TWO SHADES OF GREEN
NEW YORK CITY

PRESERVING AFFORDABLE HOUSING
AND CREATING HEALTHIER HOMES

PROGRAM EVALUATION
APRIL 2018

PREPARED BY
LOCAL INITIATIVES SUPPORT CORPORATION NEW YORK CITY

WITH ASSISTANCE FROM
NEW YORK CITY DEPARTMENT OF HEALTH AND MENTAL HYGIENE
TOHN ENVIRONMENTAL STRATEGIES

SUPPORT PROVIDED BY
STATE FARM AND WELLS FARGO
# Table of Contents

- PROGRAM OVERVIEW ........................................................................................................ 3
- KEY FINDINGS ................................................................................................................... 4
- REDUCED ENERGY USE AND COSTS AFTER TSG WORK ........................................... 5
- REDUCED WATER USE AND COSTS AFTER TSG WORK .......................................... 7
- GREEN CLEANING REDUCED COSTS ........................................................................... 8
- PEST CONTROL, RENOVATION, AND WATER UPGRADES REDUCED ASTHMA RISKS ......................................................................................................................... 9
- PROGRAM LESSONS LEARNED ..................................................................................... 12
- ACKNOWLEDGEMENTS AND PARTNERS ..................................................................... 13
PROGRAM OVERVIEW

In 2016, Local Initiative Support Corporation (LISC) New York City (NYC), with funding provided by State Farm and Wells Fargo, worked with NYC Community Development Corporations (CDCs) that own and/or manage affordable housing to integrate green and healthy practices into their housing rehabilitation and property maintenance. The program has the dual benefit of lowering building operating costs through reduced energy and water use and also improving the health and wellness of residents and staff—hence the name, Two Shades of Green (TSG). LISC NYC runs the TSG program in partnership with NYC Department of Health and Mental Hygiene (DOHMH) and NYC Smoke Free.

Nine CDCs participated in the program: Banana Kelly Community Improvement Association, Belmont Arthur Avenue Local Development Corporation, Bridge Street Development Corporation, Fifth Avenue Committee (FAC), Hope Community Inc., IMPACCT Brooklyn, MBD Community Housing Corporation, St. Nicks Alliance, and West Side Federation for Senior Supportive Housing (WSFSSH). LISC’s work with these CDCs built upon previous TSG efforts with five CDC partners in 2014-15.

THE NEED

TSG was formed with a recognition of the complex factors impacting health in low-income families, many of whom are disproportionately exposed to home health hazards such as pests (cockroaches and mice), damp living spaces or mold, or environmental tobacco smoke. Rising energy and water costs often strain the operating budgets of the multifamily rental housing they live in, which can result in deferred maintenance and poor housing conditions. These types of conditions can aggravate preventable health problems like asthma, obesity, and heart disease. With the emerging consensus that smart property management strategies can help reduce operating expenses and create healthier living environments, and given LISC NYC’s longstanding commitment to preserving the quality and sustainability of affordable housing, LISC NYC assisted CDCs in finding innovative and simple strategies to improve the operations of their large and aging building portfolios, with a focus on addressing building conditions linked to health risks.

CORE PROGRAM ELEMENTS

TSG provided funding to help CDCs:

1. Track building energy and water performance using WegoWise benchmarking software;
2. Undertake energy or water efficiency retrofits; and
3. Implement at least one of the below health-related activities.
   - **Safe and green pest control**, which reduces exposure to toxic pesticides, seals holes to prevent pests from entering, and in doing so, reduces asthma risks.
• **Smoke-free housing**, which reduces resident exposure to secondhand tobacco smoke and asthma risks, reduces fire risk, and decreases the cost of preparing units for new renters.

• **Active design**, which increases resident physical activity through low-cost modifications and add-ons to buildings and surroundings.

• **Green cleaning**, which reduces exposure to harmful chemicals through the use of cost-effective, safe and environmentally friendly cleaning products.

LISC NYC and its partners provided technical assistance to support CDCs’ efforts needed to:

1. Conduct building assessments to identify energy, water and health-related needs through a full roof to basement holistic inspection;
2. Identify retrofit specifications and high performing vendors;
3. Provide onsite technical support and sample resident engagement materials; and
4. Learn about effective strategies, projects, and practices from past TSG efforts and other CDCs during learning community meetings and training.

TSG program materials include: NYC DOHMH [pest control tool kit], LISC resources for green cleaning, and green and healthy property management, and LISC’s Guide to Green and Healthy Multi-Family Affordable Housing.

**KEY FINDINGS**

- CDCs are eager to undertake strategies to reduce energy, water, and other operating expenses.

- CDCs want to improve resident health (asthma, obesity) and are open to strategies to do this through healthy property management and renovation upgrades.

- TSG work intersects with renovation, property management, and resident services, requiring buy-in across multiple staff to implement and coordinate the work.

- TSG activities can be incorporated into existing affordable housing refinancing and renovation processes, streamlining the delivery of this multi-faceted program.

- Onsite technical assistance from the DOHMH was critical to advance Integrated Pest Management (IPM) work during renovation and ongoing property management.

- Energy, water, and health-related measures delivered results.
REDUCED ENERGY USE AND COSTS AFTER TSG WORK

A variety of energy and water projects were included in larger renovation efforts. In general, the projects led to declines in electric, gas and water use.

ELECTRIC ENERGY USE FELL BY 36%
Three owners pursued LED lighting upgrades in common areas. One owner (FAC) also installed more energy efficient refrigerators. Two owners (FAC, Banana Kelly) saw a greater than 40% reduction in use.

Figure 1: Electric Consumption Before and After Retrofits (kWh/sq. ft.)
CDCs experienced a range of savings in property level electric bills.

<table>
<thead>
<tr>
<th></th>
<th># Apartments</th>
<th>Annual Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAC 150 Nevins St.</td>
<td>8</td>
<td>$1,350</td>
</tr>
<tr>
<td>Banana Kelly 1084-1086 Home St.</td>
<td>59</td>
<td>$3,400</td>
</tr>
<tr>
<td>Belmont Arthur 2029 Lafontaine Ave</td>
<td>11</td>
<td>$490</td>
</tr>
</tbody>
</table>

GAS USE DROPPED, SAVING OVER $4,000/YEAR AT ONE PROPERTY
Two owners pursued gas boiler upgrades (Banana Kelly and FAC). Gas use and costs declined for both, with annual savings ranging from $2,173 to over $4,000.

<table>
<thead>
<tr>
<th></th>
<th>Decreased Use</th>
<th>Annual Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Kelly</td>
<td>17%</td>
<td>$4,379</td>
</tr>
<tr>
<td>FAC</td>
<td>2%</td>
<td>$2,173</td>
</tr>
</tbody>
</table>

Figure 2: Changes in Gas Use Before and After Retrofits
REDUCED WATER USE AND COSTS AFTER TSG WORK

26% DROP IN USE AT ST. NICKS, SAVING $5,000 IN THE FIRST 8 MONTHS
St. Nicks upgraded showerheads and faucet aerators as part of their renovation at 140 Johnson Avenue. Eight months post retrofit, the property has used 678,039 fewer gallons of water and water bills declined by over $5,000.

Figure 3: St Nicks Annual Changes in Water Consumption Post Retrofit

27% DROP IN USE AT FAC IMMEDIATELY AFTER RETROFIT
A second CDC (FAC) also undertook water saving measures, replacing showerheads, faucet aerators and some toilets. Water use declined by 27% in the 3 months post retrofit (Figure 4). However, 12 month post retrofit use increased slightly when compared to the prior year due to an apparent water spike, possibly related to building operations.

Figure 4: FAC Changes in Water Use 3 Months Before and After Retrofit (Gallons)
GREEN CLEANING REDUCED COSTS

Three CDCs pursued green cleaning strategies, at six buildings. The smallest building had six apartments and the largest 18. Belmont Arthur and IMPACCT Brooklyn transitioned multiple properties to green cleaning strategies, as shown below.

GREEN CLEANING PRODUCTS COST LESS THAN TRADITIONAL CLEANERS
The TSG team documented reduced cleaning costs after switching to green products at all six buildings. Reductions ranged from 5% to 84%. Figure 5 shows the range of declines.

Figure 5: Green Cleaning Costs Were Lower Than Traditional Cleaners

Owners reported an average 49% reduction in cleaning costs after switching to green products.

The average cost decline per apartment was $19.15. Traditional cleaning costs averaged $32.58/apartment. After switching to green strategies, costs dropped to $13.43/apartment.

Figure 6: Green Cleaning Costs Were Lower Than Traditional Cleaning Costs/ Apartment
PEST CONTROL, RENOVATION, AND WATER UPGRADES REDUCED ASTHMA RISKS

IPM IMPROVED BUILDING CONDITIONS AND REDUCED PEST ACTIVITY

Pests and Asthma
Living in buildings with pests can increase asthma risks because cockroaches and mice produce allergens than can trigger asthma attacks in sensitized people. Mice and rats can also carry diseases that can be transmitted to residents and building workers. Using integrated pest management (IPM) strategies to seal holes and cracks that allow pests to enter a building can help to reduce pest problems. Working with residents and maintenance staff to effectively control trash, water leaks, and other conditions that attract pests is another key element of IPM.

As part of TSG, owners worked with DOHMH to identify IPM strategies appropriate for their building. This typically involved a site visit to walk through the building and identify rehab opportunities and conditions requiring property management actions. DOHMH staff also provided ongoing technical support to owners as they implemented their renovation and worked with their pest professionals and maintenance staff to adopt IPM.

IPM Results
Four owners chose to pursue IPM strategies during their renovation and ongoing operations, in a total of four buildings.

DOHMH staff conducted pre- and post-intervention inspections to determine the level of pest activity and presence of conditions conducive to pests. A DOHMH pest management professional assessed each building and reviewed existing building pest control protocols. A scale was used to rate the severity of pest conditions and quality of pest control practices, from 1 (“Severe/lacking”) to 7 (“Excellent”).

At one building, most pre-IPM assessment scores were classified as either “Bad” or “Poor,” but improved once IPM was implemented. Improvements were observed specifically in the level of pest activity, quality of the pest management contract, and the integration of pest control as part of operations and maintenance protocol. At the second building that incorporated IPM, an improvement in pest control services was observed. IPM practices were not fully implemented in two of the four properties at the time of the second building assessment. No improvements in pest-related conditions and services were found in these buildings. Note that conditions conducive to pests at FAC’s building were worse due to active construction.

related waste created harborage areas for pests and made it difficult to fully inspect the building. A summary of the findings is shown in Table 2.

Table 2: Changes in Building Conditions in Buildings After IPM

<table>
<thead>
<tr>
<th>Measure</th>
<th>IPM Completed</th>
<th>IPM Not Yet Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Belmont Arthur</td>
<td>HOPE</td>
</tr>
<tr>
<td>Pest activity</td>
<td>Better</td>
<td>Same</td>
</tr>
<tr>
<td>Conditions conducive to pests</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>Pest services</td>
<td>Same</td>
<td>Better</td>
</tr>
<tr>
<td>Pest contract</td>
<td>Better</td>
<td>Same</td>
</tr>
<tr>
<td>Operations &amp; maintenance</td>
<td>Better</td>
<td>Same</td>
</tr>
<tr>
<td>Staff Knowledge of pest management</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>Summary score (of the above)</td>
<td>Better</td>
<td>Better</td>
</tr>
</tbody>
</table>

IMPROVED BUILDING CONDITIONS AND FEWER PEST PROBLEMS
DOHMH, in conjunction with Mount Sinai, surveyed residents in four properties about their perceptions of building conditions before and after TSG work. The survey was voluntary, and participants had to be at least 18 years old to answer the questions. Overall, tenants reported improved satisfaction with their building, maintenance staff responses to repair requests, and rated the following building conditions as good to excellent: garbage and pest control, maintenance, and safety (Table 3). ²

Table 3: Resident Satisfaction with Building Services Before and After TSG Work

<table>
<thead>
<tr>
<th>Measure</th>
<th>%PRE</th>
<th>%POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Satisfaction (somewhat to very satisfied)</td>
<td>(N=48)</td>
<td>(N=56)</td>
</tr>
<tr>
<td>Building overall</td>
<td>68</td>
<td>79</td>
</tr>
<tr>
<td>Response of the super or building management to requests for repairs in the home</td>
<td>66</td>
<td>79</td>
</tr>
<tr>
<td>Assessment of Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage control good to excellent **</td>
<td>58</td>
<td>84</td>
</tr>
<tr>
<td>Rat control good to excellent ***</td>
<td>56</td>
<td>87</td>
</tr>
<tr>
<td>Cockroach control good to excellent (m)</td>
<td>57</td>
<td>69</td>
</tr>
<tr>
<td>Mice control good to excellent ***</td>
<td>49</td>
<td>75</td>
</tr>
<tr>
<td>Odor control good to excellent</td>
<td>59</td>
<td>66</td>
</tr>
<tr>
<td>Maintenance good to excellent</td>
<td>60</td>
<td>69</td>
</tr>
<tr>
<td>Cleaning good to excellent</td>
<td>60</td>
<td>64</td>
</tr>
<tr>
<td>Safety from crime in building good to excellent</td>
<td>69</td>
<td>87</td>
</tr>
</tbody>
</table>

Significance Key: (m)=marginal - p<0.20; **p<0.05; ***p<0.01

² Given the relatively small sample size of tenant surveys, only garbage management, rat, cockroach, and mice control service improvements were found to be statistically significant.
Figure 8: Pest Activity: Residents Reporting Problems Before and After TSG Work

![Graph showing pest activity](image)

Note: The change in cockroach observations is marginally statistically significant (p<0.020); change in mice observations is not statistically significant.

RESIDENTS REPORT FEWER WATER LEAKS REDUCING ASTHMA RISKS

Living in damp environments has been shown to increase respiratory risks such as asthma. As part of TSG, CDCs undertook renovations that often addressed underlying moisture issues and in two buildings included water conservation measures to upgrade showerheads, faucets, or toilets. Residents at the four CDCs participating in the tenant survey reported improved conditions with fewer faucet leaks and leaks overall.

Table 4: Percent of Residents Reporting Water Leaks Before and After TSG Work

<table>
<thead>
<tr>
<th>Measure</th>
<th>%PRE</th>
<th>%POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaky faucets (m)</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>Leaks under the sink</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Leaking toilet</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Leaks from outside</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>Any Leaks</td>
<td>30</td>
<td>29</td>
</tr>
</tbody>
</table>

Significance Key: (m)=marginal - p<0.20; **p<0.05; ***p<0.01

RESIDENT-REPORTED HEALTH STATUS

Resident health status was measured before and after TSG work to see whether building-related improvements led to improvements in resident-reported health. While improvements in building conditions and building services were observed, the overall percentage of residents reporting their general health as “Good” to “Excellent” remained essentially the same and statistically insignificant, at about 80% of respondents. One major limitation of this finding was that the majority of respondents in the sample population lived in supportive housing, and included many older adults with chronic health conditions.
In working with these nine CDCs, the team gleaned lessons that LISC NYC can apply to future work.

1. **CDCs are interested in strategies to reduce energy and water use, many of which can be incorporated into rehab projects.**

2. **CDCs want to improve resident health and are open to strategies to do this through healthy property management and renovation upgrades.**

3. **Energy, water and green cleaning costs declined after implementing efficiency retrofits or using green products.** CDCs saw declines in energy and water use in nearly every retrofit project. All CDCs reported lower cleaning costs after switching to green products.

4. **CDCs often lack the staff capacity to manage a multi-faceted TSG program, which intersects with renovation, property management, and resident services.** Often these work areas involve multiple staff and it can be difficult for one point person to coordinate and oversee the TSG work. A further challenge is staff turnover. Nearly every CDC in the TSG group experienced staff changes during the course of this project.

5. **Construction delays impacted the TSG workplans.** It can be challenging to incorporate TSG actions into larger renovation projects, when the TSG work is a relatively small aspect of a much broader effort (e.g., pest proofing and water upgrades are discrete and relatively minor aspects of substantial rehab projects).

6. **Few owners used the energy and water benchmarking data to inform operations.** Although the program required benchmarking, only one owner had sufficient capacity and expertise to use WegoWise benchmarking data on a regular basis. Insufficient staff capacity and time to work with benchmarking is connected to the larger staff capacity challenges discussed above. Added training could be helpful at both the outset and during the project to showcase how benchmarking data in general can inform rehab work and ongoing property management. For example, such data can help alert owners to water leaks and track changes in energy or water use after retrofits to ascertain if efficiency strategies produced the anticipated results or if added onsite adjustments are needed to ensure the projects achieve the full benefits.

7. **The multi-faceted nature of TSG could be streamlined to align with existing renovation processes to embed energy, water, and health actions into current systems.** Year 15 refinancing and capital needs assessments offer opportunities to embed TSG actions into CDCs’ current work with Year 15 technical assistance providers. Transitioning TSG actions from a side project to an element of existing processes could help to better manage the work and impact systems change.
8. **While it is relatively easy to track changes in energy and water use using utility data and benchmarking software, documenting changes in resident outcomes is more challenging.** It is expensive and often difficult to track or survey resident health before and after building changes. And, unless relatively large numbers of residents are enrolled, it can be difficult to observe statistically robust results. As an alternative, the NYC DOHMH piloted a building assessment tool to characterize the severity of pest conditions and quality of pest control services. This tool offers a promising approach to evaluate changes in the presence of potential asthma triggers.

**ACKNOWLEDGEMENTS AND PARTNERS**

We would like to acknowledge and thank State Farm and Wells Fargo, which have both generously supported the TSG program.

Our CDC partners are essential to our TSG program’s success. Over the past 40 years in partnership with LISC NYC, CDCs have developed and preserved over 40,000 affordable homes and apartments. CDCs also serve as a vital link between low- and middle-income families and critical services that improve the health, safety and quality of life for New York City residents.

Our TSG CDC partners included: Banana Kelly Community Improvement Association, Belmont Arthur Avenue Local Development Corporation, Bridge Street Development Corporation, Fifth Avenue Committee (FAC), Hope Community Inc., IMPACCT Brooklyn, MBD Community Housing Corporation, St. Nicks Alliance, and West Side Federation for Senior Supportive Housing (WSFSSH).

We are tremendously grateful for our initial partner, NYC DOHMH that helped make Two Shades of Green a success. The following key partners provided critical expertise and support to the program: Crown Janitorial, NYC Department of Housing Preservation and Development, National Equity Fund, WegoWise, Tohn Environmental Strategies, the Department of Environmental Medicine and Public Health at Mt. Sinai Icahn School of Medicine, and Steven Winter Associates.