New York Energy $mart℠ Programs

Energy Efficiency and Renewable Power for Your Home

SUNY-Oswego Science Café

Oswego City Public Library
October 22, 2009

Chris Carrick
CNY Energy $mart Communities Coordinator
New York State Energy Research Development Authority (NYSERDA)

Your Partner for Energy Savings
Who is NYSERDA?

• A public benefit corporation established in 1975

• Funds research in energy supply and efficiency, and energy-related environmental issues

• Offers financial incentives (grants and loans) for homeowners through **NY Energy $mart℠ Programs**:
  • Home Performance with ENERGY STAR®
  • New York ENERGY STAR® Labeled Homes Program
  • Solar PV Incentive Program (PON 1050)

Your Partner for Energy Savings
NYSERDA Eligibility

- Residential consumers, businesses, state and local governments, not-for-profit and private institutions, public and private schools, colleges and universities, and health-care facilities that pay into the System Benefits Charge are eligible for incentives.

- Eligible participants must purchase energy from one of the following utility companies:
  - National Grid
  - NYSEG
  - RG&E
  - Central Hudson Gas & Electric
  - O&R
  - Con Ed

“SBC” is the...

- System Benefits Charge
- Appears on your utility bill
- Makes you eligible for NYSERDA incentive
- Not available to LIPA customers

Your Partner for Energy Savings
NYSERDA’s “Market” Programs

• Most of NYSERDA's energy efficiency initiatives are part of the New York Energy $mart℠ Program
  • http://www.GetEnergySmart.org

• NYSERDA's renewable energy incentives are part of the Power...Naturally℠ Program
  • http://www.PowerNaturally.org

• All Power...Naturally℠ Program incentives may be combined with other NYSERDA programs, such as the Home Performance with ENERGY STAR®, the New York ENERGY STAR® Labeled Homes Program and the Energy $mart℠ Loan Fund

Your Partner for Energy Savings
Residential use comprises $\frac{1}{3}$ of U.S. energy consumption.

NYS total energy cost = $65$ Billion
Residential users cost = $19$ Billion

Many opportunities to decrease this amount.

Your Partner for Energy Savings
The largest users of energy in the home

- Heating and Cooling: 60%
- Refrigerator: 12%
- Lighting, Cooking, and other Appliances: 12%
- Water Heating: 16%
National Impact of Energy Efficiency

U.S. Energy Consumption

U.S. Energy Consumption at constant 1970 E/GDP

Efficiency; Structural Change


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NYSERDA’S Residential Programs

• Home Performance with ENERGY STAR®

• New York ENERGY STAR® Labeled Homes

Program Goal
To help New York State residents live more affordably by providing them with a comprehensive “house as a system” program that delivers savings through quality ...

Your Partner for Energy Savings
What is ENERGY STAR®?

• ENERGY STAR® is a government-backed program helping businesses and individuals protect the environment through superior energy efficiency.

• Guidelines set by U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA)

• [www.energystar.gov](http://www.energystar.gov) - product info, manufacturers, standards
Who’s Who in the Program

• **New York State Energy Research and Development Authority (NYSERDA)**
  - Program sponsor and manager. Program funded through the SBC (Systems Benefit Charge) that customers pay on energy bills.

• **Conservation Services Group, Inc. (CSG)**
  - NYSERDA’s program implementer, also provides technical and marketing support for participating contractors

• **Building Performance Institute (BPI)**
  - National accrediting agency used by the HPwES program. BPI establishes testing procedures and safety guidelines for building performance work.

Your Partner for Energy Savings
What is Home Performance Contracting?

A “whole house” approach to home improvement:

- Focus is on much more than just energy efficiency!
  - Health and safety
  - Comfort
  - Durability and long-term value of housing
  - Environmental benefits

- Requires understanding the dynamic interaction among home systems
  - Heating and cooling systems
  - Water heaters and other combustion appliances
  - Ventilation
  - Shell features

- Many customers perceive value immediately – then enjoy lower energy bills!
Only **BPI Accredited** companies can offer the program services and gain access to NYSERDA incentives for their customers!

A Building Performance Institute-accredited Home Performance Contractor uses a blower door test during the Comprehensive Home Assessment to tell where air leaks are.
BPI Accreditation

• Individual technicians are certified; the company must also be accredited.

• To be accredited, a company must have:
  • Trained staff, certified by BPI at two levels:
    • Building Analyst: Basics of building science and knowledge of home assessment procedures
    • Specialist: Advanced knowledge in particular subject area (Envelope, Heating, Cooling)
  • Adequate insurance
  • Commitment to customer service
  • Commitment to BPI job standards
  • Commitment to report jobs to BPI

Your Partner for Energy Savings
The Enemy! Infiltration/Exfiltration

- The loss or gain of heat through areas where inside and outside air meet
- Accounts for 30% of the heat lost from a typical home

WHERE DOES THE HEAT GO?

- 25% Roof
- 35% Walls
- 10% Windows
- 15% Draughts
- 15% Floors

Your Partner for Energy Savings
The Comprehensive Home Assessment

Comprehensive Home Assessment looks at the house as a system:

- Health & Safety
  - Combustion Safety Tests
  - Visual Inspection
- Shell Measures – Air Sealing and Insulation
  - Blower Door Test
  - Infrared Camera
- Heating/Cooling System Efficiency
- Lighting
- Major Appliances

Your Partner for Energy Savings
The Comprehensive Home Assessment

• Required for all homes!

• Assessments must be completed by staff members who are certified at Building Analyst level or higher

• Participating contractor charges customer or not, depending on their marketing approach

• Contractor produces a computerized report laying out recommendations for customer
The Comprehensive Home Assessment

- Program software
- Targeted Residential Energy Analysis Tool (TREAT)
  - Allows contractors to provide in-depth financial analysis of possible improvement measures to the customer
  - Provides ability to create professional looking assessment reports quickly and efficiently
  - Speeds the processing of incentives and other programmatic requirements

<table>
<thead>
<tr>
<th>Measure Description</th>
<th>Non-energy benefits</th>
<th>Package 1</th>
<th>Package 2</th>
<th>Package 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Change Pack&quot; - All &quot;8&quot; Insulate Walls - Upgrade 8,000 square feet of existing walls to R-40, 1&quot; J-Cell,1&quot; Foam, 1&quot; Wood, &amp; 1&quot;</td>
<td>Improve comfort, increase value of building</td>
<td>$1,904</td>
<td>$1,904</td>
<td>$1,904</td>
</tr>
<tr>
<td>&quot;Low-8&quot; Ceiling, Enviro Acne, No Rot&quot; - Upgrade 1,200 square feet of existing ceiling to R-40, 1&quot; J-Cell, 1&quot; Foam, 1&quot; Wood, &amp; 1&quot;</td>
<td>Improve comfort, increase value of building</td>
<td>$900</td>
<td>$900</td>
<td>$900</td>
</tr>
<tr>
<td>Targeted Air Sealing &amp; Insulation of Insulated Walls - Reduce energy use and leakage of existing walls from 2.250 CFM to 1.250 CFM</td>
<td>Reduce drafts</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
</tr>
<tr>
<td>Targeted Air Sealing, Insulation of Insulated Walls - Reduce energy use and leakage of existing walls from 2.250 CFM to 1.250 CFM</td>
<td>Reduce drafts</td>
<td>$500</td>
<td>$500</td>
<td>$500</td>
</tr>
<tr>
<td>Install 20% efficient boiler or system, install new system for $50,000</td>
<td>Increase efficiency</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>Install new Aspen Style Low E Windows - install 20&quot; double pane clear windows with wood frames</td>
<td>Increase comfort, increase value of building</td>
<td>$9,000</td>
<td>$9,000</td>
<td>$9,000</td>
</tr>
<tr>
<td>Install CFL bulbs: Replace 8 existing lighting fixtures with 3 low-VLW, 4&quot; CFL bulbs</td>
<td>Reduce maintenance, reduce replacement over 10,000 lamp-years, reduce maintenance bills</td>
<td>$73</td>
<td>$73</td>
<td>$73</td>
</tr>
<tr>
<td>Upgrade Refrigerators in Energy Star model: Improved Appliances - replace old model fridge, modern, energy efficient, added appliances, and energy star refrigerator, &amp; Cu Refin</td>
<td>Increase comfort, increase efficiency</td>
<td>$350</td>
<td>$350</td>
<td>$350</td>
</tr>
<tr>
<td>Your dryer to achieve higher energy efficiency</td>
<td>Improve dryer efficiency and comfort</td>
<td>$250</td>
<td>$250</td>
<td>$250</td>
</tr>
</tbody>
</table>

Your Partner for Energy Savings
Eligible Measures

- Negotiate from list of recommendations generated by the Comprehensive Home Assessment
- "Core" measures
  - Insulation
  - Air sealing
  - Heating and cooling
  - Water heater
  - Appliances, lighting

Your Partner for Energy Savings
Eligible Measures

Health and safety measures:

- Some jobs cannot be done unless certain health and safety standards are addressed!
- Up to $2,000 for some “non-eligible” building performance repairs (for jobs not receiving Assisted HPwES subsidies)
- Other measures: windows, doors
- Scope of work is reviewed by program administrator:
  - To make sure health and safety standards are being met
  - To ensure all proposed measures are eligible
Installation and Completion Certificate

- Contractor installs measures
- Performs tests at end of job:
  - Combustion safety
  - Blower door
- Customer signs Certificate of Completion with test-out results
- CSG reviews installed project and health & safety results:
  - Will call if there is a problem with health & safety data
  - May authorize completion but schedule program inspection
- CSG authorizes:
  - Payment to contractor
  - Low-interest loan or grant to customer

Your Partner for Energy Savings
Customer Incentives

- 10% homeowner financing incentive
  - Reimbursement check from NYSERDA covering 10% of eligible costs, up to $3,000 incentive
- Reduced interest ENERGY STAR® financing loans
  - 5.99% unsecured loan, up to 10-year term
- Energy $mart™ Loan Fund
  - Secured loans through participating NYS banks
  - Rate buy-down: 4% for 10-year maximum term
  - Minimum rate of 2%
Customer Incentives

• Assisted Home Performance with ENERGY STAR®
  
  • For households with income less than 80% of State Median Income for that house size

  • NYSERDA pays for 50% of the cost of eligible measures, up to $5,000 subsidy for single-family home

  ❖ Assisted subsidy can be combined with a subsidized loan from NYSERDA or with subsidies provided through community development programs

  ❖ This is not a loan – it doesn’t have to be paid back!!
Program Benefits to Customers

• Whole house assessment!
  • Allows the customer to choose home improvements that will actually save money

• Peace of mind!
  • A home free of common health and safety hazards

• Incentives and financing!
  • Several options available to the customer
Energy Upgrades for Older Homes

- National Trust for Historic Preservation
  - “The Whole House Resource Bank”
  - www.preservationnation.org/issues/weatherization/resources

The Whole House Resource Bank

Our Whole House Resource Bank is designed to be your portal to the best weatherization information, tools, and materials available on the Internet today. Here you'll find five full sections (general weatherization, energy audits, windows, roofing, insulation, mechanical systems) populated with hundreds of links to websites, articles, reports, case studies, and do-it-yourself checklists — all written, prepared, and presented by movers and shakers in preservation and energy efficiency.

Check out each of the five sections to the right, but also be sure to explore our list of ten links that you should definitely bookmark listed (in alphabetical order) below.

1. **Do-It-Yourself Home Energy Audit**
   Illustrated guide on energy audits, air leaks, moisture control, insulation, heating systems, paybacks, and new technology. Includes a tear-out checklist. (City of Seattle, PDF 1.00 MB)

2. **Energy Conservation in Traditional Buildings**
   Illustrated report on insulation, draught-proofing, windows, and other ways for rehabilitating your older or historic building to reduce energy usage. (English Heritage, PDF 1.45 MB)

Links & Resources

- Homeowner Workshops & Conferences
- Weatherization & Audits Links & Resources
- Windows Links & Resources
- Insulation Links & Resources
New York ENERGY STAR® Labeled Homes Program

- Uses 30% less energy than conventionally built homes
- Tried and true technologies:
  - Effective insulation
  - High-performance windows
  - Tight construction and ducts
  - Efficient heating and cooling equipment
  - Efficient appliances
- Lower monthly utility bills
- More comfortable and healthier home
- 3rd Party raters used to verify home efficiency

Your Partner for Energy Savings
Third Party Verification

Home Energy Rating Certificate

44433 Steep Hill Drive
Rochester, NY 1234

Uniform Energy Rating System

|------------|--------|-------------|---------|--------------|---------|--------------|--------------|---------|-------------|

NY HERS Score: 87 / HERS Index: 65

General Information

Conditioned Area: 3000 sq. ft.
Conditioned Volume: 24,000 cubic ft.
Bedrooms: 3
House Type: Single-family detached
Foundation: Conditioned basement

Mechanical Systems Features

- Heating: Fuel-fired air distribution, Natural gas, 96.0 AFUE
- Cooling: Air conditioner, Electric, 17.0 SEER
- Water Heating: Conventional, Natural gas, 0.61 EF
- Duct Leakage to Outside: Supply And Return: 0.00, 0.00 CFM @ 25 Pascals
- Ventilation System: Exhaust Only: 60 cfm, 18.0 watts
- Programmable Thermostat: Heating: Yes, Cooling: Yes

Building Shell Features

- Ceiling R-50
- Vaulted Ceiling: NA
- Above Grade Walls: R-17
- Foundation Walls: R-10.0
- Slab: R-0.0 Edge, R-0.0 Under

Lights and Appliance Features

- Percent Fluorescent Pln-Based: 12.10
- Percent Fluorescent CFL: 0.00
- Refrigerator (kWh/yr): 650.00
- Dishwasher Energy Factor: 0.58

Estimated Annual Energy Cost

<table>
<thead>
<tr>
<th>Use</th>
<th>MMBtu</th>
<th>Cost</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating</td>
<td>50.7</td>
<td>$253</td>
<td>16%</td>
</tr>
<tr>
<td>Cooling</td>
<td>4.6</td>
<td>$149</td>
<td>9%</td>
</tr>
<tr>
<td>Hot Water</td>
<td>19.5</td>
<td>$97</td>
<td>6%</td>
</tr>
<tr>
<td>Lights/Appliances</td>
<td>34.4</td>
<td>$575</td>
<td>56%</td>
</tr>
<tr>
<td>Photovoltaics</td>
<td>0.9</td>
<td>$0</td>
<td>0%</td>
</tr>
<tr>
<td>Service Charges</td>
<td>195</td>
<td></td>
<td>12%</td>
</tr>
<tr>
<td>Total</td>
<td>$1573</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

This home meets or exceeds the minimum criteria for all of the following:

- EPA Energy Star Home
- Energy Conservation Code of New York

Oakland Raters
123 Main Street
Anywhere, USA
444.555.6666
fax: 444.555.6667

The Home Energy Rating Standard Disclosure for this home is available from the rating provider.

RE/MAX - Residential Energy Analysis and Rating Software v12.2
This information does not constitute any warranty of energy cost or savings.
## Mortgage & Energy Cost Example

<table>
<thead>
<tr>
<th></th>
<th>Typical home</th>
<th>ENERGY STAR® Labeled Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>cost</td>
<td>$200,000</td>
<td>$203,000</td>
</tr>
<tr>
<td>Down payment</td>
<td>$20,000</td>
<td>$20,300</td>
</tr>
<tr>
<td>Monthly payment</td>
<td>$1,079</td>
<td>$1,095</td>
</tr>
<tr>
<td>Monthly energy costs</td>
<td>$189</td>
<td>$132</td>
</tr>
<tr>
<td>Total monthly cost</td>
<td>$1,268</td>
<td>$1,227</td>
</tr>
</tbody>
</table>

**Net ENERGY STAR® Savings per month**  $\sim 41$
Financial Impacts

With that $40 per month, a homeowner could…

Pay off mortgage 2 years 8 months earlier, saving $22,680 in interest.
Federal Residential Energy Efficiency Tax Credit

- Credit is equal to 30% of expenditures, with a maximum of $1,500 for all technologies placed in service in 2009 and 2010.
- Eligible energy efficiency property includes: water heaters, furnaces, boilers, heat pumps, air conditioners, building insulation, windows, doors, roofs, circulating fans used in a qualifying furnace.
- Eligible renewable energy property includes: biomass stoves that use qualified biomass fuel.
- Equipment must be new and in compliance with all applicable performance and safety standards as described in tax code.
- Consult the ENERGY STAR® website for a list of specific eligible technologies: [http://www.energystar.gov](http://www.energystar.gov)

Your Partner for Energy Savings
What is Solar PV?

• Electricity directly from sunlight

• Made from high-tech semiconductor materials (silicon)

• Modules produce DC power; Inverter converts that power to AC

Your Partner for Energy Savings
Why Install PV?

• Makes electricity without polluting
• Purchasing a PV system helps protect you from increasing electricity costs
• Makes a strong environmental statement
• PV modules are reliable...some have warranties of 20 years or more

Your Partner for Energy Savings
Is There Enough Sun for Solar PV in Central New York?

Your Partner for Energy Savings
Can Solar PV Really Work in Central New York?

It does in Germany!

- Germany has similar climate and solar radiation as England – worse than CNY
- Germany’s **feed-in tariff** requires utilities to pay customers a guaranteed rate for any solar power they feed into the grid
- Germany is the world's top PV installer, accounting for almost half of the global market in 2007:
  - Germans installed about 1,300 megawatts of new PV capacity in 2007, up from 850 megawatts in 2006, for a cumulative total exceeding 3,830 megawatts
  - Solar power now meets about 1% of Germany's electricity demand, could reach 25% by 2050

Your Partner for Energy Savings
## Solar PV in New York

### Installed PV capacity in MW

<table>
<thead>
<tr>
<th>State</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>06-07</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California</td>
<td>52</td>
<td>71</td>
<td>87</td>
<td>23%</td>
</tr>
<tr>
<td>New Jersey</td>
<td>5.5</td>
<td>18</td>
<td>17</td>
<td>-6%</td>
</tr>
<tr>
<td>Nevada</td>
<td>0.5</td>
<td>2.6</td>
<td>15</td>
<td>477%</td>
</tr>
<tr>
<td>Colorado</td>
<td>0.2</td>
<td>0.9</td>
<td>12</td>
<td>1233%</td>
</tr>
<tr>
<td>New York</td>
<td>1.4</td>
<td>2.7</td>
<td>4.4</td>
<td>63%</td>
</tr>
</tbody>
</table>

### Drivers in NYS
- Renewable Portfolio Standard (w/ DG set-aside)
- Good incentives
- Above average cost of electricity

Your Partner for Energy Savings
Why doesn’t everybody Have Solar?

• First things first: address energy efficiency!
• Need unrestricted site
• It’s expensive - consider purchasing green power from the “grid”
Facts for PV Solar System Sizing

• 80 -90 square feet of PV modules will produce approx. 1,000 watts of power – a 3 kilowatt array will require about 270 square feet of area

• In most of NY State, each kilowatt of roof mounted PV will produce about 1,000-1,100 kWh per year – average yearly electricity usage for NYS residence is about 7,000 kWh

• Solar modules do not like high heat – proper installation to provide maximum cooling is very important!

• Solar modules love the cold – at -40 F the voltage can be up to 25% higher than rated!
Things to Remember about Solar PV

- Larger systems cost less/watt
- Solar roofing costs more/watt than panels
- Battery backup adds to the cost
- Roof mounts are less expensive than ground-mounts
- Some contractors are less expensive than others
- Some contractors are better qualified than others
Solar PV Incentive – PON 1050

- **Power...Naturally** – NYSERDA's renewable energy programs: http://www.PowerNaturally.org

- All **Power...Naturally** incentives may be combined with other NYSERDA programs, such as the **Home Performance with ENERGY STAR®**, the **New York ENERGY STAR® Labeled Homes Program** and the **Energy $mart** Loan Fund

- $38.8 million available for 2008-2009

Your Partner for Energy Savings
Solar PV Incentive – Payment Amount

• **Residential** – $2.50 per watt up to the first 4 kW and $1.50 per watt after the first 4 kW up to a maximum of 8 kW per site/meter.

• **Commercial** – $2.50 per watt up to the first 40 kW and $1.50 per watt after the first 40 kW up to a maximum of 80 kW per site/meter.

• **Not-for-Profit** - $4.00 per watt up to the first 25 kW up to a maximum of 25 kW per site/meter.

• **Bonus** - $0.50 per watt for ENERGY STAR® Homes and BIPV
How Much Will PV Cost You?

*Overall average system price: $8,585/kW-DC*

*Your Partner for Energy Savings*
How Much Will PV Cost You?

• **Clean Power Estimator** uses actual utility rates, location, and program incentives to provide customers with a summary of system costs and benefits


• Then click “Clean Power Estimator”
Cost of PV Solar Electricity Using Clean Power Estimator

- Zip Code: 12203 (Albany)
- Customer Type: Residential
- Electric Bill: $150/mo
- System Size: 2.5kWdc

- Avg. Installed Price: $22,350
- Incentive: $10,000
- NY Net State Tax Credit (After Federal Tax Impacts): $3,941
- Estimated Final Cost: $8,409
- Finance with NYSERDA’s Energy Smart Loan℠

Your Partner for Energy Savings
### Input Selections

<table>
<thead>
<tr>
<th><strong>Zip Code</strong></th>
<th>12203</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer Type</strong></td>
<td>Residential</td>
</tr>
<tr>
<td><strong>Electric Bill</strong></td>
<td>$150 per month</td>
</tr>
<tr>
<td><strong>System Size</strong></td>
<td>2.5 kW-DC</td>
</tr>
</tbody>
</table>

### Net System Cost

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Installed Price</td>
<td>$22,350</td>
</tr>
<tr>
<td>Incentive</td>
<td>-$10,000</td>
</tr>
<tr>
<td>NY Net State Tax Credit</td>
<td>-$3,941</td>
</tr>
<tr>
<td>Estimated Final Cost</td>
<td>$8,409</td>
</tr>
</tbody>
</table>

### Estimated Annual Results

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Bill Savings</td>
<td>$252</td>
</tr>
<tr>
<td>Percent Savings</td>
<td>14%</td>
</tr>
<tr>
<td>Electricity Production</td>
<td>2,818 kWh</td>
</tr>
<tr>
<td>CO₂ Reduction</td>
<td>4,731 lbs</td>
</tr>
<tr>
<td>NOx Reduction</td>
<td>4.37 lbs</td>
</tr>
<tr>
<td>SO₂ Reduction</td>
<td>13.05 lbs</td>
</tr>
</tbody>
</table>
Solar PV Incentive – Program Status

Program Summary

Program Total

Program Total

Systems

108
In Process

1,155
Completed

2,373 kW-DC
Commercial

5,847 kW-DC
Residential

NYSEG

National
Grid

Central
Hudson

ConEd

54%
Consumer
Investment

46%
NYSERDA
Incentives

PowerClerk®
5/13/2009 2:52 PM EDT

Your Partner for Energy Savings
Net Metering for PV Systems

- Allows you to use your energy production to offset your electric consumption over a period of time.
- Power flows into grid and runs the meter backwards when you generate more electricity than you use.
- For residential PV systems (25 kW and less), net excess generation (NEG) in a given month is credited to the next month's bill at the utility's retail rate.
- At the end of the annual billing cycle, customers are paid at the utility's avoided-cost rate for any unused NEG.

Your Partner for Energy Savings
Other Ways to Defray Cost for Residential Renewable Energy

New York Residential Solar Tax Credit

- Credit amount: **25% of qualified expenditures** for a solar electric and solar-thermal system on residential property (includes equipment and installation)
- Credit amount: **20% of qualified expenditures** for fuel cells installed at a principal residence (includes equipment and installation)
- Maximum incentive: $5,000 for solar energy and $1,500 for fuel cells
- Eligible system size: 10kW for solar electric and 25kW for fuel cells
- Any amount of the system cost provided by a grant from any source is not eligible for this credit.
- If the tax credit exceeds state tax liability, the **excess amount may be carried forward** for five years.
Federal Residential Renewable Energy Tax Credit

- Credit of **30% of qualified expenditures** for a system that serves a U.S. residence – does *not* have to be the taxpayer’s principal residence
- Expenditures are treated as made **when the installation is completed** – if installation is on a new home, the "placed in service" date is the date of occupancy by the homeowner
- Expenditures **include labor costs** for onsite preparation, assembly or original system installation, and for piping or wiring to interconnect a system to the home
- **No maximum credit** for systems placed in service after 2008 (for systems placed in service in 2008, maximum credit was $500 per half kilowatt, not to exceed $4,000)
- Systems must be placed in service on or after January 1, 2008, and **on or before December 31, 2016**
- If the federal tax credit exceeds tax liability, the **excess amount may be carried forward** to the succeeding taxable year
# Cost and Payback Example for Residential PV

<table>
<thead>
<tr>
<th>System Size (kW)</th>
<th>Annual kWh</th>
<th>Total Cost</th>
<th>NYSERDA Incentive</th>
<th>NYS Tax Credit</th>
<th>Fed Tax Credit</th>
<th>Total Incentives</th>
<th>Final Cost</th>
<th>Energy Saved/Yr*</th>
<th>Simple Payback</th>
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<td>$35,700</td>
<td>$1,824</td>
<td>19.57</td>
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</table>

* assumes $0.19/kWh
Solar PV Incentive – Project Locations

Systems by Location

Rated Capacity
- more than 142.9 kW DC
- 35 - 142.9 kW DC
- 9 - 34.9 kW DC
- 3 - 8.9 kW DC
- less than 3 kW DC

Your Partner for Energy Savings
Solar PV Incentive – Program Rules

- First come/first served

- Won’t be approved for systems already installed

- Available only to Eligible Installers; must be passed on to customer

- Must be installed by Eligible Installer

- Capped at 8kW for residential systems; 80 kW for non-residential; 25 kW for non-profits, schools and municipalities

- PV system capacity cannot exceed 110% of historical electricity usage

Your Partner for Energy Savings
Solar PV Incentive - Payment Process

• Paid to approved Eligible Installers

• NOT paid directly to owner of PV system

• Entire incentive MUST be passed on to the owner of the PV system by the Eligible Installer

• Eligible Installers in NYS: www.PowerNaturally.org

• Then click “Solar PV Installers”

Your Partner for Energy Savings
Solar PV Incentive – Payment Timing

• In two installments:
  • 75% paid AFTER the equipment is delivered to the installation site; then
  • 25% paid when PV system is grid-connected and approved by your utility.

• NYSERDA reserves right to review any installation prior to final incentive payment

Your Partner for Energy Savings
Program Benefits to Customers

• NYSERDA reviews system design, incentive applications, customer purchase agreement

• Includes easy-to-read digital meter to monitor system performance

• Systems monitored for energy production twice/year for two years

• Installers will inspect system if it’s not operating at specified performance goals

• Full five-year parts and labor warranty

Your Partner for Energy Savings
Why Wind Power?

• All energy production has environmental, economic and socio-political impacts

• Wind power is one of the lowest-impact forms available today

• Basic economics and state/federal incentives make it feasible to offset utility power

<table>
<thead>
<tr>
<th>Electricity Generation</th>
<th>Coal Fired</th>
<th>Gas Fired</th>
<th>Oil Fired</th>
<th>Wind</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWh</td>
<td>350,000</td>
<td>350,000</td>
<td>350,000</td>
<td>350,000</td>
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</table>

<table>
<thead>
<tr>
<th>Fuel Consumed</th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Tons of Coal</td>
<td>180,000</td>
<td>2,500,000</td>
<td>560,000</td>
<td>None</td>
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</tbody>
</table>

| Tons CO₂ Emitted       | 347,673    | 183,446   | 296,433   | 0    |

| Tons NOₓ Emitted       | 865        | 324       | 562       | 0    |

| Tons SO₂ Emitted       | 1,973      | 1         | 2,292     | 0    |

New York Wind Power Education Project
~ Pace Law School Energy Project ~ Citizens Campaign for the Environment ~ NYPIRG ~
Why Wind Power? Environmental Benefits

No Oil, Gas or Coal Exploration and Extraction

Your Partner for Energy Savings
Large Wind vs. Customer-Sited Wind

- **Large Wind Turbines**
  - over 1.5 MW; towers usually over 200 ft
  - electricity sold to utility
  - sited in groups; installed by a developer

- **Customer-Sited Wind Turbines**
  - usually under 100 kW; most are 5 to 10 kW
  - towers usually 80 to 140 ft (lower towers are usually not suitable for New York’s conditions)
  - designed to off-set customer’s purchases of utility electricity

*Your Partner for Energy Savings*
Siting Considerations – Wind Resource

• Good wind resource (> 10 mph or 4.5 m/s)
  • economics improve significantly as wind speed increases (i.e. 8,800 kWh at 10mph site vs. 13,800 kWh at 12mph site—56% more!!)
• Unobstructed exposure from high wind directions
  • obstructions reduce wind speed and cause excessive wear and tear on turbine
• Close to interconnection

Alfred University

Your Partner for Energy Savings
Siting Considerations – Wind Resource

- Most NY counties contain windy sites
- NY Wind Map helps identify site specific wind resource
- Map can be queried and magnified on web site
- Installers can help determine suitability

www.windexplorer.com

Your Partner for Energy Savings
Siting Considerations – Obstructions

- Factors to consider:
  - surrounding terrain, including buildings, trees and topography
  - prevailing wind directions
  - tower height (minimum 80 ft; 120 ft is preferable)

Site turbines at least 30 feet higher than obstructions within 500 feet.
Siting Considerations – Minimizing Impacts

- Minimum 1 acre lot
- Adequate set-backs from residences, property lines, structures, roads, power lines, etc.
- Minimal view shed concerns
- Adequate set-backs from property lines, structures, roads, power lines, etc.
- Zoning restrictions or requirements
- Communicate early with neighbors
Grid Interconnection and Technical Requirements

- **Safety Issues**
  - Must meet electrical codes
  - Must stop supplying power to grid during electrical outages

- **Power Quality Issues**
  - Must synchronize with grid
  - Must match utility power’s voltage, frequency and quality

- **Helpful Information:**
  - Interstate Renewable Energy Council “Connecting to the Grid”

*Your Partner for Energy Savings*
Customer-Sited Wind Economics

- Installed costs
  - $50,000 to $60,000 for a 10 kW machine
  - $15,000 to $20,000 for a 1 kW machine
- Maintenance costs
  - about 1 – 3% of initial installed cost per year
- Payback*
  - typically about 30 years for 1 kW and 10 kW turbines at a 12 mph site with no incentives
  - typically about 10 years for 50 kW turbines at 12 mph sites with no incentives

* Based on electric rates of 14 cents/kWh
Economics of Customer-Sited Wind Power

- Installed costs
  - $2,000 and $6,000 / kW
  - turbine, controller, and tower
- Cost trade-offs:
  - taller tower → more energy
  - rugged/durable design → longevity

- Benefits
  - example: $10 – 40 gross savings per month
- Pay-backs: 6 – 30 years
- Equipment life-times: 10 – 30 years
- Warranties: 2 – 5 years
Customer-Sited Wind – State Funding Incentives

Residential Small Wind Incentives

www.dsireusa.org

BUYDOWNS/GRANTS
- Buydown/Grants
- Buydown/Grants & Net Metering
- Buydown/Grants, Net Metering, & Loans

PRODUCTIVITY INCENTIVES
- Productivity Incentives & Loans
- Net Metering, Loans & Prod. Incentives

MINOR INCENTIVES
- Loans
- Net Metering & Loans
- Net Metering & Prod. Incentives
- Net Metering

Yearly grants through the USDA farm bill are available for Illinois, Pennsylvania, Florida, Iowa, Wisconsin and Ohio.
NYSERDA Customer-Sited Wind Program

- Funding from Renewable Portfolio Standard from 2006 through 2013 (incentives for installing PV, wind, fuel cells, digesters and possibly other technologies)
- $1.5 million per year available in incentives for customer-sited wind systems for first three years

Apple Pond Farm

Your Partner for Energy Savings
NYSERDA Customer-Sited Wind Program

- Must be grid-connected
- Must pay SBC in utility bill
- Easy application process
- First come-first served
- Must be installed by Eligible Installer
- Eligible Installer responsible for submitting applications to NYSERDA

For more information see: www.PowerNaturally.org

Harvest Home Organics

Your Partner for Energy Savings
On-Site Wind – NYSERDA Funding Incentives

NYSERDA - PON 1098

Applications accepted through 12/31/09

The following table lists multiplication factors for incentives. If you fall into any of the categories below, multiply the base incentive level derived from the table above by the multiplication factor in the table below to determine your incentive.

<table>
<thead>
<tr>
<th>Commercial Farms* and Not-for-Profits**, and Municipalities or Counties</th>
<th>Schools or Colleges that Include Wind in Curriculum***</th>
<th>Customers Participating in the Installation</th>
<th>Multiplier for Second or Third Wind Generator at one Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>1.4</td>
<td>0.75</td>
<td>0.4</td>
</tr>
</tbody>
</table>

* Commercial farms must provide evidence that they have at least $10,000 of farm-related average gross sales, excluding any income from leasing land.

** Not-for-profits must show evidence that they have 501(c)(3) status

*** Schools and colleges that include wind in their curriculum must demonstrate sufficient educational benefits to NYSERDA to qualify for the higher incentive level.

Your Partner for Energy Savings
On-Site Wind – NYSERDA Funding Incentives

End-Use Wind Turbines

As of May 7, 2007
How Are NYSERDA Incentives Paid?

• Paid to approved Eligible Installers

• NOT paid directly to owner of wind energy system

• Entire incentive MUST be passed on to the owner of the wind energy system by the Eligible Installer

• Eligible Installers in NYS: http://www.PowerNaturally.org

• Then click “Wind Installers”
When are Incentives Paid?

- In two installments:
  - 65% paid AFTER the equipment is delivered to the installation site; then
  - 35% paid when wind system is grid-connected and approved by your utility.
- NYSERDA reserves right to review any installation prior to final incentive payment
- [http://www.powernaturally.org/Programs/Solar/incentives.asp](http://www.powernaturally.org/Programs/Solar/incentives.asp)
Other Ways to Defray Cost for Wind Energy

Federal Residential Renewable Energy Tax Credit

- Credit of **30% of qualified expenditures** for a system that serves a U.S. residence – does **not** have to be the taxpayer’s principal residence
- Expenditures are treated as made **when the installation is completed** – if installation is on a new home, the "placed in service" date is the date of occupancy by the homeowner
- Expenditures **include labor costs** for onsite preparation, assembly or original system installation, and for piping or wiring to interconnect a system to the home
- **No maximum credit** for systems placed in service after 2008 (for systems placed in service in 2008, maximum credit was $500 per half kilowatt, not to exceed $4,000)
- Systems must be placed in service on or after January 1, 2008, and **on or before December 31, 2016**
- If the federal tax credit exceeds tax liability, the **excess amount may be carried forward** to the succeeding taxable year (up to 2016)
Other Ways to Defray Cost for Wind Energy

**Federal Business Renewable Energy Tax Credit**

- Credit is equal to **30% of expenditures**, with no maximum credit for small wind turbines placed in service after December 31, 2008.

- Maximum credit is $4,000 for eligible property placed in service after October 3, 2008, and before January 1, 2009.

- Eligible small wind property includes wind turbines up to 100 kW in capacity.
Other Ways to Defray Cost for Wind

✔ **NY Energy Smart Loan Fund** (NYSERDA)
  - Up to 4% interest rate reduction
  - Contact a “Participating Lender” see: [www.nyserda.org/lenders](http://www.nyserda.org/lenders)

✔ **Net Metering** – reversing the meter and selling excess energy back to the utility. August 2008 law in New York requires utilities to provide net metering for:
  - biogas projects at farms (500kW or less)
  - residential photovoltaic systems of 25 kW or less
  - non-residential photovoltaic systems of 2 MW or peak load
  - **residential wind turbines of 25 kW or smaller**
  - **farm-based wind turbines of 500 kW or smaller**
  - **non-residential wind turbines of 2 MW or peak load**
## On-Site Wind Power Installed Cost

<table>
<thead>
<tr>
<th>Item</th>
<th>High Cost</th>
<th>Low Cost</th>
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<tbody>
<tr>
<td>Wind turbine &amp; inverter</td>
<td>$27,900</td>
<td>$27,900</td>
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<tr>
<td>Tower (100 ft guyed)</td>
<td>$9,200</td>
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<td>Tower Wiring Kit</td>
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<td>Shipping</td>
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<td>Installation</td>
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<td>Sales Tax, 2%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$49,052</strong></td>
<td><strong>$39,160</strong></td>
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*New York Energy Smart*
On-Site Wind Power Simple Payback

Incentives, Wind Speed and Price/kWh

Example

- 12 mph, 5.4 m/s is class 3 wind power
- 14 mph, 2.3 m/s is class 5 wind power

- Net metering only
- 50% buy-down and net metering

Simple payback (years)

Electric rate (¥/kWh)

11 ¥/kWh
### Cost and Payback Example for On-Site Wind

<table>
<thead>
<tr>
<th>System</th>
<th>Installed Cost</th>
<th>NYSERDA Incentive</th>
<th>Federal Tax Credit</th>
<th>Final Cost</th>
<th>Annual Energy Output</th>
<th>Energy Savings/Yr*</th>
<th>Simple Payback</th>
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<tr>
<td>Bergey Excel 10kW</td>
<td>$49,052</td>
<td>$27,160</td>
<td>$6,568</td>
<td>$15,324</td>
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* assumes $0.19/kWh
Established in 1995, the Database of State Incentives for Renewables & Efficiency is an ongoing project of the North Carolina Solar Center and the Interstate Renewable Energy Council (IREC) funded by the U.S. Department of Energy.
Thank You for Your Attention!

For Further Information Contact:

Chris Carrick
CNY Energy $mart Communities Coordinator
(315) 422-8276  ext. 213
ccarrick@cnyrpdb.org

Your Partner for Energy Savings