Scottsdale 2017 Green Building Trends

City of Scottsdale Green Building Program

February 9, 2018

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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
  - Adoption of International Green Construction Code (2015 IgCC) for commercial buildings

Program Incentives

- **Scottsdale Green Building Designation**
- **Streamlined Documentation & Verification Process**
- **Technical and Permit Process Assistance**
- **No Application or 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
7. Housing Rehab Office

SCOTTSDALE AZ

CITY OF SCOTTSDALE ARIZONA

Green Building Lecture Series

- 1st 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 though 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 and search "green building"

Scottsdale Building Trends
1998 – 2017

- **Energy Efficiency**
  - Energy and Green Code adoptions with enhanced performance
  - Cathedralized attics (insulation at underside of roof decks)
  - Energy Star products, LED lighting and solar ready zones
  - Inspections and testing with 3rd party energy raters
- **Indoor Environmental Quality**
  - Outside fresh air intake for whole-house mechanical ventilation
- **Water Efficiency**
  - Xeriscaping and efficient irrigation systems
  - High efficiency plumbing fixtures
  - Efficient hot water delivery systems
- **Heat Island Mitigation**
  - Recessed entrances, shaded outdoor spaces and courtyards
- **On-Site Solar Generation**
  - Growing number of solar PV installations and battery storage

Green Home Standards Update

Updated 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).

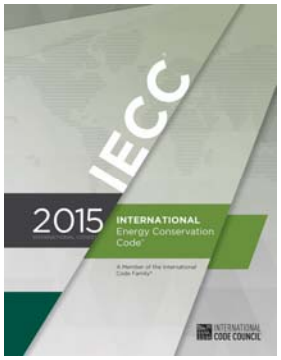
All building system components, materials, and equipment must be installed per code and manufacturer's instructions.

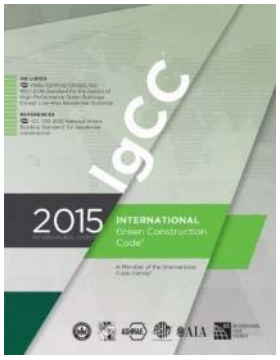
Tier 1 - Baseline GB Designation	Tier 2 - Advanced GB Designation
• Meet all 30 mandatory measures (p. 2 – 7).	• Meet all 30 mandatory measures (p. 2 – 7). • Accumulate 30 or more points from the rated options in the checklist (p. 8 - 17).

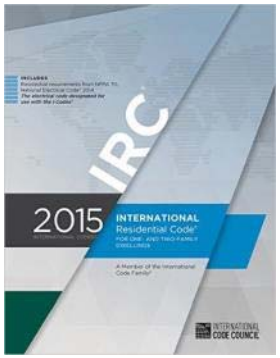
Advanced Level - Rating Categories and Maximum Available Points

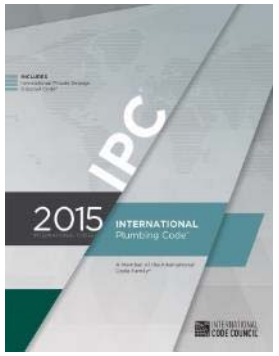
1. Site	12 pts	6. Lighting and Power	6 pts	11. Doors, Cabinetry, Trim	10 pts
2. Structural Elements	21 pts	7. Plumbing System	5 pts	12. Flooring	8 pts
3. Energy Rating/Renewables	33 pts	8. Roofing	11 pts	13. Solid Waste	6 pts
4. Thermal Envelope	7 pts	9. Exterior Finishes	5 pts	14. House Size	+/- varies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

Building Code Updates with amendments









- **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)
- **Effective date** – Jan. 1, 2017
- **Training and instructional materials** – Jan. thru Dec. 2017

Over 1400 homes issued Green Certificates of Occupancy

Silversmith Residence - Tate Studio Architects

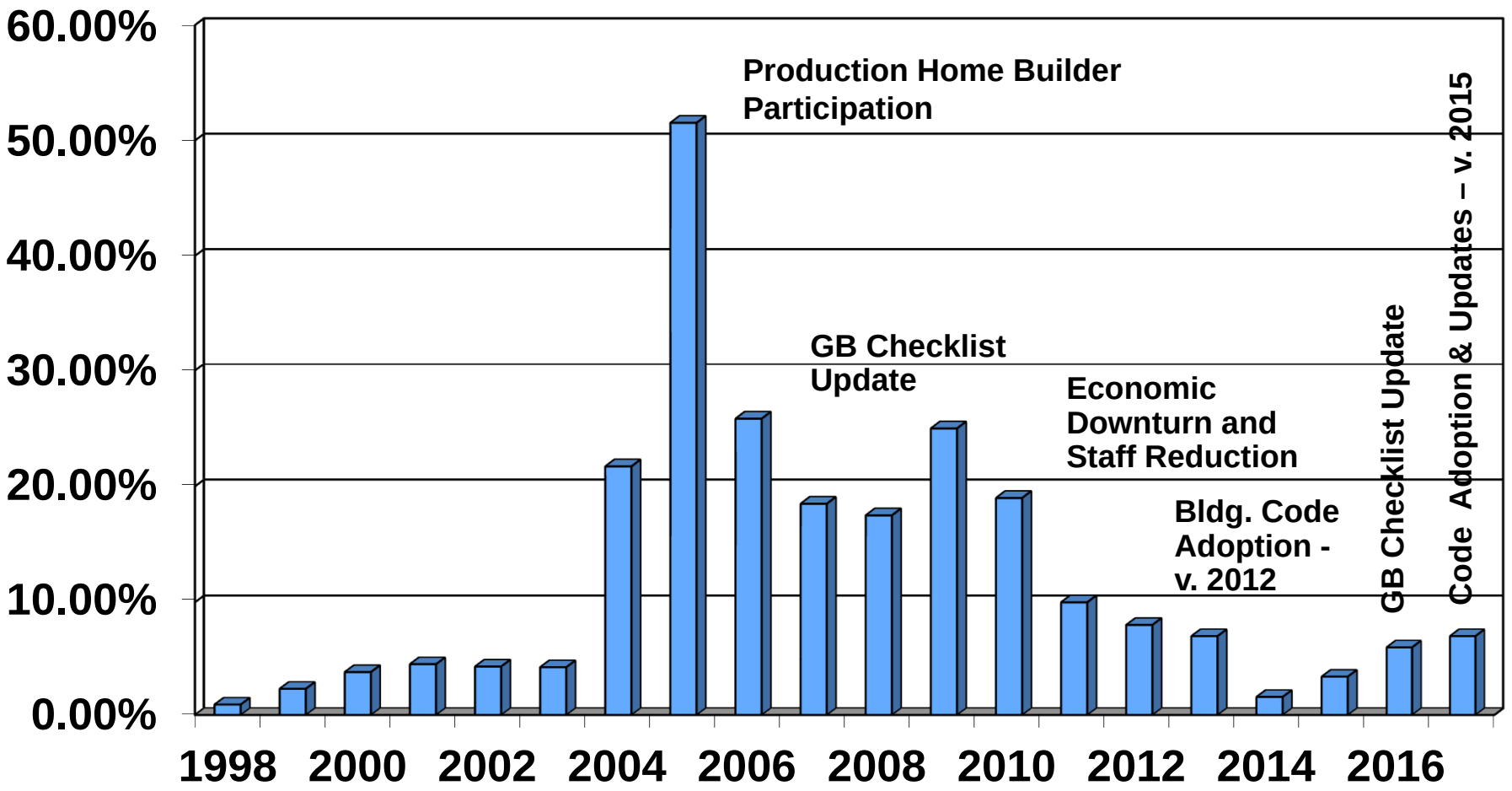
Eldorado on1st Condos – Will Bruder Architects

Becker Residence – Perry Becker Architect

The Douglas Scottsdale – John Douglas Architects

Percentage of Green Single Family Permits

1998 - 2017



Source: Scottsdale CDS records

Green Single Family & Townhomes Permits (1998 - 2017)

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	525	29	6%
2017	**560**	**38** (7 SFR; 31 townhomes)	**7%**
Total	**13,809**	**1,419**	**10.3%**

Source: Scottsdale CDS records

Green House Gas Reduction – 2017

Equivalent of **1048 cars** removed from the street representing **11,994,807 miles** driven by average cars as a result of the energy savings of **1,419 green homes**

Energy Savings and Environmental Impact Reduction of Small Custom 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 1,419 green homes in 2017**
Typical Small Custom Home[1]	**2,700 square feet**	
Average Annual Energy Reduction[1]	4,634 Kilowatt hours (kWh)	6,575,646 Kilowatt hours (kWh)
Average Annual Energy Cost Savings	**$554.23 per year** (0.1196 per kWh)[2]	**$786,447.26** (0.1196 per kWh)[2]
Equivalent Annual Greenhouse Gas Reduction[3]	3.8 tons of carbon dioxide ($C0_2$) avoided	5,392.2 tons of carbon dioxide ($C0_2$) avoided
Equivalent Passenger Vehicles removed from Street[3]	0.738 passenger vehicles	1048 passenger vehicles
Equivalent miles driven by an average passenger vehicle[3]	8,453 miles	11,994,807 miles

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

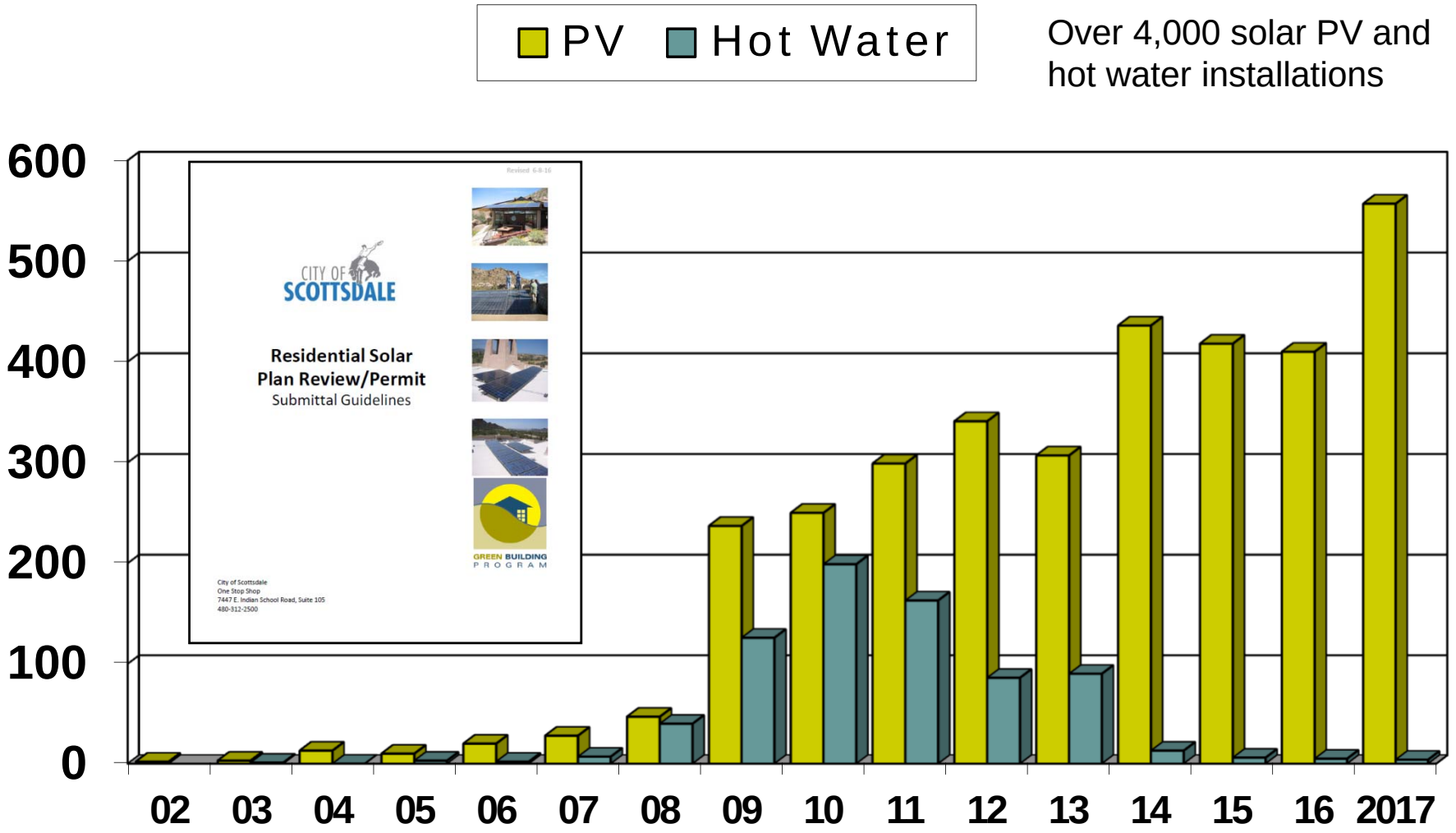
Energy Savings and Environmental Impact Reduction of Average Custom Green Homes

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 1,419 green homes in 2017**
Average Size Custom Home[1]	**5,500 square feet**	
Average Annual Energy Reduction[1]	11,183 Kilowatt-hours (kWh)	15,868,677 Kilowatt-hours (kWh)
Average Annual Energy Cost Savings	**$1,337.49 per year** (0.1196 per kWh)[2]	**$1,897,893.77** (0.1196 per kWh)[2]
Equivalent Annual Greenhouse Gas Reduction[3]	9.2 tons of carbon dioxide ($C0_2$)	13,054.8 tons of carbon dioxide ($C0_2$) avoided
Equivalent Passenger Vehicles removed from Street[3]	1.8 passenger vehicles	2,555 passenger vehicles
Equivalent miles driven by an average passenger vehicle[3]	20,398 miles	28,944,762 miles

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

Solar Permits 2002 to 2017



Over 4,000 solar PV and hot water installations

Source: Scottsdale CDS permit records

Solar Permits 2002 to 2017

Solar Electric (PV)

3,378 + solar PV permits issued

Year	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
No. of Permits	2	3	13	10	20	28	47	237	250	299	341	307	436	418	410	557

Solar Hot Water

745 + solar hot water permits issued

Year	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
No. of Permits	-	1	0	3	2	7	40	126	199	163	86	90	13	6	5	4

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

Source: Scottsdale CDS permit records

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 in **2017**.

Green Home Energy Measures	Annual Energy Savings and Pollution Reduction	
	Per Home	**Total Savings for 557 solar PV roof tops in 2017**
Average PV system size	**6 kW**	
Average Annual On-Site Energy Generation[1]	9,798 Kilowatt hours (kWh)	5,457,486 Kilowatt hours (kWh)
Average Annual Energy Value[1]	**$1,062**	**$591,534**
Equivalent Annual Greenhouse Gas Reduction[2]	7.6 tons of carbon dioxide ($C0_2$) avoided	4,233.2 tons of carbon dioxide ($C0_2$) avoided
Equivalent Passenger Vehicles removed from Street[2]	1.5 cars	836 cars
Equivalent miles driven by an average passenger vehicle[2]	16,503 miles	9,192,171 miles

Sources: [1]pvwatts.nrel.gov; [2]epa.gov/energy/greenhouse-gas-equivalencies-calculator

[2]epa.gov/energy/greenhouse-gas-equivalencies-calculator

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 2017**.

Green Home Energy Measures	Annual Energy Savings and Pollution Reduction	
	Per Home	**Total Savings for 3,378 solar PV roof tops**
Average PV system size	**6 kW**	
Average Annual On-Site Energy Generation[1]	9,798 Kilowatt hours (kWh)	33,097,644 Kilowatt hours (kWh)
Average Annual Energy Value[1]	**$1,062**	**$3,587,436**
Equivalent Annual Greenhouse Gas Reduction[2]	7.6 tons of carbon dioxide ($C0_2$) avoided	25,673 tons of carbon dioxide ($C0_2$) avoided
Equivalent Passenger Vehicles removed from Street[2]	1.5 cars	5,067 cars
Equivalent miles driven by an average passenger vehicle[2]	16,503 miles	55,747,134 miles

Sources: [1]pvwatts.nrel.gov; [2]epa.gov/energy/greenhouse-gas-equivalencies-calculator

[2]epa.gov/energy/greenhouse-gas-equivalencies-calculator

Scottsdale Commercial Projects - 2017

- **Projects approved for construction under the International Green Construction Code (IgCC)**
  - Apple Retail Store at Fashion Square
  - Scottsdale Quarter Retail/Multifamily Complex

Scottsdale City Resolution

LEED Gold Certified City Buildings

Since 2005, 12 LEED certified buildings including 4 Platinum

Airport Operations Center - Silver

Museum of the West - Gold

Appaloosa Library - Gold

Downtown Fire Station 2 - Platinum

Office of Environmental Initiatives

Planning and Development

Green Building Program

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www.scottsdaleaz.gov/greenbuilding