

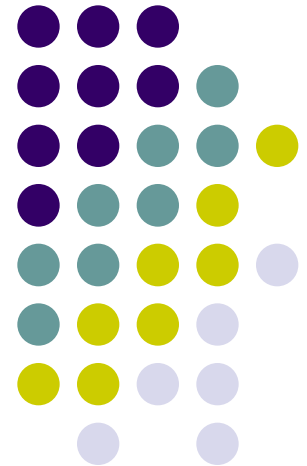
# Scottsdale 2016 Green Building Trends



## City of Scottsdale Green Building Program

January 27, 2017

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





# City of Scottsdale Green Building Program

- **Established in 1998**
  - Rating criteria based on Sonoran Bioregion
- **Verification Process**
  - Integration with city plan review, permits and inspections
- **Public Outreach**
  - Green pre-apps with new permit applicants
  - Engagement with architects, builders, owners
  - Green Building Lecture Series
- **Periodic Updates**
  - Release of Green Home Rating Checklist v4.0





# Program Incentives

- **Scottsdale Green Building Designation**
- **Streamlined Documentation & Verification Process**
- **Technical and Permit Process Assistance**
- **No Green Building Application/Certification Fees**
- **Enhanced Market Niche**
  - city designation and listings
- **Promotion Material and Educational Programs**
  - logos, brochures, handouts, job site signs, lecture series



# Green Building Program Collaboration with other City Programs & Initiatives

1. General Plan Elements
2. Planning & Zoning Ordinances & Stipulations
3. Sensitive Design Principles
4. Energy Code
5. Water Conservation Ordinance
6. City Facility Management



SCOTTSDALE



# Green Building Lecture Series

- 1<sup>st</sup> Thursday of month
- Granite Reef Senior Center
- Average attendance - 30



## Sustainable Building in the Desert

SCOTTSDALE



GREEN BUILDING PROGRAM

### CITY OF SCOTTSDALE GREEN BUILDING LECTURE SERIES 2016/2017

Scottsdale  
Granite Reef  
Senior Center,  
located at  
1700 N. Granite  
Reef Road  
(NW corner of  
McDowell &  
Granite Reef)

7 to 8:30 pm

Free Admission

October 6, 2016

#### **Rooftop Solar: An Exciting Future for All**

Join us for a lively discussion and update on rooftop solar, net-metering, evolving solar incentives, milestones, and the future of photovoltaics (PV) in the Desert Southwest.

November 3, 2016

#### **Green Renovations in Southern Scottsdale**

It's easy to incorporate the latest energy efficient, healthy and environmentally responsible features in new buildings but what about 60+ year old buildings? Hear about a major upgrade to Scottsdale's first all-electric model home (circa 1950's) and a 1960's retrofitted apartment building.

December 1, 2016

#### **Getting Toxins Out of Your Home and Workplace**

Indoor air pollutants can be six times higher than outdoor air. Learn strategies to improve indoor environmental quality, including tips on material selection, green labeling and fresh air ventilation.

February 2, 2017

#### **Living an Edible Landscape Life**

Join urban gardeners as they share the benefits and how-to's of growing your own healthy food, herbs, edible flowers and fruit trees in our desert environment. Learn about our planting and harvesting seasons. Find out about the wide range of community gardens available for you to participate in and how school gardens provide students with valuable skills.

March 2, 2017

#### **Doing Better with Less: Water Efficient Products and Treatment Alternatives for the Home**

Did you know that in a residential setting, up to 70% of city-supplied potable water is used for landscape irrigation and 30% of the remainder is used for flushing toilets? Learn about high-efficiency water using products and alternative water treatment systems.

April 6, 2017

#### **Guaranteed Fresh Air: How to Get It Indoors and Keep It**

As homes become more energy efficient, they become tighter. Besides opening windows, homes built prior to 2012 get outside air through infiltration around doors, windows, walls and ceiling penetrations. Hear about options for getting whole-house fresh air ventilation while keeping your home air tight and energy efficient.

May 4, 2017

#### **Using Radiant Barriers to Keep the Heat Out**

Radiant barriers and reflective insulation are used in astronaut suits and spacecrafts to protect against thermal radiation in fluctuating temperatures of space. Here how these materials can be used to keep your house cooler and more comfortable while reducing air conditioning costs.

June 1, 2017

#### **Repurposed Materials: Finding Treasures for Reuse**

Learn creative ways to reuse materials while saving money and natural resources.

Subscribe to Green Building Events at <http://subscriptions.ScottsdaleAZ.gov>  
Visit the Green Building website at [www.ScottsdaleAZ.gov](http://www.ScottsdaleAZ.gov) and search "green building"

# Scottsdale Building Trends

## 1998 – 2016

### ● Energy Efficiency

- Cathedralized attics (insulation at underside of roof decks)
- Amended 2006 Energy Code with 15% improved efficiency
- Energy Star certified products and LED lighting
- 2012 Energy Code with additional 10% improved efficiency

### ● Indoor Environmental Quality

- Outside fresh air intake for whole-house mechanical ventilation

### ● Water Efficiency

- Xeriscaping and efficient irrigation systems
- Efficient hot water delivery systems
- High efficiency plumbing fixtures

### ● Heat Island Mitigation

- Recessed entrances, shaded outdoor spaces and courtyards

### ● Solar Panel Systems

- Streamlined permit process for PV and hot water systems



# Green Home Checklist Update

July 2015 and December 2016

## New Mandatory Baseline Measures in accord with Changing Codes, Industry Standards and Market

SCOTTSDALE



GREEN BUILDING  
PROGRAM

City of Scottsdale

### Green Home Rating Checklist

New Construction, Major Remodels & Additions

Version 4.0 (July 2015)

Plan Check # \_\_\_\_\_ Building Permit # \_\_\_\_\_ GB Rating \_\_\_\_\_

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) not more than three stories in height with a separate means of egress (International Residential Code - IRC Section R101.2).

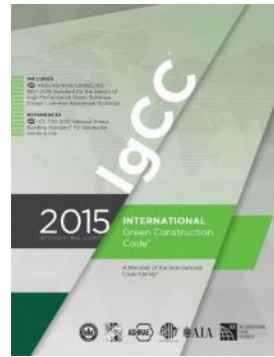
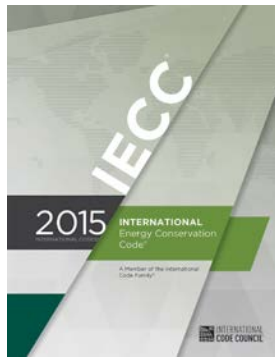
All building system components, materials, and equipment must be installed per code and manufacturer's instructions.

Tier 1 - Baseline GB Designation	Tier 2 - Advanced GB Designation
<ul style="list-style-type: none"> <li>Meet all <u>30 mandatory measures</u> (p. 2 – 7).</li> </ul>	<ul style="list-style-type: none"> <li>Meet all <u>30 mandatory measures</u> (p. 2 – 7).</li> <li>Accumulate <u>30 or more points</u> from the rated options in the checklist (p. 8 - 17).</li> </ul>

#### Advanced Level - Rating Categories and Maximum Available Points

1. Site	12 pts	6. Lighting and Power	6 pts	11. Doors, Cabinetry, Trim	10 pts
2. Structural Elements	21 pts	7. Plumbing System	5 pts	12. Flooring	8 pts
3. Energy Rating/Renewables	33 pts	8. Roofing	11 pts	13. Solid Waste	6 pts
4. Thermal Envelope	7 pts	9. Exterior Finishes	5 pts	14. House Size	+/- varies
5. HVAC	16 pts	10. Interior Finishes	4 pts	15. Innovative Design	8 pts

# Adoption of 2015 Building Codes



- **Code Amendments related to energy efficiency, water conservation and indoor environmental quality**
  - International Energy Conservation Code (IECC)
  - International Residential Code (IRC)
  - International Plumbing Code (IPC)
  - International Green Construction Codes (IgCC)
- **Adopted on November 28, 2016**
- **Effective date set for January 1, 2017**



# Over 1300 homes issued Green Certificates of Occupancy



Becker Residence



Krahman/Wallenmeyer Residence



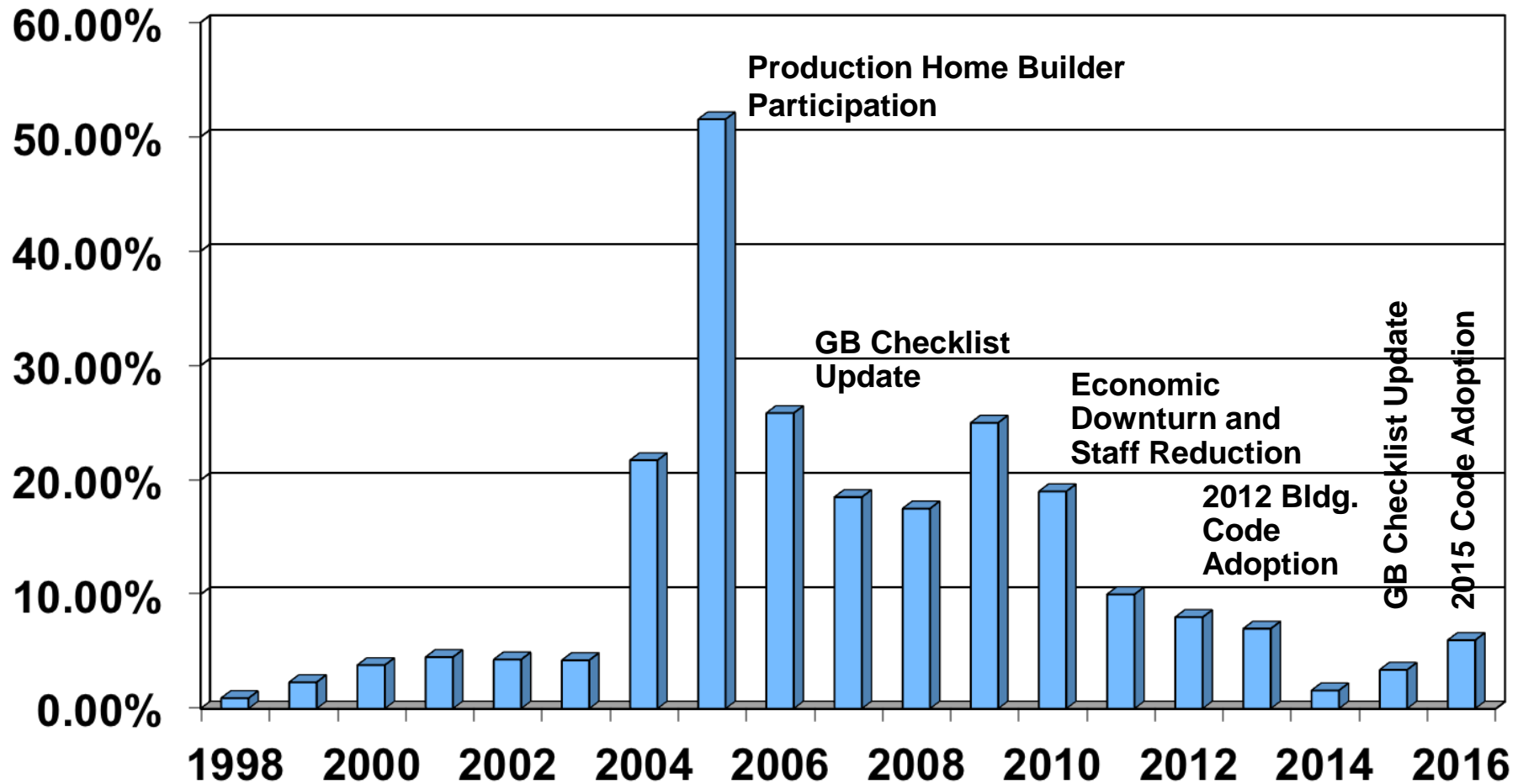
McDonnell Infill Office/Residence



Loloma 5 Town Homes

# Percentage of Green Single Family Permits

## 1998 - 2016



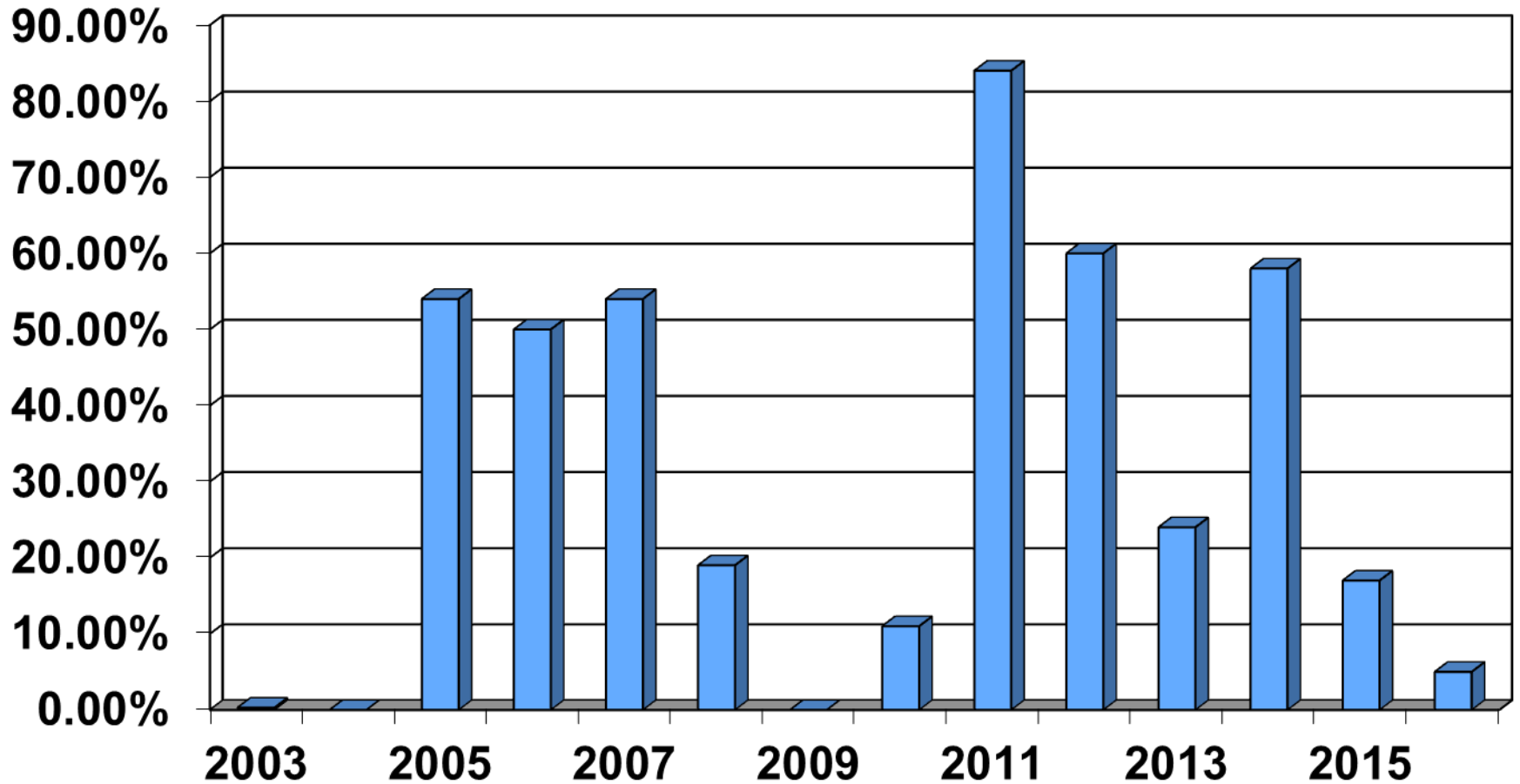
Source: Scottsdale CDS records

## Green Single Family & Townhomes Permits (1998 - 2016)

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%
2012	265	21	8%
2013	400	26	7%
2014	440	7	1.6%
2015	438	15	3.4%
2016	<b>525</b>	<b>29</b> <small>(includes 11 SFR; 18 at SOHO)</small>	<b>6%</b>
<b>Total</b>			

Source: Scottsdale CDS records

# Green Multifamily Dwelling Unit Permits 2003 - 2016



Source: Scottsdale CDS records

## Green Multifamily Dwelling Unit Permits (2003 - 2016)

Year	Total Permits	Green Permits	Percentage of Total Permits
2003	1,500	5	<b>0.3%</b> Includes 5 units at Loloma 5 Townhomes
2004	1,025	0	<b>0%</b>
2005	483	261	<b>54%</b> Includes 253 units at Optima Camelview Village, 8 units at The Duke EarlI Drive Townhomes
2006	743	373	<b>50%</b> Includes 299 Optima Camelview Village units, 74 units at Safari (non-green units include Waterfront Towers, Monterey, Barolo)
2007	621	335	<b>54%</b> Includes 198 Optima Camelview Village units, 96 at Corriente, 38 at Safari, 3 at Engle Villas Desert Park Village (non-green units include 17 at Waterfront Towers, 6 at Canavest, 6 at Hancock, 8 at Eagles Pass, 93 at Artesia, 18 at Villa Contendo, 36 at Paseo Village, 100 at Sage, 2 at Clayton)
2008	402	76	<b>19%</b> Includes 56 Optima Camelview Village units, 8 at Engle Villas at Desert Park Village, 10 at Upton, 2 at Safari (non-green units include 68 Silverstone apartments, 16 at Encore Grayhawk, 9 at Artesia, 18 at Wilshire, 7 at Courtyards at Desert Park, 2 at Hancock, 3 at Residences on Main, 203 at Classic Residences at Silverstone)
2009	24	0	<b>0%</b> (non-green projects include 5 at 6 <sup>th</sup> Street Lofts, 8 at Encore Grayhawk, 8 at Courtyards at Desert Park, 3 at Hancock)
2010	264	29	<b>11%</b> Includes 28 Optima Camelview Village units, 1 Meritage model (non-green projects include 118 at Princess Maravilla Casitas, 14 at Courtyard Desert Park, 12 at Encore Grayhawk, 80 at Ten Lofts, 11 misc.)
2011	301	254	<b>84%</b> Includes 210 Optima Sonoran I units, 44 at Optima Camelview Village (non-green projects include 39 at Princess Maravilla Casitas, 8 at Encore Grayhawk)
2012	1,024	613	<b>60%</b> Includes 325 SkySong units, 264 at Broadstone Lincoln, 24 at Corriente (non-green projects include 388 at TDI One Scottsdale)
2013	2,128	507	<b>24%</b> Includes 200 Optima Sonoran II units, 259 at Broadstone Waterfront, 48 at Corriente (non-green projects include 416 at Mark Taylor on McDowell, 369 at Portales, 303 at TDI One Scottsdale, 49 at Sage, 220 at Archstone DC Ranch, 240 at Liv North, 24 at Pinnacle Point/Eagle Pass)
2014	1,798	1,033	<b>58%</b> Includes 202 units at Optima Sonoran Village II; 267 at Scottsdale Quarter Crescent ; 556 at Clayton Apartments; 8 at Project MZ
2015	758	130	<b>17%</b> Includes 89 at Envy Condos; 41 at Equinox Apartments
2016	741	33	<b>5%</b> Includes 10 condo units at SOHO; 7 units at Eldorado on First; 16 units at Plaza Osborn Apartments
<b>Total</b>			

# Environmental Results - 2016



Equivalent of **950 cars** removed from the street representing **10,778,705 miles** driven by average cars as a result of the energy savings of **1,381 green homes**



# Energy Savings and Environmental Impact Reduction of Scottsdale Green Homes

Estimated energy savings and equivalent greenhouse gas reduction resulting from houses completed under the Green Building Program.

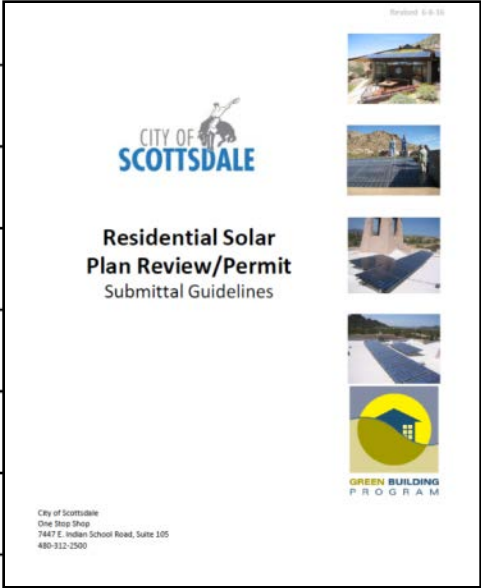
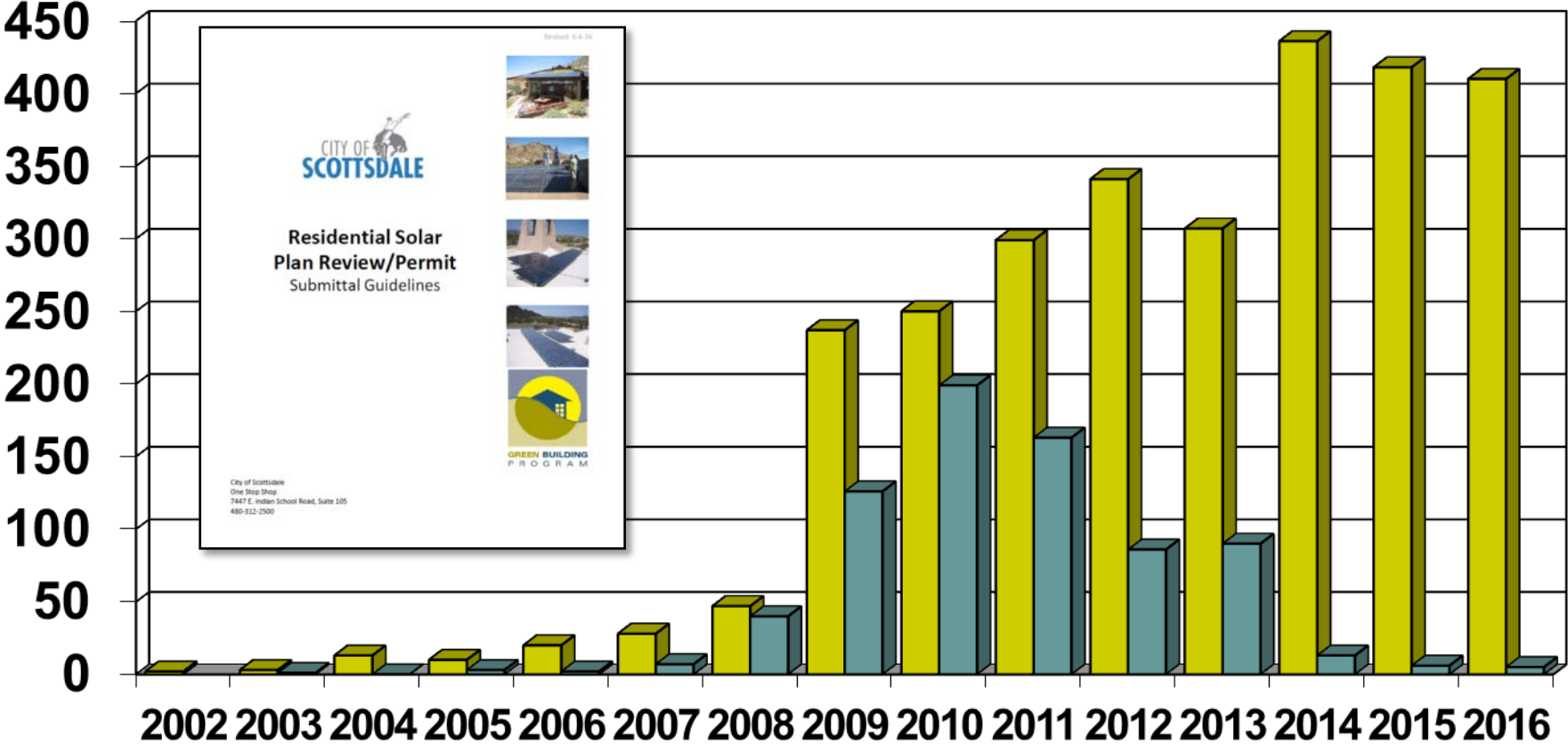
Green Home Energy Measures	Annual Energy Savings and Pollution Reduction	
	Per Home	Total Savings for 1,381 green homes in 2016
<b>Typical <u>Small</u> Custom Home<sup>1</sup></b>	<b>2,700 square feet</b>	
<b>Average Annual Energy Reduction<sup>1</sup></b>	4,634 Kilowatt hours (kWh)	6,399,554 Kilowatt hours (kWh)
<b>Average Annual Energy Cost Savings</b>	<b>\$554.23 per year</b> (0.1196 per kWh) <sup>2</sup>	<b>\$765,391.63</b> (0.1196 per kWh) <sup>2</sup>
<b>Equivalent Annual Greenhouse Gas Reduction<sup>3</sup></b>	3.6 tons of carbon dioxide (CO <sub>2</sub> ) avoided	4,971.6 tons of carbon dioxide (CO <sub>2</sub> ) avoided
<b>Equivalent Passenger Vehicles removed from Street<sup>3</sup></b>	0.688 cars	950 cars
<b>Equivalent miles driven by an average passenger vehicle<sup>3</sup></b>	7,805 miles	10,778,705 miles

Sources: <sup>1</sup>Scottsdale Green Home Energy Study (2009); <sup>2</sup>[electricitylocal.com/states/arizona/scottsdale](http://electricitylocal.com/states/arizona/scottsdale); <sup>3</sup>[epa.gov/energy/greenhouse-gas-equivalencies-calculator](http://epa.gov/energy/greenhouse-gas-equivalencies-calculator)

# Solar Permits 2002 to 2016

■ **PV**
■ **Hot Water**

Over 3500 solar PV and hot water Installations





# Solar Permits 2002 to 2016

## Solar Electric (PV)

2,821 + solar PV permits issued

Year	02	03	04	05	06	07	08	09	10	11	12	13	14	15	2016
No. of Permits	2	3	13	10	20	28	47	237	250	299	341	307	436	418	410

## Solar Hot Water

741 + solar hot water permits issued

Year	02	03	04	05	06	07	08	09	10	11	12	13	14	15	2016
No. of Permits	-	1	0	3	2	7	40	126	199	163	86	90	13	6	5

Note: Many early solar permits (2002 – 2008) were designated as minimum electrical, plumbing or water heater permits.

# On-Site Energy Generation and Environmental Impact Reduction of Solar Electric (PV) Systems

Estimated energy savings and equivalent greenhouse gas reduction resulting from installed roof top solar PV systems from **2002 to 2016**.

Green Home Energy Measures	Annual Energy Savings and Pollution Reduction	
	Per Home	Total Savings for <u>2821</u> solar PV roof tops
<b>Average PV system size</b>	<b>6 kW</b>	
<b>Average Annual On-Site Energy Generation<sup>1</sup></b>	9,798 Kilowatt hours (kWh)	27,640,158 Kilowatt hours (kWh)
<b>Average Annual Energy Value<sup>1</sup></b>	<b>\$1,062</b>	<b>\$2,995,902</b>
<b>Equivalent Annual Greenhouse Gas Reduction<sup>2</sup></b>	7.6 tons of carbon dioxide (CO <sub>2</sub> ) avoided	21,440 tons of carbon dioxide (CO <sub>2</sub> ) avoided
<b>Equivalent Passenger Vehicles removed from Street<sup>2</sup></b>	1.5 cars	4,232 cars
<b>Equivalent miles driven by an average passenger vehicle<sup>2</sup></b>	16,503 miles	46,554,963 miles

Sources: <sup>1</sup>[pvwatts.nrel.gov](http://pvwatts.nrel.gov); <sup>2</sup>[epa.gov/energy/greenhouse-gas-equivalencies-calculator](http://epa.gov/energy/greenhouse-gas-equivalencies-calculator)  
<sup>2</sup>[epa.gov/energy/greenhouse-gas-equivalencies-calculator](http://epa.gov/energy/greenhouse-gas-equivalencies-calculator)

# Scottsdale Commercial Projects - 2016

- **Projects approved under the International Green Construction Code (IgCC)**
  - The TomScot Apartments
  - Scottsdale Quarter Crescent Apartments
  - Scottsdale Quarter Office and Retail
  - The Creative Center of Scottsdale





# Scottsdale City Resolution

## LEED Gold Certified City Buildings

Since 2005, 12 LEED certified buildings including 4 Platinum



Granite Reef Senior Center



Downtown Fire Station 2



Appaloosa Library



Museum of the West

# City of Scottsdale

## Energy Star Certified Civic Buildings



In recognition of superior energy performance, the U.S. Environmental Protection Agency awards the ENERGY STAR® to

**Airport Business Center**

**2015**

Buildings that earn EPA's ENERGY STAR use 35 percent less energy and generate 35 percent fewer greenhouse gas emissions than similar buildings across the nation.



Jean Lupinacci  
Director, ENERGY STAR Commercial & Industrial Branch

June 04, 2015

Date



In recognition of superior energy performance, the U.S. Environmental Protection Agency awards the ENERGY STAR® to

**Scottsdale One Civic Center**

**2016**

Buildings that earn EPA's ENERGY STAR use 35 percent less energy and generate 35 percent fewer greenhouse gas emissions than similar buildings across the nation.



Jean Lupinacci  
Director, ENERGY STAR Commercial & Industrial Branch

May 11, 2016

Date



# Office of Environmental Initiatives

Community and Economic Development

Green Building Program

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[www.scottsdaleaz.gov/greenbuilding](http://www.scottsdaleaz.gov/greenbuilding)