



# Self-Generation Incentive Program

Assembly Utilities and Commerce Committee  
Informational Hearing  
March 17, 2014

Simon Baker, Branch Manager  
Demand Response, Customer Generation & Retail Rates  
Energy Division





## Presentation Overview

- **Background**
- **Program Changes since SB 412 (Kehoe, 2011)**
- **Current Program Status**
- **Historical Program Performance**
- **Plans for Further Evaluation**





# Introduction to the Self-Generation Incentive Program (SGIP)

**SGIP initiated by legislation in 2000, originally as a peak load reduction program**

- Encourage development and commercialization of DG technology

**Several reauthorizations and many program changes in its long history**

**Current program has four guiding principles**

- Reduce peak load demand.
- Promote system reliability (through improved utilization of the grid)
- Reduce greenhouse gas emissions
- Contribute to market transformation of distributed energy resources.

## **Budget**

- \$77 Million for incentives, \$6 Million (7%) for program administration

### **Annual SGIP Budget by Program Administrator**

<b>Program Administrator</b>	<b>Budget (Millions \$)</b>
*California Center for Sustainable Energy	\$11
Pacific Gas & Electric	\$36
Southern California Edison	\$28
Southern California Gas Co.	\$8
<b>Total</b>	<b>\$83</b>

\* The California Center for Sustainable Energy is the Program Administrator in San Diego Gas & Electric Territory





# Program Changed Significantly in 2012

## Program challenges

- 2007-09 - Slow growth due to elimination of PV and slow uptake of wind and fuel cell technologies
- 2009-10 – Addition of storage and directed biogas, but one manufacturer dominated the program

## Decision 11-09-015 Responded to Program Challenges Pursuant to SB 412 (Kehoe, 2009)

	2010	2012
<i>Guiding Principles</i>	(1) Peak reduction (2) Reliability	Added (3) GHG reductions (4) Market transformation of DG tech
<i>Incentive Budget</i>	Split evenly between renewable and non-renewable	75% renewable/emerging and 25% non-renewable
<i>Incentive Design</i>	Upfront	Upfront and Performance-based Annual incentive decline
<i>Eligible Technologies</i>	Wind (> 30 kW), fuel cells (> 30 kW), energy storage (coupled with DG)	Wind, fuel cells, energy storage (coupled and stand-alone), pressure reduction turbines, internal combustion engines, microturbines, gas turbines.
<i>System Size Cap</i>	3 MW	None, provided that the generation is sized to onsite load
<i>System Warranty</i>	5 years	10 years
<i>Other Program Changes</i>		40% manufacturer concentration limit, in-state requirement for directed biogas, energy efficiency audit, among others





# 2014 SGIP Incentive Levels

	Fuel	Incentive (\$/W)
<b>Renewable Fuels and Waste Heat Capture</b>		
Wind	n/a	\$1.13
Waste Heat or bottom cycle CHP	n/a	\$1.13
Pressure Reduction Turbine	n/a	\$1.13
Gas Turbine – CHP	Renewable	\$2.08
Microturbine – CHP	Renewable	\$2.08
IC Engine – CHP	Renewable	\$2.08
<b>Non-Renewable fuels</b>		
Gas Turbine– CHP	NG	\$0.46
Microturbine – CHP	NG	\$0.46
IC Engine – CHP	NG	\$0.46
<b>Emerging technologies</b>		
Advanced Energy Storage	n/a	\$1.62
Fuel Cell – CHP or electric only	NG	\$1.83
Fuel Cell – CHP or electric only	Renewable	\$3.45





# SGIP Applications by Technology Type

## Completed or In-Payment SGIP Applications

Equipment	Applications	Capacity (kW)	Incentive (\$)
A.E.S.	6	2,914	5,904,444
Fuel Cell CHP	102	25,205	79,319,857
Fuel Cell Electric	135	64,710	237,188,596
Gas Turbine	11	30,845	7,164,285
Internal Combustion	254	155,839	95,594,411
Microturbine	143	25,029	22,117,026
Pressure Reduction Turbine	1	500	625,000
Wind Turbine	19	22,763	27,050,847
<b>Total</b>	<b>671</b>	<b>327,803</b>	<b>474,964,466</b>

## Pending SGIP Applications

Equipment	Applications	Capacity (kW)	Current Incentive (\$)
A.E.S.	767	33,425	65,004,368
Fuel Cell CHP	13	4,935	10,094,650
Fuel Cell Electric	84	47,427	119,509,885
Gas Turbine	4	22,561	4,176,000
Internal Combustion	24	24,506	34,828,939
Microturbine	17	11,480	9,291,300
Pressure Reduction Turbine	6	1,330	1,644,620
Waste Heat to Power	3	1,754	1,823,860
Wind Turbine	7	6,509	8,044,686
<b>Total</b>	<b>925</b>	<b>153,927</b>	<b>254,418,308</b>





# Energy Storage in SGIP

- Primarily lithium-ion batteries. Minimum 63.5% Round-Trip Efficiency (RTE) required.
- Intended use ranges from bill management/peak demand reduction, EV charging, and backup power supply.
- Supports customer-side storage procurement target of 200 MW by 2020 pursuant to AB 2514 (Skinner, 2010) (Decision 13-10-040)

**Average Size of Energy Storage Applications in SGIP**

Program Year	Applications		Average Capacity (kW)	
	Residential	Non-Residential	Residential	Non-Residential
California Center for Sustainable Energy	74	37	5	112
Pacific Gas & Electric	171	257	5	72
Southern California Edison	135	91	5	111
Southern California Gas Co.	2	6	5	282
<b>Total</b>	<b>382</b>	<b>391</b>	<b>5</b>	<b>88</b>





# Historical Program Performance

## 12<sup>th</sup> Annual SGIP Impact Evaluation (Itron, 2013)

- Does **not** reflect projects that have come online since the program changed

### GHG Emission Reductions

- By the end of 2012, the SGIP was decreasing more than 128,000 metric tons of GHG emissions (as CO<sub>2</sub>) per year; an amount equivalent to the GHG emissions of more than 25,000 passenger vehicles.

### Peak Demand Reduction

- Participating SGIP projects reduced the California Independent System Operator's (CASIO) peak demand by 123 megawatts (MW) during the top 200 demand hours during 2012, an increase from the 92 MW and 106 MW of peak demand capacity shown in 2010 and 2011, respectively.

### Additional Benefits Moving Forward

- Assuming build-out of the current queue of SGIP projects, GHG emission reductions will grow to over 140,000 metric tons per year by the end of 2016 and peak demand reductions will increase to nearly 190 MW by the end of 2016.

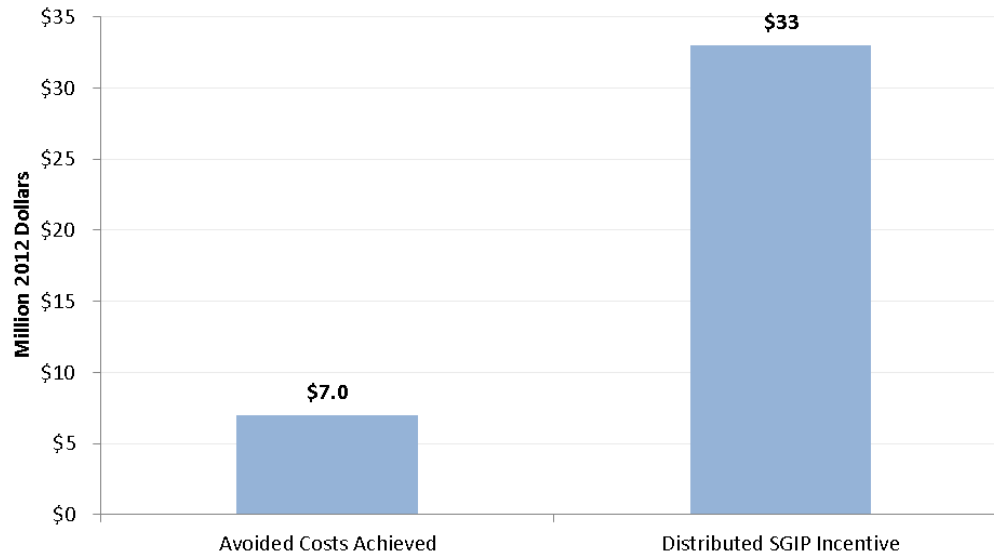






## Historical Program Performance (Cont.)

Peak Savings Benefits Achieved at Relatively High Incentive Costs



Source: 12<sup>th</sup> Annual SGIP Impact Evaluation (Itron 2014)

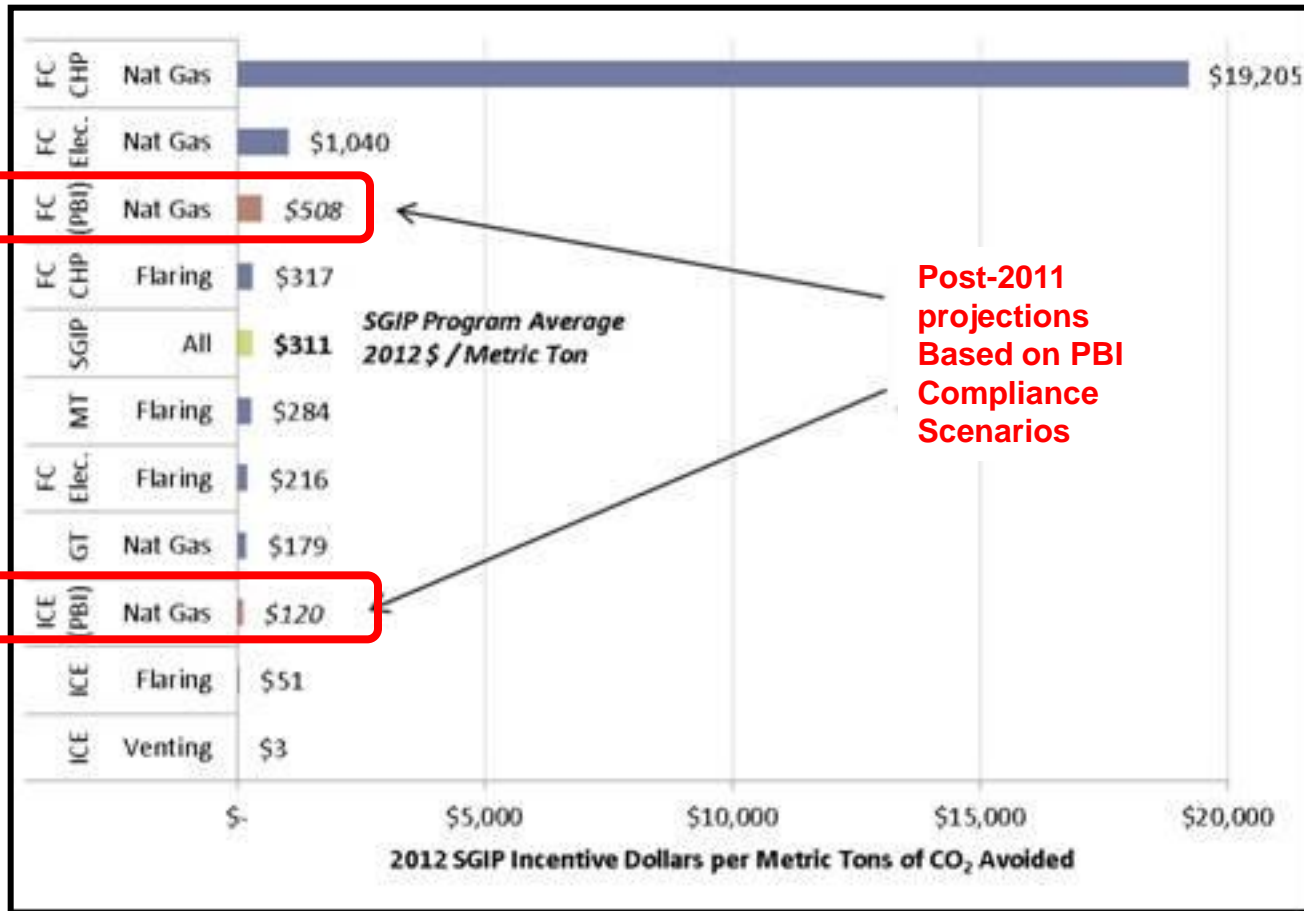
*Note: Does not reflect systems installed after the adoption of D.11-09-015.*





# Historical Program Performance (Cont.)

Cost of GHG Reduction is High (on average), but range is wide and strongly influenced by pre-2012 program design factors





## Plans for Further Evaluation

- **2011 cost-effectiveness study helped to inform D.11-09-015**
- **Self-reported data (from SGIP applicants) reveals no apparent downward trends in installed costs by technology.**
  - To date, there is little available data to independently assess the market transformation impacts of the SGIP.
- **Cost-Effectiveness and Market Transformation Study planned for 2014**
  - Reassess costs and benefits of the program, and extent to which distributed equitably
  - Determine if the appropriate incentive levels are being offered for each technology
  - Assess extent to which the SGIP has stimulated the production and deployment of distributed energy resources, thereby helping to lower capital costs and promote market transformation.



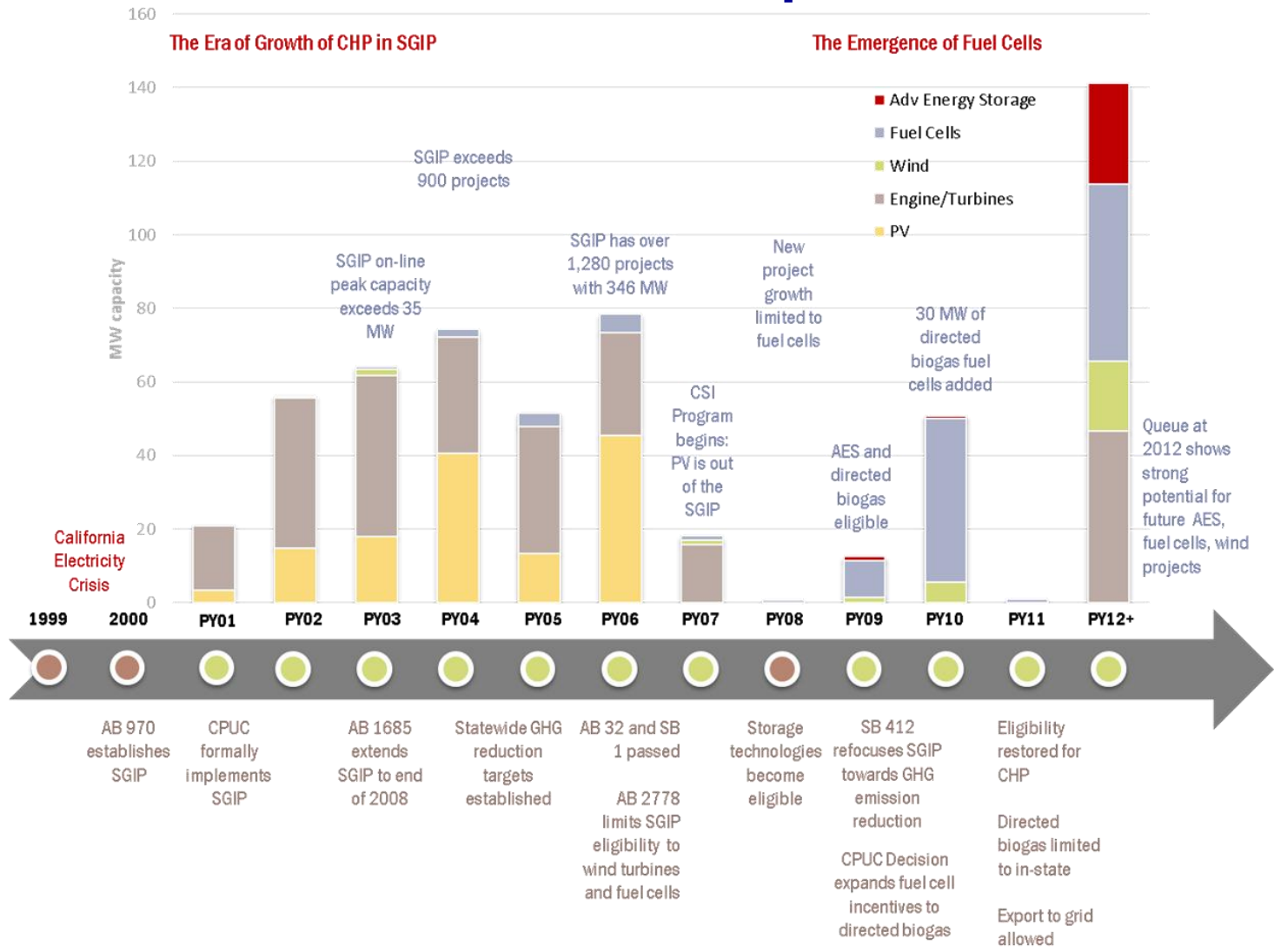


# INFORMATIONAL SLIDES





# Itron 12<sup>th</sup> Annual SGIP Impact Evaluation

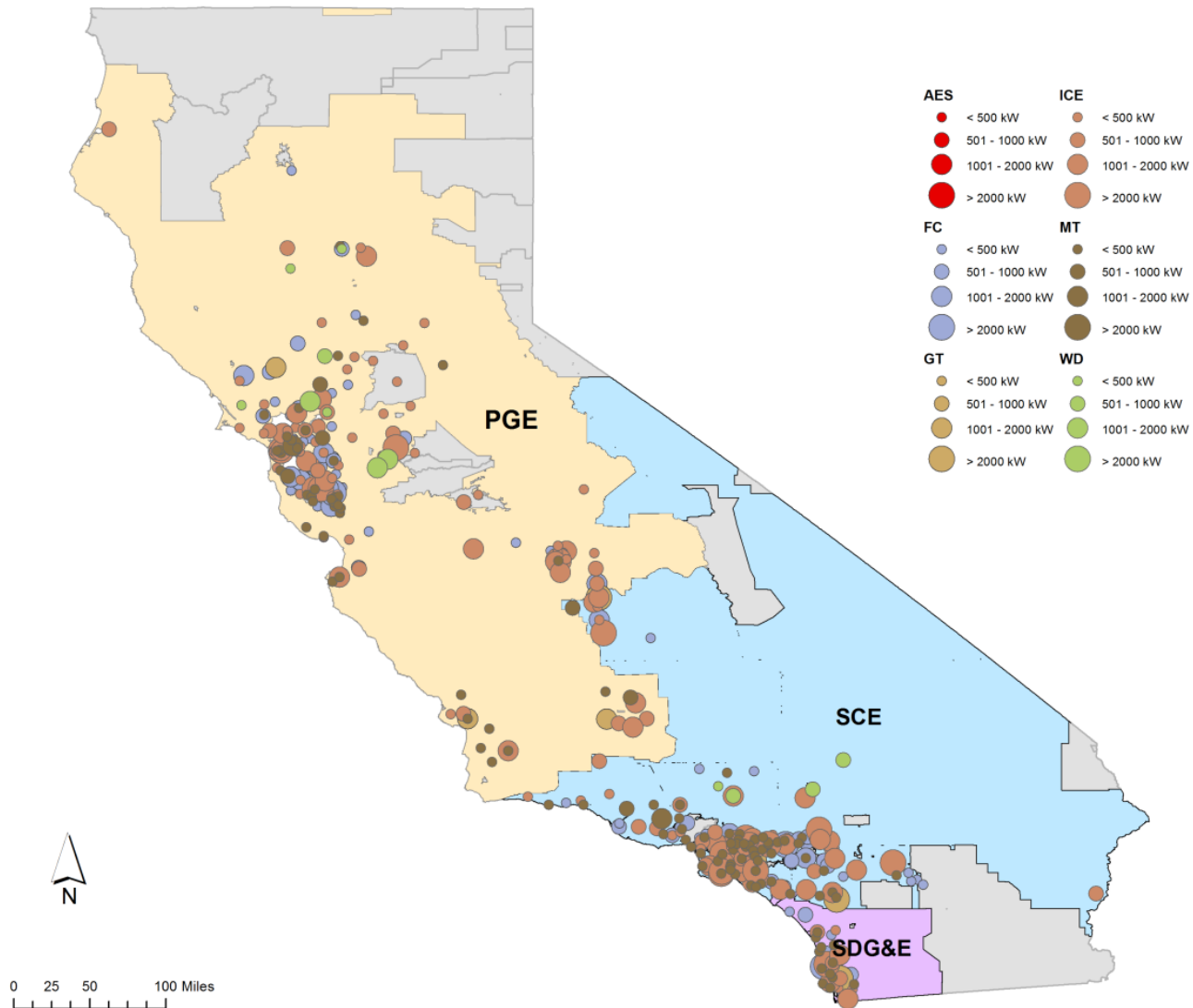


Note: The capacity is shown for the year a project applied to the program, not necessarily the year it was completed and online.





# Geographical Distribution of SGIP Systems





# Installed SGIP Applications by Territory

## Completed or In-Payment SGIP Applications

Territory	Applications	Capacity (kW)	Incentive (\$)
California Center for Sustainable Energy	64	35,680	\$ 54,528,578
Pacific Gas and Electric	294	130,681	\$ 212,653,917
Southern California Edison	144	72,781	\$ 122,903,324
Southern California Gas Company	152	94,036	\$ 94,468,133
<b>Total</b>	<b>654</b>	<b>333,178</b>	<b>\$ 484,553,952</b>

## Pending SGIP Applications

Territory	Applications	Capacity (kW)	Incentive (\$)
California Center for Sustainable Energy	136	19,270	\$ 21,698,396
Pacific Gas and Electric	541	81,828	\$ 134,305,408
Southern California Edison	240	33,219	\$ 62,303,868
Southern California Gas Company	34	23,711	\$ 38,189,078
<b>Total</b>	<b>951</b>	<b>158,028</b>	<b>\$ 256,496,749</b>





# Energy Storage in SGIP

## Pending Energy Storage SGIP Applications by IOU Territory

Territory	Applications	Capacity (kW)	Incentive (\$)
California Center for Sustainable Energy	114	4,505 \$	6,675,626
Pacific Gas and Electric	443	20,638 \$	39,977,615
Southern California Edison	206	10,748 \$	21,472,643
Southern California Gas Company	6	1,080 \$	1,339,738
<b>Total</b>	<b>769</b>	<b>36,970 \$</b>	<b>69,465,622</b>

## Average Size of Energy Storage Applications in SGIP (Completed and Pending)

Sector	Applications	Capacity (kW)
Commercial	374	83
Government	15	266
Non-Profit	8	21
Residential	372	5
<b>Total</b>	<b>769</b>	<b>48</b>







# SGIP Installed Cost per Watt

## Average Installed Cost by Technology

Technology	Applications	Average of Cost Per Watt (\$/W)
A.E.S.	6 \$	5.65
Fuel Cell CHP	78 \$	9.51
Fuel Cell Electric	138 \$	10.79
Gas Turbine	11 \$	2.75
Internal Combustion	255 \$	2.70
Microturbine	145 \$	3.46
Wind Turbine	20 \$	4.48
<b>Total</b>	<b>653 \$</b>	<b>5.44</b>

**Limited data (fuel cell data shown here) indicates no downward trend for installed costs**

## Average Installed Cost for Fuel Cells Using Natural Gas

Year	Applications	Average of Cost Per Watt (\$/W)
2001	1 \$	18.00
2002	1 \$	7.10
2004	3 \$	9.25
2005	6 \$	6.24
2006	3 \$	10.08
2007	3 \$	6.99
2008	5 \$	9.79
2009	12 \$	9.55
2010	63 \$	10.12
2011	15 \$	11.91
2012	24 \$	11.89
2013	2 \$	12.25
<b>Grand Total</b>	<b>138 \$</b>	<b>10.37</b>

Data as of March 12, 2014





# Technology Diversity in SGIP

Highest number of equipment installed by applications, capacity, and received incentives

Manufacturer	Applications
Bloom Energy	127
Capstone Turbine Corp	100
Hess Microgen	45
Dresser Waukesha	44
ClearEdge Power	43
GE Energy	35
Ingersoll-Rand	31
Fuel Cell Energy	30
Coast IntelliGen Power	29
Tecogen	27
UTC Power	20
Caterpillar	17
Cummins Power	14
DTE Energy Technologies	12
iPower Energy Systems	9
BluePoint Energy	8
Solar Turbines (Caterpillar)	7
Deutz	6
Guascor	6
Turbec AB	4

Manufacturer	Installed Capacity
Bloom Energy	58,235
GE Energy	44,019
Dresser Waukesha	36,246
Hess Microgen	28,496
Solar Turbines (Caterpillar)	26,869
Fuel Cell Energy	24,800
Caterpillar	16,847
Capstone Turbine Corp	15,100
Cummins Power	12,812
Coast IntelliGen Power	11,105
UTC Power	9,491
Ingersoll-Rand	8,615
Deutz	5,911
Guascor	4,218
Mitsubishi Power Systems	4,000
Tecogen	3,890
Kawasaki	2,806
DTE Energy Technologies	2,620
Stowell Distributed Power	2,235
BluePoint Energy	2,080

Manufacturer	Incentive (\$)
Bloom Energy	215,657,280
Fuel Cell Energy	79,232,173
GE Energy	37,180,752
UTC Power	23,792,800
Dresser Waukesha	21,687,291
Hess Microgen	17,541,618
Capstone Turbine Corp	12,987,082
Cummins Power	8,356,097
Caterpillar	8,342,765
Ingersoll-Rand	8,083,191
Coast IntelliGen Power	6,085,302
Mitsubishi Power Systems	5,250,000
Ballard Power Systems	4,747,500
Solar Turbines (Caterpillar)	4,452,129
Tecogen	3,165,706
Deutz	2,852,423
Guascor	2,698,292
Tesla	2,672,044
BYD	2,000,000
Flex Energy	1,875,000

