



Connecticut Lawn Equipment
Exchange Fund:
Final Report

—Prepared for:
Connecticut Department of Energy
and Environmental Protection
Bureau of Air Management

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Executive Summary

Background

In 1999, Connecticut, New York, and New Jersey filed an interstate air pollution case against a Midwestern power generator. Four years later, a Federal Judge ruled in favor of these states, finding that the company had violated certain Clean Air Act (CAA) provisions. The resulting settlement funds were to be allocated to a Supplemental Environmental Projects (SEP) that would reduce local emissions of haze- and smog-forming air particles and other pollutants in Connecticut.

Using \$550,000 of these SEP funds, the Connecticut Department of Energy and Environmental Protection (DEEP) implemented the Lawn Equipment Exchange Fund (LEEF). Launched in 2010, LEEF incentivized municipalities and regional school districts to exchange their old, high-polluting lawn and grounds maintenance equipment for new, lower-polluting machines. The project reimbursed municipalities for 80 percent of the purchase price for the equipment exchanges found to provide the most cost effective pollution reductions.

Scope

LEEF specifically targeted emissions of total hydrocarbons (THC) and nitrogen oxides (NO_x)—air pollutants that contribute to local smog and haze formation. The program was open to Connecticut's 169 municipalities and 17 regional school districts; individuals and private entities were not eligible to participate. Equipment eligible for exchange were lawn and grounds maintenance equipment powered by engines with less than 25 horsepower. The project further required that new equipment must meet the U.S. Environmental Protection Agency's (EPA's) nonroad small spark-ignition Phase 3 standards or the California Air Resources Board's (CARB's) small offroad engine Tier III standards. Machines that operate solely in winter (e.g., snow blowers) were excluded from consideration because Connecticut's ozone issues are limited to warmer months in the spring, summer, and fall.

Participation

Over the course of a three-month enrollment period running from September 10 through December 10, 2010, 82 municipalities and 4 regional school districts submitted applications for a total of 929 proposed equipment exchanges. Project funds reimbursed 80% of the purchase price for 328 equipment exchanges that were approved for 71 different municipalities or regional school districts. Overall, the project paid out \$447,000 for the purchase of new, lower-polluting lawn and grounds maintenance equipment. Awards ranged from \$100 to \$24,700 per piece of equipment.

Major Findings

The LEEF program achieved a projected reduction of nearly 49 tons of THC and NO_x combined over the lifetime of the exchanged machines. The cost-effectiveness across the whole program worked out to approximately \$9,000 per ton of offset THC and NO_x. Exchanges involving smaller pieces of equipment (e.g., leaf blowers and trimmers) typically outperformed larger machines (e.g., ride-on mowers) in terms of cost-effectiveness, though exchanges involving larger machines contributed far more in terms of the absolute amount of emissions reduced.

Project Scope

The LEEF project was developed and implemented by DEEP, Bureau of Air Management. This section reviews important elements of the project's scope, including roles and responsibilities of those designing, implementing, and administering the LEEF program; program specifications in terms of eligible entities, equipment, exchanges, scrappage procedures, and equipment purchasing; and major program milestones.

Roles and Responsibilities

Three parties shared responsibilities relating to the design, administration, and implementation of the LEEF program:

1. **Connecticut Department of Energy and Environmental Protection (DEEP):** Oversaw the entire project; advised on important aspects of the project scope, including eligible equipment, scrappage plan, and awards criteria; helped resolve unanticipated issues; confirmed final list of awardees; reviewed and approved all outreach messages, award notifications, and payment requests; and monitored the program's email account.
2. **De la Torre Klausmeier Consulting, Inc. (dKC), prime contractor:** Directly oversaw all subcontractor activities.
3. **Eastern Research Group, Inc. (ERG), subcontractor:** Implemented many activities identified in the project implementation plan; coordinated with DEEP on project status; assisted municipalities with participation (e.g., enrollment, scrappage, and reimbursement); developed and implemented emissions estimation methodology and cost-effectiveness rankings; and helped review applications and reimbursement requests for DEEP-approved projects.

Program Specifications

LEEF was developed and administered in a manner consistent with DEEP's Policy on Supplemental Environmental Projects (SEP). DEEP officials and ERG worked together to establish the program scope, from eligibility criteria through reimbursement procedures. The following sections outline these key program features.

Eligible Entities

According to the original Project Implementation Plan:

“Only Connecticut municipalities are eligible to participate in LEEF. Municipalities that contract out their lawn and grounds maintenance services are eligible, but only if the contractor uses municipality-owned equipment. Purchases may be made by any department within a municipality (e.g., public works, schools, parks and recreation) provided that the equipment is ultimately owned by the municipality.”

In practice, however, this language revealed a discrepancy in coverage for municipalities whose school districts were part of larger, multi-municipality regional school systems. Therefore, the program was expanded to allow regional school districts to apply as independent entities. With that adjustment, eligible participants totaled 169 municipalities and 17 regional school districts. Within each

municipality’s application, there was no limit to the number of departments that could propose equipment exchanges.

LEEF program officials received several inquiries regarding eligibility of other entities. Examples of groups that inquired about eligibility but ultimately did not receive permission to participate in the first round of funding included:

- A privately-owned condominium and golf course community spanning multiple municipalities
- A regional consortium of municipalities attempting to apply under a single cover
- A regional education council receiving a mix of local, state, federal, and private funding
- A municipal housing authority receiving funding from tenants rather than from municipality-wide tax payers

Eligible Equipment

To set bounds on the universe of equipment covered by this program, LEEF application instructions initially listed only the following equipment categories—as used in the state’s “Lawn and Grounds Maintenance Contract”—as eligible:

- Lawn mowers (ride-on and walk-behind)
- Tractors
- Leaf blowers and vacuums (backpack and non-backpack)
- Chainsaws
- Pole saws
- Shredders and chippers
- Trimmers
- Edgers
- Pruners
- Brushcutters

Further, all equipment had to:

- Have engines with less than or equal to 25 horsepower (hp) (19 kilowatts [kW]); and
- Meet one or both of the following emission standards:
 1. U.S. Environmental Protection Agency (EPA) nonroad small spark-ignition engine Phase 3 standards
 2. California Air Resources Board (CARB) small offroad engine Tier III standards

Provided a machine met the above-listed eligibility requirements, no limitations were placed on its model year.

From the outset of the program, instructional materials made clear that applicants were allowed to petition LEEF officials to consider equipment exchanges falling outside of the original list. Always-excluded categories included snow blowers and snow throwers, utility vehicles, generators, replacement engines, and engine-less equipment (e.g., snow plows, equipment trailers). Snow blowers and snow throwers were excluded due to their sole use in winter months, which precluded them from contributing to summertime ozone levels. On the other hand, frequently petitioned equipment categories receiving approval for consideration included:

- Groomers
- Overseeders, sod cutters, slicers, and thatchers
- Sprayers
- Field line painters
- Plate compactors

Finally, both propane- and diesel-powered engines were eligible to be replaced under the LEEF program. Although diesel engines are not covered by EPA’s Phase 3 standards, the potentially substantial emission reductions associated with replacing diesel engines resulted in LEEF specifications being expanded to allow for their inclusion.

Eligible Exchanges

Eligible exchanges were limited to those that were “one-for-one” or “like-kind.” In general, this meant that the program would only provide reimbursement for a proposed new machine similar to that which would be scrapped. In practice, the level of similarity between exchanges was flexible, especially when the new equipment resulted in a decrease in power or size. For example, some large walk-behind mowers were exchanged for small ride-on mowers, and some backpack leaf blowers were exchanged for push blowers.

Ultimately, the determining factor in whether a piece of equipment was considered a suitable replacement for its retired counterpart was largely driven by the match-up between the two machines’ functions and capabilities. Municipalities were reminded that even if a proposed exchange was allowed for consideration, changes that significantly increased horsepower from an old to new engine were likely to decrease calculated air quality benefits, and thus negatively affect an exchange’s likelihood of being awarded. On the other hand, “down-sizing” equipment, or exchanging a larger old machine for a smaller new machine, often served to improve an exchange’s chance at receiving an award.

Broken or nonfunctioning machines were not eligible to be considered for an exchange. Instructions and certification language required municipalities to confirm that their old machines were functioning at the time of the proposed exchange; however, LEEF officials did not examine engines and equipment for functionality prior to scrapping.

Finally, recently completed purchases could not be submitted for funding retrospectively. Only prospective exchanges were considered.

Scrappage Requirements

The LEEF program required that all old equipment being replaced by new machines had to be fully scrapped and permanently removed from the marketplace as an emitter. At the time of award notification, awardees were provided with a complete set of instructions outlining the steps necessary for receiving their 80 percent reimbursements. Any deviations from these requirements, the entities were warned, could result in disqualification from the program and all associated reimbursements. This was especially emphasized with regard to old equipment scrappage, with the instructions warning:

Reimbursements will not be awarded to municipalities that cannot prove old equipment was scrapped according to project requirements!

Program scrappage requirements were as follows:

- 1. Old equipment.** All old equipment had to be scrapped within three months of receipt of new equipment. In order for the program to achieve its intended air quality benefits, old engines were prohibited from re-entering the marketplace. Therefore, participants were instructed to dispose of their old equipment at scrap metal facilities and to provide sufficient documentation to LEEF officials so as to enable them to determine that a specific item had been scrapped. Such documentation ideally involved copies of itemized receipts clearly listing each piece of equipment scrapped (e.g., by serial number or model number), the scrapped equipment's weight, the dollar amount of reimbursement (if applicable), and the date of scrapping. When receipts were unavailable, notes listing each piece of equipment scrapped signed by a scrap facility official were deemed acceptable. Additional documentation, such as photos of wrecked equipment, were accepted but not required.
- 2. Waste oil and gasoline.** All oil and gasoline remaining in an engine at the time of equipment scrapping was encouraged to be reused where possible. Where not, reimbursement materials provided entities with resources for determining the best procedures for managing these fluids. Further, all parties filing for reimbursement were required to certify that waste fluids from scrapped equipment were handled according to applicable environmental regulations.

When submitting reimbursement materials, entities were required to provide the following documentation as evidence of their having followed the above-listed steps: 1) contact information for the scrap facility used to scrap old equipment; 2) a signature certifying that all entered information was valid and true, all old oil and gasoline was acceptably recycled or disposed of, all old equipment was scrapped according to listed project standards, and all scrapped equipment was rendered unusable; and 3) scrapping receipts for each exchange. Until all steps were completed, LEEF officials would not process a request for reimbursement.

Purchasing Options and Pricing

Program participants were allowed to purchase their new equipment through a state-wide equipment purchase contract or directly from vendors. If participants purchased equipment from the state contract, they deferred to the procurement procedures outlined therein. Otherwise, procurement procedures were specific to the requirements mandated by individual entities.

As outlined in the LEEF program instructions, awards were issued based on the calculated cost-effectiveness of air quality improvements per exchange. Therefore, proposals with inflated equipment costs would be ranked lower than exchanges proposing lower-priced alternatives. In general, applications displayed equipment prices that were fairly similar across participants and their respective vendors.

At the time of award notification, participants were reminded that the LEEF program would only reimburse awardees at 80 percent of the *original* proposed price, or at 80 percent of the actual purchase price if the latter were lower. Participants were not reimbursed for amounts above that which they had been awarded, and thus were responsible for covering a greater percentage of the cost if the purchase price was higher than the originally quoted price. This stipulation benefited the program two-

fold, as it discouraged applicants from (1) submitting unrealistically low prices during the application process and (2) submitting inflated prices after having been approved for an exchange.

Ranking of Exchanges

Following the close of the enrollment period, all submitted exchanges were compiled into a database. For equipment with engine family numbers listed in the Equipment Inventory Form—necessary for all new equipment and listed for all old equipment where available—exhaust emission factors for total hydrocarbons (THC), nitrogen oxides (NO_x), and carbon monoxide (CO) were identified from values published in EPA’s then-current nonroad small spark-ignition database and CARB’s certification database for small spark-ignited engines. Where old engine family numbers were unavailable either due to equipment age or missing labels, emission factors were assigned based on assumptions made in EPA’s NONROAD model. This model estimates air pollution impacts of nonroad engines, equipment and vehicles, or development of nonroad emission inventories by professional mobile source modelers.

For each proposed exchange, ERG calculated emissions over the remaining useful life of the equipment of interest. Emission benefits for the proposed exchanges were calculated by subtracting the total emissions for the new equipment from the total emissions for the old equipment. Cost-effectiveness was determined for each exchange by dividing the summed THC and NO_x values by the equipment’s 80 percent cost of reimbursement, and exchanges were then ranked based on this cost-effectiveness figure.

For a more detailed discussion of the methodologies used to estimate emissions and determine the overall cost-effectiveness of proposed exchanges, refer to Attachment 7: LEEF Emissions Estimation Methodology.

Milestones

This section lists major LEEF milestones, running from program inception through program completion (see table below). A detailed discussion of the administration and implementation procedures surrounding these events follows in the next section.

LEEF Timeline	
Deliverable	Date Completed
<i>Task 1: Refine Project Implementation Plan</i>	
Final Project Implementation Plan	September 2010
Final project timeline	
Verified list of equipment eligibility requirements	July 2010
<i>Task 2: Develop Outreach Materials and Promote Project</i>	
Application forms, reimbursement forms, and information sheets	August 2010
Distribution lists for municipalities and other groups	

LEEF Timeline	
Deliverable	Date Completed
<i>Task 3: Process Application Forms and Prepare Preliminary Ranking of Applicants</i>	
Summary of application forms and of key data	December 2010
Preliminary ranking of applicants	March 2011
<i>Task 4: Notify Municipalities of Awards and Monitor Equipment Replacement Activity</i>	
Notification of municipalities selected to participate	March 2011
Monitoring of project implementation	September 2010–
Monthly updates to DEP	August 2012
<i>Task 5: Process Reimbursement Requests and Prepare Final Summary Report</i>	
Payments on all completed reimbursement requests	April 2011 – August 2012
Final project report and all supporting information	November 2012

Official Launch

LEEF officially launched on September 10, 2010, with a press release issued by the Governor’s office and a direct mailing to municipalities. A “soft launch” took place several months prior at the Connecticut Association of Street and Highway Officials (CASHO) Equipment Technical Show in May 2010. There, a DEEP official distributed fact sheets, provided contact information to interested parties, and encouraged potential participants to consider the program’s reimbursement funds when planning future equipment purchases.

Enrollment Period

The initial enrollment period for LEEF spanned a three-month window from the official launch date through December 10, 2010. During this period, LEEF officials reached out to municipalities to increase awareness about the program through organizations such as the Connecticut Council of Small Towns (COST) and the Connecticut Conference of Municipalities (CCM). In addition, the LEEF Help Line (telephone and e-mail) served as a means for fielding program inquiries regarding participant and equipment eligibility. Finally, LEEF officials worked with participants to ensure all necessary application materials had been properly completed by the close of the enrollment period. Allowances were made for applicants who had submitted their materials by the program deadline to make any necessary information revisions. However, no new applications were accepted after December 10, 2010.

Program materials mentioned the possibility of a second enrollment period pending initial participation levels and subsequent funding availability. However, program engagement was sufficiently high in the first enrollment phase that, without additional funds being allocated to the program, the need for additional enrollment periods did not materialize.

Award Notification

The evaluation and ranking of proposed exchanges based on the cost-effectiveness of their estimated emissions reductions took place between January and March of 2011. All program applicants were notified of their award status by email on March 24 and 25, 2011. For awarded applicants, approval notifications included reimbursement instructions, a timeline for reimbursement procedures, and a table clearly outlining the specific exchanges that had been awarded; for many participants, awards were issued for only a subset of their originally proposed exchanges. Applicants that failed to receive an award were emailed a notification that included an explanation of the awards process and a reiteration of the high level of demand for program funds. Further details about notification content for both parties are discussed in later sections of this report.

Reimbursement Period

The initial reimbursement period was slated to run from award notification (March 2011) through March 31, 2012. During this time, awardees were to scrap their old equipment, purchase their new equipment, and submit all necessary forms to LEEF officials in order to receive their reimbursements. However, the original deadline was extended by several months to July 13, 2012, in order to accommodate interested participants that had not yet submitted their materials, as well as a select few municipalities that had been issued a second round of awards in the spring of 2012.

Program Implementation

Implementation of the LEEF program took place in three phases: outreach and promotion; enrollment and awards; and purchase and reimbursement. These phases, and the tasks and responsibilities associated with each, are outlined in the following sections.

Phase I: Outreach and Promotion

Phase I of the LEEF program entailed a significant amount of process development on the back end of the program in tandem with outreach and promotion on the front end. Between the program's "soft launch" on May 13, 2010, and its official launch on September 10, 2010, details on eligible participants and equipment, awards criteria, and application instructions and processes were finalized. This information was then disseminated through a series of outreach and promotion activities taking place before and during the enrollment period, including:

- **Soft launch, CASHO Equipment Technical Show (Wallingford, CT) – May 13, 2010:** Announced key concepts behind the then-forthcoming LEEF program to target municipal employees (e.g., public works departments). Fact sheets were made available that broadly outlined the program and offered an approximate timeline of events. By providing this information in May of 2010, DEEP enabled certain municipalities to factor potential purchases into annual budgets before they were set in June.
- **Official launch, Governor's office – September 10, 2010:** Issued press release through the Governor's office to mark the official launch of the LEEF program. Basic background information was provided, followed by a link to the program's website for additional detailed information.

- **Direct email communication –September 2012:** Shared informational flyer with the chief elected officials of every municipality in Connecticut, as well as the heads of school systems, shortly after the press release. Materials were designed to highlight the key concepts of the program, the availability of funds, and the general program timeline. Contact information for the website and the Help Line resources was provided. Later communications included responses to Help Line inquiries and reminders about the program’s scope and timeline.
- **Informational presentation, Technology and Transfer Expo – September 15, 2010:** Presented an informational PowerPoint slideshow outlining the purpose and scope of the LEEF program. The DEEP presenter recorded contact information for all attendees interested in receiving future informational materials.
- **Connecticut Conference of Municipalities (CCM) Convention and Expo (Hartford, CT) – October 6, 2010:** Provided program information in a one-page flyer. DEEP presented the LEEF materials on the side of an EPA-sponsored booth.
- **Connecticut Council of Small Towns (COST) website – Summer-Fall 2010:** Included a short promotional article in the July 11, 2010, Connecticut COST Town Leaders’ E-Bulletin. The CT-COST website also linked to a posting about the program during the fall of 2010.
- **CCM newsletter – Fall 2010:** Developed a write-up briefly describing the program for issuance in the CCM newsletter, distributed to Connecticut municipalities.
- **LEEF website – September 2010-Present:** Served as the program’s information and application materials hub (www.ct.gov/dep/mowerexchange). The website provided the following content: contact information for the Help Line (email [dep.mowerexchange@ct.gov] and voicemail (“vmail”) [860-424-3317]); frequently asked questions (FAQs); explanation of eligible participants and equipment; application and reimbursement forms; and accompanying program checklists and timelines.
- **Help Line (voicemail and email) – September 2010-Present:** Established a v-mail and email Help Line for the LEEF program. ERG monitored the vmail Help Line, and DEEP officials monitored the email Help Line. LEEF officials promptly responded to all program-related inquiries, which address topics ranging from overall program scope to equipment eligibility specifics.

Phase II: Enrollment and Awards

Phase II of the LEEF program covered the application and enrollment process, the ranking of exchanges, and the issuance of awards. On the front end, LEEF officials worked closely with participants to ensure that applications were completed as fully and accurately as possible. On the back end, DEEP and ERG developed cost-effectiveness calculations by which to rank specific exchanges, and determined award limits such as caps on the number and value of exchanges awarded per participant. Specific activities and items of note during this phase included:

- **Enrollment package:** The LEEF enrollment package included an Enrollment Form and an Equipment Inventory Form. The Enrollment Form captured information like participant contact information and certification language, while the Equipment Inventory Form documented the specifics of each proposed exchange in spreadsheet format. Only one application could be

submitted per municipality, though there was no limit to the number of departments within a municipality that could contribute proposed exchanges to the Equipment Inventory Form.

- **Equipment eligibility:** Program participants were allowed to submit inquiries to LEEF officials regarding equipment eligibility, as well as petition for an exchange's inclusion. Participants were often directed to the program's FAQ page on the website for information on how to determine a piece of equipment's eligibility. For petitions, however, DEEP assessed eligibility on a case-by-case basis, ultimately evaluating the degree to which each proposed exchange matched the overall intent of the program.
- **Finalizing applications:** Once an enrollment package was submitted, LEEF officials reviewed materials to verify that: 1) all fields in the Enrollment Form had been completed, including being signed by an authorized official; and 2) all exchange information was complete and accurate for old and new equipment. Often, participants would fail to populate all fields of the Equipment Inventory Form, or would enter incorrect information.
- **Monitoring of program status:** ERG updated DEEP weekly regarding LEEF's status, including overall Help Line activity, number and total dollar amount of submitted applications, and a general count of eligible entities expressing interest in the program.
- **Awarding exchanges:** All proposed exchanges were compiled into a database and ranked according to their estimated cost-effectiveness of emission reductions. Additional considerations, such as placing caps on the number of exchanges (8) and dollar value (\$25,000) of awards per applicant, were then layered onto the initial ranking. Exchanges from the resulting list were subsequently awarded in order from most to least cost-effective until the total amount of money disbursed totaled the initial awards allocation of approximately \$472,000.
- **Notifying applicants:** Following award allocation by LEEF officials, all applicants were notified of their award status. For applicants failing to receive any awarded exchanges, notification materials explained the awards process, reiterated the high level of demand, and assured the participant that should additional funding become available, they would be notified and their current exchange would be further considered for an award. For fully- or partially- awarded applicants, notification included an "awards package" that clearly listed the exchanges awarded, the steps necessary for completing the reimbursement process, and all necessary reimbursement materials (including forms to submit and a process checklist). Awardees also received notification that DEEP reserved the right to revoke any awards if an exchange did not take place within the specified time frame or match the specifics of the awarded exchange without first receiving official approval.

Phase III: Purchase and Reimbursement

Phase III of the LEEF program covered the time from when participants received award notification on March 24, 2011, through the final deadline of filing for reimbursements of July 13, 2012. LEEF officials worked with awardees to ensure all submitted materials were complete, accurate, and filed by the program deadline. Specific items of note during this phase included:

- **Reimbursement package:** The reimbursement package consisted of a Reimbursement Form, proof of payment for all new equipment, and proof of scrappage for all old equipment. The

Reimbursement Form captured information like the participant's contact information, address to which the reimbursement check should be mailed, name/entity to whom the reimbursement check should be issued, scrap facility contact information, and certification via signature that all old equipment had been scrapped according to program standards. Participants receiving multiple awards were allowed to submit materials for partial reimbursements over the length of the reimbursement period.

- **Verification of completed materials:** All fields of the Reimbursement Form, including the signature field adjacent to the certification language, had to be filled in for the document to be considered complete. Proof of payment for new equipment could be fulfilled through the submission of a copied receipt, invoice stamped "PAID," or a copy of the check used to pay for the equipment. Equipment scrapping was typically proven through submitting a copied itemized receipt from the scrap facility used; however, scrapping verification could also be acceptably demonstrated by writing out each piece of scrapped equipment and having the sheet signed by a scrap facility official.
- **Issuance of reimbursement checks:** Once a reimbursement package was deemed complete, DEEP would alert the entity of its approval status and ERG would issue and mail the check. In the event a check was lost, ERG would void the old check and re-issue a new one. All reimbursements were tracked by ERG.
- **Award refusal:** In the event an award recipient was no longer interested in pursuing its reimbursement, the entity was able to follow formal procedures to officially decline its award and free its funds for re-allocation. Only three municipalities exercised this option.
- **Monitoring of program status:** ERG updated DEEP weekly regarding award allocation status. Running tallies were kept for the number of reimbursements approved, checks issued, and exchanges completed. In the final months of the reimbursement period, program status also came to include the number of awardees that had not yet been heard from, and the relative success of re-engagement tactics.
- **Re-allocation of unused funds:** Towards the end of the reimbursement period, DEEP officials assessed the amount of funds remaining due to complete or partial award refusal, or alternatively due to equipment costing less than its original bid price. A portion of these freed funds were re-allocated to the next most cost-effective exchanges on the ranking list, provided the alerted municipalities were still interested in making the trade.
- **Follow-up with inactive awardees:** Out of 76 total awardees, only 7 failed to file their reimbursement packages by the original program deadline of March 31, 2012. DEEP decided to extend the program deadlines to give these 7 entities additional time to complete their reimbursement requests, even though they had already been reminded of the pending deadline on multiple occasions. Numerous additional attempts were made to remind the 7 entities to submit their reimbursement requests. By the final program deadline of July 13, 2012, all but two of the awarded entities had requested reimbursements. After the final deadline passed, DEEP officials notified the remaining two entities that their reimbursement was considered forfeited.

Participation and Results

Participation

Connecticut is comprised of 186 entities that were eligible for LEEF funds: 169 municipalities and 17 regional school districts. Overall, 46 percent of these eligible entities (82 municipalities and 4 regional school districts) submitted applications by the enrollment period deadline. Applicants were received from entities in all parts of the state.

The LEEF Help Line directly fielded 174 incoming calls and 301 incoming emails between September 10, 2010, and December 23, 2010, the effective length of the enrollment period. During the reimbursement period (March 24, 2011, through July 13, 2012), the Help Line recorded an additional 76 calls and 171 emails. Note that these figures do not capture the many additional communications that were directed immediately back to DEEP, nor do they capture the outgoing contacts made by LEEF officials.

Applications

The 86 submitted LEEF applications totaled nearly \$2.2 million across 939 proposed exchanges when considered at full cost. The greatest number of proposed exchanges by a single applicant was 64; the smallest was 1. More than 80 percent of all exchanges were proposed by just 44 percent of the applicants.

Three equipment categories combined to cover more than 60 percent of all exchanges: trimmers at 23 percent; chainsaws at 20 percent; and leaf blowers at 20 percent. An additional 20-plus percent was accounted for by all lawn mowers, with stand-behind mowers at nearly 13 percent of exchanges and ride-on mowers at more than 8 percent. The remaining 15 percent of exchanges were spread across more than 15 equipment categories, including brush cutters, pruners/pole saws, and edgers.

In terms of cost, 44 percent of the proposed new equipment fell in the \$250-499 range, and 6 percent of machines were priced at \$10,000 or more. In terms of old equipment age, more than three-quarters were from 1995 or later, and more than half of those were post-2000 model years.

Awards

The initial allocation of LEEF funds covered the 358 most cost-effective proposed exchanges. At 80 percent reimbursement, these ranged in price from \$100 to \$24,700 per piece of equipment. With program caps of \$25,000 or 8 exchanges per entity—whichever came first—the 358 exchanges were distributed across 76 entities (72 municipalities and 4 regional school districts). Across all applicants, 76 (88 percent) received some level of an award, while 10 applicants (12 percent) did not receive any awards.

Trimmers made up 33 percent of all awarded exchanges, and more than 55 percent of all proposed trimmers received funding. Leaf blowers accounted for slightly over 20 percent of the awarded exchanges, and chainsaws followed close behind at slightly under 20 percent. Ride-on mowers and stand-behind mowers together accounted for another nearly 20 percent of exchanges, and the final 9 percent of exchanges were spread across 9 different equipment categories.

Air Quality Benefits

With the program's emphasis on reducing haze- and smog- forming pollutants and particles, the cost-effectiveness of air quality benefits was assessed according to an exchange's estimated expected reduction in THC and NO_x combined. The LEEF program achieved an estimated air quality improvement factor of approximately \$9,000 per ton of THC and NO_x combined, resulting in an estimated nearly 49 tons reduced over the lifetime of the machines.

LEEF was oversubscribed at a 4-to-1 ratio of proposed exchanges to available funds, which afforded DEEP the opportunity to be discerning in its assignment of awards. However, there was still a good degree of diminishing returns as the awards moved down the cost-effectiveness list. For example, the rate of emissions reductions for the first 50 percent of awarded exchanges was approximately \$3,600 per ton, while for the latter half the figure was considerably higher.

The cost-effectiveness of exchanges within specific equipment categories varied similarly to that across all categories. Broad trends, however, suggested that exchanges involving smaller pieces of equipment (e.g., leaf blowers and trimmers) outperformed larger machines (e.g., ride-on mowers) in terms of cost-effectiveness, while exchanges involving larger machines contributed more in terms of the absolute amount of emissions reduced. Across the board, exchanges that upgraded two-stroke engines to four-stroke engines exhibited particularly beneficial cost-effectiveness figures.

In addition to reductions of THC and NO_x, LEEF-funded exchanges also resulted in reductions of emissions of particulate matter and carbon monoxide. Though these reductions were not considered in the ranking of machines or in the overall cost-effectiveness calculations of the program, the additional benefits do add further value to the program.

Conclusions and Lessons Learned

LEEF was funded with an original assignment of \$550,000, \$447,000 of which was distributed to municipalities and regional school districts. The remaining funds were used to pay the contractor for assisting in developing and implementing this program, and some unspent funds were returned to DEEP. With its allotment, the LEEF program aimed to achieve two primary goals: 1) to reduce local emissions of haze- and smog- forming pollutants; and 2) to provide financial assistance to municipalities during a period of difficult budgeting decisions. By the close of the program, both goals had been addressed: approximately 49 tons of THC and NO_x were projected to be offset through LEEF-funded exchanges, and \$447,000 of settlement money had been disseminated to municipalities and regional school districts across the state.

Ultimately, however, while good will was fostered amongst the participants and funds did assist in improving local air quality across the state, the program was not without its share of hurdles. What follows is a discussion of some of the major lessons learned throughout the development, implementation, and administration of the LEEF program.

Program Design

Several assumptions put forward in the original statement of work ultimately did not carry through to the final program design. Most notable of these was the elimination of establishing a concrete list of eligible equipment, and instead developing a set of criteria by which applicants could determine the eligibility of each specific machine. Early on in program design it became readily apparent that the universe of available equipment was constantly evolving. Therefore, even though program officials saw the utility in developing a set list of “pre-approved” equipment for municipalities to select from, any list developed was at risk of growing obsolete and of unequally representing the various manufacturers of eligible machines. The shift to eligibility criteria freed up applicants to pursue the best available options facing them, and to ensure that no eligible exchanges were mistakenly precluded from being part of the program.

Establishing a means for estimating the cost-effectiveness of exchanges also required several iterations of processing steps. Most automated programs commonly used for calculating such benefits operate on a large scale, meaning that averages are frequently applied across a group of exchanges to achieve a solid cohort estimate but failing to provide information relevant to each individual exchange. In this case, though, the opposite was required: exchanges had to be assessed and ranked based on their individual cost-effectiveness. Once such a system was developed the process flowed quickly; however, revisions in the system leading up to the ranking resulted in the need for additional data to be retroactively pulled per exchange, which was a time-consuming process.

An additional unforeseen challenge facing the cost-effectiveness calculations arose from the unexpectedly old age of many of the pieces of equipment submitted for exchange. Assumptions from EPA’s NONROAD model used to determine the expected useful life of the machines frequently projected that the equipment would function for less time than its actual age, let alone projecting it to run additional years into the future. This old equipment age presented two major challenges: 1) for the very old equipment, no engine-specific emission factors were available and thus very generalized assumptions had to be made for these calculations; and 2) with the old equipment already outliving its useful life as assigned by EPA’s model, estimates had to be made regarding the future life of the equipment such that the improvement in emissions could be calculated. The mobile source air quality experts supporting this part of the program documented all assumptions used to estimate emissions reductions for older equipment.

Program Administration

The LEEF program was unique in that, unlike many state-funded grant programs, the target audience was primarily non-office-based employees. With the exception of the larger towns and cities that employed grants administrators, most participants filed applications through the departments proposing the exchanges (e.g., department of public works or department of parks and recreation). These employees were often less familiar with the Microsoft Office program Excel, and thus sometimes required the assistance of a LEEF official to complete the Equipment Inventory Form (an Excel file). In the future, despite the improved back-end ease of use of Excel files, a table designed in Word may prove to be more user-friendly for the target audience. Or, should additional funds be made available, an online Web portal that prompted users per line item would be definitively the best alternative.

The potentially single greatest hurdle from a program implementation and administration stand point was the use of an engine family number as an equipment identifier. While this information was crucial for determining equipment eligibility and assessing the overall cost-effectiveness of exchanges, it proved to be very difficult for most applicants to readily identify—particularly for the equipment being exchanged. While all engines are supposed to have labels presenting such information, variability in label location placement, legibility of numbers, and correctness of said information complicated efforts dramatically. Nearly all submitted applications required at least one round of revisions to correct engine information, with many more requiring the submission of several iterations. In addition, where at the program’s outset officials expected equipment vendors to be applicants’ best sources of information on this front, in reality many vendors did not have any awareness of engine family numbers; and in some cases, vendors supplied incorrect information from their manufacturer-specific distributors. Once these misunderstandings were addressed, however, LEEF officials were able to work with vendors and distributors to ensure that all were on the same page in terms of information required to complete the LEEF application.

In addition to the difficulties that arose with capturing the appropriate engine family number per machine, certain other fields in the Equipment Inventory Form also raised issues for some participants. In particular, the “estimated hours of use” column returned a wide variety of answers, which may or may not have accurately reflected the actual hours of use of the machine. The hours of use factored heavily into the cost-effectiveness calculations, and applicants that potentially over-estimated their hours generally fared better in the rankings than those that under-estimated that time. However, outside of exceptional cases where hours of use were listed at or close to 40 hours per week for 52 weeks per year, LEEF officials’ hands were generally tied in terms of following up on hours as applicants had certified in their forms that the information was true to the best of their knowledge. While in the future it would be beneficial to remove such an influential field from the subjectivity of rough user estimates, ultimately the difference in hours used is pivotal to the benefit of a proposed exchange. Therefore, one alternative may be to simply provide additional guidance for how best to estimate the hours that should be entered for that field.

Finally, by comparison to the application process, the administration of the reimbursement process generally proceeded smoothly. More than 90 percent of all reimbursements were finalized by the original deadline of March 31, 2012. Only 7 applicants required additional time, and just 2 of these failed to submit their forms by the time of the final project deadline. However, program officials spent considerable time and resources tracking and following up with these final 7 applicants. For a comparatively small gain, these last participants required a disproportionate amount of administrative funds. Any future iterations of this program should factor in the possibility of this occurring, and make clear following the initial deadline that any granted extensions marked the hard and fast final deadline.

- Attachment 1. LEEF Enrollment Forms**
- Attachment 2. LEEF Reimbursement Package**
- Attachment 3. LEEF Frequently Asked Questions**
- Attachment 4. LEEF Launch Press Release**
- Attachment 5. LEEF Awards Press Release**
- Attachment 6. LEEF Informational One-Page Flyer**
- Attachment 7. LEEF Emissions Estimation Methodology**
- Attachment 8. LEEF Help Line and Reimbursement Tracking Sheets**
- Attachment 9. LEEF Final Awards and Cost-Effectiveness Ranking**

Attachment 1. LEEF Enrollment Forms



State of Connecticut
 Department of Environmental Protection
 79 Elm Street
 Hartford, CT 06106-5127
 www.ct.gov/dep

Connecticut Lawn Equipment Exchange Fund

Municipality Enrollment Form

Connecticut Department of Environmental Protection
 Bureau of Air Management

Internal Use Only	
Date Received:	
Received by:	
Application ID:	

Municipality Information

Municipality:									
Contact Name:				Contact Job Title:					
Phone:		Fax:		E-mail:					
Physical Address:				City:		State:	<i>CT</i>	Zip Code:	
Mailing Address:				City:		State:	<i>CT</i>	Zip Code:	

Check this box if the Equipment Exchange Inventory is completed and submitted for all interested departments in this municipality.

Authorized Official: Individual authorized to apply for and receive reimbursement funds

I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information may be punishable as a criminal offense under section 22a-175 of the Connecticut General Statutes, under section 53a-157b of the Connecticut General Statutes, and in accordance with any applicable statute.

Name of Authorized Municipality Official	Position
Signature of Authorized Municipality Official	Date

Attachment 1B. LEEF Equipment Inventory Forms



State of Connecticut
 Department of Environmental Protection
 79 Elm Street
 Hartford, CT 06106-5127
 www.ct.gov/dep

Equipment Inventory Form

OLD EQUIPMENT: Enter details for the equipment you will be exchanging							NEW EQUIPMENT: Enter details for the equipment you propose purchasing							Notes				
Equip. category	Machine manufacturer	Model year	Model number	Horsepower (hp)	Engine manufacturer	Engine family number	Estimated annual usage (hrs)	Years in service	Equip. category	Machine manufacturer	Model year	Model number	Horsepower (hp)		Engine manufacturer	Engine family number	Anticipated annual usage (hrs)	Anticipated years in service

NOTE: The "Engine family number" field MUST be filled out for all new equipment, and for all old equipment beginning with model year 1998 (2000 for Stihl). An EPA engine family number is 12 characters long, including the "." in the middle. It is sometimes referred to as the "EPA Family I.D." An example for a Kawasaki engine is "AKAXS.7452IB".

For more information, visit the LEEF FAQ page here:

Attachment 2. LEEF Reimbursement Package

Reimbursement Instructions

Congratulations on being awarded funds from the LEEF program. In order to be sure you receive a complete reimbursement in a timely manner, it is essential that you follow all instructions closely. Should you have any questions about the listed steps, please contact the LEEF Help Line at (860) 424-3317 or by email at dep.mowereexchange@ct.gov and a project representative will assist you.

ATTENTION: From your proposed exchange list, the following received an award:

[Municipal-specific award information was inserted here.]

DEP will only issue reimbursements for the exchanges listed above. The quoted price in this table reflects the equipment price provided in your application. DEP will reimburse you 80 percent of this amount within 60 days after you submit a complete reimbursement package.

Purchase of New Equipment

You may purchase the equipment listed above through the state's master [Lawn and Grounds Maintenance Equipment contract](#)¹ or through your own procurement procedures. If you elect to purchase the equipment listed above through the state contract, you must follow the contract's procurement procedures.

A copy of an itemized receipt or invoice for each purchase documenting the exact type and cost of equipment purchased must accompany the Reimbursement Form. The information must be sufficiently detailed so as to allow DEP to verify that the equipment listed in the table (above) was purchased, and DEP will reimburse you for only that equipment. If for any reason the equipment listed above is no longer available for purchase, you should contact DEP immediately.

Please note that any increase in cost from that provided in your original application is not subject to reimbursement. All reimbursements will be strictly limited to 80 percent of the price listed above. If, however, the actual cost on your invoice or receipt is lower than that originally proposed, DEP will reimburse 80 percent of the new *lower* price.

Scrappage Requirements

Within three months of receipt of new equipment, a municipality must scrap the old equipment listed in the table according to project standards. Scrap facility information and scrappage verification must be

¹ See, State of Connecticut Partial Contract Award, Contract No. 010PSX0307.

submitted with the Reimbursement Form. Reimbursements will not be made until proof of scrappage is provided to DEP.

Old equipment must be scrapped according to these procedures:

1. **Waste oil and gasoline.** Some scrap metal facilities accept engines still containing oil and gasoline, but many do not. Find out if your scrap metal facility accepts waste fluids before dropping off equipment. In Connecticut, most municipalities have transfer stations or recycling centers that collect used oil. Gasoline must either be reused in other equipment or recycled or disposed of at a permitted facility. For more information on managing used oil, visit DEP's [used oil management webpage](#). Before you receive reimbursement, you will be required to certify that your municipality handled waste fluids according to all applicable environmental regulations.
2. **Old and unusable equipment.** Dispose of old machines at a scrap metal facility. A copy of an itemized receipt from the scrap metal facility must accompany the Reimbursement Form. The receipt must include the information necessary to allow DEP to determine that a specific item was scrapped. This information should include: the dollar amount (if any) paid to the municipality by the scrap facility, the weight and type of metal scrapped, and the date of equipment scrappage.

Reimbursements will not be awarded to municipalities that cannot prove old equipment was scrapped according to project requirements!

Reimbursement Form

The Reimbursement Form has three sections that must be completed. For your convenience, you may use the attached Word file format of the Reimbursement Form for electronic submission to DEP.

1. Contact information for the participating municipality. Note that checks will only be made payable to a municipality or a department within a municipality; checks will not be made out directly to individuals.
2. Contact information for the scrap facility used to scrap old equipment.
3. Signature (may be electronic) certifying that all entered information is valid and true; all old oil and gasoline were acceptably recycled or disposed of; all old equipment was scrapped according to listed project standards; and all scrapped equipment was rendered unusable.

At the bottom of the Reimbursement Form, verify that both purchase and scrappage receipts are included for each exchange. DEP will not process a reimbursement request until the Reimbursement Form and all applicable receipts are submitted. You must retain these receipts for at least three years from the date of purchase or scrappage, whichever is longer.

Submitting Reimbursement Package

DEP requires electronic submission of all reimbursement materials, which include an electronic version of the completed Reimbursement Form and scanned images of the two required receipts for each approved exchange. Electronic files should be e-mailed to DEP at dep.mowerexchange@ct.gov.

DEADLINE: All Reimbursement Forms must be submitted within three months of the purchase of new equipment. Municipalities may submit multiple forms in the event that not all approved exchanges are acted upon at the same time across a municipality. All reimbursement requests must be submitted to DEP no later than March 31, 2012.

When DEP receives a completed Reimbursement Form, it will review the form and receipts to confirm adherence to project guidelines. Once verified, a reimbursement check will be issued to the municipality within 60 days of receipt of reimbursement package. This will complete the equipment exchange process.

NOTE: Prior to issuing reimbursements or at anytime thereafter, DEP may conduct audits or inspections as necessary to verify compliance with all LEEF program requirements.

Attachment 3. LEEF Frequently Asked Questions

MUNICIPAL LAWN EQUIPMENT EXCHANGE FUND (LEEF) FREQUENTLY ASKED QUESTIONS:

1. Q: May I exchange an inoperable piece of equipment for a new machine?

A: No. The aim of LEEF is to improve air quality by replacing high-emitting machines with cleaner, lower-emitting machines.

2. Q: I submitted an application. When should I purchase my equipment?

A: You should not purchase equipment listed on your applications until a DEP official has confirmed that your proposed exchange has been accepted. This will not occur until January, 2011.

3. Q: Do EPA and CARB maintain databases of engines that meet their standards?

A: Yes. EPA's database is available online in this file: <http://www.epa.gov/otaq/cert/eng-cert/smeng/nr-s-si07-11.zip>. This program pertains to "Phase 3" certified engines in that file. CARB's certification database is available online at: <http://www.arb.ca.gov/msprog/offroad/cert/cert.php>. Choose "Small Spark-Ignited Engines" from the drop-down list.

Note that the databases are only updated periodically, so they may not reflect all engines that are currently eligible. Speaking with an equipment vendor is the easiest way to determine what equipment is eligible under the project standards.

4. Q: What factors into determining whether or not an exchange will receive an award?

A: DEP will evaluate proposed exchanges based on: 1) the cost of new equipment; 2) the amount of emissions reduced by replacing the old equipment and 3) other environmental quality or environmental equity factors associated with a proposed exchange. Exchanges resulting in the lowest cost per unit of emissions reduced have the best chance of receiving awards.

The air quality benefits of a proposed exchange are highest when the new equipment is as low-emitting as possible, the equipment is used frequently by the municipality, and the equipment to be scrapped is very old.

5. Q: Do I need to manually sign the Enrollment Form, or can it be electronically signed?

A: “Electronic signatures” are acceptable. This means that forms do not have to be scanned, and instead the Excel spreadsheets can be directly e-mailed to DEP.

6. Q: How should I submit the Equipment Inventory Form?

A: By e-mail. Please send an electronic version of the Excel spreadsheet to DEP at dep.mowerexchange@ct.gov. If you have already submitted a hard copy or a scanned version of the Equipment Inventory Form, LEEF officials will call you and ask that you e-mail the original Excel file. rev. October 5, 2010

7. Q: Will DEP let me know if any of my proposed exchanges are ineligible?

A: Yes. Once an application has been submitted, LEEF officials will review the file to determine if any information is missing, if all proposed exchanges include eligible equipment, and if all proposed exchanges will result in an air quality improvement. Municipalities are encouraged to submit their applications as soon as possible, such that they will have ample time to make corrections or propose new exchanges before the final application deadline.

8. Q: What is an “engine family number”? Where can I find it?

A: Most old engines and all new engines come with a designated “engine family number.” This alphanumeric code is 12 characters long, usually including a period. For old equipment, you should be able to find this number on the engine label. For new equipment that you propose to purchase, your equipment vendor should be able to tell you the engine family number. An application cannot be processed if the engine family number is missing.

Below is an example of an engine label from an older Tecumseh engine. In this case, the engine family number is the 12-character string (TTP195U1G1RA) found in the middle of the engine label:



9. Q: How does DEP decide if an exchange is like-kind?

A: This question must be addressed on a case-by-case basis, so contact the Help Line if you are unsure whether your proposed exchange involves similar enough machines. If the function of the machine does change significantly, such as from the use of a small push-mower to a commercial-sized riding mower, LEEF officials will alert the municipality that the exchange will not be granted.

An important factor in DEP's decision is the exchange's potential for emission reductions. If you propose to purchase a machine with a much larger engine, it is possible that it will emit more pollutants than the old, smaller machine.

10. Q: Can I exchange a high-powered machine for a lower-powered machine?

A: Yes. There is no limit to the degree you may "downsize." In fact, exchanges that replace larger models with smaller models will most likely result in emission benefits and could increase the likelihood of receiving an award. rev. October 5, 2010

11. Q: Are diesel-powered engines eligible for exchange?

A: Yes. Technically, EPA's Phase 3 standards for nonroad small spark-ignition engines and CARB's Tier 3 standards apply to small spark-ignited off-road engines, and not to diesel engines. However, given the potentially substantial emission reductions associated with replacing diesel engines, DEP will consider proposed exchanges involving diesel engines provided (1) the engines are less than 25 horsepower and (2) the proposed exchange results in emission reductions.

12. Q: Does the old equipment I am proposing to scrap need to meet any EPA or CARB standards to be considered eligible?

A: No, only new equipment must meet the EPA or CARB emission standards. The main requirements for old equipment are (1) they must have an engine of 25 hp or less, (2) they must have a similar function to the new equipment that you propose to purchase, and (3) they must be scrapped according to the LEEF program specifications.

13. Q: I recently purchased a new piece of eligible equipment. Can I apply to receive a reimbursement?

A: No. Awards will only be offered for proposed exchanges. Pre-purchased equipment cannot be retroactively submitted to receive funds. Municipalities that are applying for exchanges should not purchase new equipment until after receiving an award notification from DEP. DEP plans to announce the awarded exchanges in January 2011.

Attachment 4. LEEF Launch Press Release

FOR IMMEDIATE RELEASE

CONTACT: Donna Tommelleo, 860-524-7313

September 10, 2010 donna.tommelleo@ct.gov

Governor Rell: \$500,000 Available to Assist Towns and Cities in Purchasing New Energy Efficient Maintenance Equipment. Program Pays 80 Percent of Replacement Costs for Lawn and Grounds Equipment

Governor M. Jodi Rell today announced a new state initiative that will reimburse cities and towns for 80 percent of the cost of purchasing new energy-efficient lawn and grounds maintenance equipment.

The Lawn Equipment Exchange Fund (LEEF) is administered by the Connecticut Department of Environmental Protection (DEP) The program has \$500,000 available for reimbursements to cities and towns when they replace older equipment with new cleaner equipment that meets U.S. Environmental Protection Agency (EPA) or California small engine standards. The LEEF program will help to achieve reductions in overall air pollution, air toxics and greenhouse gasses.

“This innovative program will contribute to our ongoing efforts to make Connecticut’s air cleaner. The program is also a plus for municipal pocketbooks and local taxpayers, as it gives cities and towns an opportunity to replace outdated equipment at little cost. Just like getting old cars off the road is a real benefit to our environment, mothballing old lawnmowers helps us all breathe a little easier,” Governor Rell said.

According to EPA, an older gasoline-powered push mower emits as much hourly pollution as 11 cars and an older riding mower emits as much hourly pollution as 34 cars. This air pollution contributes to the formation of ozone, or smog, and haze in Connecticut. By replacing older equipment, municipalities can have equipment that is up to 70 percent cleaner than the old equipment.”

The program allows municipalities to seek an 80% reimbursement for purchasing replacement equipment such as:

- Lawn mowers

- Leaf blowers and vacuums
- Shredders and chippers
- Selected 2- and 4-cycle equipments such as chainsaws, trimmers, bush saws and edgers

Because this program is designed to combat emissions issues during warm weather months when air quality is more of an issue, equipment such as snow blowers and snow throwers are not eligible.

“As we continue to make major strides toward cleaning up large sources of air pollution we cannot lose sight of smaller, but also significant, sources of emissions,” the Governor said.

The program is financed with settlement funds from an interstate air pollution case filed by Connecticut, New York and New Jersey in the fall of 1999 against a Midwestern power generator, Ohio Edison. In August 2003, a Federal Judge ruled in favor of Connecticut and the other states, finding that the company had violated the Clean Air Act’s New Source Review (NSR) provisions.

For further information on the LEEF and application procedures, visit the DEP’s website at www.ct.gov/dep/mowerexchange.

Attachment 5. LEEF Awards Press Release

March 24, 2011

DEP Announces 76 Cities and Towns Receiving Funding For New, Cleaner, Outdoor Maintenance Equipment

Program provides 80% of replacement costs for lawn and grounds equipment

The Connecticut Department of Environmental Protection today announced that 76 cities, towns and regional school districts will receive nearly \$500,000 in funding for the purchase of new, more efficient lawn and grounds maintenance equipment through the agency’s Lawn Equipment Exchange Fund (LEEF) program. The program, announced last fall, provides Connecticut’s municipalities the opportunity to both help improve local air quality – since new equipment runs cleaner – and save substantial money on the purchase of new lawn and grounds maintenance equipment such as lawn mowers, leaf blowers and hedge trimmers. The program provides municipalities with 80% reimbursement for the cost of purchasing new, replacement equipment.

"This program is an excellent example of innovative thinking that benefits the environment and the economy," said DEP Commissioner Daniel C. Esty. "The environment benefits because new equipment is significantly cleaner than older equipment and the municipalities save money and get to purchase equipment that they might not otherwise be able to afford. The funds we are awarding today will allow for the replacement of nearly 360 older pieces of equipment resulting in emissions reductions of more than 100 tons over the lifetime of the new equipment."

The LEEF Program is funded through a \$550,000 Supplemental Environmental Project (SEP) relating to an interstate air pollution case against Ohio Edison, a mid-western power company that was found in violation of federal new source review regulations. This program was selected because it meets multiple

goals of reducing overall air pollution, air toxics and greenhouse gas emissions while assisting municipalities.

The individual awards are based on the cost effectiveness of each proposed equipment exchange's air quality benefits. DEP estimated emission benefits using an Environmental Protection Agency Model with the cost and utilization factors provided in submitted applications. Within the cost effectiveness framework, other factors incorporated into award allocations including caps on the number of exchanges (8) awarded and the amount of reimbursement (\$25,000) awarded per municipality, as well as consideration of designated environmental justice communities.

For further information on the LEEF Program, please go to the DEP website: www.ct.gov/dep/mowerexchange.

[List of 76 Towns Receiving Awards and Amounts Being Received.](#)

Attachment 6. LEEF Informational One-Page Flyer

Municipal Lawn Equipment Exchange Fund
Connecticut Department of Environmental Protection (DEP)

Before you make that purchase...

Did you know that Connecticut municipalities can buy certain new lawn and grounds maintenance equipment and get refunded 80% of the cost?

What is the project?

Municipalities can apply to exchange old, high-polluting lawn and grounds maintenance equipment for new, low-polluting machines. If your application is awarded, DEP will refund 80% of the cost.

What is the goal of this project?

To reduce emissions of air pollutants that form smog and haze, which can be harmful to human health and the environment.

Who can participate?

This project is only open to Connecticut municipalities.

What types of equipment are eligible?

Only certain lawn and grounds maintenance equipment with ≤ 25 horsepower (19 kilowatts) engines are eligible.

What is the project timeline?

- Official launch: September 10, 2010
- Enrollment period: September 10, 2010 — December 10, 2010
- Awards period: early 2011
- New equipment: in hand before the start of spring work

How can I learn more?

- E-mail: dep.mowerexchange@ct.gov
- V-mail: (860) 424-3317
- Website: <http://www.ct.gov/dep/mowerexchange>

Attachment 7. LEEF Emissions Estimation Methodology



3508 Far West Blvd., Suite 210
Austin, TX 78731

MEMORANDUM

TO: Paul Farrell, Connecticut Department of Environmental Protection

FROM: Diane Preusse, Rick Baker, Julie McNamara, and John Wilhelmi

DATE: February 17, 2011

SUBJECT: Emissions Estimation Methodology

ERG used the following methodology to estimate emissions for the proposed equipment exchanges. The proposed calculation methodology is based on the principal equations coded into EPA's NONROAD model. Use of the equations in a spreadsheet—instead of running NONROAD several hundred times for the universe of proposed exchanges—provided significant cost savings and is expected to yield the same relative ranking of individual applications.

In order to calculate the emissions benefits from an equipment exchange program, many assumptions and inputs were needed. Most equation inputs were taken directly from the information provided on the municipalities' LEEF applications. One important assumption made by ERG pertained to the remaining useful life of the old equipment being exchanged. In NONROAD, the remaining useful life is a function of the equipment's standard classification code (SCC) and annual activity. If the SCC could not be assigned based on the information included in the application, ERG assigned a value based on the text descriptions for different SCC categories provided in the NONROAD model.

Another important assumption involves the assignment of technology types to each equipment piece, which in turn determines the emission factors used in the calculations. When available, technology types were assigned based on information obtained from the EPA/CARB certification databases. However, when this information was not available, which occurred predominantly with the old equipment, technology types were assigned based on the most common technology type for a given

SCC and horsepower rating for a given model year, using the default technology types within the NONROAD model. Also, in many instances, the applicant provided power ratings in terms of cubic centimeters (cc). In these instances, a conversion factor (16 cc = 1 horsepower) was used to estimate the horsepower rating of the equipment. Emissions were calculated for the estimated remaining life of the equipment, and this time horizon was capped at ten years.

For each proposed exchange, ERG calculated emissions over the remaining useful life of the equipment of interest. Emission benefits for the proposed exchanges were calculated by subtracting the total emissions for the new equipment to be purchased from the total emissions for the equipment to be scrapped. To maintain consistency with the emissions certification information available in the EPA database, this analysis was restricted to exhaust emissions. Emission reductions were calculated separately for “HC + NO_x” (hydrocarbons plus nitrogen oxides) and for carbon monoxide. When EPA certification data was available for “HC + NO_x”, the emissions factor was split into separate emission factors for HC and NO_x based on the default NONROAD emission factors for a given SCC-horsepower-technology type-model year combination for HC and NO_x.

The remainder of this memo presents the main equations ERG used to estimate emission reductions for the proposed equipment exchanges.

Emissions calculations are ultimately a function of the equipment type, age, technology type, and other parameters. Emissions will be based on the following equation:

$$Emissions_p/yr = Power * LF * AA * EF_p * DF_p$$

- Where:
- Power = Horsepower, which will be taken from the municipalities’ LEEF applications
 - LF² = Load factor (% of rated power), for which a default value in NONROAD will be used
 - AA = Annual activity (hrs/year), from the LEEF applications
 - EF_p³ = Zero-hour emission factor for pollutant p (grams/bhp-hr), which will be taken from certified emission factors published by EPA and CARB; default NONROAD values will be used only when published emission factors are not available (which will typically be for the old equipment being exchanged)
 - DF_p⁴ = Deterioration factor, calculated from the equation below

By multiplying the zero-hour emission factors by the deterioration factors, the age-dependent emission factors are obtained. ERG will use NONROAD’s standard deterioration equation for this purpose:

$$DF_p = 1 + A \times engine\ age^b$$

² Load factors are based on the equipment’s source classification code (SCC).

³ Emission factors are specific to a given SCC, horsepower, model year, technology type, and pollutant.

⁴ Deterioration factors are specific to a given technology type and pollutant.

Where: Engine Age = Engine age expressed as a fraction of median life, calculated using the equation below
 A, b = Default NONROAD coefficients that vary by technology type, SCC, and pollutant

By calculating engine age in terms of the fraction of median life and substituting this value into the above equation, a separate deterioration factor can be calculated for each engine age of interest (in years). Engine age can be calculated as follows:

$$\text{Engine Age} = AA \times \text{Age} \times LF / ML$$

Where: AA = Annual activity (hrs/year), from the LEEF applications
 Age = Engine age (years), from the LEEF applications
 LF = Load factor (% of rated power), from NONROAD defaults
 ML = Median life (hrs), calculated using the equation below

The median life (in years) was calculated using this equation:

$$\text{Median Life in years} = ML / (AA / \text{Age} \times LF)$$

Where: AA = Annual activity (hrs/year), from the LEEF applications
 Age = Engine age (years), from the LEEF applications
 LF = Load factor (% of rated power), from NONROAD defaults
 ML = Median life (hrs), from NONROAD defaults

Following standard NONROAD assumptions, deterioration was capped once the engine age equals the median life of the engine.

Attachment 8. LEEF Help Line and Reimbursement Tracking Sheets

First Round of Reimbursements

Municipality	Approval Hold-Up	Date Approved by DEP	Number of Exchanges Awarded	Number of Exchanges Filed for in RP	Dollar Amount Awarded	Dollar Amount of Check Issued	Date Filed with Accounting	Date Check Issued by ERG/Date Mailed
Ansonia	N/A	12/6/2011	3	3	\$ 22,393.49	\$ 22,393.48	12/6/2011	12/20/2011
Ashford	N/A	11/30/2011	8	3	\$ 2,054.88	\$ 866.79	11/30/2011	12/7/2011
Avon	Decli	3/8/	8	0	\$ -	\$ -	N/A	N/A

	ned awar d	2012			1,882.39			
Beacon Falls	N/A	5/24/2011	1	1	\$ 5,903.34	\$ 5,903.30	5/25/2011	5/31/2011
Bloomfield	N/A	8/22/2011	8	8	\$ 6,331.20	\$ 5,794.94	8/22/2011	8/26/2011
Bolton	N/A	11/16/2011	8	8	\$ 3,104.00	\$ 2,898.15	11/16/2011	11/21/2011
Branford	N/A	5/24/2011	2	2	\$ 12,479.98	\$ 10,543.98	5/25/2011	5/31/2011
Bridgeport	N/A	12/7/2011	8	8	\$ 1,843.20	\$ 1,843.20	12/7/2011	12/20/2011
Bristol	N/A	9/27/2011	8	8	\$ 8,055.20	\$ 7,692.62	9/27/2011	10/3/2011
Brookfield	N/A	6/7/2011	1	1	\$ 3,869.74	\$ 3,869.74	6/7/2011	6/10/2011
Brooklyn	N/A	9/27/2011	1	1	\$ 6,783.20	\$ 6,783.20	9/27/2011	10/3/2011
Burlington	N/A	5/12/2011	8	8	\$ 2,111.94	\$ 2,111.92	5/12/2011	5/13/2011
Canaan	N/A	5/24/2011	3	3	\$ 1,975.12	\$ 1,597.25	5/25/2011	5/31/2011
Cheshire	N/A	9/9/2011	7	7	\$ 6,293.21	\$ 6,293.21	9/9/2011	9/12/2011
Chester	N/A	7/21/2011	3	3	\$ 1,071.88	\$ 1,071.88	7/21/2011	7/22/2011
Colchester	N/A	5/25/2011	8	8	\$ 1,881.34	\$ 1,881.36	5/25/2011	5/31/2011
Columbia	N/A	5/12/2011	4	4	\$ 697.47	\$ 697.48	5/12/2011	5/13/2011
Coventry	N/A	2/28/2012	3	3	\$ 480.00	\$ 479.88	2/28/2012	3/6/2012
Cromwell	N/A	6/29/2012	8	6	\$ 1,958.14	\$ 1,446.22	6/29/2012	7/13/2012
Danbury	N/A	11/21/2011	4	4	\$ 16,691.98	\$ 16,469.04	11/21/2011	11/28/2011

Durham	N/A	3/30/2012	2	2	2	\$ 1,360.00	\$ 1,360.00	3/30/2012	4/9/2012
East Haddam	N/A	10/20/2011	6	6	6	\$ 3,829.90	\$ 3,829.90	10/20/2011	10/31/2011
East Hampton	N/A	5/3/2012	2	2	2	\$ 800.00	\$ 627.14	5/3/2012	5/7/2012
East Hartford	N/A	7/21/2011	8	8	8	\$ 18,697.60	\$ 18,697.58	7/21/2011	7/22/2011
East Lyme	N/A	5/12/2011	1	1	1	\$ 5,659.95	\$ 5,521.76	5/12/2011	5/13/2011
Ellington	N/A	6/27/2011	1	1	1	\$ 6,079.20	\$ 6,079.20	6/28/2011	7/5/2011
Farmington	N/A	9/7/2011	3	3	3	\$ 1,374.42	\$ 1,361.62	9/7/2011	9/12/2011
Fenwick	N/A	5/24/2011	4	4	4	\$ 1,291.20	\$ 1,291.20	5/25/2011	5/31/2011
Glastonbury	N/A	3/14/2012	7	7	7	\$ 2,800.00	\$ 2,593.46	3/14/2012	4/2/2012
Goshen	N/A	4/21/2011	3	3	3	\$ 782.38	\$ 600.50	4/21/2011	4/22/2011
Guilford	N/A	2/23/2012	1	1	1	\$ 184.00	\$ 183.96	2/23/2012	2/27/2012
Hamden			8	0	0	\$ 1,761.44	\$ -	Note: Municipality failed to submit reimbursement package before deadline. Awarded funds were never claimed.	
Hartford	Declined award	10/7/2011	3	0	0	\$ 551.98	\$ -	N/A	N/A
Hebron	N/A	10/5/2011	1	1	1	\$ 274.37	\$ 274.37	10/5/2011	10/18/2011
Kent	N/A	4/21/2011	7	7	7	\$ 2,479.77	\$ 2,479.77	4/21/2011	4/22/2011
Killingworth	N/A	9/21/2011	8	8	8	\$ 1,911.84	\$ 1,911.68	9/22/2011	9/26/2011
Meriden	N/A	7/11/2012	2	2	2	\$ 449.27	\$ 447.79	7/13/2012	8/15/2012

Montville	N/A	1/6/2012	1	1	\$ 6,783.99	\$ 6,359.99	1/6/2012	1/16/2012
Morris	N/A	5/24/2011	1	1	\$ 456.93	\$ 435.17	5/25/2011	5/31/2011; 6/24/2011
New Haven	N/A	1/24/2012	8	8	\$ 6,516.74	\$ 6,254.00	1/25/2012	1/30/2012
New Milford	N/A	10/20/2011	5	5	\$ 1,519.80	\$ 1,278.34	10/20/2011	10/31/2011
North Haven	N/A	6/14/2011	5	5	\$ 19,282.16	\$ 18,945.36	6/16/2011	6/17/2011
North Stonington	N/A	8/10/2011	1	1	\$ 5,759.36	\$ 5,759.36	8/10/2011	8/12/2011
Norwalk	Declined award	2/13/2012	2	0	\$ 798.40	\$ -	N/A	N/A
Norwich	N/A	5/12/2011	8	8	\$ 9,809.73	\$ 9,809.74	5/12/2011	5/13/2011
Orange	N/A	10/18/2011	7	7	\$ 23,091.84	\$ 22,011.36	10/19/2011	10/24/2011
Plymouth	N/A	6/14/2011	6	6	\$ 2,838.92	\$ 2,804.54	6/16/2011	6/17/2011
Redding	N/A	10/18/2011; 2/3/2012; 2/9/2012	8	8	\$ 12,837.60	\$ 10,802.46	10/19/2011; 2/3/2012; 2/9/2012	10/24/2011; 2/12/2012
Roxbury	N/A	7/7/2011	4	4	\$ 1,302.62	\$ 1,302.62	7/12/2011	7/19/2011
RSD #8	N/A	1/23/2012	1	1	\$ 358.37	\$ 358.37	1/23/2012	1/30/2012
RSD#6	N/A	6/14/2011	1	1	\$ 9,920.00	\$ 9,920.00	6/16/2011	6/17/2011
RSD#7	N/A	3/29/2012	1	1	\$ 447.20	\$ 447.20	3/29/2012	4/2/2012
Salem	N/A	1/12/2012	1	1	\$ 6,800.00	\$ 6,359.99	1/12/2012	1/16/2012

Seymour	N/A	7/19/2011	8	8	\$ 18,892.14	\$ 18,892.13	7/21/2011	7/22/2011
Sharon	N/A	9/21/2011	7	7	\$ 2,855.72	\$ 2,855.72	9/22/2011	9/26/2011
Shelton	N/A	7/5/2011	2	2	\$ 718.40	\$ 718.40	7/5/2011; 11/28/2011	7/11/2011; 11/28/2011
Simsbury	N/A	2/22/2012	6	6	\$ 7,203.96	\$ 6,748.72	2/22/2012	2/27/2012
South Windsor	N/A	6/27/2011	8	8	\$ 2,678.40	\$ 2,678.40	6/28/2011	7/5/2011
Southbury	N/A	8/17/2011; 11/14/2011	8	8	\$ 22,395.08	\$ 22,286.30	8/22/2011; 11/16/2011	8/26/2011; 11/21/2011
Southington	N/A	5/7/2012	8	8	\$ 2,975.78	\$ 2,975.78	5/7/2012	5/14/2012
Stratford			5	0	\$ 14,053.45	\$ -	Note: Municipality failed to submit reimbursement package before deadline. Awarded funds were never claimed.	
Suffield	N/A	8/24/2011	1	1	\$ 6,119.99	\$ 6,119.99	8/24/2011	8/26/2011
Thomaston	N/A	11/29/2011	3	3	\$ 8,189.98	\$ 8,189.97	11/29/2011	12/7/2011
Torrington	N/A	5/31/2011	8	8	\$ 1,829.89	\$ 1,806.55	5/31/2011	6/3/2011
Vernon	N/A	6/30/2011	8	8	\$ 7,565.50	\$ 7,565.50	7/5/2011	7/11/2011

Wallingford	N/A	2/2/2012	6	6	\$ 7,001.60	\$ 5,281.44	2/2/2012	2/13/2012
Waterbury	N/A	1/9/2012	8	8	\$ 5,883.14	\$ 5,579.36	1/9/2012	1/16/2012
Watertown	N/A	6/21/2011	1	1	\$ 24,703.18	\$ 24,442.62	6/23/2011	6/24/2011
West Hartford	N/A	12/8/2011	5	5	\$ 14,943.68	\$14,927.68	12/8/2011	12/20/2011
Westbrook	N/A	5/24/2011	7	7	\$ 2,064.74	\$ 2,023.13	5/25/2011	5/31/2011
Weston	N/A	6/27/2011	2	2	\$ 10,040.00	\$ 10,040.00	6/28/2011	7/5/2011
Westport	N/A	8/22/2011	8	7	\$ 24,343.20	\$ 24,103.20	8/22/2011	8/26/2011
Windham	N/A	5/24/2011	4	4	\$ 10,062.48	\$ 9,976.10	5/25/2011	5/31/2011
Windsor	N/A	6/7/2011	5	5	\$ 2,406.27	\$ 2,135.07	6/7/2011	6/10/2011
Windsor Locks	N/A	6/13/2011; 4/2/2012	8	8	\$ 2,123.21	\$ 1,808.81	6/16/2011; 4/3/2012	6/17/2011; 4/9/2012
Woodbury	N/A	6/15/2011	1	1	\$ 6,359.99	\$ 6,359.99	6/16/2011	6/17/2011
Total			358	324	\$ 472,082.47	\$ 438,260.94		72

Second Round of Reimbursements

Municipality	Approval Hold-Up	Date Approved by DEP	Number of Exchanges Awarded	Number of Exchanges Filed for in RP	Dollar Amount Awarded	Dollar Amount of Check Issued	Date Filed with Accounting	Date Check Issued by ERG/Date Mailed
Windham	N/A	3/12/2012	1	1	\$ 770.40	\$ 770.40	3/12/2012	4/2/2012
North Haven	N/A	4/9/2012	1	1	\$ 2,359.20	\$ 2,119.96	4/10/2012	4/17/2012

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Windsor	N/A	4/10/2012	1	1	\$ 1,358.40	\$ 1,358.40	4/10/2012	4/17/2012
Guilford	N/A	7/12/2012	1	1	\$ 5,292.98	\$ 4,565.60	7/13/2012	8/1/2012
Total			4	4	\$9,780.98	\$8,814.36		

Total Amount of Reimbursement Checks Paid by ERG: \$447,075

Initial Project Pre-Payment Made by CT-DEEP: \$472,082

Amount of Reimbursement Funds Never Paid: \$25,007

Note: Some of the funds that were not paid were lumped back into our labor. This was negotiated between dKC and CT-DEEP earlier this year.

Attachment 9. LEEF Final Awards and Cost-Effectiveness Ranking

In Project Files- see Attachment 9