

## Case Studies of Successful Programs LMI EE and Solar programs



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# New NJBPU Office of Policy & Planning website

# OPP was established in 2017 to:

- Assist the Board's Commissioners and Staff with energy-related policies
  Microgrid
- To work with other state and federal agencies on energy-related matters impacting New Jersey
- Special projects http://www.nj.gov/bpu/about/divisions/opp/

Energy	Resilience	Bank

Smartgrid

Alternative Fuel Vehicle

	Changes in New Jersey RPS with Solar and OSW set aside - 1999 to present												
EY	1999		2004			2006				2010 SAA	2011 OSV	V	
	Class I	Class II	Class I	Class II	Solar	Class I	Class II	Solar		GWh	MW	٦	
2001	0.5	2.5											
2002	0.5	2.5											
2003	0.75	2.5											
2004	0.75	2.5											
2005	0.75	2.5	0.74	2.5	0.01	0.74	2.5	0.01					
2006	1	2.5	0.983	2.5	0.017	0.983	2.5	0.017					
2007	1.5	2.5	2.037	2.5	0.039	2.037	2.5	0.0393					
2008	2	2.5	2.924	2.5	0.082	2.924	2.5	0.0817					
2009	2.5	2.5	3.84	2.5	0.16	3.84	2.5	0.16					
2010	3	2.5				4.685	2.5	0.221				Τ	
2011	3.5	2.5				5.492	2.5	0.305		306		Τ	
2012	4	2.5				6.32	2.5	0.394		442		Τ	
2013						7.143	2.5	0.497		596	1,025	٦	
2014						7.977	2.5	0.621		772		٦	
2015						8.807	2.5	0.765		965		٦	
2016						9.649	2.5	0.928		1,150		٦	
2017						10.485	2.5	1.118		1,357			
2018						12.325	2.5	1.333		1,591		٦	
2019						14.175	2.5	1.572		1,858		٦	
2020						16.029	2.5	1.836		2,164		1	
2021						17.88	2.5	2.12		2,518		Τ	
2022										2,928		٦	
2023									П	3,433		٦	
2024									П	4,610		٦	
2025									П	5,316		٦	
2026									П	5,316		٦	

## New Jersey Renewable Energy Portfolio Standard – Class I and Class II

Started at 0.5% - 36,500 MWh EY 2018 12.325% – 9,479,780 MWh Class I PV, wind, biomass, LFG, SS hydro, OSW – Class II RRF LS hydro NJ RPS including Class I + Class II + solar = 24.48 by 2028

# Printed 2014/03/06 01:59 PM Eastern Standard Time

#### State of New Jersey

#### New Jersey's Solar Renewable Energy Portfolio Standard

- 1. Original Interim Standards in EDECA, Adopted by NJBPU Passed Feb. 1999, Effective 2001 Contained No Solar Carve Out
- 2. RPS Rule revised 2004 RY05 - 0.01% RY06 - 0.0170% RY07 - 0.0393% RY08 - 0.0817% RY09 - 0.1600%
- 3. Rule Revised 2006 RY10 - 0.2210% RY11 - 0.3050% RY12 - 0.3940% RY13 - 0.4970% RY14 - 0.6210% RY15 - 0.7650%

4. Solar Advancement Act of 2010 "Energy Year" EY 2011 - 306 gwh EY 2012 - 442 gwh EY 2013 - 596 gwh EY 2014 - 772 gwh EY 2015 - 965 gwh EY 2016 - 1,150 gwh EY 2017 - 1,357 gwh EY 2018 - 1,591 gwh EY 2019 - 1,858 gwh EY 2020 - 2,164 gwh EY 2021 - 2,518 gwh EY 2022 - 2,928 gwh EY 2023 - 3.433 gwh EY 2024 - 3,989 gwh EY 2025 - 4,610 gwh EY 2026 - 5,316 gwh EY 2027+> 5,316 gwh

...5. from Solar Act signed 07.23.12

EY 2011 - 306 (Gwhrs) EY 2012 - 442 Gwhrs EY 2013 - 596 Gwhrs EY 2014 - 2.050% EY 2015 - 2.450% EY 2016 - 2.750% EY 2017 - 3.000% EY 2018 - 3.200% EY 2019 - 3.290% EY 2020 - 3.380% EY 2021 - 3.470% EY 2022 - 3.560% EY 2023 - 3.650% EY 2024 - 3.740% EY 2025 - 3.830% EY 2026 - 3.920% EY 2027 - 4.010% EY 2028 - 4.100%,

0.01% is 7,000 MWh or 5.8 MW -- 3.2% is 2,400,000 MWh or 2,000 MW In CY 2017 installed 404 MW of solar = to RY 2005 solar RPS every 5 days

## **Solar Obligations**



http://njenergydata.rutgers.edu/

Source: RPS Report Summary 2005-2016

http://www.njcleanenergy.com/files/file/Renewable\_Programs/RPS%20Comp%20EY%202016%20Combined%20Data%20All.pdf

2017-21 RPS Obligation projections based on % RPS requirements multiplied by GWh electricity sales projected based on EIA Annual Energy Outlook 2017 forecast.

#### State of New Jersey

#### New Jersey Solar Installations Annually as of 10/31/17

	Residen	itial (kW)	<b>Non-Re</b> : < = 10	sidential 0 (kW)	<b>Non-Re</b> : > 100 to <	<b>sidential</b> 1000 (kW)	<b>Non-Re</b> : > = 100	<b>sidential</b> D0 (kW)	Non-Re Tota	sidential I (kW)	Grid Supply (kW)		Total of All Projects as of 10/31/17 (kW)	
Year	Qty	Capacity	Qty	Capacity	Qty	Capacity	Qty	Capacity	Qty	Capacity	Qty	Capacity	Total Qty	<b>Total Capacity</b>
2000	4	12	2	11	0	0	0	0	2	11	0	0	6	23
2001	2	5	0	0	0	0	0	0	0	0	0	0	2	5
2002	25	73	9	324	1	262	0	0	10	586	0	0	35	659
2003	65	365	17	282	1	480	0	0	18	762	0	0	83	1,127
2004	253	1,530	42	382	2	623	0	0	44	1,005	0	0	297	2,535
2005	626	4,626	78	1,030	16	3,923	0	0	94	4,953	0	0	720	9,579
2006	747	5,353	105	1,882	36	11,097	0	0	141	12,979	0	0	888	18,331
2007	527	3,852	95	2,133	26	8,353	0	0	121	10,486	0	0	648	14,339
2008	654	4,921	170	3,874	44	13,247	4	6,134	218	23,256	0	0	872	28,176
2009	1,058	8,022	243	6,808	88	24,236	9	15,299	340	46,342	5	3,371	1,403	57,735
2010	2,136	16,487	380	12,753	154	45,625	12	20,987	546	79,365	19	25,187	2,701	121,039
2011	5,114	42,945	821	26,280	435	134,006	50	106,496	1,306	266,782	51	137,619	6,471	447,346
2012	5,307	45,807	631	22,314	413	120,417	47	87,882	1,091	230,614	23	56,794	6,421	333,215
2013	5,959	47,943	265	10,666	228	74,009	26	64,412	519	149,087	18	23,162	6,496	220,193
2014	6,818	55,267	113	4,194	102	35,309	10	45,163	225	84,667	8	63,371	7,051	203,305
2015	12,752	100,967	117	3,708	83	26,254	7	21,630	207	51,592	8	41,684	12,967	194,242
2016	21,485	177,136	222	6,292	122	42,302	18	42,480	362	91,074	22	136,243	21,869	404,452
2017	14,388	123,241	192	6,408	107	38,923	6	10,660	305	55,991	6	56,753	14,699	235,985
Total	77,920	638,552	3,502	109,342	1,858	579,067	189	421,142	5,549	1,109,551	160	544,183	83,629	2,292,286

\*Note: All projects with a Permission to Operate ("PTO") date will be reported as installed in the month/year in which the PTO was issued. There are 428 projects, mostly older, that did not report a PTO date to the program. These projects are reported as installed in the month/year in which the project reached QA/QC status.

## NJ Solar Installations (as of 9/30/17)





## **Residential Solar Project Cost per kW**



Source: NJCEP CORE: http://njcleanenergy.com/files/file/Renewable\_Programs/CORE/CORE\_Paid\_Projects\_063013.xls NJCEP REIP: http://njcleanenergy.com/files/file/Renewable\_Programs/CG%20Updates%20/CG/REIP\_Paid\_Projects\_093013.xls TRC: Data file from from Melissa Zito, TRC (1/20/17) OpenPV: https://openpv.nrel.gov/index Tracking the Sun 2016: https://emp.lbl.gov/publications/tracking-the-sun-ix-the-installed-pri Tracking the Sun 2015: https://emp.lbl.gov/sites/all/files/lbnl-188238\_data\_file.xls US: Tracking the Sun 2016: https://emp.lbl.gov/sites/all/files/lbnl-188238\_data\_file.xls



## Non Residential (<500kW) Solar Project Cost per kW



Source: NJCEP CORE: http://njcleanenergy.com/files/file/Renewable\_Programs/CORE/CORE\_Paid\_Projects\_063013.xls NJCEP REIP: http://nicleanenergy.com/files/file/Renewable Programs/CG%20Updates%20/CG/REIP Paid Projects 093013.xls TRC: Data file from from Melissa Zito, TRC (1/20/17) OpenPV: https://openpv.nrel.gov/index Tracking the Sun 2016: https://emp.lbl.gov/publications/tracking-the-sun-ix-the-installed-pri Tracking the Sun 2015: https://emp.lbl.gov/sites/all/files/lbnl-188238 data file.xls

US: Tracking the Sup 2016 Figure 6 https://omp.lbl.gov/sites/all/files/lbpl\_100603

Cost per kW



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Source: NJCEP CORE: http://njcleanenergy.com/files/file/Renewable\_Programs/CORE/CORE\_Paid\_Projects\_063013.xls NJCEP REIP: http://njcleanenergy.com/files/file/Renewable\_Programs/CG%20Updates%20/CG/REIP\_Paid\_Projects\_093013.xls TRC: Data file from from Melissa Zito, TRC (1/20/17) OpenPV: https://openpv.nrel.gov/index Tracking the Sun 2016: https://emp.lbl.gov/publications/tracking-the-sun-ix-the-installed-pri Tracking the Sun 2015: https://emp.lbl.gov/sites/all/files/lbnl-188238\_data\_file.xls





# Weighted Average SREC Price and SACP vs Energy Year

Weighted Average SREC Price and SACP vs Energy Year





Source for SREC Price: New Jersey lean Energy Program SREC Pricing, http://www.njcleanenergy.com/renewable-energy-archive

#### State of New Jersey

#### Residential Solar in New Jersey: Past and Potential



Cara Goldenberg WWS 593N: GIS for Policymakers Fall 2016

#### Resources:

 National Renewable Energy Laboratory, Spreadsheet of annual 10-Niometer solar data (GHI) data by zip code, (1998-2009) 2) New Jensey Doant of Fubility. Project List - Solar Installations - October 2014.
New Jensey Census Data, Average Household Income Level and Number of Households, 2016

## Are LMI Communities participating in the NJBPU Solar programs

Solar Adoption by Average Household Income



Cara Goldenberg WWS 593N: GIS for Policymakers Fall 2016

# Are LI communities/residents

# How many solar projects in Abbott districts

# 6,617 projects of 83,629 total = 8% 263 MW installed of 2,292 total = 12%

Population of Abbott districts = 21%

## NJ Electricity Sales with and without EE, Solar and Appliance Standard Savings



In 2016 10,000,000 in avoided electricity generation and use-At the average retail rate this is \$13.5 million in savings



State of New Jersey



State of New Jersey



## **New Jersey Current Microgrids – 58**

Level 1 or single customer microgrid one meter --- 46 Level 2 or single customer / campus one meter – 12 Level 3 or multiple customers / advanced microgrid – multiple meters but one PCC

The Board is focusing on Level 3 – multiple customer of advanced microgrids called – Town Center DER microgrids with a focus on connecting public critical facilities at the local level that can provide shelter during and after an emergency.

The Board at its June 2017 agenda approved funding for 13 Town Center DER microgrids for critical facilities for \$2 million.

### **Town Center DER Microgrids – Approved Feasibility Studies**



- 1. City of Paterson
- 2. Montclair Township
- 3. Hudson County Secaucus
- 4. City of Hoboken
- 5. Woodbridge Township
- 6. Highland Park
- 7. Middletown
- 8. State of New Jersey City of Trenton
- 9. Neptune Township
- 10. Camden County City of Camden
- 11. Galloway Township
- 12. City of Atlantic City
- 13. Cape May County Middle Township
- 9 Municipalities
- 3 Counties
- 1 State agency (Treasury)
- 3 Renewable Energy facilities2 District Thermal facilities



## Rutgers University 23 Ac Parking lot 8.8 MW --

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