Green Building Trends: Scottsdale and Beyond

City of Scottsdale Green Building Program

June 2012

Anthony Floyd, AIA, LEED-AP
City of Scottsdale
Office of Environmental Initiatives

SCOTTSDALE
GREEN BUILDING
PROGRAM

Overview

1. Background
2. Scottsdale Green Buildings
3. Solar Energy Activity
4. Green Codes and Standards

Scottsdale Environmental Initiatives

1. Indian Bend Multi-Use Wash
2. Environmentally Sensitive Lands Ord.
3. Natural Area Open Space
4. McDowell Mountain Preserve
5. Sensitive Design Principles
6. Green Building Program

SCOTTSDALE AZ

CITY OF SCOTTSDALE ARIZONA

Green Building Program

- **Established in 1998 as a voluntary program**
  - Green Building Advisory Committee (1998-2011)
    - Program development and outreach
- **Regionally derived rating criteria**
  - Sonoran Desert Character and Sustainability
  - Developed for single family, multifamily and commercial development
- **Verification Process**
  - Integration with city development process
    - Building plan review, permits and inspections

Green Building Incentives

- **Expedited plan review and development process assistance**
- **Market differentiation for owners, developers, designers and builders**
  - Directory of participants and construction site signs
- **Promotional material, education and public outreach**

Green Building Rating Checklist

City of Scottsdale

Green Building Rating Checklist

Residential – New Construction, Major Remodels & Additions

Sept. 1, 2006 - Update

Plan Check # _____ Building Permit # _____ GB Total Points _____

Project or Owner's Name - _____

Project Address - _____

Designer Name - _____

Builder Name - _____

Use this rating worksheet to qualify projects under the Green Building Program for one- and two-family dwellings and multiple single-family dwellings (townhouses and condominiums) not more than three stories in height with a separate means of egress (International Residential Code - IRC Section R101.2).

All building system components, materials, and equipment must be installed per code and manufacturer's instructions.

Entry Level	Advanced Level
• Meet all mandatory measures and adjust rating for house size (p. 2 – 7). • Accumulate 50 - 99 points from the rating checklist (p. 8 –26).	• Meet all mandatory measures and adjust rating for house size (p. 2 – 7). • Accumulate 100 or more points from the rating checklist (p. 8 – 26).

Summary of Rating Categories		
1. Site	6. Electrical Power, Lighting, Appliances	11. Interior Doors, Cabinetry, Trim
2. Structural Elements	7. Plumbing System	12. Flooring
3. Energy Rating/Performance	8. Roofing	13. Solid Waste
4. Thermal Envelope	9. Exterior Finishes	14. Innovative Design
5. Heating, Ventilation, & Air Conditioning	10. Interior Finishes	

How does Scottsdale Compare to other Green Building Programs?

Prepared by the Residential Green Building Committee, USGBC Arizona Chapter

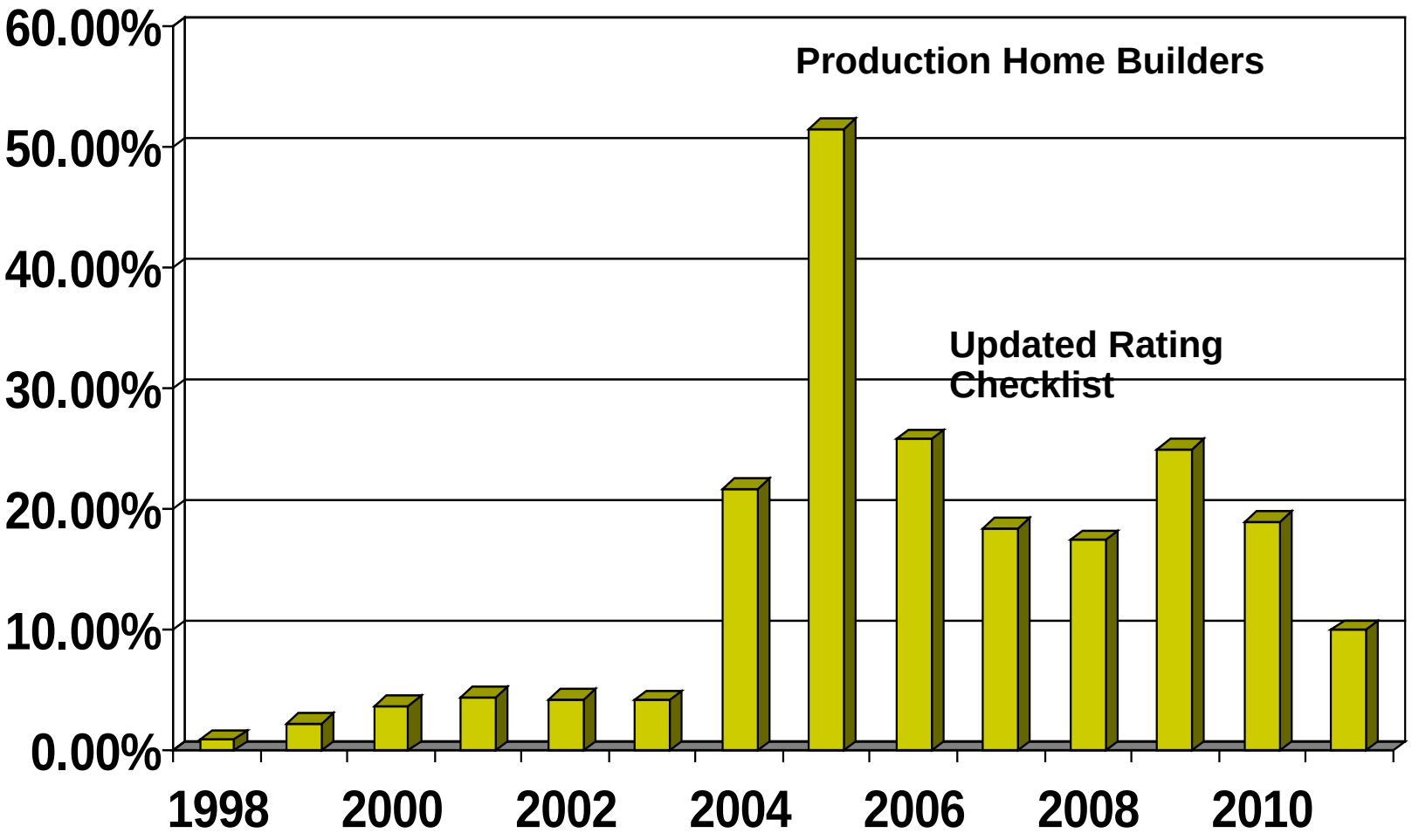
Program Measures	LEED for Homes	ICC 700/NAHB	City of Scottsdale Green Building Program	Pima County Regional Residential GB Program	Coconino County Sustainable Building Program
Entry certification level	Certified	Bronze	Entry Green Building	Bronze	Entry Level
Consensus built	USGBC process	ANSI process	Scottsdale GB Advisory Committee & Open Meeting Law process	Pima County GB Advisory Committee & Open Meeting Law process	Coconino County Sustainable Building Advisory Committee
Third Party certification	Yes, and legally binding accountability form signed by Builder for unverifiable field items	Yes	Yes, field verifiable items done by bldg. inspectors; Certificate of Completion req'd for unverifiable field items (i.e. – recycled content, zero VOC)	Yes, field verifiable items done by bldg. inspectors; Submittal req'd for unverifiable field items (i.e. – recycled content, zero VOC)	Yes, certification done by selected Coconino County Sustainable Building Advisory Committee Members
Energy: Key Measures					
- Energy Star or equivalent	Mandatory	Optional (points)	Mandatory	Mandatory	Optional (points)
- 3rd party performance test	Mandatory	Optional (points)	Mandatory (10/09)	Mandatory	Optional (points)
- Meet code	Yes	Not in CA	Yes	Yes	Yes
Water: Key Measures					
- Types of measures	Indoor and outdoor	Indoor and outdoor	Indoor and outdoor	Indoor and outdoor	Indoor and outdoor
- High-efficiency water fixtures	Points only for total home compliance	Points per fixture	Mandatory for indoor; Points for outdoor	Points per fixture	Some mandatory, some optional (points)
IEQ: Key Measures					
- MERV 8 filters	Mandatory	Optional (points)	Mandatory	Optional (points)	N/A
- No unsealed/unvented combustion appliances	Mandatory	Optional (points)	Mandatory	Optional (points)	Optional (points)
- No air handling equip. in garage	Mandatory	Optional (points)	Mandatory	Optional (points)	Optional (points)
Materials: Key Measures					
- Construction waste mgmt plan	Mandatory	Optional (points)	Optional (points)	N/A	Optional (points)
- Minimize excess lumber in framing	Mandatory (max of 10% excess for home compliance	Points available per framing area	Optional (points)	Options (points) available per framing technique	Optional (points)
- Storage and collection of recyclables	N/A	N/A	Mandatory (recycling area in or near kitchen)	Optional (points)	Optional (points)
Site: Key Measures					
- Erosion controls during constr.	Mandatory	Optional (points)	Optional (points)	Mandatory	Optional (points)
- Landscaping measures	Mandatory	Optional (points)	Mandatory	Optional (points)	Optional (points)
- Protected entrances	N/A		Mandatory (protection from direct summer sun)	Enclosed Vestibule (points)	Optional (points)
Program Fees					
- Single family home	Members: $375/unit	Members: $200/unit	No fees	No fees	No fees
- Production homes	Members: $107/unit	Members: $200/unit	No fees	No fees	No fees
Verification Fees	TBD by market	TBD by market	Other than city inspections, TBD by market	No fees if participating in utility energy program, or using prescriptive path	No fees

Scottsdale Green Building Outreach

- **Green Building Lectures**
  - 1st Thursday of each month
  - avg. attendance is 45
- **Solar Lectures**
  - 3rd Thursday of each month
  - avg. attendance is 25

www.scottsdaleaz.gov/greenbuilding

Green Single Family Permit Activity



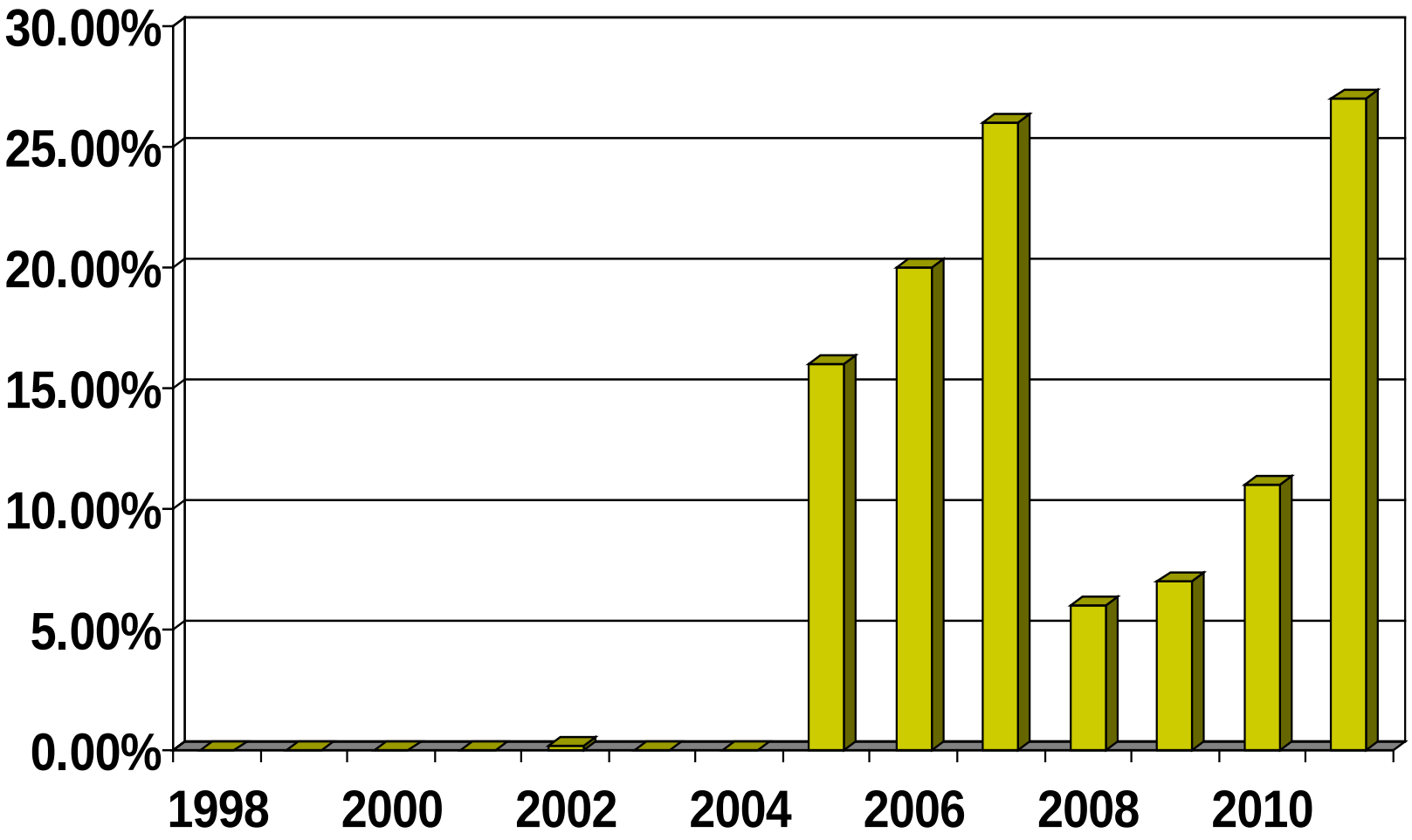
Source: Scottsdale CDS records

Green Single Family Permit Activity (1998 - 2011)

Year	Total Permits	Green Permits	Percentage of Total Permits
1998	2172	20	1%
1999	1554	36	2%
2000	1076	41	4%
2001	843	38	5%
2002	768	33	4%
2003	896	38	4%
2004	1137	247	22%
2005	852	439	52%
2006	685	177	26%
2007	573	106	19%
2008	200	35	18%
2009	121	30	25%
2010	149	28	19%
2011	155	15	10%
Total	**11,181**	**1,283**	**12%**

Source: Scottsdale CDS records

Green Tenant Improvement Permits



Source: Scottsdale CDS records

Green TI and Condo Unit Build-outs (1998 - 2011)

Year	Total Permits	Green Permits	Percentage of Total Permits
1998	1732	0	0
1990	1789	0	0
2000	1366	1	0.07
2001	1003	0	0
2002	832	2	0.2
2003	1149	0	0
2004	982	0	0
2005	1121	181	16%
2006	1328	264	20%
2007	1019	265	26%
2008	638	41	6%
2009	193	13	7%
2010	354	37	11%
2011	227	61	27%
Total			

Source: Scottsdale CDS records

Scottsdale Building Trends
1998 – 2012

- **Energy Efficiency**
  - Cathedralized attics (insulation at roof deck)
  - All buildings constructed from 2006 to 2012 are 15% or more efficient than national energy code (2006 IECC)
- **Heat Island Mitigation**
  - Shaded building entrances, courtyards, outdoor living spaces and limited hardscape surfaces
- **Water Efficiency**
  - Low-water use landscaping and efficient irrigation systems
  - High efficiency plumbing fixtures
  - Efficient hot water delivery systems (recirculation pumps)
- **Passive and Active Solar Systems**
  - Significant increase in permits for photovoltaic (solar electric) and solar hot water systems

“A cynic is a man who knows the price of everything, and the value of nothing.”

Oscar Wilde

Green equates to Quality

- It’s not a question of whether one can afford green building, but whether how much one is able to afford
  - Health
  - Performance
  - Safety
  - Durability
  - Comfort

Costs are Relative

- **Depends on how far you go**
  - Standard Quality versus High Quality
- **If a green product costs more, it is often**
  - More durable
  - High performing
  - Multi-functional
  - Aesthetically valued
- **You generally get what you pay for**

Green Saturation into the Market

- **Most environmentally responsible products are no more expensive than average costs**
  - composite decking (recycled plastic/scrap wood) that is highly durable with low maintenance
    - comparable to higher grade cedar or redwood

  - high efficiency toilets (1.28 gpf)
    - WaterSense label is the industry standard

Green Saturation into the Market

- **Engineered lumber products**
  - standard component of wood construction
- **Energy efficiency products**
  - highly competitive market
- **Recycled content materials**
  - economic benefit for most manufacturers
- **Regional and Indigenous materials**
  - economic advantage for locally recovered, harvested, extracted or manufactured building products

SCOTTSDALE GREEN BUILDING PROGRAM

Foster Residence - 2004

AAC walls, Daylighting, Solar Power, Metal Framing - Edwards Design Group

Hovey Residence - 2004

Scottsdale's first
Building Integrated Solar PV System

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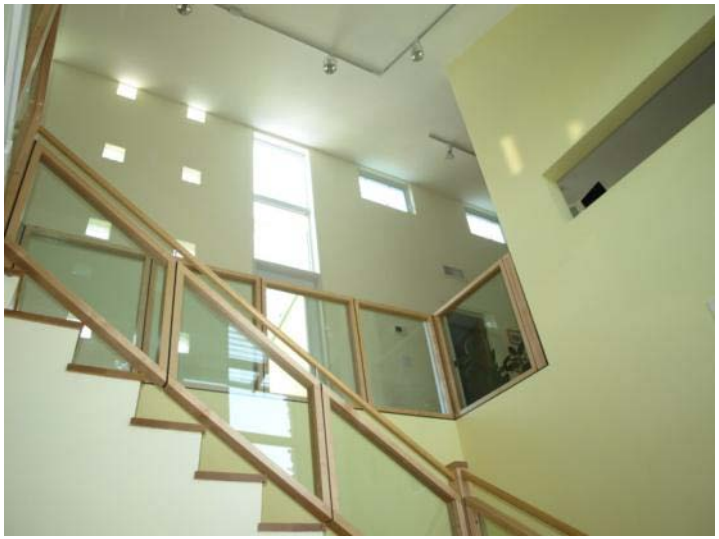
McDonnell Residence - 2005

Downtown in-fill development
Live-work remodel and addition

Daylighting, solar control
energy efficient building envelope



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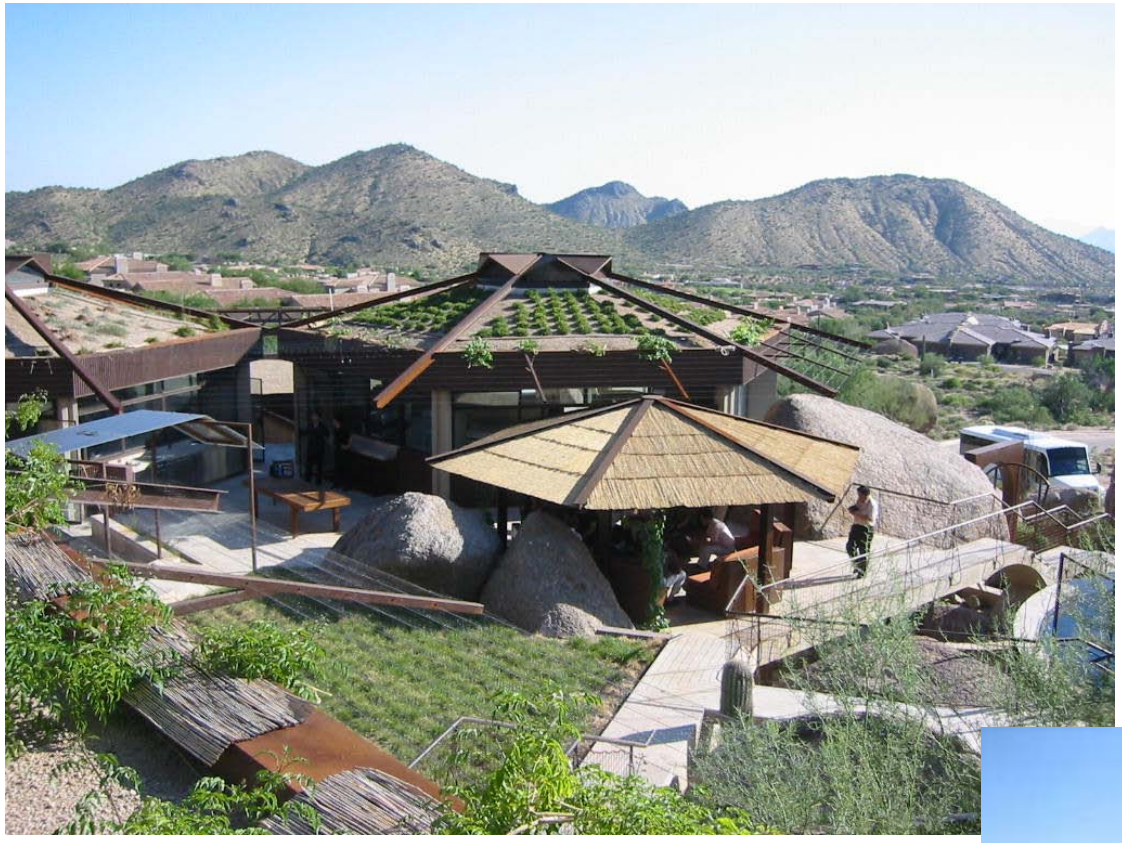
Strata International – 2005

Saebi Alternative Building System – Load bearing foam foundation, walls and roof



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Scottsdale's
Highest Rated Green Home

Beaulieu Residence - 2006

Earth sheltered, renewable energy,
passive cooling, vegetated roofs,
site integration, outdoor living,
indoor natural ventilation,
gray water recycling

Post Occupancy
Energy Audit of Scottsdale Green Homes

Project	Building Completion Date	Size (sq. ft.)	Governing Building Code (at time of permit)	Energy Audit, Performance Testing and Rating (8/09 to 5/10)
Becker Residence (exterior insulated masonry wall construction)	8/02	2,654	UBC 1997	HERS Index - 73 27% better than 2006 IECC
Loloma 5 Town Homes (exterior insulated masonry & wood frame construction)	10/04	1,612	UBC 1997	HERS Index - 76 24% better than 2006 IECC
McDonnell Infill Office/Residence (exterior insulated masonry wall construction)	12/04	2,241	UBC 1997	HERS Index - 61 39% better than 2006 IECC
Krahman/Wallenmeyer Residence (exterior insulated wood frame wall construction)	8/08	5,508	IRC 2003	HERS Index - 10 (65 w/o solar) 90% better than 2006 IECC
Moore Remodel (exterior insulated masonry wall construction)	4/10	1,842	IRC 2003	HERS Index – 8 (55 w/o solar) 92% better than 2006 IECC

Post Occupancy Energy Audit of Green Homes

Becker Residence

Krahman/Wallenmeyer Residence

McDonnell Infill Office/Residence

Loloma 5 Town Homes

Scottsdale City Resolution
LEED Gold Certified City Buildings

March 2005

Gabor Lorant Architects

Granite Reef Senior Center
1st LEED Gold certified city facility - 2006

Solar partnership with SRP
solar electric (PV) shade canopy
roof mounted solar electric (PV)

Lost Dog Wash Trailhead Building - 2006

B. Timmerman

Weddle Gilmore Architects

Scottsdale certified

1st LEED Platinum certified city facility

LEA Architects

Downtown Fire Station 2 - 2009

DSAA / DWL Architects

J. Jones

Appaloosa Library - 2009

Weddle Gilmore Architects

C. Brown

Gateway Access Trailhead Building - 2009

Richard + Bauer Architects

Arabian Library – 2008/2009 certification

U.S. GREEN BUILDING COUNCIL LEED USGBC

McCormick-Stillman Model Railroad Building - 2011

Holly Street Studio Architects

LEED Gold
certified city facility

WLC Architects

LEED Platinum
pending

Fire Stations #1 and #8 - 2012

SkySong
ASU Scottsdale Innovation Center

SkySong - 2009

Phase I & II Office Buildings

Amanda Wills, Earth911.com

General Dynamics Facility

Certified Green under the new LEED Operations and Maintenance designation – EB/OM

- 2009 – General Dynamics became the first industrial site of its size to receive the LEED-EB/OM designation
- 2005 - General Dynamics received the first EB certification during the LEED pilot program

- Conversion of 250,000 square feet of lawn to a Xeriscape
- Diverted 575 tons of recyclable materials from local landfills

Optima Camelview Village

Optima Development

Largest Scottsdale Green Building Project (Phase I-III, 2005-2012)

11 buildings - 700 residential units - 24,000 sq. ft. retail – 13 acre site

18 acres of vegetated terraces – Seeking LEED Silver certification

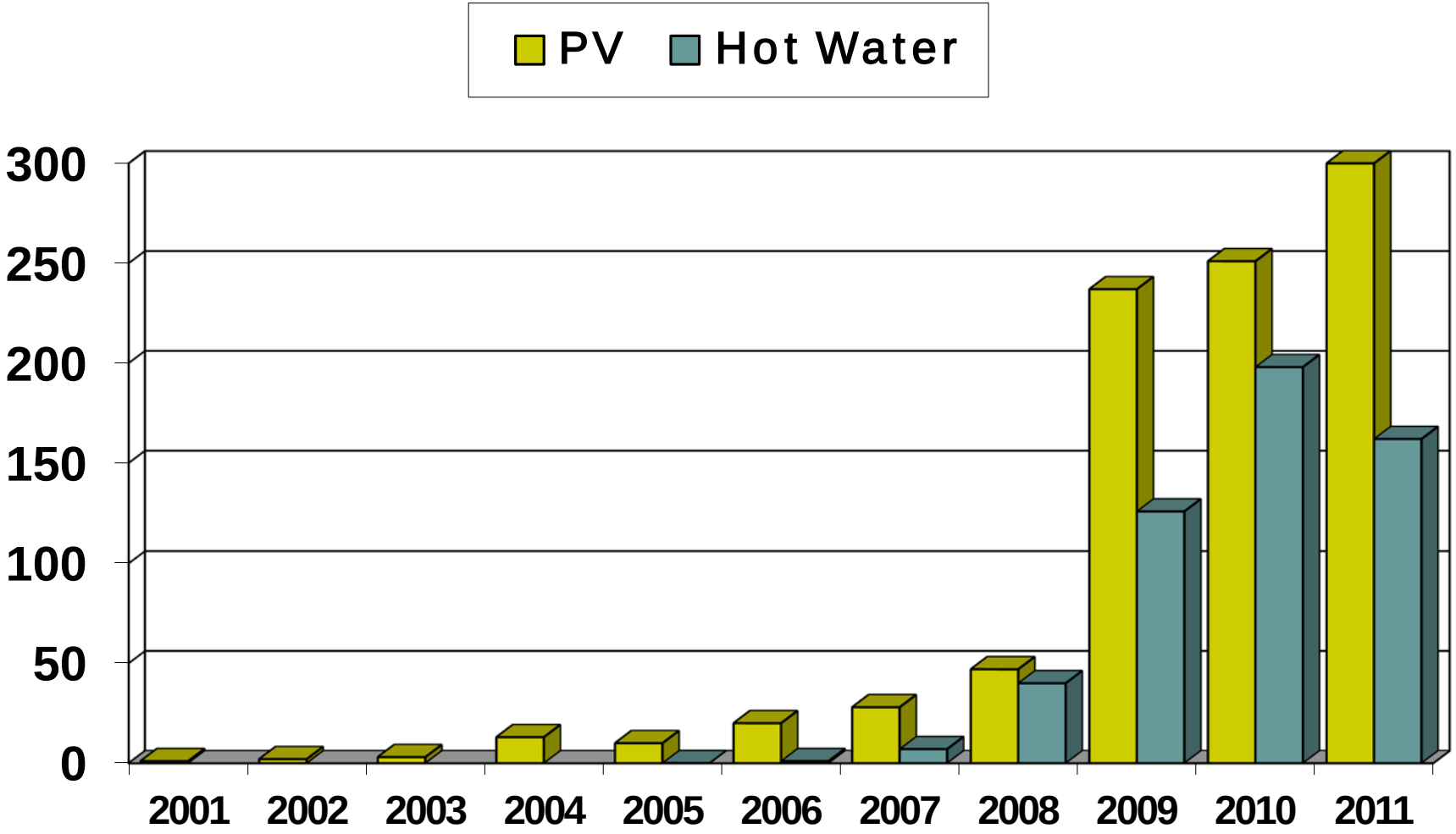
Hyatt Regency Scottsdale at Gainey Ranch

Largest Solar Hot Water System Installed in a Hotel

- Domestic hot water for
  - 492 guest rooms
  - main laundry services room
  - restaurants
- Designed to reduce the resort's energy use by 50%
- Estimated 3-year payback on investment beginning in 2009

Solar Permits 2001 to 2011

Solar Demand Continues to Grows



Source: Scottsdale CDS permit records

Solar Permits 2001 to 2011

Solar Demand Continue to Grows

Solar Electric (PV)

Year	01	02	03	04	05	06	07	08	09	2010	2011
No. of Permits	1	2	3	13	10	20	28	47	237	251	300

Solar Hot Water

Year	01	02	03	04	05	06	07	08	09	2010	2011
No. of Permits	-	-	-	-	0	1	7	40	126	198	162

Source: Scottsdale CDS permit records

Solar Design Guidelines

Without esthetic consideration of solar panel placement,
panels requiring southern exposure could look like this lunar landing.

Solar System Submittal Guidelines

Residential Solar Plan Review
Quality Submittal Guidelines

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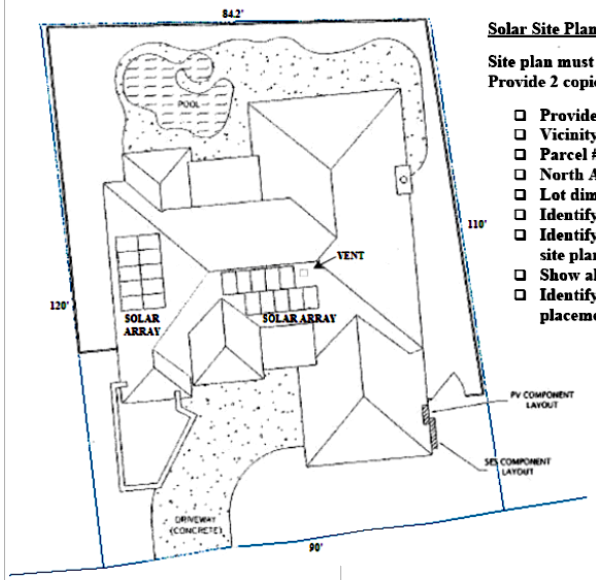
This packet applies to roof-mounted solar photovoltaic and hot water systems only.

City of Scottsdale
One Stop Shop
7447 E. Indian School Road, Suite 105
480-312-2500

September 2009

SOLAR SITE PLAN CHECKLIST/EXAMPLE

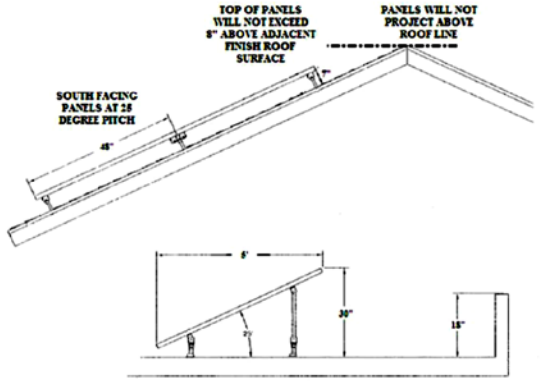


Solar Site Plan Checklist:

Site plan must be legible, show entire lot, and be proportional in scale. Provide 2 copies of site plan.

- ☐ **Provide Zoning**
- ☐ **Vicinity Map**
- ☐ **Parcel # (APN), lot & subdivision**
- ☐ **North Arrow**
- ☐ **Lot dimensions**
- ☐ **Identify street**
- ☐ **Identify easements (i.e. NAOS or drainage easement—represent on site plan with dashed lines)**
- ☐ **Show all ridge lines, and/or parapets**
- ☐ **Identify all vents, chimneys, or other apparatus that may affect placement of panels**

SOLAR ELEVATION EXAMPLE



2/5/09

City of Scottsdale

Green Building Program

"Sustainable Building in the Sonoran Desert"

SOLAR PANEL PLACEMENT DESIGN GUIDELINES FOR SINGLE FAMILY HOMES

The following guidelines are to be used in the design and placement of solar panels (photovoltaic and solar thermal systems) on pitched and flat roofs of single-family dwellings for the purpose of compatible design. With a little foresight and planning, a solar system can be effectively integrated into the design of new and existing roofs. Those projects which comply with the design guidelines qualify for over the counter plan review. All other proposals will be required to be submitted for plan review.

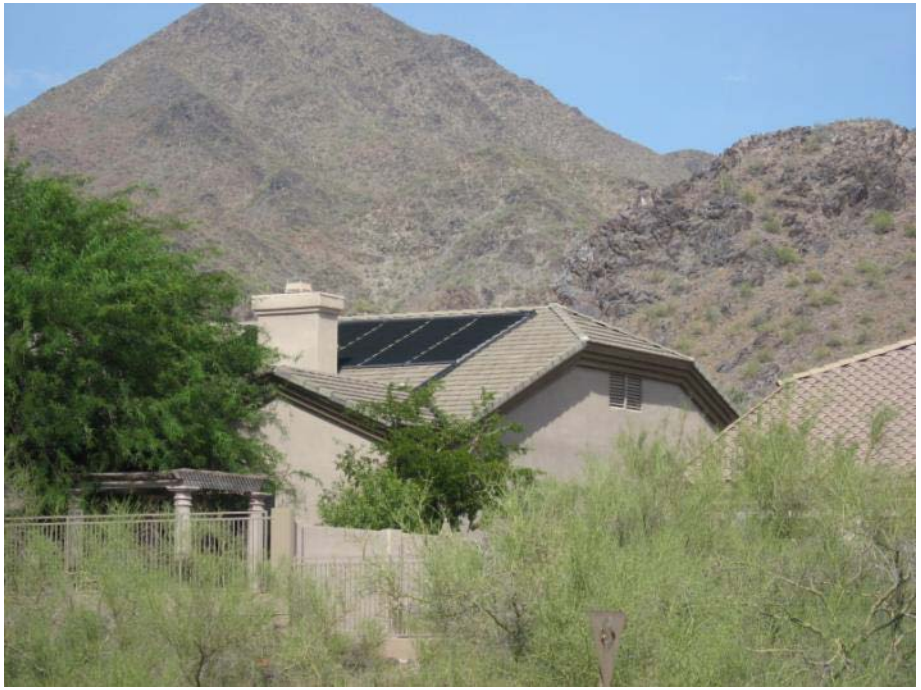
A. South Facing Pitched Roofs (within 45° east or west of due south)

1) Solar panels should be low profile and parallel with the plane of the pitched roof.
2) Top of the panels should not exceed 8 inches above the adjacent finish roofing surface (e.g. - tile, shingles). Panels should not project above the roof ridge line.
3) Placement of panels should be uniform. Consider the panels as part of the overall roof configuration. Match the shape and proportions of the array with the shape and proportions of the roof.
4) Color of panel frames and support structure should be neutral and compatible with roof surface color (exposed frames and components should have a non-reflective surface).

+ Per guidelines
- Not per guidelines

1

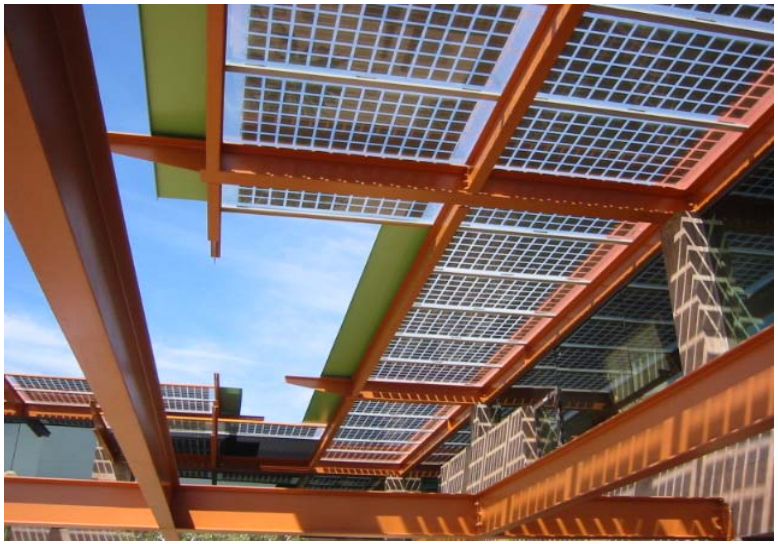
- **Solar PV Panel Placement Design Guidelines**
  - South Facing Pitched Roofs
  - North and East/West Facing Pitched Roofs
  - Flat Roofs



Building Integrated PV Systems

SunPower SunTile
is a roof-integrated solar tile for flat and S-Tile roofs.

Building Integrated PV Systems



Desert Mountain Residence, Scottsdale

Optima Biltmore Condo Project, Phoenix

Scottsdale Granite Reef Senior Center

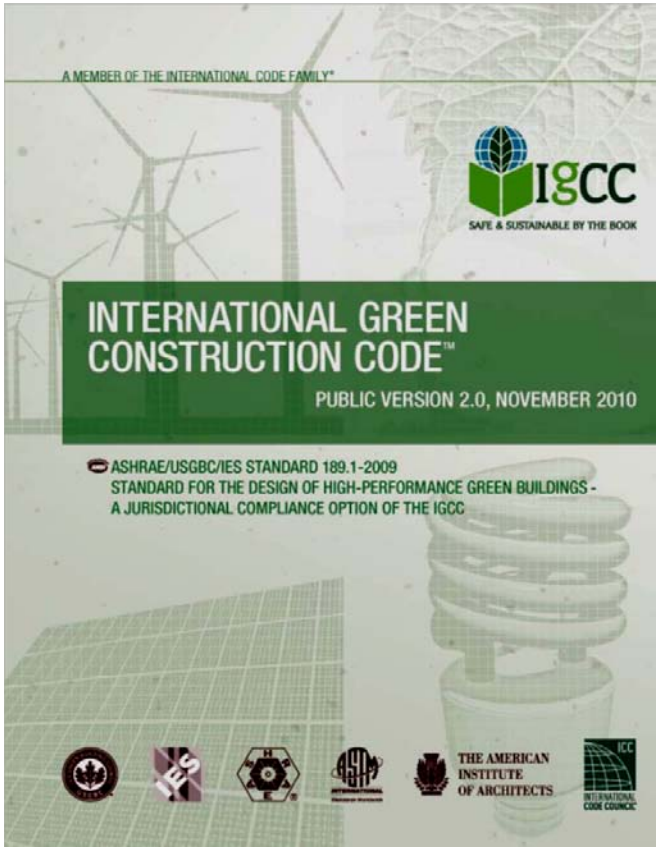
Building Integrated PV Systems

Beaulieu Residence, Scottsdale

The Smart Energy House

Scottsdale's IgCC Adoption

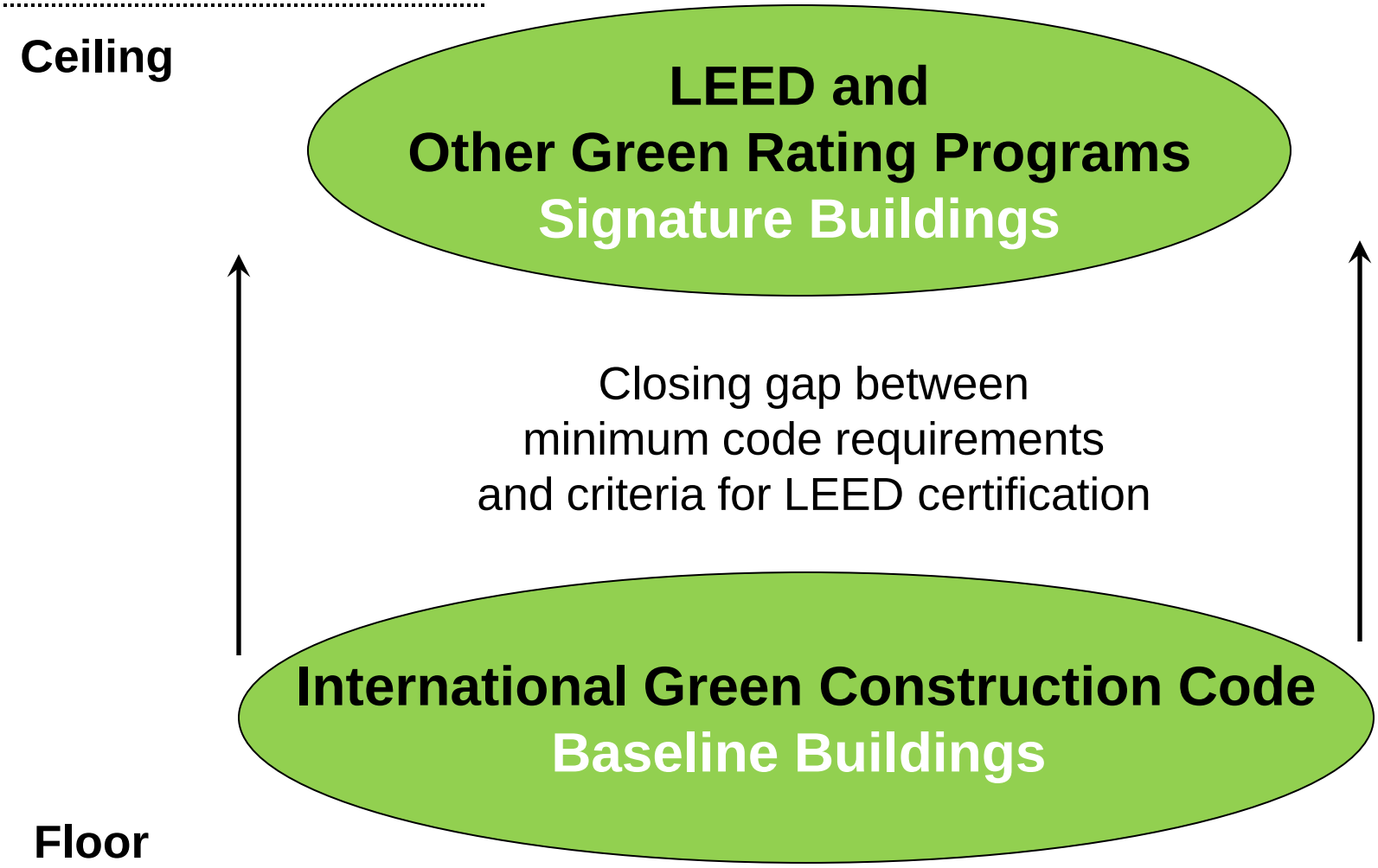
July 5, 2011 – Voluntary/Mandatory



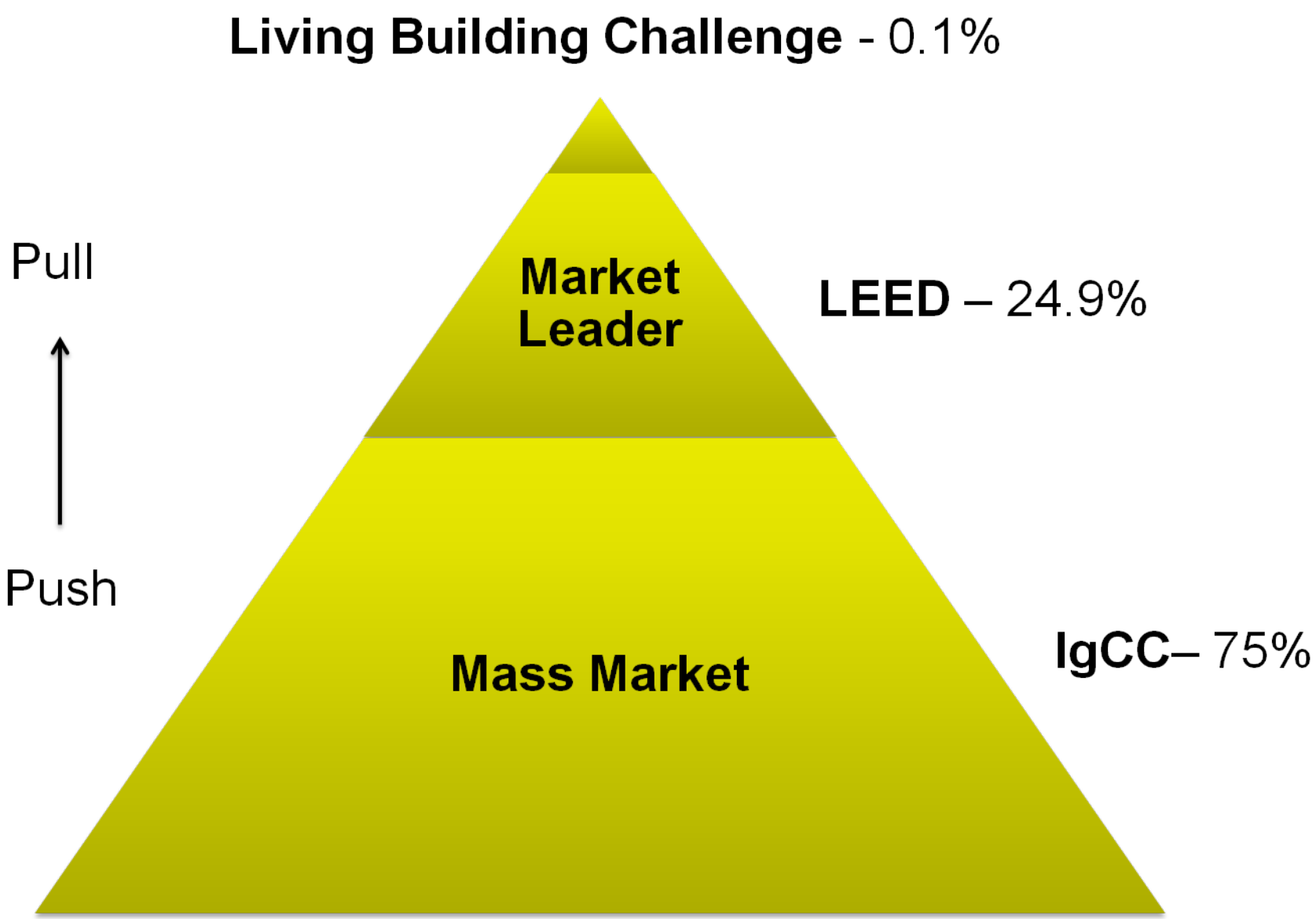
- Site Development and Land Use
- Materials Resources
- Energy Efficiency
- Water Efficiency
- Indoor Environmental Quality
- Commissioning, Operation and Maintenance

Version 2.0 - November 2010

Gap between IgCC and LEED



Towards Regenerative Buildings



Alignment of Tools and Instruments

Green Rating Programs

Government Policy

Standards & Codes

Market Supply & Demand

For More Information

Office of Environmental Initiatives
Planning, Neighborhoods and Transportation Division
Green Building Program
Anthony Floyd, AIA, LEED-AP
afloyd@scottsdaleaz.gov
480-312-4202
www.scottsdaleaz.gov/greenbuilding