

Energy Audit Report
Lee Recycling Center
Office and Facility
11 Recycling Center Rd, Lee NH
August 16 & 17, 2011



SDES Group
2 Washington Street
Suite 206
Dover, NH 03820
603-617-3767



Recycling Center Office and Facility

Main Building Description:

Building: 1 Story
Year built: 1850
Foundation: Granite slab
Framing: Prefab Metal
Roof: Gable
Exterior: Pre-finished corrugated metal

Interior: Wall Board, Drywall
Flooring: Concrete slab
Bathrooms: One
Heat: Propane Gas, Forced Hot Air
A/C: Yes

Finished area: 1080 Sq. Ft.

Test Results:

| Blower Door Reading |
|-------------------------------------|
| Winter-time conditions: 2229 CFM 50 |

| Air Sealing Limit |
|--|
| Building Airflow Standard: 1673 CFM 50 |
| Ventilation required for occupants: 60 cfm |
| Ventilation required for building: 109 cfm |

1. Roof System



Existing Conditions:

- The roof structure consists of steel rafters. There is 8” of open rafter depth (beyond the existing insulation).
- There is 2” of fiberglass insulation (R-value 2.8 per inch) below the metal roof surface, held in place with a reinforced plastic air/vapor barrier (similar to Tyvec), creating a “hot” roof system.
 - This system is not an effective thermal barrier, as snow on the roof is melted quickly through heat conduction.

Recommendation:

- Add a minimum of 4” closed-cell spray foam insulation (R-value 6.2 per inch) providing a minimum aggregate R-value of 30.

2. Heating Ventilation and Air Conditioning / Furnace Room

Existing Conditions:

- There is a Bryant Air Conditioning unit located at the exterior (front) of the office.
 - Model 597CN024 – F
 - Power Supply 208/230 Volts/AC
- There is a shed off of the utility room with a safety shower and eye bath

Recommendation:

- Install pipe wrap on the water pipes for the safety shower and eye bath
- Spray closed cell foam in the shed area
- **See Recommendations provided by Revolution Energy for heating system and electrical generation improvements**
- Ensure that floor, ceiling or wall registers are not blocked by furniture or other related items. If they are blocked the heating or cooling system will not function to its peak performance when it was installed.

3. Mechanical and Electric Systems / Pump Room

Existing Conditions:

- Torna – Tech Main Pump – Electric Fire Pump Controller
- Automated hydraulic pump sprinkler system
- There’s an access hatch to a half-basement/crawl-space with a 30,000 gallon back-up water supply for the hydraulic pump sprinkler system
- A 50 kw capacity back-up generator is necessary for:
 - the hydraulic pump sprinkler system
 - 20 horse power compactor motor
 - Bailers – One 20 horse power; One 30 horse power
 - A large-scale capacitor is necessary
 - Without electricity trash can be placed in open-top containers
 - At least one is kept open during the winter
- 5,000 watt back-up generated is needed for the other typical office electric demands (lights, etc.)
- Wall insulation 2” loose fill fiberglass (R-value 2.8 per inch) enclosed in reinforced plastic air/vapor barrier.
- There is an access hatch to the exterior with no insulation.
- 5” water pipes pass through the wall to the exterior

Recommendation:

- Air seal and weatherize the access hatch to the exterior
- Air seal around the 5” water pipes at the exterior wall.

4. Walls

Existing Conditions:

- The walls are a combination of pre-finished corrugated metal on the exterior with, 2” of fiberglass insulation within a reinforced plastic air/vapor barrier.
- The office space has additional insulation and drywall installed.

Recommendation:

- The greatest benefit per cost is derived from air sealing and insulating at the basement/crawl space and the attic level – where the building pressures and air infiltration and exfiltration are the greatest. The benefit per cost of accessing and installing additional wall insulation is marginal and is not recommended at this time.

5. Doors

Existing Conditions:

- There are two metal exterior doors to the office

Recommendation:

- Add weatherization door kits to the exterior doors

6. Windows

Existing Conditions:

- The office area has a combination of double glazed (5/16” space) windows at the front and side and fixed windows, double glazed on the side facing the recycling facility

7. Lighting – Interior

Existing Conditions:

- There are fluorescent light panels throughout the office with energy efficient T-8 bulbs.
- The recycling facility space has 19 fluorescent lighting panels on occupancy sensors

Recommendation:

- Change the recycling facility fluorescent panel lighting from occupancy sensors to lumen sensors, each on their own circuit
 - to provide lighting when necessary, and reduce electric costs.
- Install an override switch at the office.

8. Compactor Area Crawl-Space



Existing Conditions:

- The compactor generators are heated during the winter months with electric heaters in an un-insulated crawl space with an open-air access way.
 - Electric costs for heating the compactor generators is \$300 / month.

Recommendation:

- Add 3” of closed-cell spray foam at the ceiling (R-6.2 per inch) and cover the steel joists and beams with 1” of closed-cell spray foam.
- Frame the generator crawl space side walls with ½ “ plywood to the exterior, and 2 x 3 framing (flush to the interior surface of the pylons).
 - Insulate the stud bays with 2 1/2” spray foam (R-6.2 per inch and air sealing) to the surface of the framing, then 2” rigid foam insulation over the 2x3 framing (creating a more durable surface, with some reflective heat benefit).
- Frame the front wall with 2 x 4’s at the front pylon (& before the container attachment flange), plywood to the exterior and rigid board insulation.

9. Maintenance Building – Detached



Existing Conditions:

- The building is heated with recycled waste oil
- There are plans to build a shed roof building off of the side of the maintenance building for an expanded swap shop (26’ wide x 12’ deep).

- The new swap shop is planned to have R-30 walls and R-50 roof insulation
- There is sufficient waste oil to heat both the maintenance building and the planned new swap shop.
- Another heating system is anticipated to be paid for by the grantor of the waste oil.

Electrical Office Machines and Appliances

Recommendation:

- When replacing these units opt for an energy star unit. (Energy Star units are certified by the federal government to have met certain energy reduction criteria.)
- Utilize automatic computer shutdown systems to turn off all computers at the end of each day
- Turn off all, printers, cable modems, TVs and other media equipment when not in use.
- Quarterly clean refrigerator coils. This will ensure the appliance is running in its intended condition.
 - A good way to remember this, is when you get your property tax you'll know it's time to clean the refrigerator coils!

Lee Recycling Center– Energy Efficiency Recommendations

In order from highest to lowest priority

1) *Enclose and insulate Compactor Area- Crawl Space*

- Add 3” of closed-cell spray foam at the ceiling (R-6.2 per inch) and cover the steel joists and beams with 1” of closed-cell spray foam.
- Frame the generator crawl space side walls with ½ “ plywood to the exterior, and 2 x 3 framing (flush to the interior surface of the pylons).
 - Insulate the stud bays with 2 1/2” spray foam (R-6.2 per inch and air sealing) to the surface of the framing, then 2” rigid foam insulation over the 2x3 framing (creating a more durable surface, with some reflective heat benefit).
- Frame the front wall with 2 x 4’s at the front pylon (& before the container attachment flange), plywood to the exterior and rigid board insulation.

2) *Insulate Roof system over office space*

- Add a minimum of 4” closed-cell spray foam insulation (R-value 6.2 per inch) providing a minimum aggregate R-value of 30.

3) *Insulate and air seal Mechanical and Electric Systems/Pump Room components*

- Air seal and weatherize the access hatch to the exterior
- Air seal around the 5” water pipes at the exterior wall.
- Weatherize the attic hatch 4” rigid foam board, door gasket, and hook and eye

4) *Lighting sensors modifications*

- Change the recycling facility fluorescent panel lighting from occupancy sensors to lumen sensors, each on their own circuit (around 30 units)
 - to provide lighting when necessary, and reduce electric costs.
- Install an override switch at the office.

5) *Construct new swap shop and insulate detached Maintenance Building*

- The new swap shop is planned to have R-30 walls and R-50 roof insulation
- There is sufficient waste oil to heat both the maintenance building and the planned new swap shop.
- Additional waste oil heating system is anticipated to be paid in part by NH DES grant program.

5) Door weatherization

- Add weatherization door kits to the exterior doors

6) HVAC maintenance

- Install pipe wrap on the water pipes for the safety shower and eye bath
- Spray closed cell foam in the shed area
- Ensure that floor, ceiling or wall registers are not blocked by furniture or other related items. If they are blocked the heating or cooling system will not function to its peak performance when it was installed.

7) Electrical Office Machines and Appliances

- As aging units need replacement, opt for an energy star unit. (Energy Star units are certified by the federal government to have met certain energy reduction criteria.)
- Utilize automatic computer shutdown systems to turn off all computers at the end of each day or when idle.
- Turn off all, printers, cable modems, TVs and other media equipment when not in use.
- Consider plugging all appliances into a central power strip and turn off when leaving room.
- Quarterly clean refrigerator coils. This will ensure the appliance is running in its intended condition. Also, fill empty milk jugs to increase the mass inside the refrigerator, it will increase its efficiency and help it maintain a constant temperature.
 - A good way to remember this, is when you get your property tax you'll know it's time to clean the refrigerator coils!