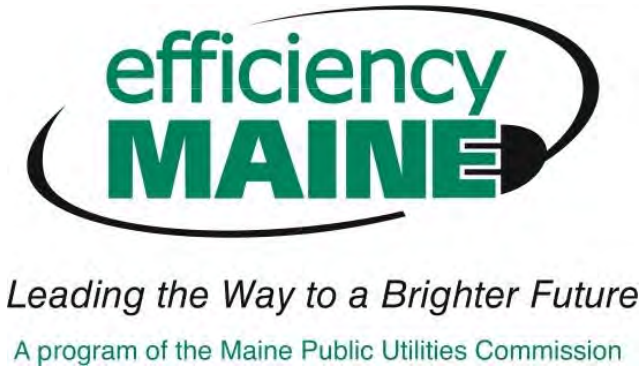
MAINE STATE LEGISLATURE

Maine Solar and Wind Energy Rebate Program

2009 Annual Report



December 1, 2009

Submitted By:

Energy Programs Division
Maine Public Utilities Commission
101 Second Street, Station #18
Augusta, ME 04333-0018

By Jim Conlan P & H, Vinalhaven

By Rich Roughgaden Maine Solar Engineering, Belgrade

Table of Contents

Jim Robinson, Mainly Plumbing

Installation by Mid Coast Energy Systems

1.0 INTRODUCTION

The Maine Public Utilities Commission (Commission) is pleased to present the fourth Maine Solar and Wind Energy Rebate Program Annual Report. This report covers Program Year 2009, which ran from July 1, 2008 through June 30, 2009.

The following subsections provide information on the program's purpose, funding, and Program Year 2009 highlights.

1.1 Background

The purpose of the Maine Solar and Wind Energy Rebate Program (hereafter referred to as the Program) is to meet the following goals:

1) Increase the use of solar photovoltaic (PV), solar hot water, solar air, and small wind systems by Maine residents.
2) Promote the development of trained and certified renewable energy installers throughout the State of Maine.

The Program was established on June 29, 2005 as part of Governor Baldacci's Solar Initiative and enacted into law as ***An Act To Encourage the Use of Solar Energy***, which is codified at 35-A M.R.S.A. §3211-B.[1] The Program is administered by Efficiency Maine's Energy Programs Division within the Commission (Efficiency Maine) and implemented under Efficiency Maine's Chapter 930 Solar Energy Rebate Program Rule.[2] During Program Year 2009, the Program provided rebates for the installation of solar hot water, solar hot air, PV, and small wind systems for Maine residents.

[1] Pursuant to Reviser's Report 2005, Chapter 1, Section 17, §3211-B was re-allocated to 35-A M.R.S.A. §3211-C.

[2] Chapter 930 is available at http://www.maine.gov/mpuc/doing_business/rules/part_9/chap_930.htm.

For the sake of clarity, these technologies are defined as follows:

- **Solar thermal** refers to the heating of water and air. Solar thermal systems collect the sun's heat and use it for domestic hot water or space heating in buildings. There is a broad variety of technologies that perform these functions efficiently.
- **Photovoltaic (PV)** electrical systems generate electricity directly from the sun. There are also many product options in this evolving field.
- A **small wind** system is any device such as a wind charger or wind turbine, and associated facilities, which converts wind energy potential into electrical energy with a peak generating capacity of not more than 100 kilowatts (KW).

Section 3211-C(5) requires Efficiency Maine to submit annual reports to the Utilities and Energy Committee (Committee) that include a summary of actions taken by Efficiency Maine relating to the Program during the prior 12 months. The purpose of this report is to satisfy this reporting requirement.

1.2 Funding

The Program is funded through revenues raised by an assessment of $0.005 applied to each kilowatt-hour (kWh) sold in Maine. The authorizing legislation initially allocated $500,000 per year for 3.5 years, and the Program originally had a sunset date of December 31, 2008. During the First Regular Session of the 123rd Legislature, the Program was extended to December 31, 2010 and the total allocation cap was increased to $2,750,000 (P.L. 2007, Chapter 158).

During the first 124th legislative session additional legislation extended the Solar and Wind Incentive Programs to December 2015 and increased the annual allocation to $1 million. Funds from the American Recovery and Reinvestment Act of 2009 (ARRA) will provide half of the funding over the next two years. Efficiency Maine must continue the allocation of at least 20 percent of the Program funds to each of the three system types.

1.3 New Wind Rebates

In its 2008 session, the Legislature enacted a law that expanded the Program to include qualified wind energy systems: ***An Act to Implement Recommendations of the Governor's Task Force on Wind Power Development***, P.L. 2007, Chapter 661. This act directed Efficiency Maine to establish a wind energy system rebate program for installation of a qualified energy wind system in an area of "demonstrated wind power potential." Chapter 661 also directs Efficiency Maine to determine the allotment of the funds in each fiscal year between PV system rebates, solar thermal system rebates, and

wind energy systems rebates provided that Efficiency Maine commits at least 20 percent of Program funds to each of the three system types.

1.4 Additional Training

Also during the 2008 session, the Legislature passed a law designed to offer installer training to specific professions related to renewable technology installations. The law is titled ***An Act to Clarify the Qualifications of Installers under the Solar Energy Program***, P.L. 2007, Chapter 493. Chapter 493 provides for the inclusion of qualifying boiler technicians, propane and natural gas technicians, and Type II, III and Universal refrigeration technicians as certified solar hot water system installers.

1.5 Temporary Suspension of Solar Thermal Rebates

During the summer of 2008, the rate of applications far outpaced the Solar Programs budget, forcing Efficiency Maine to temporarily suspend issuing reservations for incentives. Applications rejected after the program expended all available funds and those that did not receive a reservation in Program Year 2008 were awarded a reservation during the 2009 Program Year. These reservations completely exhausted all funds that were to be allocated to the solar incentive for the 2009 Program Year.

In the meantime, a number of reservations expired for various reasons throughout 2008 and 2009. The money reserved for these reservations was allowed to flow back into the program for re-allocation. In January 2009 Efficiency Maine opened the program to receive applications for a two-week period. Applications received in that period were entered into a blind drawing. Applications pulled in the drawing were awarded rebate reservations until the funding was again exhausted, allowing additional applicants to move forward with their solar installations.

The American Recovery and Reinvestment Act (ARRA) provided an infusion of money in the form of the following two grants:

- A grant of $500,000 of Energy Efficiency and Conservation Block Grant (EECBG) money in year one.
- A second grant of EECBG funds of $500,000 in year two.

This funding allowed Efficiency Maine to reopen the Solar & Wind Incentive Program on July 1, 2009 and the results will be reported more fully in the 2010 Annual Report.

1.6 Adjustment of Rebate Levels

By Order dated December 18, 2008 in Docket No. 2008-498, Efficiency Maine made further adjustments to Program incentive levels. In this adjustment, rebates for

residential solar thermal systems were reduced from 30 percent of installed system costs or $2,500 (whichever is less) to 25 percent of installed system costs or $1,000 (whichever is less). Rebates for commercial solar thermal installations were reduced from 35 percent of installed system costs or $10,500 (whichever is less) to 25 percent of installed system costs or $1,000 (whichever is less). The primary reason for reducing incentive levels is to ensure that rebates are distributed in a manner that reasonably maximizes the number of rebate recipients. Efficiency Maine's decision to reduce the incentive levels was supported by comments Efficiency Maine received from the public and the reduced levels currently in force today.[3]

1.7 Summary of Program Accomplishments from Inception through June 30, 2009

Efficiency Maine issued a total of 668 program rebates since program inception. These rebates break down into the following system has types:

- 559 thermal hot water systems
- 98 photovoltaic systems
- 3 hot air systems
- 3 wind turbines

[3] Our December 18, 2008 Order in Docket No. 2008-498 contains additional details about our recent incentive level revisions. The December 18, 2008 Order can be found on the Commission's web site at http://www.state.me.us/mpuc

Solar Thermal Class at KVCC, Fairfield **1**

2.0 TRAINING

During the 2009 Program Year, the solar thermal training class was expanded from two to three days based on class feedback that often stated there was "too much information for two days." A third day allows the instructor to cover subject matter in more detail and spend more class time on each topic while allowing the student to better digest and internalize the information. Class evaluations have confirmed the additional class time as being very productive and well received.

As of July 1, 2009, 435 Thermal Installers trained through Efficiency Maine were listed on Efficiency Maine's website. In addition, seven National American Board Certified Energy Practitioner (NABCEP), Master Electricians were also listed on the Efficiency Maine web site.

Figure 2-1 depicts the location of the State trained and certified solar installers in Maine. Figure 2-2 depicts the towns in which solar systems were installed during the 2009 Program Year. It is apparent that there is good penetration of both installers and installations within 75 miles of the coast. Three systems were installed in eastern Maine and several in Aroostook County; however, no installations or certified installers were located in the western corridor, and this remains a challenge to our training plan. In facing a similar challenge, Efficiency Maine has worked over the past two years developing a base of trained certified installers now serving Aroostook County.

The western corridor, the northern section of Aroostook County, and eastern sections of the state are still in need of development with respect to solar technologies (see illustrations on the next page).

Figure 2-1
Distribution of Solar Thermal Installers

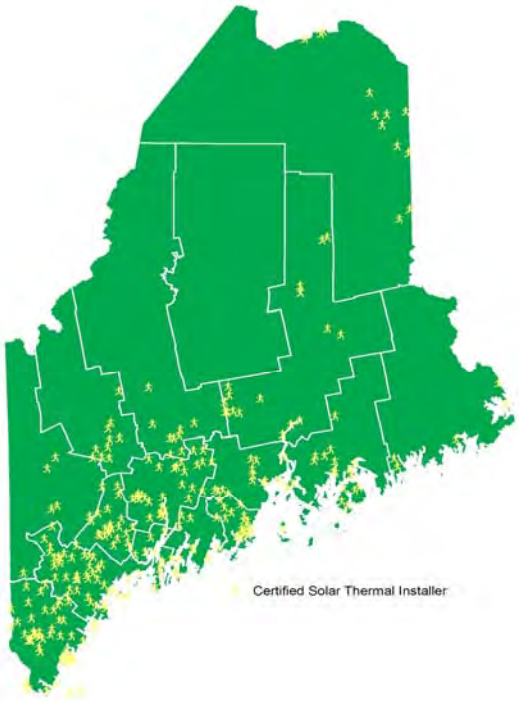
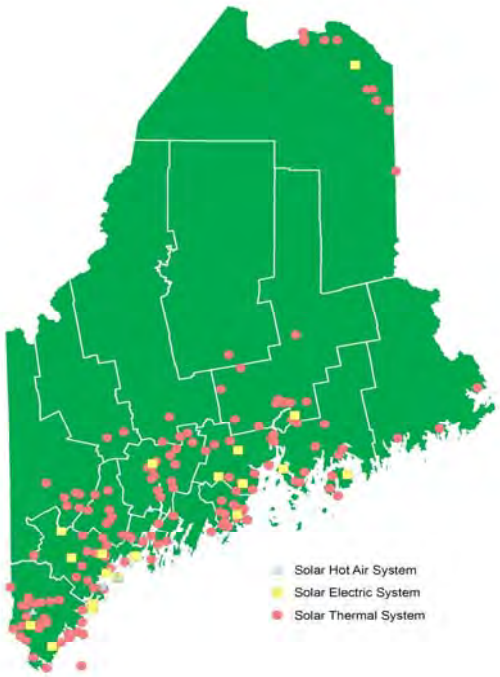


Figure 2-2
Distribution of Solar Installations



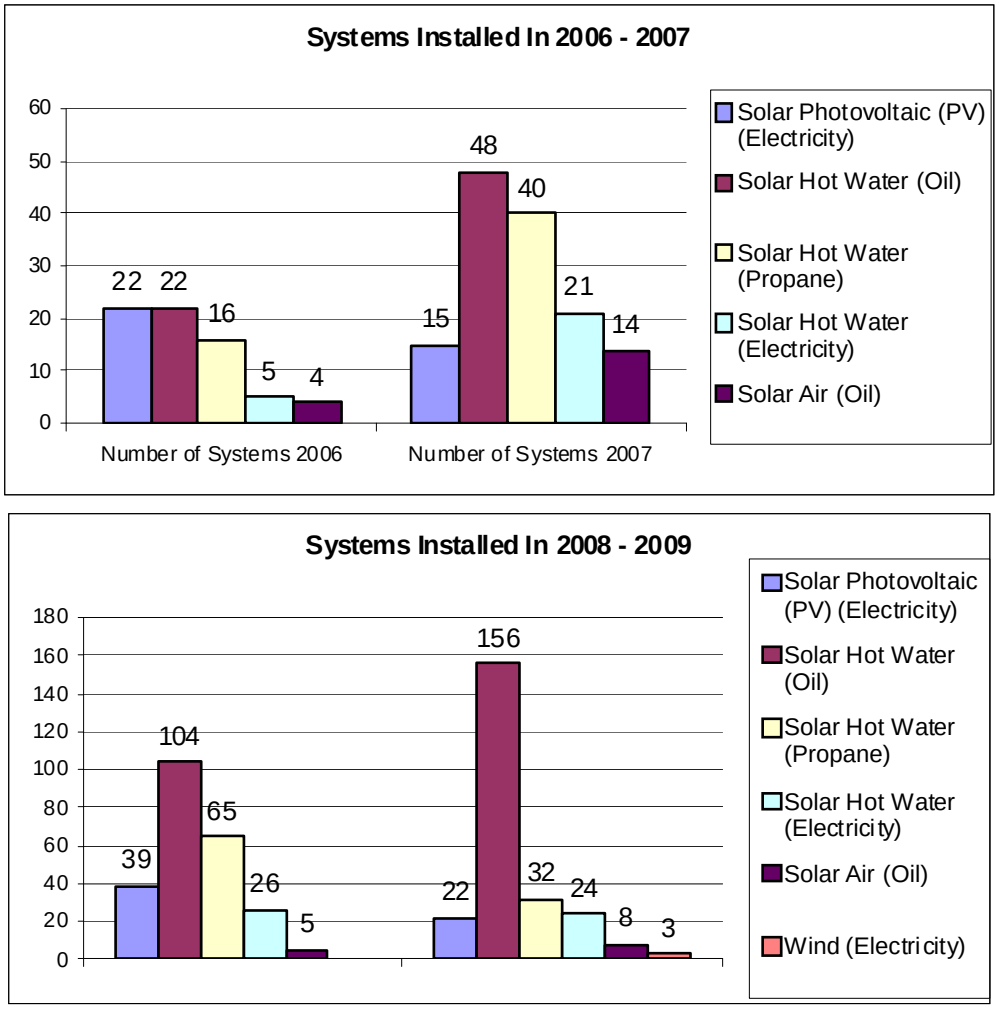
This year Efficiency Maine will concentrate on developing the western corridor by making contact with plumbing and heating contractors and encouraging those services to seek solar training and certification. Solar technologies will augment existing plumbing and heating businesses to provide renewable energy methodologies to rural Maine. Additionally, we will continue to offer our services to those communities that would like to start community green teams. These teams will be better prepared to educate the local area residences to the benefits of cost effective solar thermal systems as well as the Efficiency Maine energy efficiency programs and services. We have participated in energy expos in all areas of Maine and we will continue to develop those inroads.

Efficiency Maine will be making a concerted effort along with Kennebec Valley Community College (KVCC) to take the solar training program on the road. Currently classes are provided at the KVCC campus in Fairfield. New classes are tentatively scheduled to be held in the Machias/Calais area, Presque Isle, Central Maine (Fairfield KVCC), and in southern Maine. Efficiency Maine is seeking a suitable facility in western Maine. Classes will be offered as long as sufficient interest exists.

Installer training remains an integral and critical component of market development and part of Efficiency Maine's statutory mandate. Training is central to developing a certified source of competent installers able to provide high-level consumer information and to perform quality installations.

Figure 2-3 illustrates all systems installed since the program inception. As depicted, thermal hot water is gaining popularity and likely reflects the increase in authorized installers (boiler technicians, refrigeration technicians, and propane and natural gas technicians) who are now authorized to install systems.

Figure 2-3
System Installations 2006 – 2009



3.0 FINANCIAL REPORT

The Solar Incentive Program was temporarily suspended for the last six months of 2008 and the first six months of 2009 because all available funds had been reserved by June 2008. Oil prices were at their peak at that time and Efficiency Maine received a higher than average number of requests for solar incentives. Approved projects that were not completed within the specified 120-day install time lost their rebate reservation, allowing Efficiency Maine to temporarily open the Solar Program in January to accept new applications for a two week period.

Table 3-1 provides a financial summary of the Solar Incentives Program from inception through June 30, 2009. The table also tracks "reservations" which is a constantly fluctuating account of Program money that is set aside for an applicant upon receipt of their application. When money for any particular project becomes "reserved," money is held in escrow for three to four months before the project is completed, at which time the reserved money is actually paid to the applicant. In some instances a reservation is awarded but the project does not go forward. In these cases, the reservation amount reverts back to the available funds and is re-awarded to the next applicant.

The reservation process performs three critical functions. First, the reservation informs the applicant that program money is reserved for their proposed installation. Second, it provides an accurate method of tracking future Program expenses. Third, it provides a time buffer in times when applications outpace funding and the program runs the risk of spending more than what is statutorily authorized.

Table 3-1
Maine Solar Incentive Financials
July 1, 2008 through June 30, 2009

System Type	Authorized Funding through 12/31/10	Reserved	Paid Reservations	Unpaid Reservations	Systems Installed
Solar Electric PV	$637,500	$447,795	$427,895	$19,900	98
Residential Air		$32,410	$20,936	$11,474	30
Residential Water		$1,242,747	$959,265	$283,482	519
Energy Star Air		$0	$0	$0	0
Energy Star Water		$28,300	$11,800	$16,500	4
Maine Home Performance Air		$0	$0	$0	0
Maine Home Performance Water		$13,500	$9,000	$4,500	3
Commercial Air		$6,825	$4,200	$2,625	1
Commercial Water		$290,927	$239,302	$51,625	33
Solar Subtotal	*$1,912,500*	*$1,614,709*	*$1,244,503*	*$370,206*	*590*
Wind Energy	$200,000	$87,018	$10,000	$77,018	3
Total	**$2,750,000**	**$2,149,522**	**$1,682.398**	**$467,124**	**691**

Installation by Revision Energy Rockport

4.0 INSTALLATIONS

The following subsections provide details on each technology type included in the Program.

4.1 Solar Thermal Hot Water

Table 4-1 depicts the 212 solar hot water systems that received rebates in Program Year 2009. These projects represent a total of 47 installation companies, 11 more than last year. One company installed 63 (29.7 percent) of the 212 systems that received rebates in 2009. The next busiest company installed 17 systems, or 8 percent. At the other end of the spectrum, 23 companies installed one solar hot water system that received a rebate in Program Year 2009. These numbers suggest that the Thermal Solar Hot Water Industry is still maturing. The data further suggest that many companies that install solar hot water systems in Maine do so as a secondary activity to their primary business focus, which might be heating or plumbing activities. Maine is starting to see companies focusing more on solar hot water system installations as their primary business focus. Efficiency Maine will continue to monitor growth to determine if these companies continue to grow with solar installations as their core business.

Table 4-1
Ranking by Companies of Thermal Hot Water Systems
Installed from July 2008 to June 2009

No. of Companies	No. of Systems Installed	Group Total	Percent of Total
23	1	23	10.85%
9	2	18	8.49%
1	3	3	1.42%
5	4	20	9.43%
1	5	5	2.36%
1	6	6	2.83%
1	7	7	3.30%
2	11	22	10.38%
1	12	12	5.66%
1	16	16	7.55%
1	17	17	8.02%
1	63	63	29.72%
47		**212**	**100%**

Table 4-2 outlines the four-year thermal installation history. The data show steady progress for thermal installations despite the program being temporarily suspended. It also demonstrates that the incentives allocated to thermal systems are being fully utilized. With the additional ARRA monies and the reduced incentive level, Efficiency Maine anticipates an increasing number of thermal installations.

Table 4-2
Four-Year Thermal Hot Water Rebate History

	7/1/05 to 6/30/06	7/1/06 to 6/30/07	7/1/07 to 6/30/08	7/1/08 to 6/30/09
Number of Systems Installed	43	109	196	212
Average System Size (MMBTUs)	16.6	25.25	27.33	22.84
Average Total Cost	$8,024	$12,006	$10,767	$12,359
Average Rebate	$1,234	$1,245	$2,062	$2,965
Average Customer Cost	$6,790	$11,357	$8,705	$9,394
Percent of Cost Paid by Rebate	15%	10%	15%	25%
Average System Cost w/o Commercial		$8,612	$12,284	$8,835
Average Rebate w/o Commercial			$1,814	$2,150

4.2 Photovoltaic (PV)

Installed by IRC Group, Augusta

Efficiency Maine provided rebates for 22 PV systems during the 2009 Program Year compared to 39 rebates in 2008. Table 4-3 provides a ranking of companies installing PV systems in the State. One company installed 78 percent of the systems while five other companies installed one system each

Table 4-3
Ranking by Companies of Installed PV Systems in 2009

No. of Companies	Systems Installed	Group Totals	Percent of Installations
1	17	17	78 %
5	1	5	23 %
6	18	22	100 %

Table 4-4 itemizes installed PV systems over a four year period. Average system size is slightly smaller and costs were higher this year than over the past three years. Cost per watt before and after incentives have gone up in Maine over the last year, while nationally the cost per watt has dropped rather significantly. Cost per watt may be higher this year because Maine law requires PV installations be completed by an American Board Certified Energy Practitioner (NABCEP), and there are only seven installers available in Maine.

Table 4-4
Four-Year PV Rebate History

	7/1/05 to 6/30/06	7/1/06 to 6/30/07	7/1/07 to 6/30/08	7/1/08 to 6/30/09
Number of Systems Installed	22	15	39	22
Average System Size (KW)	2.74	2.17	2.32	2.06
Average Total Cost	$23,889	$22,112	$22,717	$24,087
Average Rebate	$6,027	$6,022	$4,136	$1,985
Average Customer Cost	$17,863	$16,090	$18,581	$22,101
Percent of Cost Paid by Rebate	25%	28%	18%	8%
Installed Total Cost/Watt[1]	$8.91	$10.18	$9.78	$11.68
Customer Cost/Watt	$6.35	$7.41	$8.00	$10.71

[1] Total cost before rebate deducted.
[1] Cost to customer after rebate.

4.3 Solar Hot Air

Installed by Jim Robinson of Mainly Plumbing, Gorham

2009 proved to be another slow year for solar hot air system installations with only eight systems installed, despite the cost-effectiveness of the technology. It should be noted that the percentage of rebates paid is beyond the 25 percent limit for thermal incentives because additional incentives of up to $500 are awarded for those meeting Maine Home Performance or Energy Star criteria. Table 4-5 itemizes the thermal hot Air installations over the past four years.

Table 4-5
Four-Year Thermal Hot Air Rebate History

	7/1/05 to 6/30/06	7/1/06 to 6/30/07	7/1/07 to 6/30/08	7/1/08 to 6/30/09
Number of Systems Installed	4	14	5	8
Average System Size (MMBTUs/Year)	10.2	9.6	12.08	8.9
Average Total Cost	$1,820	$2,080	$4.546	$3,461
Average Rebate	$455	$552	$1,466	$1,032
Average Customer Cost	$1,365	$1,560	$1,467	$2,430
Percent of Cost Paid by Rebate	25%	25%	33%	30%

4.4 Wind

In the spring of 2007, the Legislature passed a law establishing a wind energy rebate program to be funded from the existing energy rebate program (P.L. 2007 Ch.661). As required by law, 20% of the annual $500,000 was set aside for qualified wind projects.

During the 2007 session, the Legislature also passed L.D. 349: ***A Resolve to Provide for Small Wind Power Generation***. This authorized Efficiency Maine to establish a $40,000 pilot project fund for small wind power generation. Efficiency Maine enhanced the existing wind incentive by providing an additional $2,000 per installation to encourage higher towers that better access cleaner wind resources.

Installed by Green Earth Energy, Fort Kent

On January 1, 2009 Efficiency Maine began accepting applications for reservations to install wind turbines for applicants with demonstrable wind resources in Maine. Efficiency Maine met with the National Research Energy Laboratory's (NREL) Denver staff on several occasions to solicit input on program development. Efficiency Maine then developed the Wind Application form to help educate applicants and set installation requirements that would accomplish two goals:

- Set program criteria that help ensure the most cost effective installations could go forward.
- Ensure that taxpayer money was being distributed wisely on systems that had the best chance of producing reliable energy.

The Program requires at a minimum Class II wind zone (9.8 to 11.5 mph) and mounting heights of at least 65 feet at the turbine hub. Class III wind zone (11.5 to 12.5 mph) installations require a 50-foot height at the turbine hub. Additionally, the tip of the blade must be at least 30 feet higher than any trees or buildings within a 250-foot radius.

While the application form requires a site wind analysis using two different wind analysis programs, the results are not foolproof. Unfortunately, national wind data maps cannot account for areas with obstructions such as trees, buildings, and other obstacles that may create turbulence around wind turbines and dramatically reduce output. Sufficient wind is extremely site-specific and a prime challenge for Efficiency Maine is to determine as accurately as possible that the proposed installation is acceptable.

Generally, a good wind resource begins near the 50-foot level and turbine output increases by 20 percent for each additional 10-foot rise in tower height.

As of June 30, 2008 the State Wind Incentive Program has paid three wind incentives for installations with an average annual production of 4,000 kWh and an average payback period of 23-years.

5.0 PROGRAM YEAR SAVINGS FROM SOLAR AND WIND ENERGY PROGRAMS

This section summarizes the yearly and lifetime carbon dioxide (CO_2) and fuel savings realized by the various components of the Program. Figure 5-1 shows the annual CO_2 savings; Figure 5-2 shows CO_2 lifetime savings. Program Year 2009 realized a total of 218 tons of CO_2 savings with a lifetime savings, assuming 20 year life, of 4,364 tons.

Figure 5-1

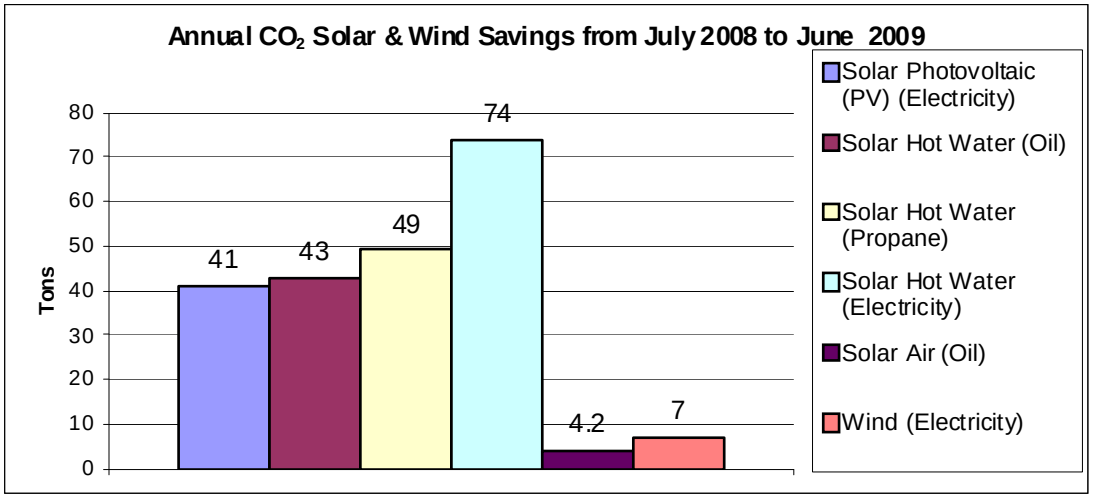


Figure 5-2

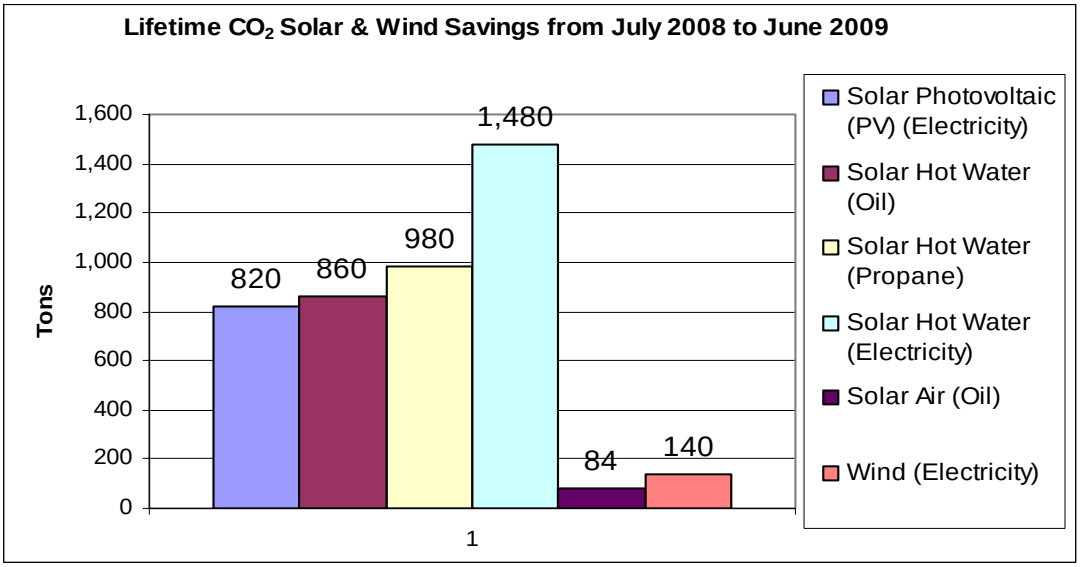
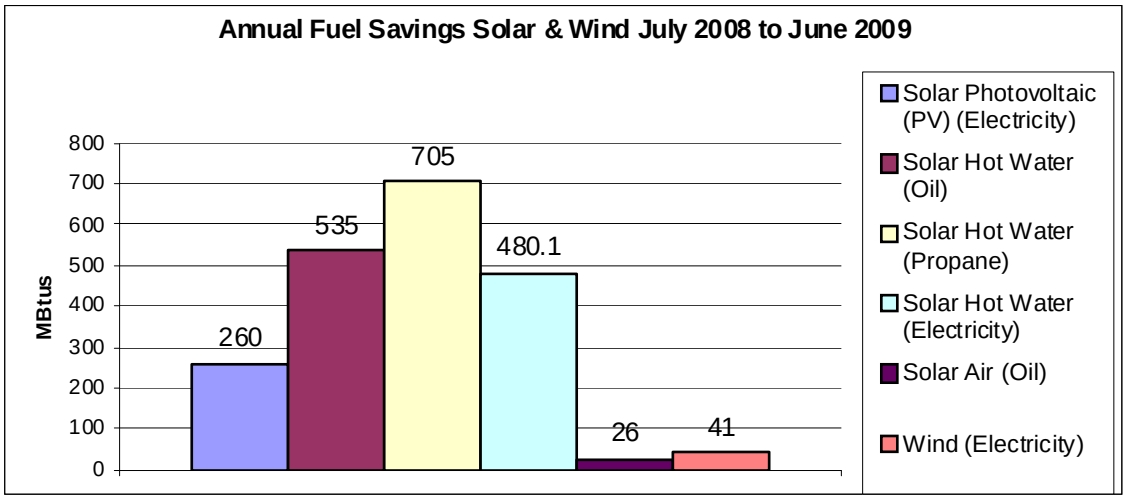


Figure 5-3 shows 2009 Program Year fuel savings in MMBTUs. As shown, calculated fuel savings for thermal systems installed during the 2009 Program Year from PV system installs are 76,417 kWh hours and 260.3 MMBTUs. Oil savings were 3,821 gallons and 535 MMBTUs. Propane savings of 7,699 gallons and 705 MMBTUs saved annually. Thermal electric accounted for 140,709 kilowatt hours with 480.1 MMBTUs saved; Thermal solar hot air saved 186 gallons of oil and 26 MMBTUs, while wind saved 12,000 kilowatt hours and 41 MMBTUs. Combined, there were 2,047 MMBTUs saved cumulatively last year.

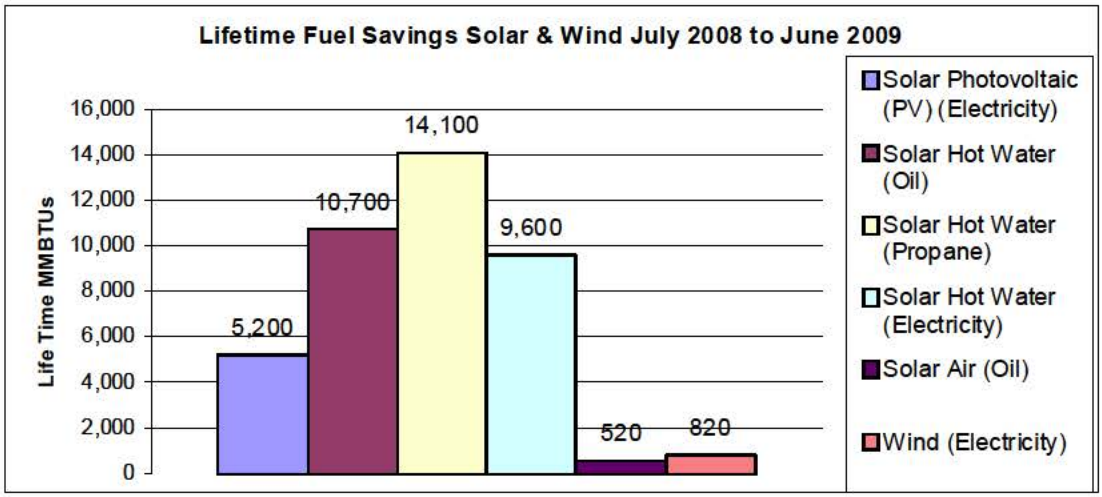
Figure 5-3



Calculated fuel savings for thermal systems installed during the 2009 Program Year from PV system installs are 76,417 Kilowatt hours saved and 260.3 MMBTUs saved yearly. Oil savings were 3,821 gallons and 535 MMBTUs, Propane savings of 7,699 gallons and 705 MMBTUs saved annually. Thermal electric accounted for 140,709 kilowatt hours with 480.1 MMBTUs saved; Thermal solar hot air saved 186 gallons of oil and 26 MMBTUs, while wind saved 12,000 kilowatt hours and 41 MMBTUs saved per year. Combined, there were 2,047 MMBTUs saved accumulatively last year.

Figure 5-4 extrapolates data depicted in Figure 5-3 over a 20-year lifetime period. PV savings over a 20 year period equal 1,528,340 kilowatt hours saved or 5,200 MMBTUs**.** Thermal oil savings are 76,420 gallons and 10,700 MMBTUs. Thermal Propane savings equaled 153,980 gallons and 14,100 MMBTUs. Thermal electric savings were 2,814,180 kilowatt hours and 9,600 MMBTUs. Thermal Hot Air lifetime savings 3,720 gallons of oil and 520 MMBTUs and finally, Wind lifetime savings equaled 24,000 kilowatt hours and saved 820 MMBTUs.

Figure 5-4


Lifetime Fuel Savings Solar & Wind July 2008 to June 2009
Life Time MMBTUs
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
5,200
10,700
14,100
9,600
520
820
Solar Photovoltaic (PV) (Electricity)
Solar Hot Water (Oil)
Solar Hot Water (Propane)
Solar Hot Water (Electricity)
Solar Air (Oil)
Wind (Electricity)

6.0 CONCLUSION

The Solar and Wind Energy Rebate Program started the 2009 Program Year under suspension, due to exhausted funds. By January of 2009, monies released from unused reservations flowed back into the program for re-distribution. A significant number of reservations did not go forward after oil prices moderated, and these reservations temporarily reinvigorated the program.

Fuel pricing has been more stable this Program Year compared to last year. However, despite lower fuel prices, suspension of the Program created a pent-up demand while applicants waited for the program to re-open. In the month of July 2009 (Program Year 2010) Efficiency Maine reserved rebates for 115 additional thermal systems. The ARRA funds enabled Efficiency Maine to pay 75 thermal incentives previously scheduled. More detail will be provided in the 2010 Solar and Wind Report.

We anticipate growing interest in solar and wind technologies. We particularly look forward to working closely with Maine's Wind Working Group to help individuals and communities make informed decisions regarding these technologies, and with the Community College renewable energy programs. We also will build upon our existing relationships with the University of Maine and Unity College, both of whom are providing invaluable assistance in setting up wind measurement sites with anemometers and data recording technologies.

For more information, contact:
John Brautigam
Director, Energy Programs Division
Maine Public Utilities Commission
(207) 287-1594