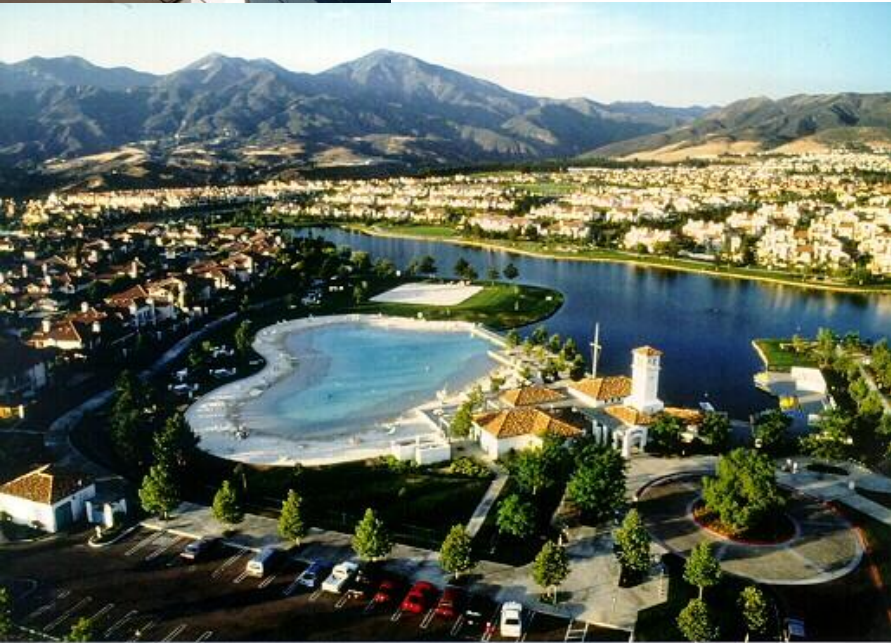




Residential Property Management Driving Energy Efficiency and Sustainability: From Benchmarking to Retrofits and Beyond



Presented by:

Devesh Nirmul, CSDP, CEM, LEED AP
Director of Energy and Sustainability
Solutions

June 3, 2011

Who we are

FirstService Overview

\$2B annualized revenues
18,000 employees worldwide



FirstService

Creating value one step at a time

Commercial Real Estate

- Colliers International
- 3rd largest global provider
- \$725M revenue

Residential Property Management

- FirstService Residential
- Largest in the United States
- \$645M revenue

Property Services

- Foreclosure services, painting, closet organization, home inspection, damage remediation
- California Closets, Field Asset Services, CertaPro Painters, etc.
- \$435M revenue



What we do

- **Residential property management**

- Property maintenance
- Accounting & budgets
- Procurement & capital projects
- Community programs
- Consulting services
- Landscaping

- **Largest manager of residential communities in North America**

- 50 offices in 18 states and Western Canada
- Over 4,600 buildings/communities
- Over 1,000+ high-rise buildings
- 1.2+M units under management
- Over 1B sq ft under management



1.2 million units
120 trillion Btu
\$2.2 billion

The Why and the How

1

Buildings and Landscapes: Impacts and Opportunities

2

Why we care?

3

Energy Performance Benchmarking

4

Sustainability Assessments and Benchmarking: HOAs



IMPACTS OF THE BUILT AND LANDSCAPED ENVIRONMENT

How “**GREEN**”
can help.



IMPACTS OF U.S. BUILDING ON RESOURCES

40%

Primary energy use*

72%

Electricity
consumption*

49%

CO₂ emissions*

13.6%

Potable water
consumption*

Source:

*Environmental Information Administration (2008). EIA Annual Energy Outlook.

**U.S. Geological Survey (2000). 2000 data.

IMPACTS OF U.S. LANDSCAPES ON RESOURCES

25

Million Tons of Carbon/yr
are captured by urban
trees

2-9°F

**Reduction in peak
summer temperature**
can be achieved
through the use of
vegetation

>33%

**of residential water
supply is consumed
by unsustainable
landscapes** (>7 Billion
Gallons/day)

70%

of urban water pollution is
generated by polluted and
contaminated stormwater
runoff

Translating the Impact

Enough water to fill over 102 million 25,000 gallon pools each year



FirstService
Residential Management

The Bottom Line on “Greening Up”

- ❑ Finding ways to operate our built environment more like the way **nature** operates
 - ❑ Efficient: Cost and consumption reduction opportunities
 - ❑ No-waste or pollution / 100% recycling
 - ❑ Zero carbon footprint



**ENERGY
USE**

24%* -50%**

**CO₂
EMISSIONS**

33%* -39%****

**WATER
USE**

40%**

**SOLID
WASTE**

70%**

Green Buildings Can Reduce...

* Turner, C. & Frankel, M. (2008). Energy performance of LEED for New Construction buildings: Final report.

** Kats, G. (2003). The Costs and Financial Benefits of Green Building: A Report to California's Sustainable Building Task Force.

*** GSA Public Buildings Service (2008). Assessing green building performance: A post occupancy evaluation of 12 GSA buildings.

SUSTAINABILITY AND FIRST SERVICE RESIDENTIAL (FSR)

Why do we **care**?



Market Leadership and Opportunity

FSR will deliver **Sustainable Operations and Maintenance Services** to the residential marketplace.

Challenge

Void in the marketplace for delivering sustainable solutions to **existing residential buildings and communities**

Market and legislation will continue to drive the demand for high-performance buildings and sustainable communities.




We will find/leverage opportunities to improve **quality of life, property values, and financial performance** of their properties while **reducing their environmental footprint**.

Commitment to Sustainability

- Residential and commercial buildings account for 47% of US CO₂ emissions from fossil fuels
- Due to our size and position of influence, we have the potential to significantly reduce energy consumption and create value for our clients
- Energy represents between 15% and 30% of association budget
- We believe we have a social responsibility as an industry leader to drive sustainability

GOAL: 25% reduction in energy use and cost across our residential portfolio of more than 1,000 buildings → NYC by 2013

A decorative graphic on the left side of the slide consists of two overlapping triangles. The top triangle is light gray and points downwards. The bottom triangle is a medium blue and points upwards. They overlap in the center, creating a darker blue area.

Our **opportunity** to
reduce energy
consumption and
cost for our clients
is **significant**.



MEASUREING PERFORMANCE

“**Apples** to
Apples”
comparisons

How
“**GREEN**”
can help.



FS ENERGY

- Launched FS Energy in 2008 to execute on commitment and goals
- Energy service company focused on reducing energy consumption and costs for FirstService managed clients
 - Provide healthier environment for owners and tenants
 - Increase asset value for clients
- Initial focus on NYC – 450 high-rise buildings
 - PlaNYC Greater Greener legislation
 - Chicago and FL (Miami, Tampa, Orlando) to follow – additional 700 high-rises
- Dedicated team based in NYC
- Leverages FirstService portfolio and data



Why FS Energy?

- ❑ **Reduce costs:** Energy costs represent average of 15%-30% of association budget
- ❑ **Benchmarking:** There is currently no accepted standard for benchmarking residential buildings. Our portfolio-based Building Energy Rating Guide (BERG) Score is the first step **in impacting capital, operations and maintenance decisions**

GOAL: 25% reduction in energy use and cost across our residential portfolio of more than 1,000 buildings → NYC by 2013

Five Step Strategy

- 1 Benchmark critical data (measure to manage)
- 2 Identify opportunities
- 3 Communicate recommendations to clients
- 4 Implement solutions
- 5 Measure and report results



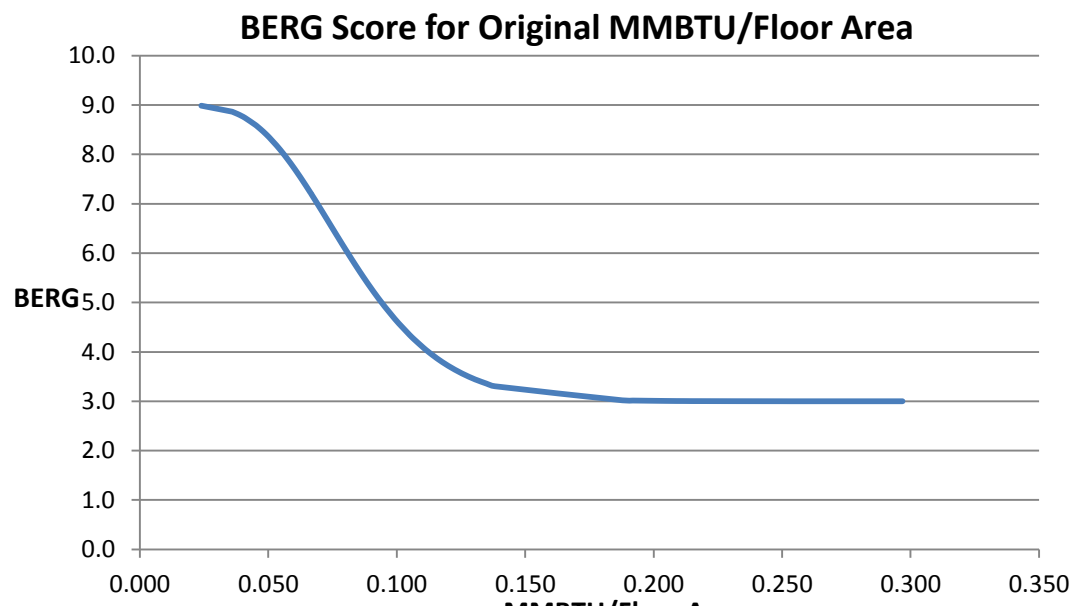
Benchmark Critical Data

- Gather important building typology and utility consumption information
- Leverage our portfolio to compare energy use across properties – per sq. ft & unit

The screenshot displays the FirstService Residential Management web application interface. At the top, a blue header bar contains the text 'Welcome ! Mark Sanfilippo' and navigation links for 'Home', 'Wisdom Reports', 'Property Search', and 'Dashboard'. Below this, a dark blue sidebar on the left lists various menu items: 'General Information', 'Building Size', 'Resident Services/Amenities', 'Commercial Space', 'Building Mech & Elec System', 'Plumbing/Water Use', 'Energy Services', 'Common Areas', 'Individual Units', 'Misc Building Components', and 'Alternative Energy Systems'. The main content area is titled 'Welcome To Typology' and features a 'Percentage Complete' indicator. The 'General Information' section is active, showing a form with the following fields: 'Building Code *' (value: 0123), 'Building Address:' (with sub-fields for 'Street Address *' (value: 1990) and 'City/Town *' (value: Aven)), 'Number of Buildings in Complex *' (value: 0), 'Resident Manager/Super Name', 'Phone' (value: 9549), 'Email', 'Agent/Property Manager Name *' (value: lmat), and 'Phone *'. A small image of a residential building is visible at the bottom left of the form area.

Statistical Correlation

- EUIs by building population type
- Sample size ≥ 30
- Direct vs. Master-metered buildings
- Central AC vs. Individual Unit Heat Pumps vs. Chiller w/individual AHUs



Identify Opportunities

- Leverage the unique and comprehensive database of building characteristics and utility bill information
- Energy Use (“EUI”) database identifies inefficient buildings – “energy hogs”
- Prioritize opportunities based on greatest savings potential
 - Energy Use (EUI)
 - Type of systems
 - Timing of significant event: capital project or refinancing



Customized Property Report



conserve. save. thrive.



Energy Report Card
123 Central Park Ave

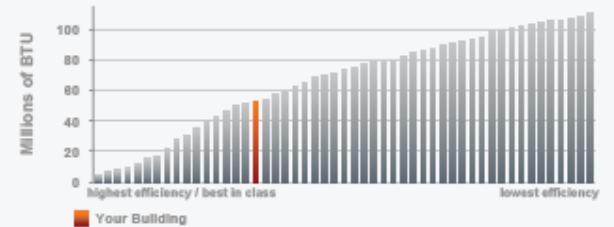
7.3

Building Energy Rating Guide

Comparison

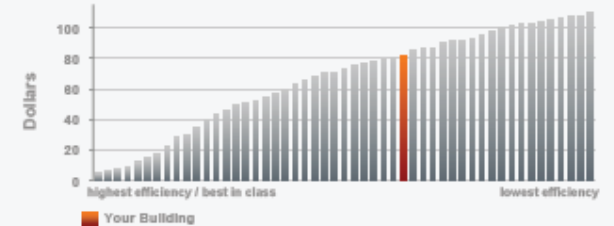
Your building compared to others in our database that are similar to yours

Energy Usage per Square Foot



These charts show your building's energy use and cost compared with similar properties in our database. **[-Direct Meter-]** Since your building is direct metered, this data excludes resident utility data.

Cost per Square Foot



Your building's square footage: _____. Your building's total units: _____.

BEST IN CLASS
(top 10% of buildings in our database)
\$ ____ / sq. ft. \$ ____ / unit



YOUR BUILDING
\$ ____ / sq. ft.
\$ ____ / unit

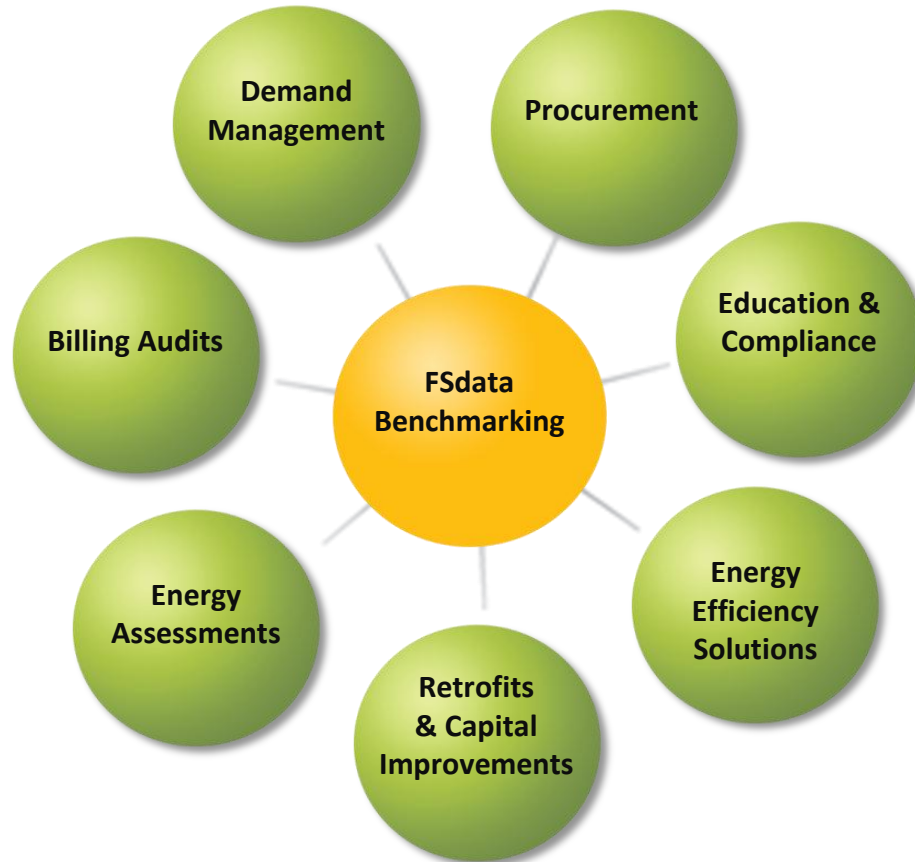
TOTAL POTENTIAL SAVINGS: \$ _____

\$ ____ / sq. ft. \$ ____ / unit

The extent of the improvements that can be implemented cost-effectively for your building can only be determined upon a more thorough analysis of your building by FS Energy.

Implement Solutions

Execute on opportunities by providing **expertise** and **resources** to our **clients**



Implement Solutions: Retrofit Financing

- Leveraged FirstService banking relationships to develop a retrofit financing solution
 - **Savings** on the utility bill **will finance the debt service**
- **No increase in monthly maintenance fees** or need for special assessment



Achievements to Date



Conserve. Save. Thrive.

- ✓ 450 high-rise properties benchmarked in NY
- ✓ Procurement savings of \$5M for clients
- ✓ Executed 15 retrofit projects
- ✓ 35 clients in demand management program
- ✓ Prepared NYC clients for compliance with LL84



FirstService
Residential Management

Demand Management for Horizon Condominium:

400 unit, 40 floor midtown Manhattan building



CHALLENGE

Board desired reduced energy expenses without inconveniencing residents

SOLUTION

Enrolled building in modest demand response program with a twice a year energy curtailment requirement that enables sale of unused electricity back to the grid

ANNUAL SAVINGS

\$17K (demand response)

\$62K (procurement contract)

Retrofits at Bay Ridge Air Rights Co-op

800 unit, 28 story building



CHALLENGE

SOLUTION

CAPITAL COST AVOIDANCE

Residents requested an affordable, environmentally conscientious strategy to reduce energy costs and consumption within the funding constraints of a building with affordable housing status (Mitchell-Lama)

Property energy analysis resulted in the installation of 75kW cogeneration unit to work in coordination with boiler systems

Manufacturer agreed to cover installation costs (\$514K) and operational expenses

ANNUAL SAVINGS

Manufacturer agreed to sell electricity back to the property at a 15% discount from market rates and property now saves \$480K a year and will reduce carbon footprint by 283 tons over 15 yrs

What's Next

- Florida and Chicago benchmarking complete by 3rd Quarter
- Other major markets to follow
 - West Coast: Vancouver, CA, AZ, NV
 - Mid-West: TX
 - SE: Atlanta
- Increased board / resident engagement

SUSTAINABILITY ASSESSMENT (PSRS)

Property Sustainability Rating System (PSRS)

FSR's way to provide an initial sustainability assessment of a community

- **Include all key areas of sustainability**
 - Benchmarking of water, energy and waste
 - How to create “apples-to-apples” comparisons
- **Primary property types**
 - Horizontal: Large-scale master planned (2011)
 - Vertical: mid to high-rise
- **Modeled after existing rating systems**
 - LEED EB, LEED ND, Sustainable Sites Initiative (SITES)



Horizontal Master Planned Approach

1. Evaluate: Initial assessment through PSRS

- Common area water use, site management, energy use, and waste management

2. Educate: Communicate findings and recommendations

3. Engage community / residents on solutions

- Community HOAs: Common area (buildings and site) energy, water, waste reduction measures
- Residents: Opportunities for residents to commit to and implement energy, water and waste reduction techniques for home and landscape
- Plans, policies and practices

4. Execute

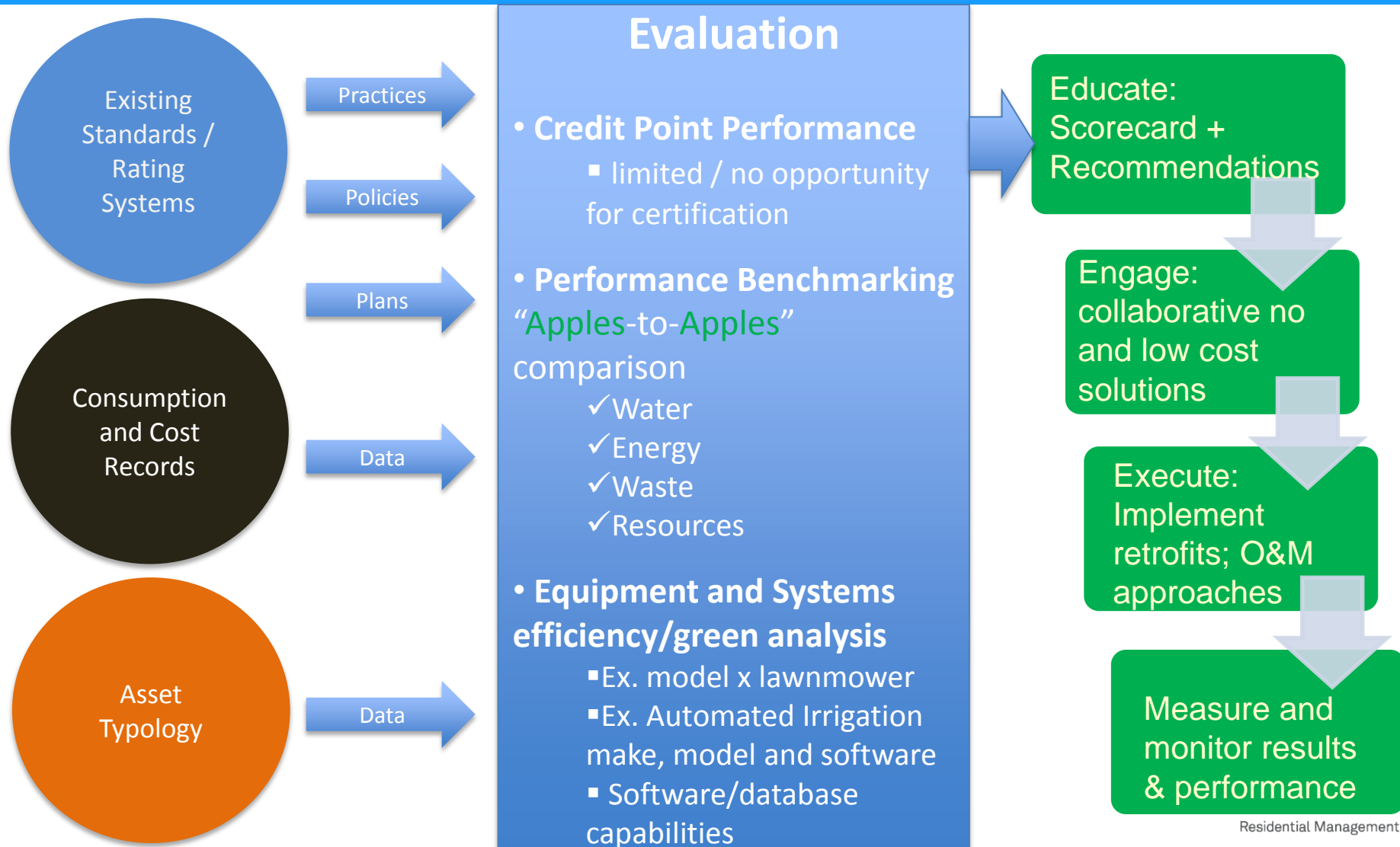
- Implement / coordinate implementation of sustainable practices

5. Measure results

- Evaluate performance against baseline: post practice implementation and continuous monitoring



Assessment & Rating Approach



FGBC Land Development: Ecosystems

Category 1 - Protect Ecosystems and Conserve Natural Resources

Item #	Item	Extra Submittal Document	Maximum Points Possible	Credit Points Achieved
P - 1	Redevelop an already developed site <input type="text" value=""/> % Redeveloped <input type="text" value=""/> % Brownfield	Y	40	<input type="text" value="0"/>
P - 2	Conservation areas <input type="text" value="1"/> <--- Total Development Size (acres) <input type="text" value="0"/> <--- Total preserved & restored acres (passive non-rec, non storm mgt) <input type="text" value="0"/> <--- State (DEP, WMDs, etc) required land preserved (acres) <input type="text" value="0.00"/> <--- Total Percentage of Build able Land Preserved	Y	60	<input checked="" type="checkbox"/>
P - 3	Develop management plan for preserved, created or restored habitats <input type="text" value="N/A"/> Well thought out conservation / preservation plan created	Y	16	<input checked="" type="checkbox"/>
P - 4	Conduct tree, topographical, soil and wildlife studies prior to design Tree <input type="text" value=""/> Soil <input type="text" value=""/> Wildlife <input type="text" value=""/> Topographical <input type="text" value=""/> Wetland <input type="text" value=""/> Tree survey signed off by certified arborist: <input type="text" value=""/>	Y	18	<input type="text" value="0"/>
P - 5	Preserve the most valuable spaces for biodiversity. Indicate which community type chosen: <input type="text" value="None"/>	Y	8	<input checked="" type="checkbox"/>
P - 6	On site conservation plan for a specific wildlife species. Conservation plan made to protect specific wildlife: <input type="text" value=""/>	Y	15	<input checked="" type="checkbox"/>
P - 7	Maintain or provide wildlife corridors. Corridor min: <input type="text" value=""/> Corridor avg: <input type="text" value=""/> Corridor has a sub-roadway conection or doesn't cross street <input type="text" value=""/>	Y	18	<input checked="" type="checkbox"/>
P - 8	Preserve upland buffers to enhance preserved wetlands. <input type="text" value="N/A"/> P-8 Preserve Upland Buffer tab completed	Y	12	<input checked="" type="checkbox"/>
P - 9	Preserve or provide aquifer recharge areas in uplands. <input type="text" value=""/> % of acreage preserved for prime aquifer	Y	12	<input checked="" type="checkbox"/>
P - 10	Reuse or recycle materials on site <input type="text" value=""/> % of materials being reused in project	Y	10	<input checked="" type="checkbox"/>
P - 11	Treating storm water from neighboring sites or in pre-existing areas <input type="text" value=""/> % of storm water being treated	Y	8	<input checked="" type="checkbox"/>
P - 12	Low impact development techniques <input type="text" value=""/> % improvement in water quality	Y	8	<input checked="" type="checkbox"/>
P - 13	Conserve land via dry storm water areas that serve as amenities <input type="text" value=""/> % of storm water area designed for dual land Used for preserving existing vegetation <input type="text" value=""/>	Y	10	<input checked="" type="checkbox"/>
P - 14	Non-listed environmental benefit points <input type="text" value="N/A"/>	Y	5	<input type="text" value="0"/>
	Total		240	<input type="text" value="0"/>

FGBC Land Development: Amenities

Category 4 - Amenities

Item #	Item	Extra Submittal Document	Maximum Points Possible	Credit Points Achieved
A - 1	Neighborhood parks Develop neighborhood parks within:	N	4	✓
				N/A
A - 2	Community or regional parks Developed a community or regional park in plan:	N	2	✓
				N/A
A - 3	Community pool, developments with single family residences A common pool available for	N	4	✓
				no households
A - 4	Community food plot, garden, passive parks Incorporated at least 5 acres or 5% of site:	Y	10	✓
				N/A
	Agricultural area deed restricted to be farmed organic:			N/A
A - 5	Compost / mulch facility Develop a mulching/compost facility w/ development:	Y	3	✓
				N/A
	Compost / mulch facility adj. to community garden:			N/A
A - 6	Golf course is Audubon International certified or excluded Golf course is Audubon International certified:	Y	6	✓
				N/A
	Development is over 300 acres and no golf course:			N/A
A - 7	Landscape criteria & management plan for common areas & amenities % Florida friendly plants that are soil, water, and climate appropriate for non-recreational areas:	Y	6	✓
	% of plants that are Florida native:			
	Detailed green management plan consistent with Florida Friendly Development Covenants			N/A
A - 8	Non - listed environmental benefits points Description of what you did:	Y	5	✓
				N/A
		Total	40	0
5 Minimum Points required in Category 4: Total Amenity Category Credit Points Earned For Designation (Maximum 25 points)				0





LEED 2009 for Existing Buildings: Operations & Maintenance

Project Checklist

6	1	2	Sustainable Sites	Possible Points: 26
---	---	---	--------------------------	---------------------

Y	N	?		
✓			Credit 1 LEED Certified Design and Construction	4
✓			Credit 2 Building Exterior and Hardscape Management Plan	1
✓			Credit 3 Integrated Pest Management, Erosion Control, and Landscape Management Plan	1
		✓	Credit 4 Alternative Commuting Transportation	3 to 15
			Reduce by 10%	3
			Reduce by 13.75%	4
			Reduce by 17.5%	5
			Reduce by 21.25%	6
			Reduce by 25%	7
			Reduce by 31.25%	8
			Reduce by 37.5%	9
			Reduce by 43.75%	10
			Reduce by 50%	11
			Reduce by 56.25%	12
			Reduce by 62.5%	13
			Reduce by 68.75%	14
			Reduce by 75%	15
✓			Credit 5 Site Development—Protect or Restore Open Habitat	1
✓			Credit 6 Stormwater Quantity Control	1
✓			Credit 7.1 Heat Island Reduction—Non-Roof	1
		✓	Credit 7.2 Heat Island Reduction—Roof	1
✓			Credit 8 Light Pollution Reduction	1



LEED 2009 for Existing Buildings: Operations & Maintenance Project Checklist

1 0 0 Water Efficiency

Possible Points: 14

Y N ?

Prereq 1
 Credit 1

Minimum Indoor Plumbing Fixture and Fitting Efficiency

Water Performance Measurement

<input type="checkbox"/>	Whole building metering	1
<input type="checkbox"/>	Submetering	2

1 to 2

Credit 2

Additional Indoor Plumbing Fixture and Fitting Efficiency

<input type="checkbox"/>	Reduce by 10%	1
<input type="checkbox"/>	Reduce by 15%	2
<input type="checkbox"/>	Reduce by 20%	3
<input type="checkbox"/>	Reduce by 25%	4
<input type="checkbox"/>	Reduce by 30%	5

1 to 5

Credit 3

Water Efficient Landscaping

<input checked="" type="checkbox"/>	Reduce by 50%	1
<input checked="" type="checkbox"/>	Reduce by 62.5%	2
<input checked="" type="checkbox"/>	Reduce by 75%	3
<input checked="" type="checkbox"/>	Reduce by 87.5%	4
<input checked="" type="checkbox"/>	Reduce by 100%	5

1 to 5

Credit 4

Cooling Tower Water Management

<input type="checkbox"/>	Chemical Management	1
<input type="checkbox"/>	Non-Potable Water Source Use	2

1 to 2



Sustainable Sites Initiative Guidelines

8. Operations and Maintenance 23 possible points

Maintain the site for long-term sustainability

Prerequisite 8.1: Plan for sustainable site maintenance	190	✓
Prerequisite 8.2: Provide for storage and collection of recyclables	198	✓
Credit 8.3: Recycle organic matter generated during site operations and maintenance (2–6 points)	199	✓
Credit 8.4: Reduce outdoor energy consumption for all landscape and exterior operations (1–4 points)	201	✓
Credit 8.5: Use renewable sources for landscape electricity needs (2–3 points)	203	✓
Credit 8.6: Minimize exposure to environmental tobacco smoke (1–2 points)	204	✓
Credit 8.7: Minimize generation of greenhouse gases and exposure to localized air pollutants during landscape maintenance activities (1–4 points)	206	✓
Credit 8.8: Reduce emissions and promote the use of fuel-efficient vehicles (4 points)	208	✓

9. Monitoring and Innovation 18 possible points

Reward exceptional performance and improve the body of knowledge on long-term sustainability

Credit 9.1: Monitor performance of sustainable design practices (10 points)	210	✓
Credit 9.2: Innovation in site design (8 points)	214	✓

THE SUSTAINABLE SITES INITIATIVE™



FirstService
Residential Management

SITES: Site Maintenance Plan Worksheet

WORKSHEET: SITE MAINTENANCE PLAN						
Maintenance plan topics to be addressed by the integrated design team (including the maintenance contractor or manager)	Required or Optional?	10-year desired outcome from maintenance practice	Required actions to achieve 10-year desired outcome (include specific details below)			
			Specific activities	Skill level required	Timeline/schedule	Other details
Plant stewardship						
<i>Plant maintenance:</i> Describe the process for maintaining vegetation according to long-term plans for the site and adhering to recognized standards for professional horticultural practice.	Required for all sites					
<i>Plant health:</i> Describe the process for monitoring plant health to prevent problems. Identify the proper techniques for addressing dead, diseased, or pest-infested vegetation.	Required for all sites					
<i>Site safety:</i> Describe the process for maintaining vegetation to ensure site safety and meet the needs of the intended users of the site.	Required for all sites					
<i>Plant replacement:</i> Provide a list (include the common and scientific names) of potential <u>appropriate</u> , non-invasive plants that can be used for replacing plants. When replacing plants, consider maintenance needs of plants and design approach.	Required for all sites					
<i>Pest management:</i> Control pests, diseases and any unwanted species of plants and animals using <u>integrated pest management (IPM)</u> techniques.	Required for all sites					



Data Points for Performance Assessment

Primary Data Points	Data Sources	Performance Parameter 1
	From Landsbrook CAM, Grounds/Facilities Manager and Luke Brothers Landscaping (please send scans or electronic files of data)	Potential benchmark performance units provided below (in progress)
irrigated acreage	Irrigation zone maps, water and electric bills (water pump meters), runoff calculations	Water Consumption (WCON): GPY/irrigated acreage
Conservation area acreage and canopy (25' crown diameter on avg: cypress, pine, oak, maple, magnolia)	property maps and species id/crown diameter, runoff coefficients and calculations for various surface types in the development (see calcs page)	Tree Canopy (TC): Tree Canopy Area/total community acreage
tree canopy of common area trees (crown diameter) totals	Common Area tree map and species id/crown diameter	Tree Canopy (TC): Tree Canopy Area/total community acreage and/or Tree Canopy Area/Total paved common area (including roads and sidewalks)
fertilizer bags consumed per year and cost	Invoices	Artificial Fertilizer Consumption (AFC): lbs/yr/acre
fertilizer (liquid) containers consumed per year	Invoices	AFC: Gallons/yr/landscaped acreage
pesticide: granular and liquid volume consumption per year	Invoices	Artificial Pesticides Consumption (APC): lbs/yr/acreage
pesticide: liquid volume	Invoices	APA: Gallons/yr/acreage
fuel (gasoline) - maintenance equipment	Landscape Maintenance record of fuel consumption on site 2010: 2000 gal ; 2009: 2275 gal	Landscape Maintenance Fuel Consumption (LMFC) -- mowing, weeding, etc excluding golf carts (Gallons)/yr/landscaped acreage
electric - transportation	electricity invoices (maybe difficult to pull out this piece if it is not separately metered)	Landscape Maintenance Electric Consumption (LMEC) -- electric powered equipment and golf carts (kWh/yr)
gas (natural gas) - maintenance equipment (cost and consumption) - how to benchmark (by acreage of landscaped area or common area?)--> applies to fuel and electric above as well	natural gas invoices?	Landscape Maintenance Gas Consumption (LMGC) - gas powered equipment (therms/yr)
common area street lighting electricity consumption	electricity invoices for street lighting meter(s)/accounts	Street Lighting Electricity Load (SLEL) : (kWh/lamp/yr)
common area buildings electricity consumption	electricity invoices for building meter(s)/accounts	Common Area Buildings Electricity Load (kWh/sq ft/yr)
common area irrigation electricity load	electricity invoices for water pump meter(s)/accounts	Water Pump Electricity Load (kWh/water volume pumped/yr)
mechanical, electronic equipment lists (hardware and software): there is an equipment program (including irrigation systes, VFDs, pumps, HVAC systems, etc.)	Equipment inventory list (need make and model)	N/A
Organic Materials Reuse (e.g. mulch)	Transported quantities of reused material in volume is 8100 (cubic ft) 2010: 8100 cu ft 2009: N/A – we did not mulch	Organic Landscape Material Reused (OLMR) - tree trimming, leaves, etc. anything that is not left on the ground and normally would end up in the landfill or off-site (cubic ft or tons reuse/total lanscaped area/yr)
Classification of Irrigation Zones by spray coverage (LMA vs. LMA-HOA mix)	Irrigation zone maps	
request for plant list with classification of which plants and quantities are FYN approved	Plant list	
FYN certification potential	Determine which zones would qualify for Florida friendly by working with Pinellas County Extension Agent	

Example: HOA Landscape & Water

- ❑ Large HOA with roughly **400 irrigation zones** (turf + vegetation alongside main roads within community)
- ❑ Each zone consumes **384,000 gallons per year**
- ❑ Due to the water pump speed and 2 water cycle requirement per zone, night watering bleeds into the morning
- ❑ Between **5am to 10am** is typically your **peak energy use** and most likely electric bills are higher than they need to be due to watering at this time



Cross-cutting Impacts?

- ❑ Convert 30 or so zones to **Florida-friendly** without any need for water and save not only **water**, but **energy** and also reduce **runoff of nutrients** into **water bodies**
 - ❑ 11,520,000 gallons of water consumption reduced
 - ❑ TBD: Reduced pump kWh use and kW (demand) charges
 - ❑ TBD: Reduced runoff and “watering of streets and sidewalks”
 - ❑ TBD: Reduced fertilizer and pesticide use



Recommendations

- ❑ Provide recommendations based on a comprehensive assessment
 - ❑ Informed decision-making
 - ❑ 3 options for the landscape:
 - I. Retrofit irrigation system
 - II. Continue business-as-usual
 - III. Florida-friendly low or no water / inputs




From Baselines to Ongoing Assessment

- Real-time sub-metering; continuous commissioning of buildings and energy/water consuming assets
- Scanning of monthly utility bills
- Robust Data / information collection, validation, processing and analysis is vital
 - What systems do you have in place that collect data
 - Can they speak to each other or integrated
 - Building / Energy / Lighting Automation Systems
 - Automated Irrigation Systems
 - Sustainable asset management
 - Ex. Saving that additional 10-15% of energy over time
 - Ex. Leak detection alerts and auto shut-off capability for irrigation system



POTENTIAL DEEPER ANALYSIS: ECOSYSTEM SERVICES

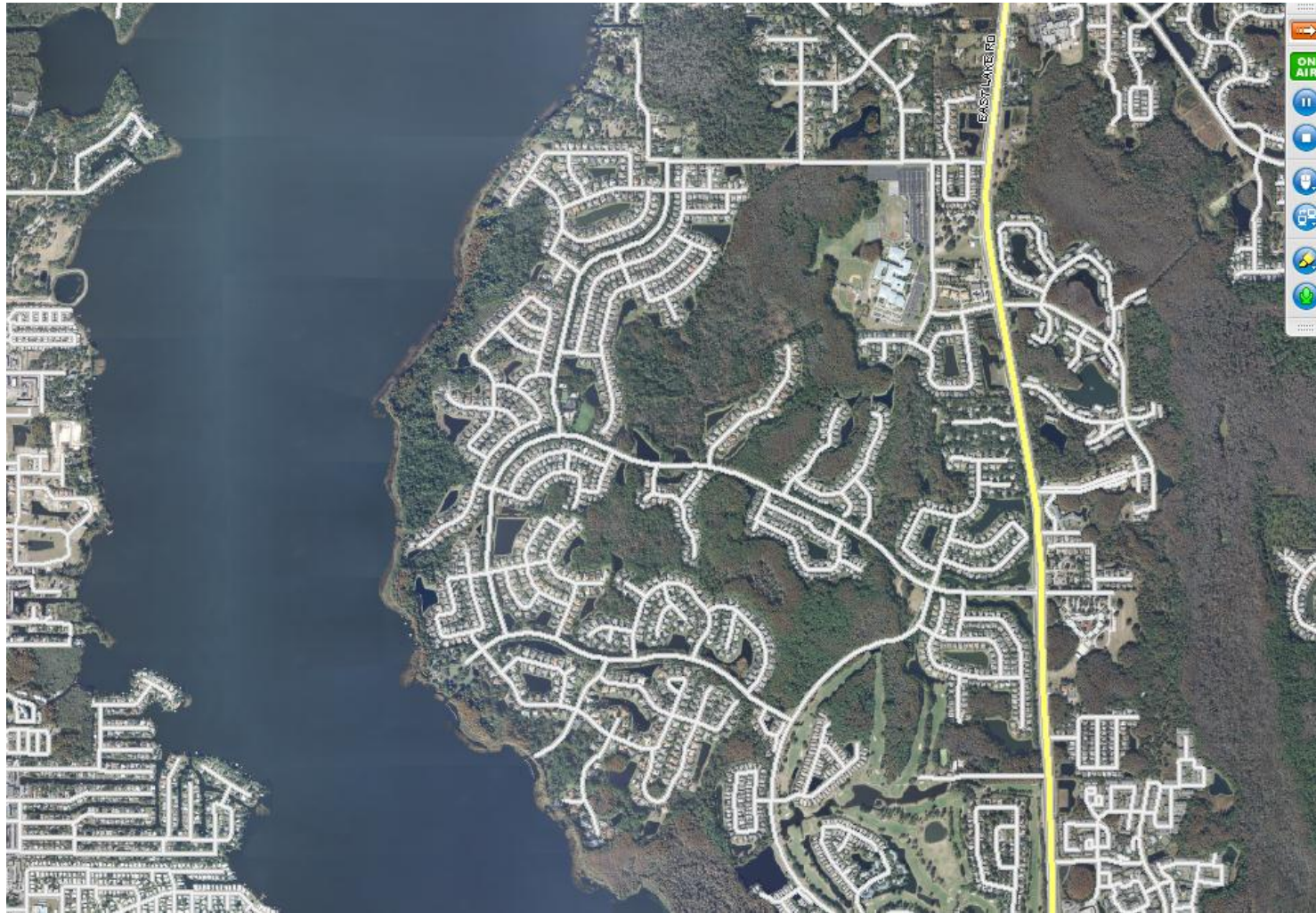


A decorative graphic on the left side of the slide consists of two overlapping triangles. The top triangle is light gray and points downwards. The bottom triangle is a medium blue and points upwards. They overlap in the center, creating a darker blue area.

Our **opportunity** to
reduce impact on the
watersheds that are
communities are part
of is **great**



Accurate Footprint Assessment – Potential Use of GIS



Accurate Footprint Assessment – Working with Existing Software



CITYgreen

How do the versions of CITYgreen differ?

Function	ArcGIS9.x	ArcView3.x
Air Pollution Removal Model	x	x
Carbon Storage Model	x	x
Carbon Sequestration Model	x	x
Stormwater Runoff Model	x	x
Water Quality Model	x	
Tree Growth Model		x
Summer Energy Savings Model		x
Tree Attribute Table		x
Alternate Scenario Model	x	x
Landcover Breakdown	x	x

Source: <http://www.americanforests.org/productsandpubs/citygreen/>



FirstService
Residential Management

What is Possible? What Data is Required? How to Communicate Value?

Table 2. San Antonio Change in Ecosystem Services as Measured with Landsat Data*

2001-2006	2001 Tree Canopy	2006 Tree Canopy	Tree Canopy Change	Tree Canopy Change	Loss of Air Pollution Removal	Loss of Air Pollution Removal Value	Loss in Stormwater Value	Loss in Stormwater Value @ \$.64/cu ft.	Loss of Carbon Stored	Loss of Carbon Sequestered
	acres	acres	acres	%	lbs./yr	dollar value	cu. ft.	dollar value	tons	tons
ETJ	222,320	219,688	-2,632	-1.2%	-295,714	-\$704,327	-93,036,121	-\$59,543,117	-113,295	-882
COSA	54,420	52,587	-1,833	-3.4%	-205,968	-\$490,572	-57,957,865	-\$37,093,034	-78,911	-614
EARZ	53,443	50,236	-3,207	-6.0%	-360,132	-\$857,757	-40,652,214	-\$26,017,417	-137,975	-1,074

**Data was taken from 2001 and 2006 National Landcover Datasets so that historical data prepared in the same way could be compared.*



We can measure this.
Need good source
info/maps for accuracy.

Community
Health

Environment:
Water Quality &
Wildlife

Environment:
Climate Change /
Heat Island
Mitigation