

# Brighter Future: A Study on Solar in K-12 Schools

Wednesday February 4<sup>th</sup> 2015



# Introduction

- ▶ Released September 18<sup>th</sup>, 2014
- ▶ Produced by The Solar Foundation for the SunShot Solar Outreach Partnership with support from the Solar Energy Industries Association
- ▶ Found 3,752 K-12 schools with solar energy systems
- ▶ Full report, downloadable database of solar schools, and interactive pin map available at [schools.tsfcensus.org](http://schools.tsfcensus.org)



# Introduction

## ► About The Solar Foundation

The Solar Foundation (TSF) is an independent national 501 (c)(3) nonprofit whose mission is to increase the understanding and use of solar energy through strategic research that educates the public and transforms markets. While TSF recognizes that solar energy is a key part of our energy future, it is committed to excellence in its aim to help people fairly and objectively gauge the value of the solar industry worldwide.

More at [www.thesolarfoundation.org](http://www.thesolarfoundation.org)

## ► About the Solar Energy Industries Association

Celebrating its 40<sup>th</sup> anniversary in 2014, the Solar Energy Industries Association (SEIA) is the national trade association of the U.S. solar energy industry. Through advocacy and education, SEIA works with its 1,000 member companies to champion the use of clean, affordable solar in America by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

Visit SEIA online at [www.seia.org](http://www.seia.org)

## ► About the SunShot Solar Outreach Partnership

The SunShot Solar Outreach Partnership is a U.S. Department of Energy program designed to increase the use and integration of solar energy in communities across the U.S.

More at [www.solaroutreach.org](http://www.solaroutreach.org) or [solar-usa@iclei.org](mailto:solar-usa@iclei.org)

# Background

## ▶ Huge Data Collection Effort

Databases carefully built from public and private sources, including:

- ▶ State Incentive Programs
- ▶ Company and School District Installation Lists
- ▶ Non-profit Solar Schools Programs
- ▶ Web Searches of School Sites, News Articles, Press Releases, etc.

## ▶ Original Analysis on Potential for Non-Solar Schools

## ▶ Executive Interviews with K-12 Schools

Conducted with representatives of 15 schools across the U.S.  
Collected information on challenges and lessons learned with the solar procurement process and on how solar has been integrated into curriculum

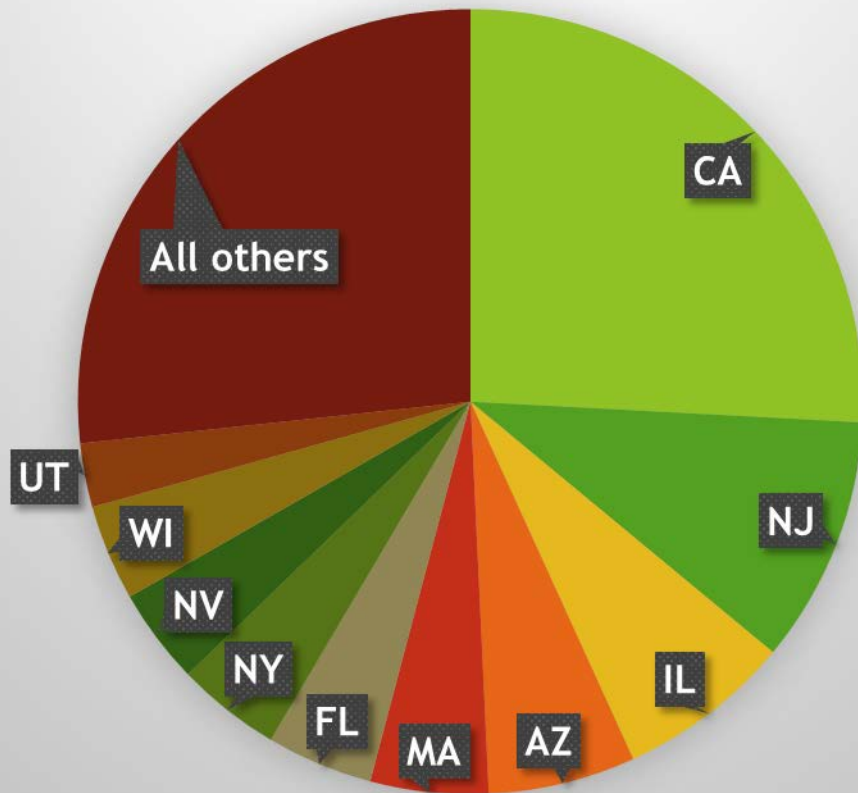
# The First K-12 Solar Schools Baseline

- ▶ 3,752 schools with a solar energy system
  - ▶ 3% of all schools and 5% of all students
  - ▶ Nearly 2.7 million students attend a school with solar
  - ▶ 3,727 Photovoltaic systems, remainder Solar Heating & Cooling
- ▶ PV Systems have combined capacity of 489,791 kW
  - ▶ Generate 642,000 MWh per year (enough to power 60,000 homes)
  - ▶ Offsets the purchase of \$77.8 million worth of electricity per year
  - ▶ Also offsets 443,000 Metric Tons of CO<sub>2</sub> equivalent
    - ▶ Equivalent to removing 93,000 cars from the road
    - ▶ Planting 11 million trees

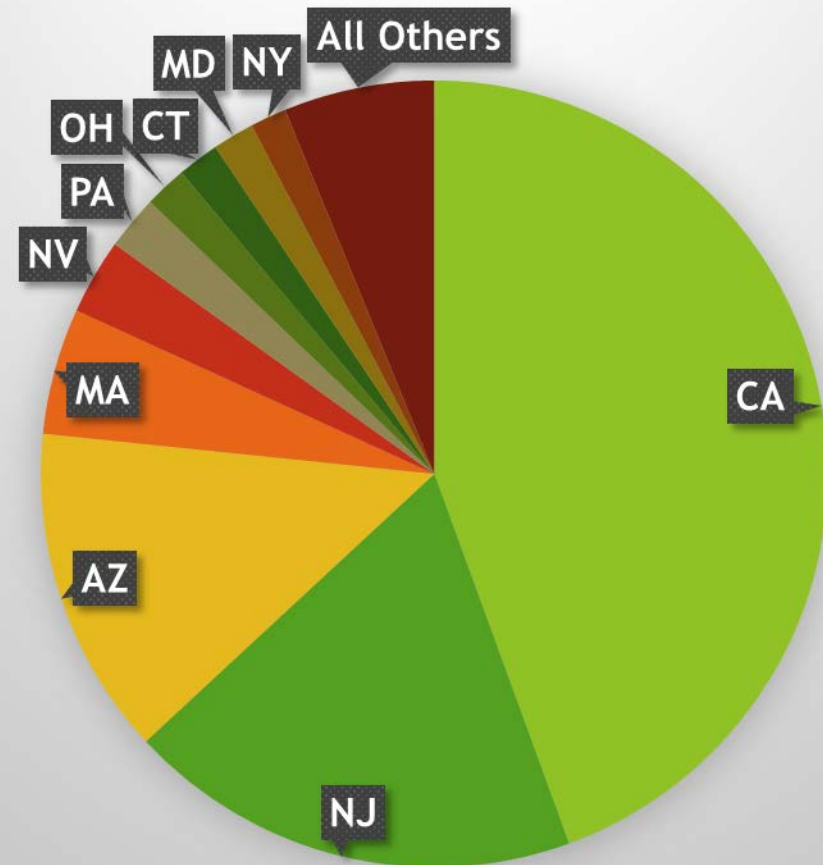


# Solar Schools by State

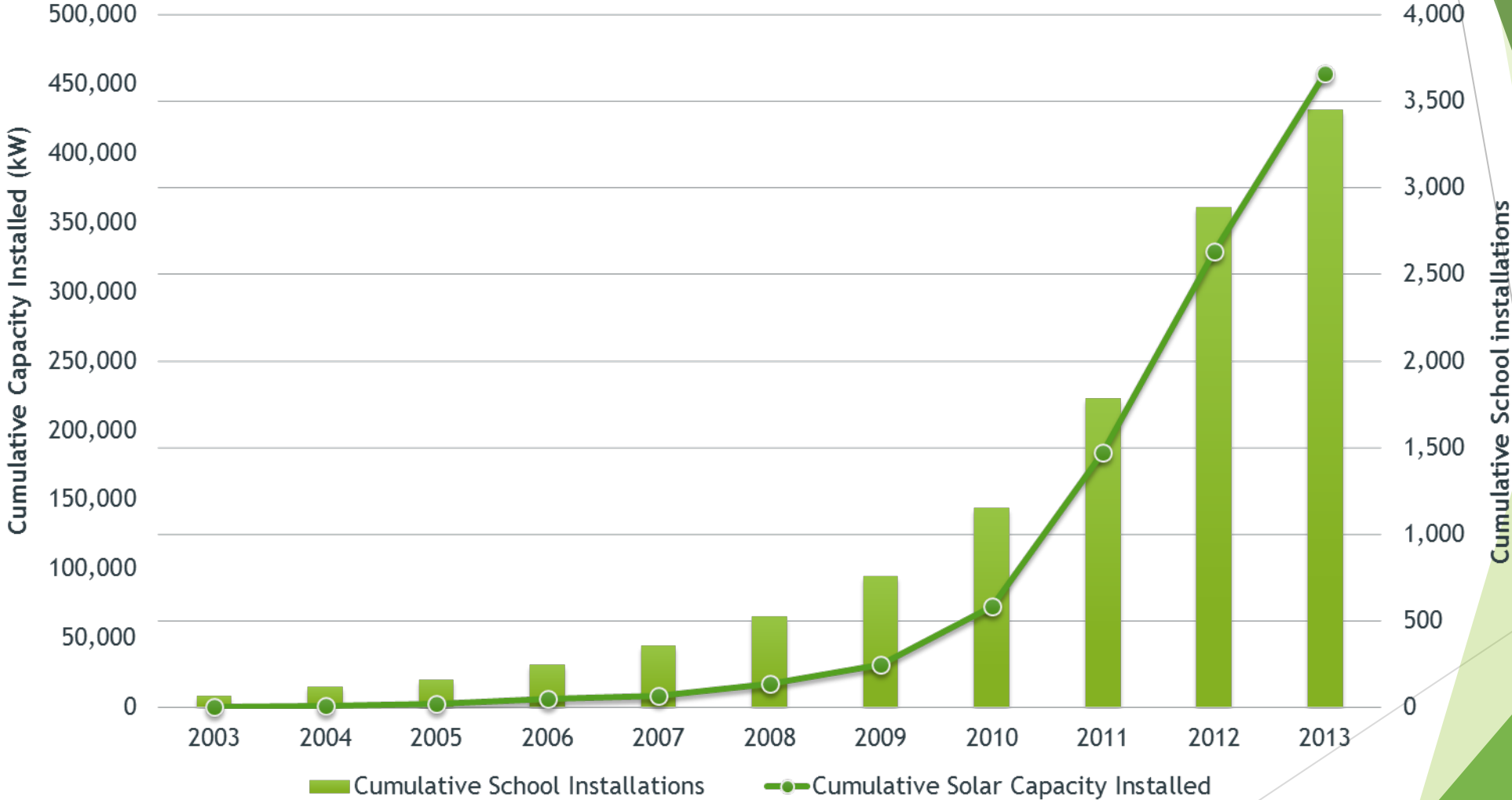
## School Solar Installations



## Installed School Solar Capacity

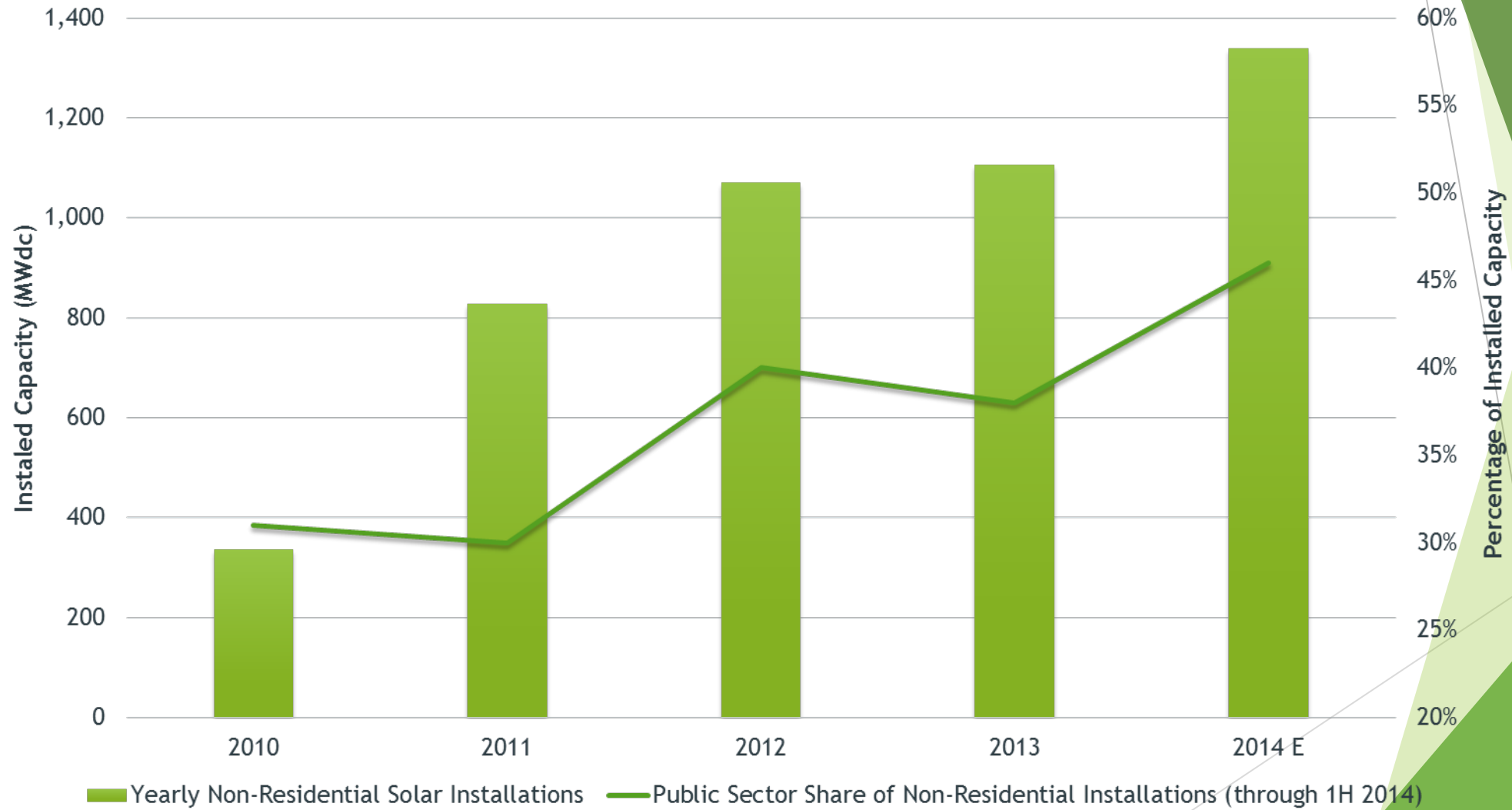


# School PV Installs Follow Industry Trends



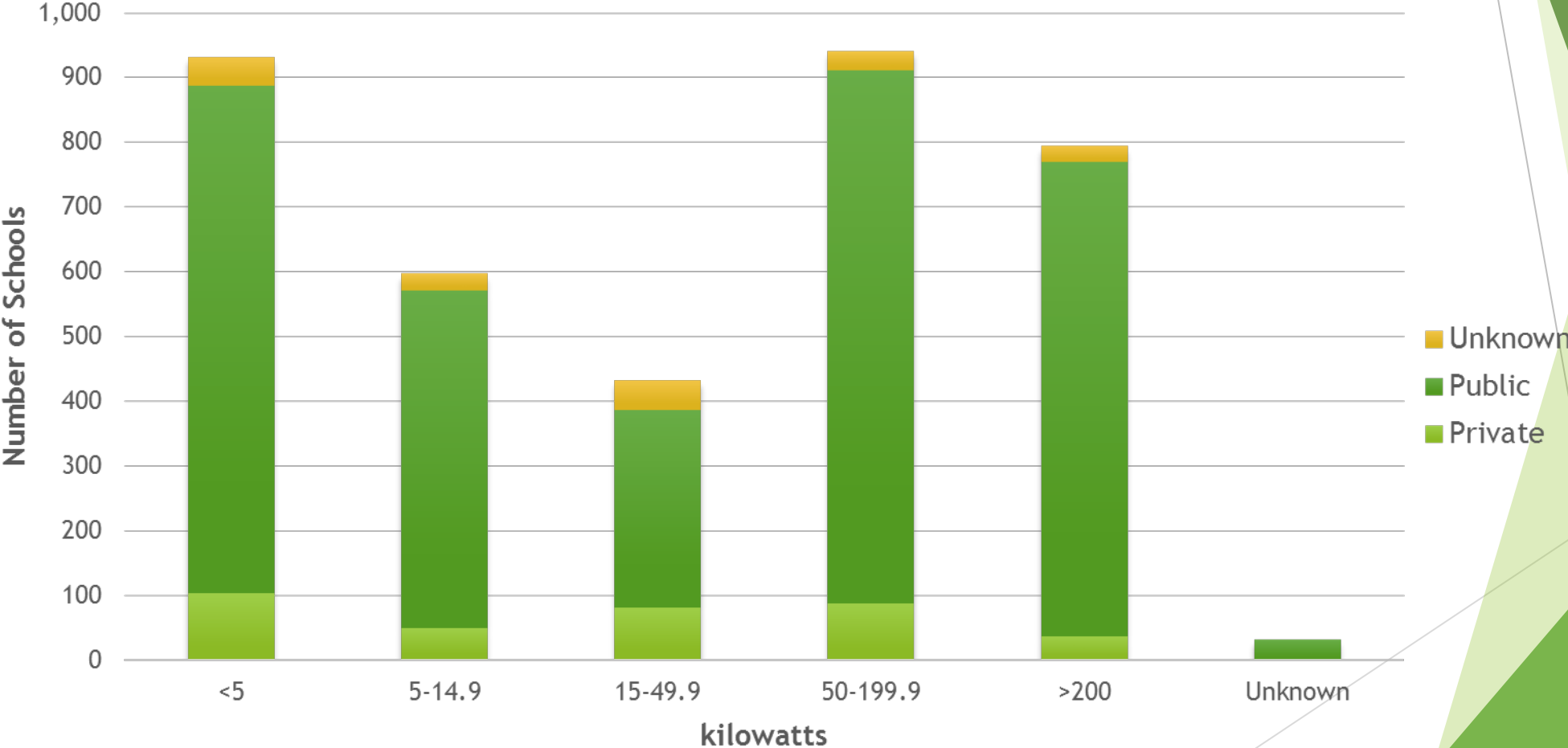


# Schools Represent New Solar Market



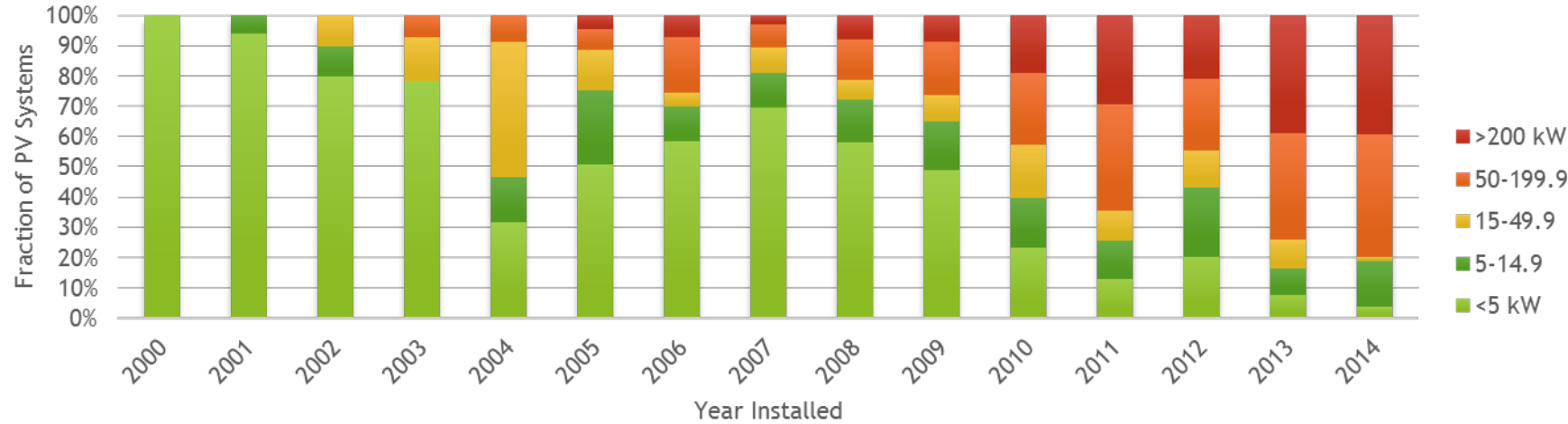
# 50% of School Installations over 50 kW

## PV System Size Distribution

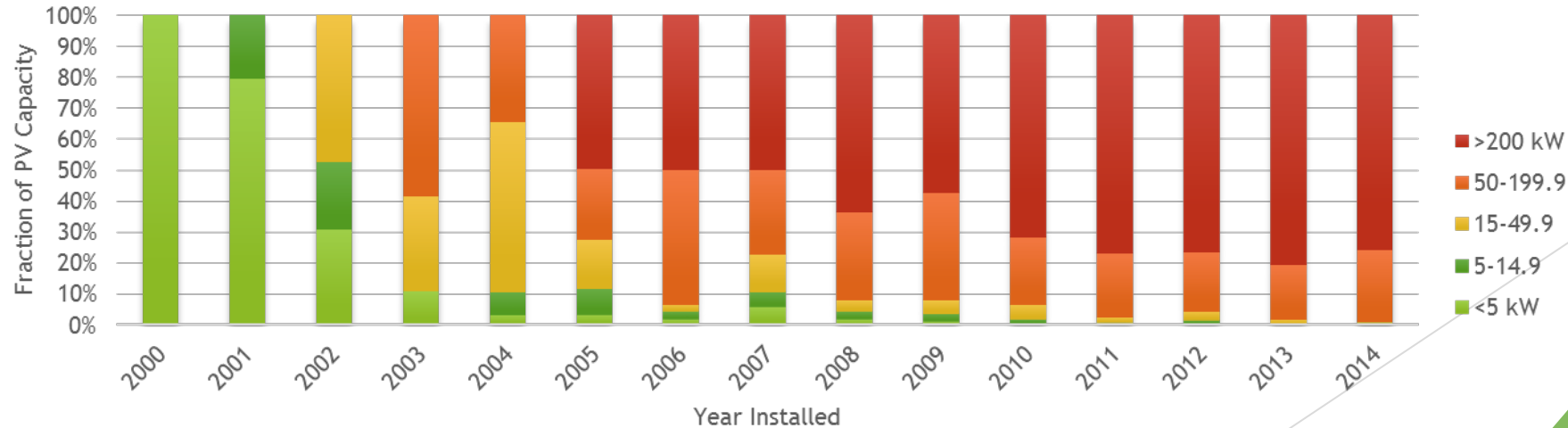


# Larger Systems Becoming Prevalent

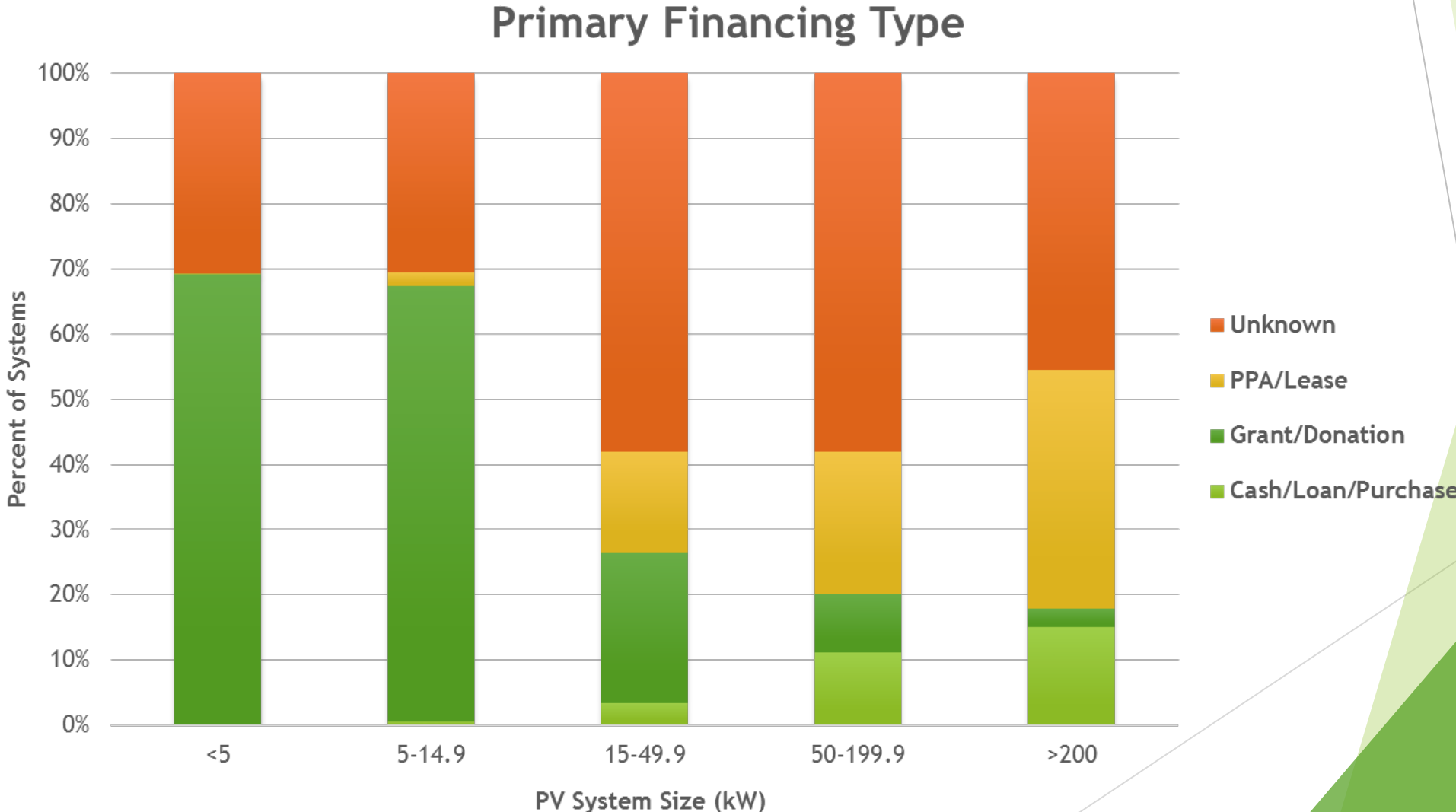
## School PV System Size Distribution by Number of Systems



## School PV System Size Distribution by Capacity



# Financing Type Varies by System Size



# Price to Install PV Decreasing over Time

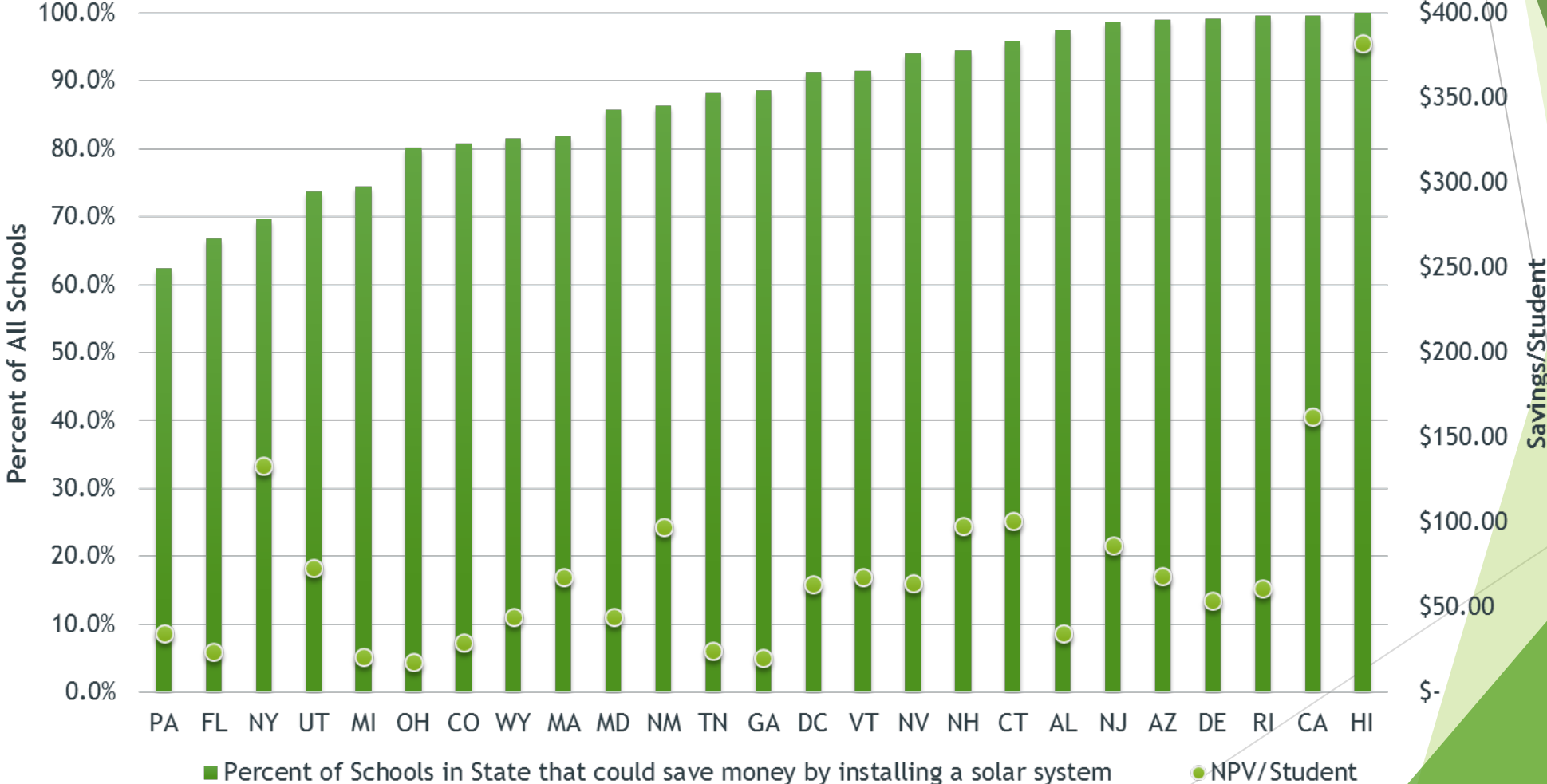
Costs less than \$/watt	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
\$10.00					1		2		1			4
\$9.50					1	3	2		1			7
\$9.00		1		2	1	1	7	2	1			15
\$8.50	2		2	1	3		3	3				14
\$8.00			1	1	1	1	7	2	2	1		16
\$7.50			2			3	7	3	8	1		24
\$7.00		3	5				4	6	8	25		51
\$6.50			4		1	4	13	8	13			43
\$6.00			1	3	4	2	11	18	18			57
\$5.50						2	7	24	18	6		57
\$5.00							6	28	34	6	1	75
\$4.50								9	13	28		51
\$4.00						1	2	4	10	16	1	34
\$3.50								5	9	11	2	27
\$3.00							1		1			2
\$2.50								1	1	1	1	4
\$2.00							1	1				2
\$1.50									3			3
\$1.00										2		2
<b>Total</b>	<b>2</b>	<b>4</b>	<b>15</b>	<b>7</b>	<b>12</b>	<b>17</b>	<b>73</b>	<b>114</b>	<b>141</b>	<b>97</b>	<b>6</b>	<b>488</b>

# Massive Untapped Potential

- ▶ Solar Potential Analyzed at K-12 Schools Nationwide
  - ▶ Schools from National Center for Education Statistics Database
  - ▶ Each school matched with TMY3 weather station, avoided electricity cost proxy
  - ▶ System performance estimated using NREL's System Advisor Model
  - ▶ Net Present Value (NPV) analysis over 30 years at \$2/watt and \$2.50/watt
- ▶ Results
  - ▶ Between 40,000 and 70,000 schools can save money by installing solar PV
    - ▶ 60% of all schools nation-wide
  - ▶ Total of 5,400 MW of additional capacity- 1/3 of all solar in U.S. today
  - ▶ Combined, systems would produce 6.9 million MWh of electricity
    - ▶ \$800 million per year in electricity and 30 year NPV of \$2.8 billion

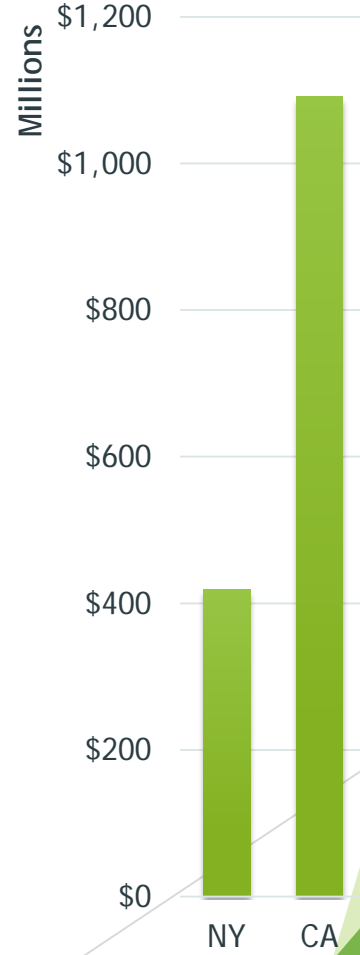
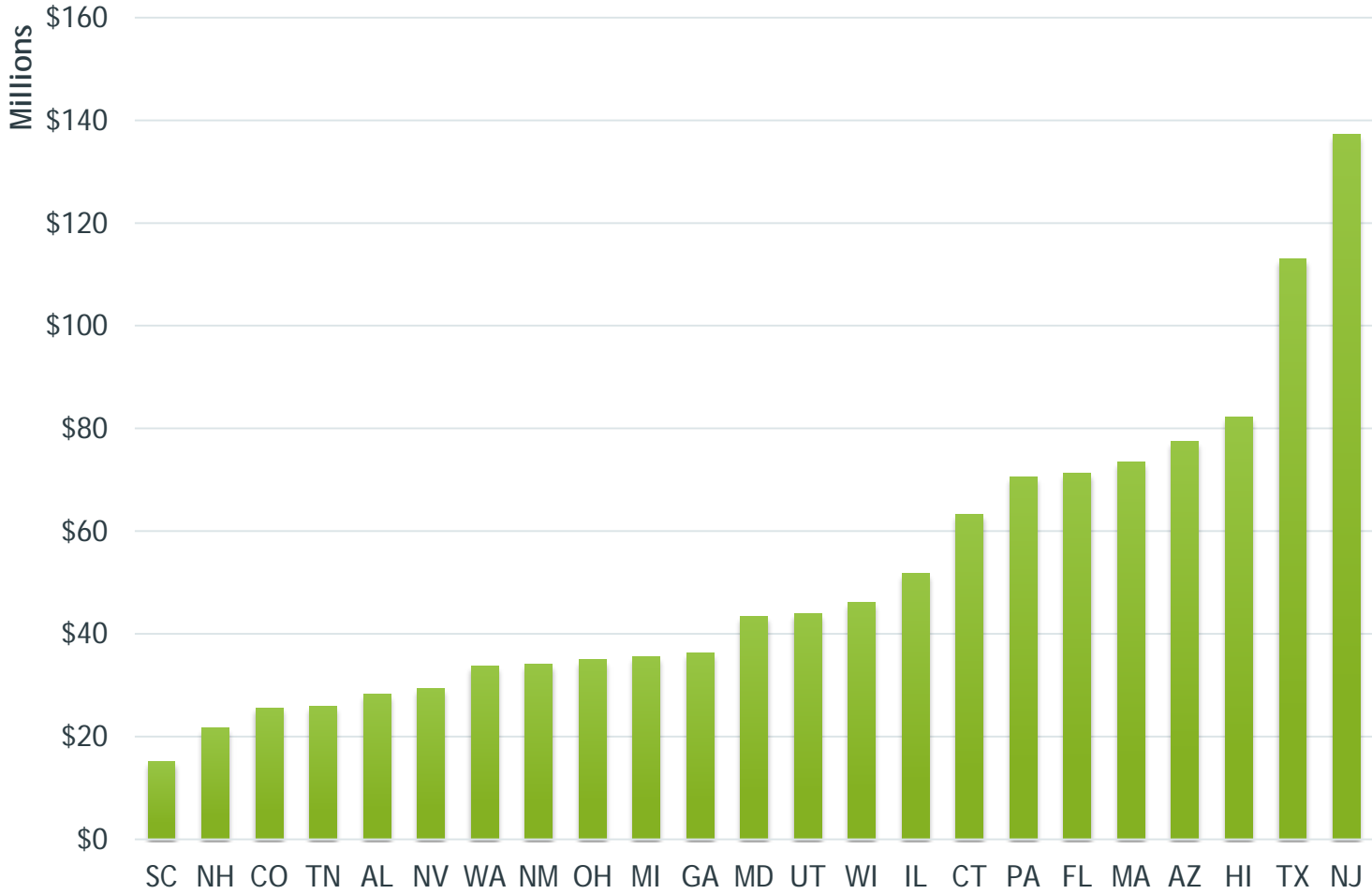
# 60% of Schools Save Money Going Solar

## Potential School Solar Candidates and Savings per Student



# Big Potential Savings

## 30 Year Solar Savings by State





# Individual Districts Could Save Millions

Potential School District Savings from Installation of Solar Photovoltaic Systems				
School district	Installed Cost at 2.00/watt		Installed Cost at 2.50/watt	
	Potential 30-year Savings	Savings per Student	Potential 30-year Savings	Savings per Student
NY - NEW YORK CITY	\$ 209,218,851	\$ 270	\$ 169,343,171	\$ 218
CA - LOS ANGELES UNIFIED	\$ 91,616,240	\$ 145	\$ 60,897,589	\$ 96
HI - HAWAII DEPARTMENT OF EDUCATION	\$ 69,016,976	\$ 380	\$ 59,865,396	\$ 329
CA - SAN DIEGO UNIFIED	\$ 22,748,529	\$ 187	\$ 17,496,397	\$ 143
NV - CLARK COUNTY SCHOOL DISTRICT	\$ 22,328,671	\$ 72	\$ 6,921,765	\$ 22
CA - FRESNO UNIFIED	\$ 15,404,452	\$ 204	\$ 11,523,012	\$ 153
CA - LONG BEACH UNIFIED	\$ 13,392,562	\$ 160	\$ 9,485,561	\$ 110
FL - HILLSBOROUGH	\$ 12,021,828	\$ 63	\$ 2,517,670	\$ 15
PA - PHILADELPHIA CITY SD	\$ 11,516,932	\$ 76	\$ 3,666,496	\$ 24
CA - SAN BERNARDINO CITY UNIFIED	\$ 10,927,293	\$ 204	\$ 8,162,420	\$ 152
NM - ALBUQUERQUE PUBLIC SCHOOLS	\$ 10,308,286	\$ 110	\$ 5,491,753	\$ 59
CA - ELK GROVE UNIFIED	\$ 10,214,135	\$ 164	\$ 7,011,960	\$ 113
CA - CAPISTRANO UNIFIED	\$ 10,199,061	\$ 191	\$ 7,452,026	\$ 139
FL - DUVAL	\$ 10,051,098	\$ 95	\$ 4,636,066	\$ 47
CA - SANTA ANA UNIFIED	\$ 9,916,265	\$ 178	\$ 7,094,333	\$ 127
WI - MILWAUKEE SCHOOL DISTRICT	\$ 9,586,830	\$ 120	\$ 5,510,326	\$ 69

# Why Are Schools Going Solar?

## Financial Stability

Between 40,000 and 72,000 non-solar schools could adopt solar cost-effectively

However, schools are already saving money!

Clovis Unified School District: \$2.7m/year (19 systems)

Rio Rancho and Cleveland High School: \$200,000/year

Parkway School District: \$1m over 20 years

Medford Board of Education: \$300,000/year

# Why Are Schools Going Solar?

## Educational Opportunities

Solar provides a much-needed means of expanding opportunities for STEM education

Students in U.S. performed 'below average' in math and at OECD average in science

Top performing students in U.S. are still years behind global leaders

# Why Are Schools Going Solar?

## Environmental Benefits

### *Reduction in Air Emissions*

An 89-kW solar PV system produces 117,000 kWh in first year, equivalent to over 80 tons of avoided CO<sub>2</sub> emissions



9,000 gallons of gasoline



66 acres of U.S. forests

### *Water Savings*

Annual savings of 24,000 gallons of water

# Challenges and Lessons Learned

## ▶ Financing for Solar Energy

- ▶ Cannot directly take advantage of federal (or state) solar tax credits

## ▶ Solar Procurement Issues

- ▶ Development Risk
- ▶ Performance Risk
- ▶ Roof Warranties

## ▶ Community and School Board Engagement

## ▶ Regulatory Requirements

# What's Next?

- ▶ Continue Data Collection on Solar Schools

Submit information on your school via web form located at [schools.tsfcensus.org](https://schools.tsfcensus.org)

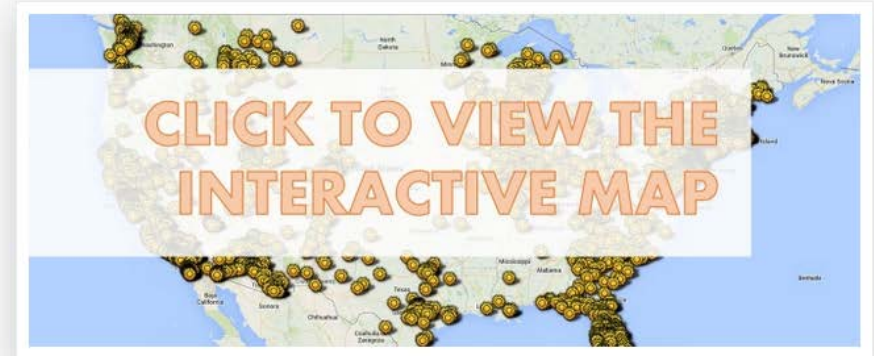
- ▶ Regular Updates to Database

- ▶ Biennial Updates to Report

## National Solar Schools Census

As part of its commitment to increase understanding on the use of solar at K-12 schools, The Solar Foundation (TSF) and its research partners at SEIA have built the most comprehensive database known of K-12 schools that have gone solar throughout the United States.

TSF's *National Solar Schools Census* serves as a starting point for sharing ideas and best practices between schools experienced with solar energy and those seeking to join their ranks. Each solar school has its own unique story to tell on how their systems were financed and installed and how (and whether) solar has been integrated into class curricula.



In TSF's report, entitled *Brighter Future: A Study on Solar in U.S. Schools*, our team uncovered a number of key findings from our data collection and analysis:

# Questions?

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# Thanks!