Green Jobs: what they are, where they are, and how to get one
By Joe Laquatra

The Clothes are Clean ... but what’s that smell?
By Herb Weisbaum

Portable Electric Heaters: can they reduce annual home heating costs?
By Mark Pierce

Architectural Styles of New Yorks Older Homes: The Gothic Revival
By Mark Pierce

The term “green jobs” is used with increasing frequency by policy-makers, newscasters, writers, and others. But not everyone understands what the term means or how to go about finding a green job.

Generally, green jobs refer to work that increases energy efficiency; produces renewable energy; prevents or mitigates environmental problems; and provides education, consulting, or accreditation in any of these areas. Information on training programs for green careers can be found at the website www.greencareersny.com. This site has information that is specific for individuals, businesses, and workforce professionals.

In the spring of 2010, Green Jobs – Green NY will become a statewide program in New York that will be administered by the New York State Energy Research and Development Authority (NYSERDA). This $112 million program will include a revolving loan fund to finance eligible projects; energy audits and energy-efficiency improvements for homes, small businesses, and non-profit organizations; and workforce training. NYSERDA will work with the New York State Department of Labor, as well as with workforce development and community organizations to provide the training. The focus of the training will be on entry-level jobs, occupational careers, continuing education, advanced training, and apprenticeships.
For updates on this program, visit www.nyservda.org/GreenNY/. On that site you can sign up for the GreenNY listerv and the GreenJobsNY listserv.

Green job opportunities are emerging in many fields, and include power purchasers, carbon traders, renewable energy site assessors, geothermal assessment specialists, renewable energy systems installers, biofuel processing technicians, fuel cell technicians, sustainability coordinators, and many more. There are a growing number of credentialing programs to support green jobs, including the Building Performance Institute, the Interstate Renewable Energy Council, the North American Board of Certified Energy Practitioners, the U.S. Green Building Council, and others.

The expanding field of weatherization training now encompasses apprenticeships, weatherization specialists, envelope and HVAC specialists, energy auditors and diagnosticians, energy improvement contractors, building operators, and business management. All of these jobs are in the private sector and provide decent wages. Green organizations focus on a triple bottom line that consists of finances, social justice, and the environment.

The Green Jobs Guidebook (www.edf.org/cagreenjobs), written by the Environmental Defense Fund (EDF), is specific for California, but is pertinent for other states. It profiles 200 jobs, provides information on job training, placement, and apprenticeship programs. It provides details on 45 job types for high school graduates, with many paying over $25 per hour. The EDF’s Mapping the Green Economy project (http://www.edf.org/page.cfm?tagID=33427) has state maps that graphically show where green jobs are located. Research conducted at the University of Massachusetts indicates that the American Clean Energy and Security Act, coupled with stimulus funds, will lead to a $150 billion investment in clean energy in the U.S. In New York State, this investment is expected to create over 109,000 jobs.

The number of green jobs is projected to grow substantially over the next decade. They will be high quality occupations, with good salaries and few barriers to entry. People interested in these opportunities can prepare for them now, by taking advantage of training programs currently being offered at community colleges, vocational schools, and other places.

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The clothes are clean … but what’s that smell?
Stinky front-loading, high-efficiency washers give consumers ‘the willies’
By Herb Weisbaum

When you buy a new washing machine, you don’t expect it to stink up your house. But that seems to be a common problem for people who own high-efficiency front-loading washers.

Rae Lembersky of Seattle likes her front-loader. It saves water and electricity and gets the family’s clothes clean. But she hated the smell.

“Imagine that you’re in one of those movies where there’s a swamp monster and it’s that kind of swampy, musty, sort of yucky smell.”

Lembersky could see what was causing the stink. She found “black, gooey, slimy stuff” growing inside the rubber gasket which goes around the glass window on the washer door. That was quite a surprise because she regularly cleans the machine and runs loads with bleach and hot water.

“It just gives me the willies,” she says. “I don’t like the thought of mold in my washer.”

Desperate for relief, she hired technician Scott Wiseman to remove and replace the disgusting rubber gasket. Once he took the washer apart,
Wiseman found mold inside the machine, too. The job cost $300.

“It’s a very common problem,” Wiseman tells me. “I get calls about this all the time.

**What’s going on here?**

After a while, all washing machines can have some odor caused by mold, mildew or bacteria. But the problem seems to be worse with front-loaders because they are designed differently from top-loaders.

Front-loaders are tightly sealed. Close the door after removing the laundry and any moisture inside the machine will be trapped inside. With a top-loader the water is more likely to evaporate.

Having the tub on its side, rather than up-and-down, can also create problems.

“Even after it spins everything out, there’s still going to be some water that ends up landing on the gasket. And water sitting on rubber is not a particularly good situation,” explains Consumer Reports deputy home editor Celia Kuperschmid Lehrman.

Consumer Reports subscribers from across the country have complained about smelly front-loaders. In fact, the editors have received so many complaints, they now warn about the problem when they review washers.

I contacted the appliance industry to find out what manufacturers think is causing the odor problem. In a statement, the Association of Home Appliance Manufacturers suggested one more contributing factor:

“Over time, changes have occurred in consumer laundry habits including the use of less bleach, more fabric softener, and more frequent cold water wash cycles. These habits may impact the accumulation of bio-film and other residues, increasing the potential odor, mold and mildew.”

**Solving the problem isn’t always easy**

Seattle homeowner Dennis Hanson has a Kenmore front-loader. He did everything his owner’s manual recommends for proper maintenance and the washer still gave off a “putrid” odor.

Hanson describes it as “a combination of rotten eggs and just really bad stagnant water.” When I was at the Hanson house, the smell filled the laundry room.

Hanson bought a Sears service contract with his washer. Technicians serviced the machine four times and never solved the problem, so I arranged for an independent examination.

Larry Schmidt from Mr. Appliance Service did what the Sears techs didn’t. He took off the front panel and removed the lint filter. It was clogged with lint, coins and other debris which trapped dirty water inside the washer. And that water was nasty.

Once Schmidt cleaned the filter and reinstalled it, the smell went away.

The Kenmore owner’s manual makes no mention of this potential problem. I contacted Sears to find out why. I also wanted to know why their service people had not checked the filter. The company did not respond to my calls and e-mails.

**Preventing the problem**

Manufacturers recommend doing a number of things to reduce or eliminate mold, mildew and odor problems:

- Only use high efficiency (HE) detergent and never use more than the recommended amount.
- Remove wet wash right away.
- Then, keep the door open a bit to let the washer dry out. (Consumer Reports warns this can be a safety problem if you have young children in the house).
Portable electric space heaters are often touted by marketers as a way for consumers to reduce their overall heating bill while remaining warm and comfortable within specific rooms of the home. But is this an accurate prediction? Can homeowners save significant amounts of money on home heating bills by turning down the central heating system thermostat while using portable electric heaters to keep temperatures within one or two main rooms of the house at more comfortable levels? This article will provide information obtained from heat loss calculations as a method to answer that question.

Heat loss calculations were based on an actual 1,232 square feet 1 story residence. The residence was carefully measured to determine the areas of the various components (windows, doors, walls, ceiling, and floors) separating heated from unheated spaces (Figure 1 and Figure 2 on page 5 illustrate the floor plan and section of this residence). The R-values of the components and the annual fuel utilization efficiency (AFUE) of the central heating system was also determined. Information obtained from this process is listed below:

### Walls, Ceiling and Floor
- **Un-insulated wood frame wall**: net area: 992 Sq. Feet, 2x4-16 inch on-center: R-4.23
- **Un-insulated floors between heated living space & unheated basement**: 1,232 Sq. Feet R-3.4
- **Ceiling Flats**: 1,232 Sq. Feet R-13

### Windows & Doors:
- **Windows**: 152 Squared Feet R-3 (this home, built in 1955, like so many older homes, has had replacement windows installed, but no insulation has been retrofitted into wall cavities).
- **Doors**: 40 Squared Feet R-4

### Infiltration (Air Leakage)
- 0.54 Air changes per hour-natural (ACH\textsubscript{natural})

This article originally appeared at msnbc.com on November 19, 2009. It is reprinted with permission.
Figure 1: Floor Plan of 1,232 square feet home that heat load calculations are based upon

Figure 2: Section of house on which heat loss calculations were based
Table 1: Cost to keep entire house at 70° for 3 hours when outdoor temp is 10°

<table>
<thead>
<tr>
<th>Heating Fuel</th>
<th>Unit</th>
<th>Heat content per unit</th>
<th>Cost per unit</th>
<th>Cost for 131,011 BTUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Oil</td>
<td>Gallon</td>
<td>139,000 BTU/gallon</td>
<td>$2.82 per gallon</td>
<td>$2.66</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>Therm (approx. 100 cubic feet)</td>
<td>100,000 BTU/therm</td>
<td>$1.80 per therm</td>
<td>$2.36</td>
</tr>
<tr>
<td>Propane</td>
<td>Gallon</td>
<td>92,000 BTU/gallon</td>
<td>$2.46 per gallon</td>
<td>$3.50</td>
</tr>
</tbody>
</table>

*131,011 BTUs is the amount required to keep the living/family room at 70° for 3 hours when outdoor temp is 10°

Scenario 1:
- How many British Thermal Units (BTUs) are required to maintain the temperature of this 1,232 square feet, 1 story home at 70° for a three hour period when the outdoor temperature is 10°?
- What would be the cost of supplying these BTUs from the following home heating fuels:
  - Fuel Oil?
  - Natural Gas?
  - Propane?

Results of calculations that answer above questions are presented in Table 1 above.

Scenario 2:
- How many BTUs are required to maintain the temperature of this house at 60° for a three hour period when the outdoor temperature is 10°?
- What would be the cost of these BTUs from:
  - Fuel Oil?
  - Natural Gas?
  - Propane?

Results of calculations to answer these questions are presented in Table 2, below.

Table 2: Cost to keep entire house at 60° for 3 hours

<table>
<thead>
<tr>
<th>Heating Fuel</th>
<th>Unit</th>
<th>Heat content per unit</th>
<th>Cost per unit</th>
<th>Cost for 100,479 BTUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Oil</td>
<td>Gallon</td>
<td>139,000 BTU/gallon</td>
<td>$2.82 per gallon</td>
<td>$2.06</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>Therm (approx. 100 cubic feet)</td>
<td>100,000 BTU/therm</td>
<td>$1.80 per therm</td>
<td>$1.81</td>
</tr>
<tr>
<td>Propane</td>
<td>Gallon</td>
<td>92,000 BTU/gallon</td>
<td>$2.46 per gallon</td>
<td>$2.69</td>
</tr>
</tbody>
</table>

*100,479 BTUs is the amount required to keep the house at 60° for 3 hours when outdoor temp is 10°

You can see from comparing results in Tables 1 and 2, that reducing the thermostat setting in this house from 70° to 60° would reduce heating costs. Heating costs over the 3 hour period would be reduced from $2.66 to $2.06 if fuel oil is consumed, from $2.36 to $1.81 for natural gas and from $3.50 to $2.69 for propane. We would expect this to be true, so there are no surprises from the results of these calculations.
Scenario 3:
The central heating system is set at 60° while a portable electric heater is placed in the living/family room of this house to keep that space at 70° for 3 hours\(^1\).

Figure 3 and Figure 4 on page 8 provide detailed information on this scenario. Keep in mind that the thermostat is not in the same room as the portable electric heater. This means that the central heating system would maintain the temperature of the entire house (including the living room) at 60° while the electric heater provides additional heat to keep just the living/family room 10° warmer - 70°.

Results from heat loss calculations for Scenario 3 show that 3,487 BTU/Hour would be required to keep the temperature of the living room at 70°. This would require 10,461 BTU from a portable electric heater over a 3 hour period. This is equivalent to 3.06 kWh of electricity (1kWh = 3,413 BTU). Assuming a cost of $0.17 per kWh for electricity (average statewide cost of electricity in 2007 in New York) the cost for this 3.06 kWh would be $0.52. Table 3, below, illustrates savings/costs.

Table 3: Keep just living room at 70° using electric heater

<table>
<thead>
<tr>
<th>Central heating system fuel</th>
<th>Cost to keep house at 60° with central heat system for 3 hours</th>
<th>Add cost of electricity to keep living room at 70°: $0.52</th>
<th>Cost of fuel to keep entire house at 70° for 3 hours with central heat system</th>
<th>Money saved/lost using electric heat to keep living room at 70°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Oil</td>
<td>$2.06</td>
<td>$2.58</td>
<td>$2.66</td>
<td>8 cents saved</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>$1.81</td>
<td>$2.33</td>
<td>$2.36</td>
<td>3 cents saved</td>
</tr>
<tr>
<td>Propane</td>
<td>$2.69</td>
<td>$3.21</td>
<td>$3.50</td>
<td>29 cents saved</td>
</tr>
</tbody>
</table>

Annual estimated savings for keeping the entire house at 60° all the time using the central heating system while keeping the living room at 70° for 3 hours each evening using a portable electric heater:

- **Fuel Oil**: $20, equal to 1.4% annual savings
- **Natural Gas**: $8, equal to 6/10 of 1% of savings
- **Propane**: $54, equal to 3% of savings

These estimated savings are based on mathematical calculations derived from a set of assumptions related to the rate of heat loss for the illustrated house. While the calculations used to obtain the above numbers have been used by engineers for decades to predict the amount of heat loss in buildings and to size heating systems, they are not an absolutely precise prediction of the amount of heat, and the cost of the heating fuel that a building will actually consume. There are several variables that the calculations do not capture. There is no adjustment made for internal heat gains within the building, the heat produced by lights and people in the building for example. The calculations also assume completely static conditions, that occupants never adjust the heating system thermostat up or down and that there are precisely 6,000 heating degree days per heating season. However, by doing these calculations we can make an educated guess about whether significant savings are possible from using portable electric heaters for supplemental heating within one or two rooms of a home.

While calculations and models of real-world conditions can never be completely precise, they are much more reliable and likely to reflect reality than the claims of marketing campaigns. Even if the predicted savings shown above are off by a factor of 2, few people would describe them as significant savings.

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\(^1\) A three hour time period in the evening was chosen because it coincides with prime time TV, 8:00pm to 11:00pm, a time when people are likely to be in a single room of a home.

\(^2\) The total annual heating - degree day method was used to calculate annual savings throughout the heating season for keeping the whole house at 60° while using a portable electric heater to keep just the living room at 70° for a 3 hour period each evening. Note that the savings per evening cannot simply be multiplied by the number of days in the heating season to obtain total annual savings. This is because the outdoor temperature will not be 10° every evening, but will change from day to day.
Figure 3: Floor plan illustrating heat losses from livingroom at 70° with remainder of house at 60°

Figure 4: Section illustrating heat losses from livingroom at 70° with remainder of house at 60°
Why are the predicted savings so small? It seems intuitive that if you turn down the central heating system, a giant in comparison to a small, portable electric heater, and then use that electric heater to keep a much smaller portion of the house just 10° warmer, that savings would be significant. Not only is the electric heater much smaller than the central heating system, it is also 100% efficient at converting electricity to heat, unlike the central heating system in our example home that is only 80% efficient at converting various fossil fuels to heat.

Table 4 provides information that illustrates why the savings are so small.

Electricity costs 2.4 times more per BTU than fuel oil, 2.8 times more than natural gas and 1.8 times more than propane. Even after factoring in the inefficiencies of an 80% AFUE central heating system, electricity is still 2 times more expensive than fuel oil, 2.3 times more than natural gas and 1.5 times more than propane.

Electricity is so expensive because it is a secondary form of energy, meaning that a primary form of energy - burning fossil fuels to power a generator for example - must first be consumed to make electricity. By the time electricity gets to your home from a power plant, about 70% of the energy consumed to create it has been lost due to generation and distribution system inefficiencies. Those inefficiencies are reflected in the price you pay for electricity.

The best options for significantly reducing home heating costs are to reduce air infiltration-exfiltration through the building envelope by sealing holes and cracks, increasing thermal insulation levels in walls, ceilings and floors and updating home heating equipment with newer, more efficient equipment. Calculations performed on the example home highlighted in this article show that if air infiltration were decreased by 50%, wall insulation increased to R-11 and ceiling insulation to R-50, the central heating system could maintain the temperature of the entire home at 70° throughout the heating season and annual heating costs would still be reduced to about $743. That is a reduction from $1,431, a 48% reduction, or an annual savings on home heating costs of $688. That’s a significant savings.

<table>
<thead>
<tr>
<th>Table 4: Cost comparisons of common heating fuels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Cost per 100,000 BTU</td>
</tr>
<tr>
<td>Heat system inefficiency penalty</td>
</tr>
<tr>
<td>Cost per 100,000 BTU delivered to space</td>
</tr>
</tbody>
</table>
The Gothic Revival style, popular in the United States between 1840 and 1880, never reached the popularity that the Greek Revival style did, but examples can still be found throughout the Northeast and especially in rural areas of upstate New York.

Many architectural historians attribute the beginning of the style to England in the mid 1700s. The Gothic Revival style takes its inspiration from the architecture of the European middle ages, a period when the Roman Catholic Church was the dominant organization across much of Europe. Because the Catholic Church was so dominant and relatively wealthy, church buildings - cathedrals and monasteries - were the largest and most elaborately designed structures. The shape and decoration of these structures provides the inspiration for Gothic Revival style buildings.

Andrew Jackson Downing is credited with popularizing the Gothic Revival style in the United States. However it was architect Alexander Davis who designed and constructed the first Gothic Revival style residence in the United States. Davis also wrote a book in 1837 promoting the style. But two patterns books, Cottage Residences 1842 and The Architecture of Country Houses 1850 written and tirelessly promoted in public lectures by Downing are attributed with making the style widely popular.

The Gothic Revival style was seldom applied to city residences for two reasons. First, because Davis and Downing stressed its suitability as a rural house; second, with its emphasis on high multiple gables and porches, it did not fit on narrow urban lots. The Gothic Revival style started to decline in houses after 1865.

High Style vs. Builder Style

High style examples of gothic revival style architecture are larger and more striking than what is known as builder style versions. The very wealthy were able to hire architects to design elaborate and highly decorative homes. They could also afford the cost of more durable materials than the typical middle class person. The home of Ezra Cornell, shown in Figure 3 on page 11, provides an example of a high style gothic revival residence.

But it was not only the wealthy who wanted a house designed in the style of the day. Trades people and farmers also wanted homes that reflected the latest architectural style. While they could not afford to pay professional fees to have a custom designed home, they could take advantage
Figure 3: Example of High-Style Gothic Revival

Figure 4: Abandoned Farm House in Lafayette, NY, Example of Builder Style Gothic Revival
of the many basic designs in plan books such as those published by Andrew Jackson Downing.

The house shown in Figure 4 is an abandoned farmhouse located in LaFayette, NY. While it certainly would not be described as high-style Gothic Revival, you can see that it has many of the distinctive features of Gothic Style architecture.

While many folks could not afford to purchase, or have the decorative moldings such as window labels and verge boards built, it did not stop them from attempting to emulate those aspects of the Gothic Revival Style. The older farmhouse shown in Figure 5 provides an example. Notice that this simple house has the basic shape of a Gothic style and that the builder did create a decorative style facia that somewhat mimics verge board on the gable edges. Also, remnants of a finial remain in the peak of the gable.

Most Gothic Revival style houses in the United States were built between 1840 and 1870. The popularity of this style quickly declined as the Italianate style gained popularity (more on the Italianate style in the next issue of HHE-News).

Figure 5: Farm house near Ithaca, NY