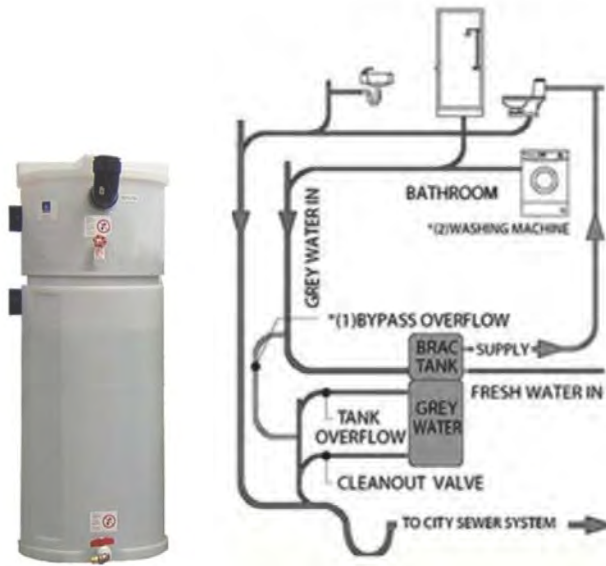




The Clivus Multrum grey water system contains a dosing basin and irrigation chambers. The grey water flows into the dosing basin. It is collected and stored for no longer than a day and a level switch activates the dosing basin's effluent pump (or gravity can be used if there is a slope available) and the grey water is moved to the irrigation chambers. The irrigation chamber is a half-round pipe placed within the root zone of the soil. The number of irrigation chambers used depends on the amount of grey water and design of the site. No filtration is necessary before the grey water enters the irrigation chambers due to the high levels of activity in the root zone of the soil. The Clivus system is custom designed and built based on the conditions on each site.



Aqua Pro Solutions offers the BRAC Grey water system. This system works by being integrated into the plumbing of the home. The grey water enters the system through the inlet pipe, passes through a filter, and collects in the lower portion of the BRAC system tank. There is a three inch overflow pipe which connects to the sewer line just in case the tank starts to overflow. The clean water inlet pipe is controlled by a float and valve which assures a minimum level and prevents the pump from running dry (and therefore prevents the toilets from running out of water). The water being collected is routed through a foot valve by a ½ hp pump with a pressure tank. This supplies the grey water at pressure to the grey water outlet and irrigation supply faucet.



Rainwater HOG offers a unique brand of grey water system tank. The modular tank is made of recyclable polyethylene and is food grade plastic. Each tank has the capacity to hold 51 gallons and is 19.5 inches X 9.5 inches X 71 inches (when vertically oriented). The tank is designed to work with conventional connection components and can be purchased through other manufacturers. When full, each HOG weighs 440 pounds. It can be installed either vertically or horizontally.³⁴

The Project RE:FOCUS house will make efficient use of grey water by recycling and reusing a portion of the grey water to irrigate the landscape (see Engineering Narrative.) In addition, there is potential for integration of the BRAC Grey water system into the home plumbing. This system allows for a 25%-40% savings in water used by the average household. It captures water used in showers, bathtubs and clothes washing machine and reuses it to flush the toilets.

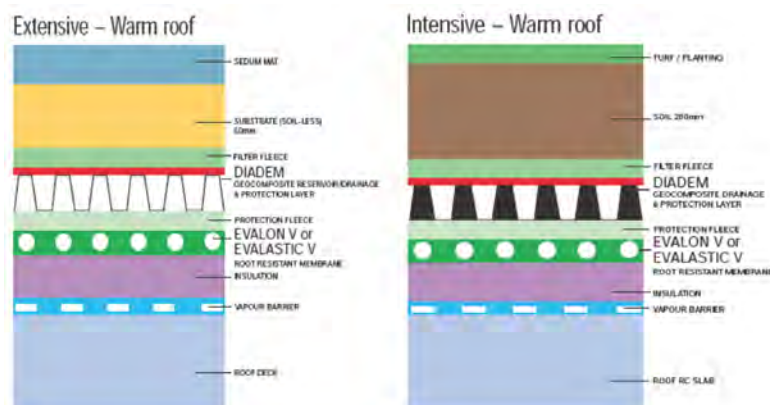


TREATMENT OF WASTEWATER

Green roofs offer many important benefits to any house including the ability to cleanse contaminants out of water. This system of roofing starts off by reducing the rate of storm runoff. Many cities combine their waste runoff with the storm drain system. This combination increases the amount of wastewater coming from the property and by cutting down on the rate of flow as well as integrating the green roof with the grey water system, the wastewater is significantly reduced. Many toxins enter water by running off the surface of a traditional roof. The plants on the roof will help to filter up to 30% of the nitrogen and phosphorus content before it grey water system and is used to flush the toilets and irrigate the lawn (after another round of being filtered in the grey water system).³⁵ The green roof is especially important during large storms when even the city's storm drain system can become overwhelmed and the polluted water diverts to the rivers and streams which leads to increased pollution and contaminated drinking water.

There are many different ways to plant a roof. One method of installation is to plant the roof itself. This method requires a series of layers which waterproof the roof and end with the plants on top. The first layer is the roofing membrane. This product can be made from many different types of materials including a liquid-applied membrane, a specially designed singly-ply sheet membrane or a built-up roof system which consists of three layers or more. The material most used is the bitumen sheets with polyester carriers and SBS modified coatings. In order to have successful drainage of the water, the roof must be sloped at least 1.5%. It is essential that the waterproofing layer is protected from aggressive roots which have the potential to penetrate. A root barrier is the next layer. This layer can be made of poured concrete, a laminated upper layer made of copper or with chemical additives in the coating of the waterproofing.³⁶ The next layer is insulation and is optional but does prevent water stored in the system from extracting heat in the winter or cool air in the summer. Each company offers its own version of insulation and ranges from integrating it into the drainage board to creating their own brand of insulation and placing it over the root barrier.³⁷ The company Hydrotech offers a CFC free, closed cell, extruded polystyrene that has high compressive strength and is resistant to moisture.³⁸ The next layer is the drainage layer and is not optional. This layer collects and moves the water towards the drain. It is absolutely important that the drainage layer is not blocked in any way. This is ensured through the installation of a filter fabric. The filter fabric is not biodegradable and prevents the smaller media particles from blocking the drainage layer. It is also resistant to natural acids and alkalis while achieving chemical neutrality.³⁹ The next layer is the growing media. Each green roof company has its own media mix which is unique and patented. The purpose of the media is to provide nutrients, water and oxygen while still being lightweight (to prevent excess loading on the roof) and stable.⁴⁰

The last layer is the vegetation. There are different ways to plant with vegetation. Extensive roof systems are defined as those with a soil media depth of six inches or less. This limits the size and type of plants which are able to be planted. The other type of green roof system is called intensive green roofs. Intensive roofs allow for a much larger variety of plants, including those with deeper root systems. This type of roof planting can even include shrubs and small trees.⁴¹ No matter which vegetation system is chosen, the plants need to be native and drought resistant (so that water won't be wasted irrigating the roof during cyclical droughts typical to the area).



The other way to create a green roof is through a modular system. This is when trays are individually planted rather than the entire roof at once. A modular system has many advantages over planting the roof on site. A modular system allows for easy roof maintenance since the modules can be moved easily to make repairs and then put back into place. This system also offers flexibility in design and plant selection. If the owner tires of one type of plant, it can be easily replaced. The modular system also allows for easy installation with a full green roof right away. Time is not needed to grow a lush roof full of plants since they can be grown in the trays at the nursery before installation. The trays can be made from recycled materials such as GreenGrid's 60% post-industrial recycled high molecular weight polyethylene trays. The company's pavers are 100% post-industrial recycled rubber. These products reduce the demand for new materials and ensure the concepts of recycle and reuse.



A roof which contains PV panels can coexist with a green roof. The green roof helps to control the urban heat island effect as well as the temperature of the roof (which helps to extend the life of the roof materials). The solar panels with a green roof underneath will stay cooler than solar panels without the protection of plants and will help to improve the function and efficiency.⁴⁴ The green roof also acts as an extra layer of insulation for the building which reduces the workload required of the solar system. The solar panels will provide shade to the green roof which will reduce the evaporation rate and therefore reduce the need for irrigation of that roof. The shade provided by the PV panels can also increase biodiversity, according to the Scandinavian Green Roof Institute.⁴⁵

There are many potential plants native to Europe which would do well on a green roof under PV panels (shaded areas). These plants include Apoleipon, Hispanicum, Desert Green Creeper, Desert Red Creeper, Desert Red Berry, and Desert Berry. Dryscapes⁴⁶

The University of Florida has taken this information into account while designing the Project RE:FOCUS house. As indicated above, a dual flush toilet has been chosen which has .8 gallons for the smaller flush and 1.6 gallons per flush for the more effective flush. The team is specifying low flow faucets for the kitchen and bathroom sinks as well as the showerhead. The appliances are all EnergyStar and WaterSense certified with lower than average water consumption. A grey water system is being developed using a polytank and additional components. An evaporative cooling system is also being considered for the added benefits of reducing power usage while increasing natural air flow. However, the green roof option was not adopted despite its apparent benefits due to the initial costs, additional weight loads, and the higher demands on waterproofing the system of the structure both because water is retained on the roof and due to the possibility of roots penetrating the waterproof membrane.

4. SOLID WASTE

ASSESSMENT PLAN

In an effort to minimize solid waste the University of Florida Team has chosen materials that best fit the design of the Project RE:FOCUS house, with a focus on sustainable products. In general, using products that are manufactured by optimized computer software and made out of recycled material reduces the amount of waste generated during the manufacturing stage. These include the materials for the building envelope, structure, and power systems.

PRECONSTRUCTION WASTE

The use of Structurally Insulated Panels (SIPs) helps to avoid much of the preconstruction waste that occurs during the manufacturing process. Many manufactures cut SIPs using optimized software that minimizes the amount of waste in the production process. Excess SIP waste created during the manufacturing process is often recycled to make other products. SIPs reduce construction waste; they can be delivered precut to the precise dimensions required, and each panel contains the structural, insulation, and moisture barrier of the wall system. OSB is the most common sheathing and facing material in SIPs, reducing wood use by as much as 35% and reducing pressure on mature forests by allowing the use of smaller farm-grown trees for structural applications. The exterior grade plywood used in some products requires more mature timber.⁴⁷

The use of recycled steel requires 33 percent less energy to recycle than to make it from iron ore. Using scrap steel and iron rather than virgin material results in an 86 percent reduction in air pollution and 76 percent reduction in water pollution. Scrap steel that is leftover after manufacturing can be recycled again into another steel product.

A typical photovoltaic module manufacturing facility generates a significant amount of scrap at the start of its operation but, within a few months to a year, reaches a steady-state level of production generating relatively little waste.

CONSTRUCTION SOLID WASTE

SIPs are primarily fabricated offsite, so there is extremely little jobsite waste disposal. Framing scraps, which account for a large portion of construction wastes, can be returned to the manufacturer for recycling. Sips offer a simple solution to construction waste reduction that is important to reducing the overall environmental impact of a building. Steel waste will be little to none due to the prefabrication of the steel parts. Photovoltaic panels will also have little to no solid waste during the construction phase.

END OF LIFE WASTE

The SIPs can potentially be re-used if the house is dismantled. Given the industrialization concept, panels could be reused in new homes. The team is investigating other uses for SIPs.

Steel is the most recycled material in the world--including nearly 70 million tons in the U.S. alone in 2006. More steel is recycled annually than all other materials, including aluminum, glass, and paper combined. The U.S. Steel Industry has exceeded Kyoto accords for improvement by more than 240%. Greenhouse gas Emissions have been reduced by nearly 45% since 1975. Air and water emissions are 90% lower today than 10 years ago. More than 95 percent of the water used for steelmaking is recycled--often returning water cleaner than when taken from its source. Virtually all hazardous waste once generated by the steel industry is now being recycled for recovery for beneficial use. For each of the past 10 years, the U.S. steel producers have experienced fewer injuries than the manufacturing average and achieved nearly a 50% reduction in the major statistical measures over the same period--even while reaching record levels of productivity. Only the North American steel industry has reduced energy demands while still increasing production.⁴⁸

Photovoltaic panels have useful lives of up to 30 years; the amount of waste generated by retired modules is currently small. By about 2020, however, this growing industry will produce a growing

PV waste stream. PV products are generally safe for landfills, because PV materials are usually encased in glass or plastic, and many are insoluble. Some modules, however, could be classified as hazardous waste, a situation that is prompting the PV industry to develop recycling processes for modules.

Because PV systems are widely dispersed, and because each system has relatively small amounts of semiconductor material per cell, recycling PV will be a challenging task. However, the industry is looking ahead and preparing for this challenge. The PV industry hopes to learn from new processes for recycling batteries and electronic devices such as computers. Some recycling processes may even allow some PV components to be recovered intact. This in turn would allow companies to produce recycled PV modules at a lower cost, and using less energy, than ever before. A 1998 workshop examined the challenges of recycling PV systems and summarized the processes and costs developed at that time.⁴⁹

Management of Domestic Waste

Household waste will be kept to a minimum through recycling practices and composting.

COMPOSTING

Compost is organic material that can be used as a soil amendment or as a medium to grow plants. It is created by: combining organic wastes (e.g., yard trimmings, food wastes, manures) in proper ratios into piles, rows, or vessels; adding bulking agents (e.g., wood chips) as necessary to accelerate the breakdown of organic materials; and allowing the finished material to fully stabilize and mature through a curing process.⁵⁰ Composting organic materials that have been diverted from landfills ultimately avoids the production of methane and leachate formulation in the landfills. Compost has the ability to prevent pollutants in stormwater runoff from reaching surface water resources. Compost has also been shown to prevent erosion and silting on embankments parallel to creeks, lakes, and rivers, and prevents erosion and turf loss on roadsides, hillsides, playing fields, and golf courses.

Using compost offers environmental benefits: The following are benefits and information offered by the United States Environmental Protection Agency on composting:

-Compost enriches soils

“Compost has the ability to help regenerate poor soils. The composting process encourages the production of beneficial micro-organisms (mainly bacteria and fungi) which in turn break down organic matter to create humus. Humus--a rich nutrient-filled material--increases the nutrient content in soils and helps soils retain moisture. Compost has also been shown to suppress plant diseases and pests, reduce or eliminate the need for chemical fertilizers, and promote higher yields of agricultural crops.”

-Compost helps cleanup (remediate) contaminated soil

“The composting process has been shown to absorb odors and treat semivolatile and volatile organic compounds (VOCs), including heating fuels, polyaromatic hydrocarbons (PAHs), and explosives. It has also been shown to bind heavy metals and prevent them from migrating to water resources or being absorbed by plants. The compost process degrades and, in some cases, completely eliminates wood preservatives, pesticides, and both chlorinated and nonchlorinated hydrocarbons in contaminated soils.”

-Compost helps prevent pollution

“Composting organic materials that have been diverted from landfills ultimately avoids the production of methane and leachate formulation in the landfills. Compost has the ability to prevent pollutants in stormwater runoff from reaching surface water resources. Compost has also been shown to prevent erosion and silting on embankments parallel to creeks, lakes, and rivers, and prevents erosion and turf loss on roadsides, hillsides, playing fields, and golf courses.”

-Using compost offers economic benefits

“Using compost can reduce the need for water, fertilizers, and pesticides. It serves as a marketable commodity and is a low-cost alternative to standard landfill cover and artificial soil amendments. Composting also extends municipal landfill life by diverting organic materials from landfills and provides a less costly alternative to conventional methods of remediating (cleaning) contaminated soil.”

What can be composted:

- Animal manure
- Dryer and vacuum cleaner lint
- Eggshells
- Fireplace ashes
- Fruits and vegetables
- Grass clippings
- Hair and fur
- Hay and straw
- Houseplants
- Leaves
- Nut shells
- Sawdust
- Shredded newspaper
- Tea bags
- Wood chips
- Yard trimmings

What to Leave Out/Reason Why:

- Black walnut tree leaves or twigs
- Releases substances that might be harmful to plants
- Coal or charcoal ash
- Might contain substances harmful to plants
- Dairy products (e.g., butter, egg yolks, milk, sour cream, yogurt)
- Create odor problems and attract pests such as rodents and flies
- Diseased or insect-ridden plants
- Diseases or insects might survive and be transferred back to other plants
- Fats, grease, lard, or oils
- Create odor problems and attract pests such as rodents and flies
- Meat or fish bones and scraps
- Create odor problems and attract pests such as rodents and flies
- Pet wastes (e.g., dog or cat feces, soiled cat litter)
- Might contain parasites, bacteria, germs, pathogens, and viruses harmful to humans
- Yard trimmings treated with chemical pesticides
- Might kill beneficial composting organisms

Types of Composting

VERMICOMPOSTING

Through this method, red worms—not nightcrawlers or field worms found in gardens— are placed in bins with organic matter in order to break it down into a high-value compost called castings. Worm bins are easy to construct (they are also commercially available) and can be adapted to accommodate the volume of food scraps generated.

-Types of Waste and Waste Generators: Worms will eat almost anything you would put

in a typical compost pile (e.g., food scraps, paper, plants). Vermicomposting can be ideal for apartment dwellers or small offices that want to derive some of the benefits of composting and reduce solid waste. It is frequently used in schools to teach children conservation and recycling.

-Climate or Seasonal Considerations: Worms are sensitive to variations in climate. Extreme temperatures and direct sunlight are not healthy for the worms. The optimal temperatures for vermicomposting range from 55 °F to 77 °F. In hot, arid areas, the bin should be placed under the shade. By vermicomposting indoors, however, one can avoid many of the problems posed by hot or cold climates. The primary responsibility is to keep the worms alive and healthy by providing the proper conditions and sufficient food.

-Requirements: Vermicomposting has only a few basic requirements, among them: worms, worm bedding (e.g., shredded newspaper, cardboard), and a bin to contain the worms and organic matter. Maintenance procedures include preparing bedding, burying garbage, and separating worms from their castings.

-Results: One pound of mature worms (approximately 800-1,000 worms) can eat up to half a pound of organic material per day. It typically takes three to four months for these worms to produce harvestable castings, which can be used as potting soil. Vermicomposting also produces compost or “worm” tea, a high-quality liquid fertilizer for house plants or gardens.

IN-VESSEL COMPOSTING

Organic materials are fed into a drum, silo, concrete-lined trench, or similar equipment where the environmental conditions—including temperature, moisture, and aeration—are closely controlled. The apparatus usually has a mechanism to turn or agitate the material for proper aeration. In-vessel composters vary in size and capacity.

-Types of Waste and Waste Generators

In-vessel composting can process large amounts of waste without taking up as much space as the windrow method. In addition, it can accommodate virtually any type of organic waste (e.g., meat, animal manure, biosolids, food scraps). Some in-vessel composters can fit into a school or restaurant kitchen while others can be as large as a school bus to accommodate large food processing plants.

-Climate or Seasonal Considerations: In-vessel composting can be used year-round in virtually any climate because the environment is carefully controlled, often by electronic means. This method can even be used in extremely cold weather if the equipment is insulated or the processing takes place indoors.

-Environmental Concerns: In-vessel composting produces very little odor and minimal leachate.

-Requirements: In-vessel composters are expensive and might require technical assistance to operate properly, but this method uses much less land and manual labor than windrow composting.

-Results: Conversion of organic material to compost can take as little as a few weeks. Once the compost comes out of the vessel, however, it still requires a few more weeks or months for the microbial activity to stabilize and the pile to cool.

The Project RE:FOCUS house would most benefit from the vessel method of composting. The vessel could be placed on the deck as an educational tool, making use of organic kitchen waste that is produced during the dining portion of the competition.



RECYCLING PROGRAM

Recycling includes collecting recyclable materials that would otherwise be considered waste. And then buying recycled products creates a circle or loop that ensures the overall success and value of recycling. Making the occupant aware of the energy saved by recycled could further encourage the occupant to recycle. Application of the Individual Waste Reduction Model (IWRM) would be beneficial by instantly showing the users of the house the benefits of recycling. The energy savings are translated into the equivalent amount of electricity, estimating how long that amount of electricity will operate a variety of household appliances.⁵²

For example, recycling an aluminum beverage can rather than landfilling it saves enough energy to operate a 60W incandescent light bulb for 4.3 hours, or to operate the equivalent compact fluorescent bulb for 20 hours.

5. MATERIALS

CHARACTER OF THE ENCLOSURE

The character of the enclosure will be highly sustainable. Along with reducing the number of shipped elements, as stated above in the sustainability concept, the “kit of parts” offers an adaptable design that can be customized encouraging the use and reuse of local building materials which accommodate different climates, cultures, and contexts. The University of Florida team has acquired salvaged wood from a local cracker house that will be used for the flooring. By bringing in local material the house connects users to their materials and creates an awareness concerning the origin of the material. By using recycled, renewable, and reusable material the house will provide users with a home energy efficiency that saves not only operational energy but embodied energy as well.

Materials such as steel have a high recycled steel content, which saves energy and reduces the house’s carbon footprint. SIP wall assemblies tend to be well sealed, enhancing energy efficiency. As with any tight structure, moisture control and well designed ventilation are critical. SIP construction can contribute to very good indoor air quality; the plastic insulating foams (expanded polystyrene or polyurethane/polyisocyanurate) are very chemically stable, and OSB is a low-emitting material. In a SIP house, good ventilation and the use of non-toxic finish materials and cleaning products are more important for indoor air quality than emissions from SIPs.⁵³