

STAYING GREEN AND GROWING JOBS:

**Green Infrastructure Operations
and Maintenance as Career
Pathway Stepping Stones**



in partnership with



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Written by Alvaro Sanchez Sanchez, Andrea Quinn, and Jeremy Hays.

Produced in partnership with American Rivers



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Headquartered in Washington, DC, American Rivers has offices across the country, and it has more than 100,000 supporters, members, and volunteers nationwide.

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About Green for All: Green For All is a national organization working to build an inclusive green economy strong enough to lift people out of poverty. Green For All is dedicated to improving the lives of all Americans through a clean energy economy. We work in collaboration with the business, government, labor, and grassroots communities to increase quality jobs and opportunities in the green industry – all while holding the most vulnerable people at the center of our agenda.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INTRODUCTION.....	2
ASSESSMENT OF OCCUPATIONS	4
Industry Analysis.....	4
Types Of Operations And Maintenance (O&M) Occupations.....	5
Wages and Accessibility	6
Unionization Rate and Job Quality.....	7
Career Ladders for Operations and Maintenance (O&M) Workers	8
Non-Uniform Certifications	9
Projected Growth for Operations and Maintenance (O&M) Occupations.....	10
Conclusion.....	12
ORGANIZATIONS CONNECTING DISADVANTAGED COMMUNITIES TO GREEN INFRASTRUCTURE OCCUPATIONS	13
Verde	14
Generation Water	15
Restoring The Environment And Developing Youth (READY)	16
Sustainable South Bronx (SSBx) BEST	17
Seattle Conservation Corps	18
Cleveland Botanical Garden Green Corps	19
Onondaga Earth Corps (OEC)	20
Conclusion.....	21
RECOMMENDATIONS & NEXT STEPS.....	22
Strategies to Make O&M Work Available to Workers Trained in Green Infrastructure	22
Opportunities to Strengthen Workforce Development Programs and Career Pathways	23
CONCLUSION	24
APPENDIX A.....	25
Operations and Maintenance High Road Toolkit.....	25
Increasing Demand:.....	26
High Road Standards:.....	27
Increasing Business Capacity:	28
Training and Certification Programs:	30
END NOTES	32

EXECUTIVE SUMMARY

The operations and maintenance (O&M) of green infrastructure represents a significant opportunity to create entry-level jobs in the green sector for individuals from disadvantaged communities. In the coming years, thousands of new green infrastructure (GI) projects will be installed throughout the country. They will require a workforce trained to maintain and monitor the projects. This report reveals that water utilities investing in green infrastructure can outsource O&M work to workforce development programs that train individuals in green infrastructure – in fact, some already do. Operations and maintenance work gives disadvantaged community members access to jobs and career on-ramps while performing the O&M work required by water utilities.

Assessment of Operations and Maintenance Occupations

The first section of this report reveals that O&M jobs are accessible, they provide a decent wage, and they offer career advancement opportunities, especially in the public sector. At the same time, there is a real threat that this work may take place in low-road work environments, represented by low wages and poor benefits. However, O&M occupations are being recognized as important on-ramps to career pathways in the water sustainability field.

Workforce Development Programs Delivering Triple-Bottom Line Benefits

The second section of this report profiles workforce development programs that are delivering the triple bottom line benefits that GI investments promise. Their work demonstrates successful private/public/ nonprofit partnerships that protect the environment, increase access to economic opportunities, and improve social conditions of disadvantaged groups. These programs are successfully utilizing O&M work to provide employment to disadvantaged communities while training them for higher-skilled, higher-earning trades.

Recommended Strategies

The final section of the report makes three recommendations to stabilize workforce development programs through O&M work that will make them permanent components of the GI field:

1. Generate opportunities for local workers and local businesses by inserting community benefits strategies into green infrastructure installation and maintenance contracts.
2. Public agencies that outsource O&M responsibilities should prioritize contracting with local workforce development programs.
3. Require the hiring of trained and certified contractors to install and maintain publically funded green infrastructure on private property.

This section also outlines a series of steps and areas of further research to strengthen workforce development programs and to solidify career pathways that lead to high quality work, high quality standards and good jobs.

INTRODUCTION

There are several reasons why O&M work represents such an important opportunity for disadvantaged workers. No reason is more relevant than the low barriers to entry for this type of work, i.e. this work doesn't require extensive or expensive training. Ironically, however, it is this low barrier to entry that also tends to drag down O&M work and promulgate a low-road environment, represented by poor wages and limited job security. As green infrastructure implementation ramps up across the country, O&M work will be more widely available. Subsequently, ensuring that this type of work does not remain low-road will be key to maximizing the economic development benefits of green in-

frastructure investments and to ensuring that O&M work can become an on-ramp to good, green careers for people from communities in need.

COMPANION REPORT: Staying Green: Strategies to Improve Operations and Maintenance of Green Infrastructure in the Chesapeake Bay Watershed

Despite the benefits of green infrastructure, one of the major challenges to adoption of these practices to manage polluted runoff is how these practices will be maintained. Operations and maintenance has been repeatedly cited as a challenge when adopting green infrastructure and remains a concern for many local governments unfamiliar with these approaches, not only in the Chesapeake Bay region, but also across the country. Similar to any type of infrastructure, without appropriate and consistent maintenance, green infrastructure will fail; rain gardens can lose functionality and fail just like a neglected detention pond or a roadway. This report examines some of the major barriers to effective operations and maintenance of green infrastructure practices in the Chesapeake Bay region and identifies strategies and best practices that local governments, practitioners, and other groups are using to develop and improve maintenance practices:

- *Financing Operations and Maintenance for Green Infrastructure*
- *Lack of Awareness or Poor Public Perception of Green Infrastructure*
- *Limited Availability of Training and Certification in Green Infrastructure Operations and Maintenance*
- *Minimal or Ineffective Enforcement and Inspection Procedures*

This report is available at
www.americanrivers.org and
www.greenforall.org

In the coming years, thousands of new green infrastructure (GI) projects will be installed throughout the country. As a cost-effective strategy to comply with the requirements of the Clean Water Act, some cities will see enough green infrastructure work in the coming decades to support a new industry that installs, supplies, maintains and monitors green infrastructure.¹ For example, New York City has committed \$2.4 billion to green infrastructure projects over the next 20 years² and Philadelphia will spend approximately \$1.67 billion on green infrastructure through 2036.³ New York City has already allocated \$192 million for green infrastructure improvements through 2015⁴ and the Northeast Ohio Regional Sewer District plans to spend \$42 million on GI through 2020 in areas around the City of Cleveland, indicating the scaling up of green infrastructure investment over the next few years in cities across the country.⁵

This level of investment represents an opportunity to create thousands of jobs as cities begin to install green infrastructure.⁶ Not only will these major investments create construction jobs, but cities will need to ensure that newly installed GI is properly maintained. Part of what complicates the planning process for cities that are investing in GI is the fact that there are still many unknowns about the capacity GI requires; be it the number of workers required to maintain GI, the degree of expertise required for O&M workers, or the funding required to ensure green infrastructure projects are cared for properly.

A companion report to this one has detailed major O&M challenges. In this report we build on that research to focus on some of the most significant characteristics of occupations in the operations and maintenance of green infrastructure projects. Specifically, this report has three goals: 1) examining the current landscape and job quality of occupations in O&M, 2) identifying and highlighting workforce development models that connect people from disadvantaged communities to jobs in the green sector, and 3) presenting recommendations for directing O&M work toward high-quality workers and jobs.

To gather information for this study, we made use of available literature on green infrastructure, occupation and industry data from the Department of Labor, and interviews with industry professionals, water utility staff and workforce development personnel. The following section details our assessment of occupations involved in O&M of green infrastructure.



HIGH ROAD TIP

Throughout the next section we offer quick tips on how to improve the quality of O&M jobs using High Road strategies. High Road refers to an economic development strategy characterized by high-quality work, high-quality jobs and broad access to opportunity for a diversity of businesses and workers. For more information on High Road strategies visit www.greenforall.org/focus/high-road-strategies/

ASSESSMENT OF OCCUPATIONS

OPERATIONS AND MAINTENANCE JOBS ARE:

Accessible: Typically requiring a high school diploma or less

Good Jobs: Many offering a family-supporting wage

Protected Jobs: With considerable numbers of unionized occupations

Career Ladder Jobs: Many with the potential to offer advancement opportunities through apprenticeships and training

Industry Analysis

Ongoing operations and maintenance (O&M) is essential for green infrastructure to continue to function effectively; this necessarily involves a variety of occupations and industries, such as landscaping, plumbing, horticulture, construction, engineering and paving. Landscaping is one of the most represented industries in green infrastructure O&M due to substantial use of bio-swales, trees, rain gardens, urban farms and roof gardens, which require ongoing upkeep. According to a survey of over 500 landscaping companies by Green Industry PRO Magazine, maintenance has been a strong area of business growth, even as demand for installation has remained spotty. In 2012, for example, workers in the landscape industry were more likely to find jobs in maintenance than in landscape installation, as 33 percent of contractors added workers to their maintenance crews to meet demand, compared to installations, where only 21 percent of contractors added personnel. Additionally, 19 percent of contractors added foreman-level maintenance personnel. Although the numbers presented above are representative of landscape businesses that perform GI and non-GI work, the numbers suggest a positive business outlook for all landscaping maintenance work.

In spite of these positive trends, however, maintenance workers were also most likely to be laid off, demonstrating the transient nature of this type of work.⁷ In addition, based on what we do know about O&M work, the number of jobs strictly associated with O&M of green infrastructure remains low throughout the country. Opportunities to perform O&M are currently confined to a few cities with substantial numbers of GI projects. Portland, Oregon and Seattle, Washington both have long histories of using GI, and city personnel are mostly responsible for performing GI maintenance work, but both cities also resort to outsourcing to meet some needs.⁸

Jobs dedicated solely to GI are currently limited. However, as the number of GI installations and demand for GI increases in the private sector, there will be pockets of high demand for GI workers who can install and maintain these projects. According to industry professionals there will be enough work in the near future in those cities that are investing heavily in GI to support several firms that specialize in GI design, installation and maintenance.⁹

In addition, the slow adoption rate of GI in some cities is the result of a lack of information about the amount of work and resources required to properly care for this new infrastructure. This situation will change as GI becomes more common. Many cities currently have little to no experience with GI and, therefore, city leaders are “learning as they go” when it comes to maintenance costs, intensity of work and required personnel.¹⁰ Because there is a learning process involved, it may take a few years before city leaders fully understand the resources required to properly maintain GI projects and before they allocate sufficient resources to ensure GI project maintenance. Until then, there will be a relatively slow increase in

demand for workers who are trained, certified, experienced and employed to install and maintain GI projects.

Despite the fact that there are relatively few GI workers at present, there is enough available information to determine what kinds of jobs are being created through investments in GI. In the following section we explore the wages, educational requirements, benefits, and growth of GI occupations.

Types Of Operations And Maintenance (O&M) Occupations

Occupations associated with O&M of green infrastructure range from farming and landscaping occupations to paving, plumbing and energy auditing.

Most GI systems require regular maintenance, caring for plantings and ensuring proper function of GI technology. The work can involve vacuuming pervious pavement, annual cleaning of cisterns; spot weeding, pruning, erosion repair, trash removal, and mulch raking of rain gardens; cleaning of inlets and periodic replacement of paver blocks of pervious pavement; or remulching void areas, treating or replacing diseased trees and shrubs of vegetated swales. Occupations in this field require low to medium skills and training, and they involve a fair amount of physical work. Table 1 below is a sample of occupations in this field.

Overall, jobs in O&M tend to be decent paying jobs. Although these jobs exist in both the private and public sectors, city workers currently perform the bulk of this work. When these city workers are union members, their O&M work is better compensated, more protected, and it provides better benefits than comparable jobs in the private sector. Private sector jobs, especially landscaping jobs, tend to be low-wage, low-benefit jobs that offer few protections and often employ day laborers or other groups with limited employment options.



HIGH ROAD TIP

To fully understand the resources required to carry out O&M work, public agencies are investing in robust tracking and reporting mechanisms that follow public investments in green infrastructure. For more information on this key component of High Road strategies see Green For All's Jobs Projections and Tracking Guide.

Table 1: Occupations in Operations and Maintenance of Green Infrastructure

Landscaping and Groundskeeping Workers
Operating Engineers and Construction Equipment Operators
Maintenance and Repair Workers, General
Pump Operators, Except Wellhead Pumps
Septic Tank Servicers and Sewer Pipe Cleaners
Water and Liquid Waste Treatment Plant and System Operators
General and Operating Managers
Crop, Nursery, and Greenhouse Farmworkers and Laborers
Pavement, Surfacing and Tamping Equipment Operators
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters
Energy Auditors (Business Operations Specialists)

* We developed a landscape view of O&M jobs by supplementing the Pacific Institute's *Sustainable Water Jobs* Study with interviews of industry professionals and water utility staff.ⁱ

WARNING

Although O&M jobs are largely low-to-medium-skilled occupations, training is essential to ensure quality work. Green infrastructure installations are component parts of engineered systems designed to capture and treat rainwater on site, which is a fundamentally different approach from more traditional infrastructure. Establishing and maintaining healthy vegetation is critical to the function of many green infrastructure practices, as they require more specialized knowledge of plants than typical landscape maintenance. As a result, many green infrastructure practices will require more frequent maintenance to protect and maintain plant health.

Unlike traditional infrastructure, green infrastructure is highly visible, which makes proper maintenance crucial. Installations that fail because of lack of maintenance or because of improper maintenance can generate public resistance to further use of green infrastructure. Failing installations can also add unforeseen costs for repairs, essentially eliminating the cost effectiveness of green infrastructure. Therefore, proper training is critical to the life-cycle of green infrastructure.

Wages and Accessibility

National data show that entry-level wages for many of the occupations associated with O&M are near minimum wage levels, with landscape workers, greenhouse workers and pipelayer helpers all earning below \$9 per hour. This type of work is especially likely to be close to minimum wage in the private sector; where some landscaping firms are notorious for paying very low wages and providing no benefits to their workers.¹² By contrast, occupations that require higher levels of education and training command higher entry-level wages. In sum, entry-level wages in O&M may not be high enough to attract a broad spectrum of workers, but some O&M occupations represent a valuable entry point. Once O&M workers gain experience and add to their skill set via training, the higher the wages they can receive as they transition from entry-level jobs to occupations that require more training and certification.

We used the Occupational Information Network (O*NET) Job Zone classifications to determine the level of education and training required to perform the work responsibilities of each occupation. O*NET is database sponsored by the US Department of Labor/Employment and Training Administration (USDOL/ETA), containing information on hundreds of standardized and occupation-specific descriptors. O*Net classifies job zone 1 as occupations that may require a high school diploma or GED certificate; job zone 2 as occupations that usually require a high school diploma; and job zone 3 as occupations that require training in vocational schools, related on-the-job experience, or an associate's degree.¹³ There are some occupations in the sample that can be characterized as both accessible and well compensated. These jobs require some work experience, a high school diploma, additional job-related course work and offer wages upward of \$20 per hour.¹⁴ Agencies that procure green infrastructure services can help steer the projects and jobs away from low-road wages and practices by explicitly embracing high-road principles and outcomes. In the third section of this brief we'll present strategies for achieving this goal.

The following table summarizes the types of occupations associated with O&M, along with the O*Net Job Zone classification.

Table 2: Wages and O*Net Job Zones for O&M Occupations			
Occupation	O*NET Job Zone	National Entry Level Hourly Wage	National Median Hourly Wage
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	2	\$13.00	\$20.00
Landscaping and Groundskeeping Workers	1	\$8.23	\$11.26
Operating Engineers and Construction Equipment Operators	2	\$12.85	\$19.96
Maintenance and Repair Workers, General	3	\$10.01	\$16.84
Pump Operators, Except Wellhead Pumpers	2	\$12.41	\$21.09
Septic Tank Servicers and Sewer Pipe Cleaners	2	\$10.29	\$16.22
Water and Liquid Waste Treatment Plant and System Operators	2	\$12.21	\$20.09
General and Operating Managers	3	\$22.87	\$45.74
Crop, Nursery, and Greenhouse Farmworkers and Laborers	N/A	\$8.99	\$12.37
Pavement, Surfacing and Tamping Equipment Operators	2	\$11.40	\$16.96
Plumbers	3	\$13.61	\$22.96
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	N/A	\$8.87	\$12.99
Energy Auditors	3	\$16.48	\$30.78

Source: Bureau of Labor Statistics

Unionization Rate and Job Quality

When unionized public sector employees perform occupations associated with O&M work, their incomes, and potentially their benefits can be far better than when the same work is performed in the private sector. In addition, many of the occupations represented in O&M work have a much higher rate of unionization compared to the national unionization rate across all occupations, estimated to be 11.3% in 2012.¹⁵ The unionization rate in O&M occupations may be higher as a result of the number of positions in the public sector. These occupations are associated with public sector employees working for parks departments, water utilities, transportation departments, and public utilities. Not surprisingly, occupations with strong union membership also have some of the highest wages in the sample, especially for occupations in O*NET job zone 2.

Table 3: Unionization Rates For O&M Occupations			
Occupation	O*NET Job Zone	National Median Hourly Wage	% Represented by Unions
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	2	\$20.00	18.6
Landscaping and Groundskeeping Workers	1	\$11.26	11.6
Operating Engineers and Construction Equipment Operators	2	\$19.96	20.1
Maintenance and Repair Workers, General	3	\$16.84	18.0
Pump Operators, Except Wellhead Pumpers	2	\$21.09	18.6
Septic Tank Servicers and Sewer Pipe Cleaners	2	\$16.22	20.1
Water and Liquid Waste Treatment Plant and System Operators	2	\$20.09	15.0
General and Operating Managers	3	\$45.74	5.8
Crop, Nursery, and Greenhouse Farmworkers and Laborers	N/A	\$12.37	4.0
Pavement, Surfacing and Tamping Equipment Operators	2	\$16.96	20.1
Plumbers	3	\$22.96	20.1
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	N/A	\$12.99	18.6
Energy Auditors	3	\$30.78	N/A

Source: Bureau of Labor Statistics



HIGH ROAD TIP

Using prevailing wage requirements is a strategy that can be used to lift wages to family supporting levels. Prevailing wage is defined as the hourly wage, usual benefits and overtime, paid to the majority of workers, laborers, and mechanics within a particular area. The federal government adopted its own prevailing wage requirement with the Davis-Bacon Act of 1931.

Career Ladders for Operations and Maintenance (O&M) Workers

Based on our conversations with workforce development staff, more work is necessary to build solid pipelines and overcome barriers that allow entry-level O&M workers to transition to higher skilled occupations in the water sector. For example, although our research did not uncover apprenticeship opportunities in GI, we found that community colleges are at the forefront of establishing vocational programs that lead to water sector careers.¹⁶ Community college programs are making the connection between training community members and replacing an aging workforce in the water sector. However, some practitioners report that these job opportunities have been slow to materialize.¹⁷ Nonetheless, training programs continue to expose young adults to career opportunities in the water sector, engineering, landscape architecture, and environmental protectionism by building strong partnerships with local providers of these services.

Non-Uniform Certifications

The lack of established uniform certification programs is a key obstacle both for workers pursuing opportunities in the green sector and groups seeking qualified workers for green infrastructure O&M. No universally recognized certification exists for green infrastructure installation and maintenance. Instead, efforts to develop training and certification programs remain regional, with additional differences between urban and rural areas. Diverse organizations such as city departments, workforce development programs, and educational institutions, have developed certification programs that cover O&M as part of overall GI training.¹⁸ One such example is North Carolina State University's Best Management Practice (BMP) Inspection and Maintenance Certification for commercial landscapers, property owners, municipal staff, homeowners associations, and other professionals. This program offers sessions on stormwater BMP functions, stormwater regulations, elements of maintenance, maintenance for green BMPs including bioretention and permeable pavements, licensing and certification, and a field tour of local BMPs.¹⁹ Nevertheless, if certifications were to be offered more widely or if a widely recognized certification did exist, it is not clear yet that certification provides GI workers with an advantage in the labor market. For example, one survey of contractors in New York City revealed that O&M certifications, in particular, played a minimal role in making a worker competitive for a job. The surveyed contractors stated that the skills required to carry out O&M were just as easily obtained through a couple of days of work.²⁰ Regardless of contractor's sentiments toward training and certification, local governments are beginning to require local contractors to demonstrate completion of training programs to perform GI work.²¹

This issue is studied further in *Staying Green: Strategies to Improve Operations and Maintenance of Green Infrastructure in the Chesapeake Bay Watershed*, as it was identified as a key O&M obstacle.



HIGH ROAD TIP

To ensure that qualified contractors install and maintain green infrastructure, public agencies can establish formal pre-approved contractor lists of companies that hire trained workers. More information on this topic can be found in section three of this report.

Projected Growth for Operations and Maintenance (O&M) Occupations

As shown in the table below, projected growth for many of the occupations in this sector is expected to top 20 percent, nationally, through 2020. We cannot attribute this growth strictly to increased GI installations. However, it is fair to assume that increased investments in GI will play a significant role in creating jobs in this sector.

Table 4: Projected Growth For O&M Occupations (2010-2020)		
Occupation	Projected Growth (%)	Job Openings
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	15	6010
Landscaping and Groundskeeping Workers	21	44,440
Operating Engineers and Construction Equipment Operators	24	16,280
Maintenance and Repair Workers, General	11	37,910
Pump Operators, Except Wellhead Pumpers	4	360
Septic Tank Servicers and Sewer Pipe Cleaners	21	1,190
Water and Liquid Waste Treatment Plant and System Operators	12	4,150
General and Operating Managers	5	41,010
Crop, Nursery, and Greenhouse Farmworkers and Laborers	N/A	N/A
Pavement, Surfacing and Tamping Equipment Operators	22	2,200
Plumbers	26	22,880
Helpers: Pipelayers, Plumbers, Pipefitters, and Steamfitters	45	4,170
Energy Auditors (Business Operations Specialists)	12	32,720

Source: Bureau of Labor Statistics



HIGH ROAD TIP

Increased availability of jobs does not guarantee that trained graduates of green workforce development programs will gain access to these jobs. One way that public agencies can be certain that a qualified worker is performing O&M is by using targeted hire strategies. This also ensures that workforce development programs are training for the jobs available in their city. More information on this issue is provided in section three of this report.

Comparing O&M Occupations To EPI's Family Budget Calculation

Our analysis of occupational data of O&M jobs revealed significant details on the quality of O&M jobs. In general, we found that these jobs are relatively accessible, they pay low to medium wages, and many of them are in the public sector. One important goal of this analysis was to discover how many of these occupations could be considered “family-supporting.” The following section attempts to shed some light on this particular issue by comparing median wages for O&M jobs to the estimated amount required to cover a family budget.

To produce a dollar amount sufficient to cover a family's budget, we used the Economic Policy Institute's (EPI) Family Budget Calculator. The Family Budget Calculator compiles costs of essentials such as housing, food, childcare, transportation and health care for different regions of the country to provide an estimate of how much income families need to get by.²² We limited our calculation to a family budget for a one-parent, one child-household. Based on our analysis, we determined that it would be difficult to support a larger size family with only one wage earner if the worker was employed in GI O&M.

We then turned to state-by-state occupational data and chose five states representing areas that in the coming years will invest heavily in green infrastructure: California, Ohio, New York, Wisconsin, and Pennsylvania. We compared the median yearly wage for a number of O&M occupations in these five states to EPI's Family Budget state calculation. The results, presented below, reveal which of the O&M occupations in each of the five states provide enough yearly earnings to cover basic family needs, given EPI's Family Budget per state.

Table 5: Comparison of EPI's Family Budget Calculation vs Occupational Median Wage Per State					
	California EPI Fam- ily Budget Calculation \$40,770	Ohio EPI Fam- ily Budget Calculation \$33,410	New York EPI Fam- ily Budget Calculation \$56,257	Wisconsin EPI Fam- ily Budget Calculation \$36,268	Penn- sylvania EPI Fam- ily Budget Calculation \$40,561
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	\$47,300	\$41,800	\$46,600	\$47,500	\$46,700
Landscaping and Groundskeeping Workers	\$24,800	\$21,600	\$26,900	\$25,000	\$24,500
Operating Engineers and Construction Equipment Operators	\$65,200	\$45,000	\$57,600	\$51,100	\$42,200
Maintenance and Repair Workers, General	\$37,900	\$35,000	\$39,400	\$37,800	\$35,600
Pump Operators, Except Wellhead Pumpers	\$42,700	\$46,000	\$74,200	\$46,600	\$32,600
Septic Tank Servicers and Sewer Pipe Cleaners	\$38,300	\$33,100	\$38,600	\$35,100	\$34,900
Water and Liquid Waste Treatment Plant and System Operators	\$62,200	\$43,500	N/A	\$45,100	\$43,600
General and Operating Managers	\$110,000	\$93,700	\$117,700	\$89,600	\$93,300
Crop, Nursery, and Greenhouse Farmworkers and Laborers	\$18,600	\$21,500	\$21,500	\$20,700	\$22,900
Pavement, Surfacing and Tamping Equipment Operators	\$54,100	\$36,900	\$62,900	\$40,600	\$40,400
Plumbers	\$53,200	\$45,200	\$63,800	\$65,000	\$49,300
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	\$31,100	\$23,600	\$26,500	\$24,900	\$29,500
Energy Auditors	\$66,500	\$61,300	\$68,200	\$56,300	\$68,700

Source: EPI & State occupational data obtained through careersinfonet.org

The preceding table shows that some O&M occupations provide enough yearly earnings to cover the basic needs that a household with one adult and one child would require. It also shows that the lowest-earning and most accessible jobs do not generate enough income to cover the basic needs of our small sample family.

These low-earning jobs, however, can open the door to other occupations in the green water sector. Their accessibility and projected growth make them well-suited occupations for entry-level workers looking to explore career development options in one of the many sectors of water sustainability. Given enough training and education, those entry-level jobs can lead to higher wage green jobs.

Conclusion

Our analysis of O&M occupations demonstrates that these jobs are accessible, they provide a decent wage, and they offer career-advancement opportunities, especially if associated with unions or in the public sector. At the same time, there is a real threat that this work may take place in very low-road work environments, especially if the private sector is not encouraged or regulated to compensate workers at a higher rate, provide benefits and guarantee worker safety standards in the landscaping industry. High Road strategies can not only improve the quality of O&M work, they can offer entry-level workers better access to family-wage careers in the green sector.

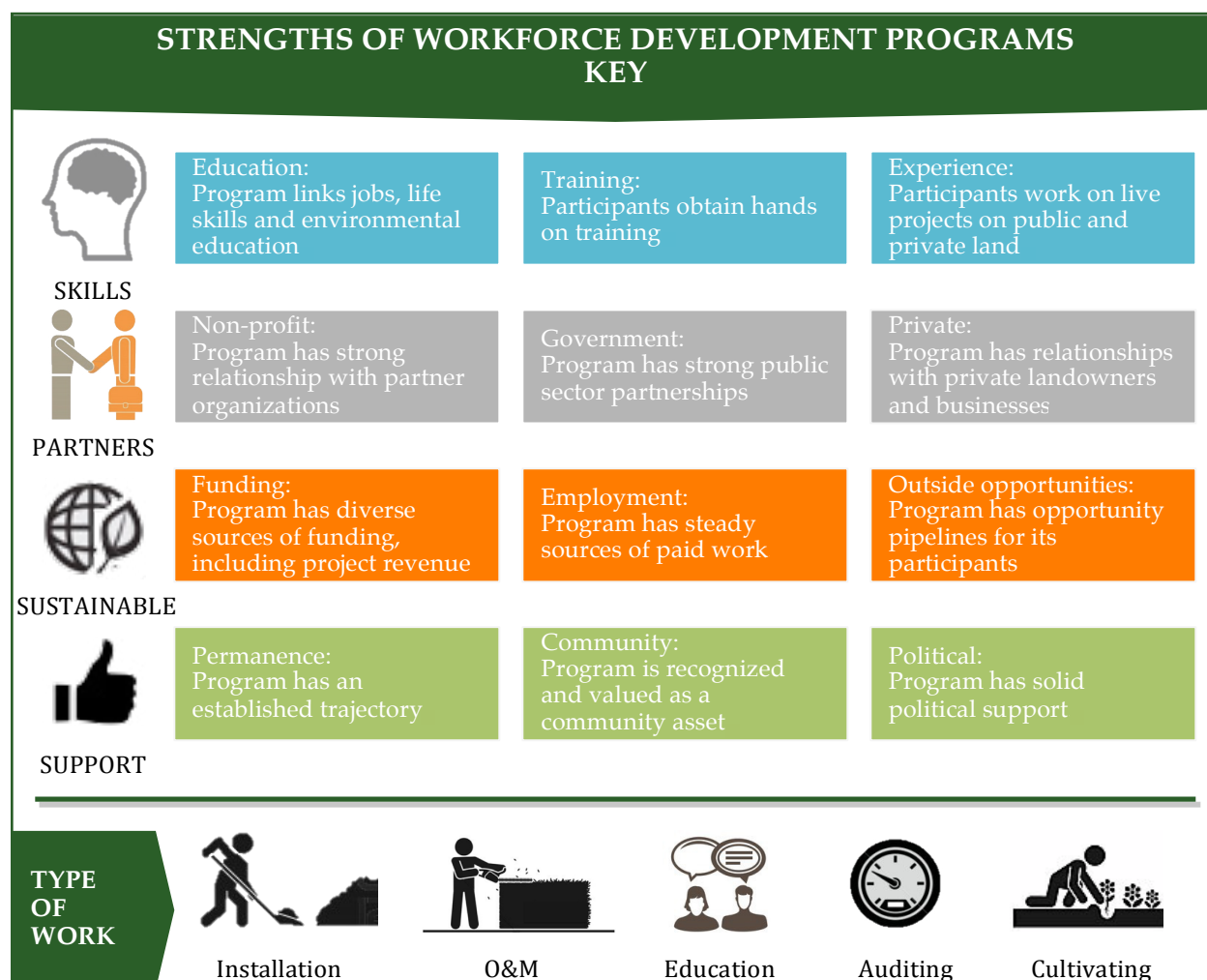
The following section highlights organizations that are developing the connections between a properly trained workforce and opportunities to improve economic and social conditions of disadvantaged community members through GI.

ORGANIZATIONS CONNECTING DISADVANTAGED COMMUNITIES TO GREEN INFRASTRUCTURE OCCUPATIONS

As part of our research, we interviewed a number of organizations that are connecting community members to green infrastructure through initiatives in workforce development, education, and economic development. These groups are diverse with respect to the populations they serve, the skills they teach, and the types of work they perform, but all of them recognize that green infrastructure has the potential to transform communities. This section highlights the work of these organizations, and introduces twelve components of successful workforce development programs in GI.

Based on interviews with social enterprise and workforce development staff throughout the country, we identified twelve components that make their programs successful. Future projects that seek to establish workforce development programs linking GI and members from disadvantaged communities should keep these twelve programmatic characteristics in mind. To better describe these components, we created an infographic that highlights the best features of each organization and provides details about the types of work they are involved in. Organizations in our study are engaged in installation of GI, O&M, education and outreach to community members, efficiency audits, and cultivation of food and plants.

A successful program has four general components: 1) it develops the skills sets of program participants; 2) it establishes partnerships to carry out its mission; 3) it has access to sustainable funding, work experience, and career opportunities; and finally, 4) it has broad constituencies of support.



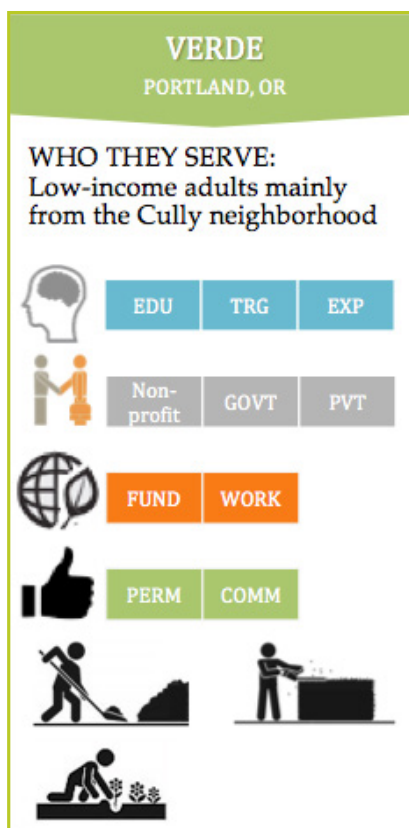
Verde

Since 2005, Verde has brought new environmental investments to Portland's neighborhoods, involved community members in the planning and building of these investments, and ensured that low-income people and people of color directly benefit from the investments.

Verde trains and employs a workforce capable of installing and maintaining systems to manage stormwater. Their crews are trained in performing construction, restoration and cultivation services. Verde also offers landscape labor to general contractors and landscape subcontractors, with a focus on contractors subject to the City of Portland's Workforce Training & Hiring Program. Verde is certified as a Section 3 business, a designation that supports job training, employment, and contracting opportunities for low-income people on local projects.

Verde has secured several contracts to perform GI work in Portland and employs 6 full-time and 6 part-time landscapers. However, Verde's staff expressed concern that they cannot compete with the low prices their competitors offer. Verde was recently outbid to perform services they had been contracted to perform for the past five years because a competitor was able to offer a very low rate for the same services.²³ Low road contractors can have a pricing advantage on non-prevailing wage projects and this sometimes challenges Verde's ability to compete for these projects. Where a project owner requires prevailing wages, or is looking to achieve other social goals such as workforce diversity or training, Verde Landscape has had success competing against low-road contractors.

In 2012, Verde established a Training Liaison position to support crew member training and transitions to post-Verde opportunities. Crew members work with the Training Liaison to develop and implement an Individual Learning Plan that sets their training goals, and participation in, up to 80 hours of paid training per year. Verde's long-term goal is that each landscape crew member receives resources and support for success as a small business owner, as an employee at a for-profit business with opportunities for wage and career growth, or as an experienced crew leader who supervises and trains future landscape crew members.



Generation Water

In 2009, Generation Water was created to provide employment opportunities for students to do hands-on environmental work. In 2010, Generation Water was awarded the State of California's \$2.5 million Green Innovation Challenge and since then, has worked with water agencies, large landscape property managers, and homeowners to save them water, time, and money.

Generation Water prepares young adults for careers in water use efficiency, sustainable landscaping, and habitat restoration. This process begins with recruiting college-educated students to work on irrigation system assessments in parks and public schools; sustainable landscaping installation on private property; and landscape restoration through the removal of invasive plant species.

Generation Water has effectively combined hands-on experience, classroom education, and the use of technology to provide its participants with experience that fits their professional development aspirations. By offering a wide array of work, Generation Water allows its participants to select which type of work they want to do, depending on their interest in physical labor or analytical, technology based work.

As is the case with Verde, finding contracting opportunities is one of Generation Water's biggest challenges. As a social enterprise, Generation Water faces stiff competition from private contractors, and it has not seen an increase in public sector opportunities in the water sector. Generation Water does, however, see increased opportunities in the near future, especially in the outdoor landscape water efficiency sector where the work requires specialization and efficient water systems installation techniques. Marcus Castain, CEO of Generation Water, is a strong advocate for bringing labor and business interests to the table to discuss workforce needs and to identify ways to collaborate on maximizing opportunities for a new workforce.²⁴



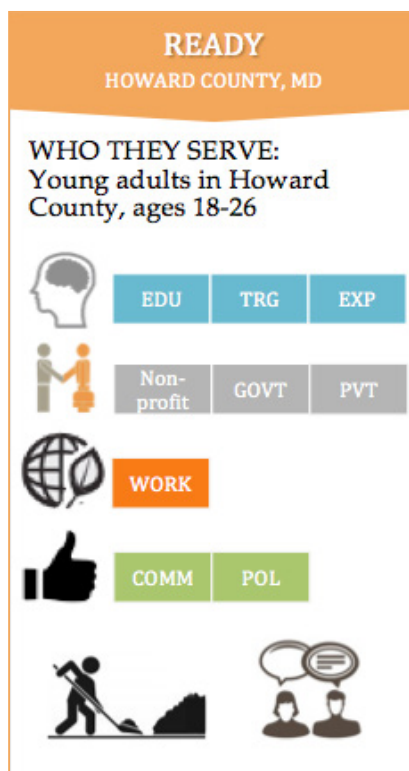
Restoring The Environment And Developing Youth (READY)

READY grew out of a grassroots effort initially conceived by members of a faith-based organization called People Acting Together in Howard (PATH). The group approached officials in Howard County, Maryland with the concept of linking youth employment to the work required under Howard County's stormwater permit. The idea received strong backing from the County Executive and the program kicked off its first year in May of 2012.

The purpose of the program is to create green jobs for young adults in Howard County while reducing stormwater runoff and improving watershed health. The program focuses on training young adults in the design and installation of green stormwater alternatives, such as rain gardens. Young adults work in crews to install rain gardens on institutional properties including schools, congregational grounds, and large properties held by non-profit organizations. READY core leadership partners include the Howard County government as well as five other non-profit organizations.

READY began with a crew of 31 individuals in its first year, and extensively informed crew members about occupations in stormwater management and other ecological topics through educational field trips, educational modules, and presentations. These experiences triggered numerous behavior changes; even individuals who do not pursue environmental careers will be more responsible stewards of the environment. Staff members are extending the breadth of the program in its second and subsequent years to form a more generalized conservation corps capable of addressing a variety of GI needs, including installation, O&M, education within the community, auditing of GI, and cultivating greenery for projects.

Lou Etgen, Associate Director of Programs with the Alliance for the Chesapeake Bay describes READY's first year in operations as highly successful, with plenty of opportunity to grow. READY's detailed report of its first year reveals that the biggest challenges to the efficiency of the program are logistical hurdles such as managing scattered sites, finding locations to store materials and equipment, and securing access to heavy machinery that can speed up larger projects. Finding sites to install GI was not a challenge for READY in the first year; indeed, 2013 starts with an open backlog of several dozen customers. READY's partnerships with faith based groups, schools, non-profit entities, and homeowner associations allowed the program to install GI improvements at no cost to the participating entities.²⁵



Sustainable South Bronx (SSBx) BEST

Founded in 2003, the Bronx Environmental Stewardship Training (BEST) Academy is SSBx's flagship program. BEST Academy is dedicated to preparing low-income New York City residents for jobs in the growing green-collar sector and addressing both environmental and economic needs in the community. BEST prepares New Yorkers for full-time employment by simultaneously teaching skills related to protecting the environment, and restoring urban green spaces, and by upgrading local buildings to a higher, greener standard.

BEST Academy operates two programs: BEST Ecology (BECO) and BEST for Buildings. The BECO program takes place over 12 week period and offers training and certifications in landscaping, wetland restoration, soil science and hydrology, tree pruning, and green roof installation and maintenance.

Many of the participants in BEST are on public assistance, have been unemployed for long stretches of time, or have been incarcerated. After graduating from the program, SSBx's Human Resources and Marketing Associates assist their graduates in finding work opportunities with non-profits or businesses in the green-collar field. Since the program's creation in 2003, more than 400 people have graduated from BEST Academy.

BEST is exploring ways to increase on-the-job training opportunities and access to work for their program participants. BEST identified red tape and obstacles that restrict their opportunities, including regulation that require work to be performed by certified contractors, and stiff competition for the available public sector work that is outsourced. In order to gain access to some work, BEST has reached out to other non-profits in need of trained workers, but this option has limited reach.

BEST is successfully training community members in green sector jobs. In the near future, O&M employment opportunities will rise in New York City. Annette Williams, Director of BEST Academy, believes that in order for her program graduates to access future work opportunities, job qualifications and requirements should be modified to take into account the background of BEST program participants. Not only does requiring something as simple as a driver's license disqualify many program participants, such requirements may be unnecessarily limiting when workers do not need to drive in order to perform O&M duties. Ms. Williams believes that direct partnerships between BEST and city work opportunities will maximize both BEST's and the city's resources.²⁶



Seattle Conservation Corps

The Seattle Conservation Corps (SCC), established in 1986, is a unique Parks and Recreation program that gives back in two ways: it trains disadvantaged community members for viable, living-wage jobs, and it performs quality work in Seattle parks and for other agencies and employers on a contract basis.

SCC employs between 80 to 100 participants per year and provides them with full time employment for one year, starting at minimum wage up to \$12 per hour. In addition, participants receive supportive services to help with housing, transportation, education, life skills training, mental health counseling, substance abuse recovery and job searches. Since 1986, SCC has helped more than 1,200 homeless individuals.

Most of the work opportunities available to SCC are obtained through contracts with the public sector, with roughly 75 percent of their \$4 million budget raised through project revenue. SCC is able to compete for public contracts because as a city program, it is not required to meet some of the procurement requirements that private contractors must meet. On the other hand, SCC is not able to compete with these same contractors for private work because the costs associated with the program for wages and supportive services raise the cost of contracting SCC's services beyond what their competitors can charge.

SCC faces some funding issues, since its association with the City of Seattle disqualifies the organization from certain grants, even when project revenue declines. SCC is exploring other revenue alternatives, such as working with the Seattle Public Utilities to sell cisterns and rain barrels, and installing GI demonstration projects. SCC estimates that 65 percent of their participants leave the program with permanent employment and that about 80 percent find stable housing. Their graduates have gone on to work for Seattle Public Utilities, Amorclad, International Belt and Rubber Supply, Seattle Parks and Recreation, Woodland Park Zoo, Franz Bakery, Pacific Piling to name a few. SCC Manager, Cathie Andersen, believes that the program's dual services of training disadvantaged community members while performing public agency work, makes it an ideal model for other cities to replicate.²⁷



Cleveland Botanical Garden Green Corps

Green Corps' mission is "Growing Youth, Growing Food, and Growing Cleveland." They do this through building life, work and leadership skills and by employing and educating high school youth in sustainable agriculture, place-based learning and community engagement. Each year, Green Corps employs and educates an average of 70 to 75 teenagers who live within the city to work at one of six urban learning farms.

Green Corps selects youth based on their desire and willingness to conduct physical labor, as well as an ability to demonstrate a sincere interest in learning about gardening, sustainable agriculture and the environment. Once hired, Green Corps student employees spend the summer working 20 hours a week developing essential work and life skills, knowledge of plants and agriculture, and community and environmental stewardship. Green Corps also has early college courses with Cuyahoga Community College, where students can earn college credit while in high school.

The Cleveland Botanical Garden recently started *Vacant to Vibrant: Redeveloping Vacant land as Green Infrastructure in Great Lakes Cities*. The project will monitor GI potential for small vacant lots, employing a triple bottom line model, gathering data on ecological services, social benefits, and economic potential. The project will build on lessons learned in Green Corps to train 18-24 year olds on assessment, installation, operations and maintenance of green infrastructure.

The pilot aims to improve water quality, stabilize neighborhoods, and prepare young adults for entry into the green workforce. In 2014 the program will install GI projects in vacant lots in Buffalo, NY, Cleveland, OH, and Gary, IN. Each installation will use scientific equipment and citizen science engagement to measure reduction in runoff, ability of the soil to hold post-rain event moisture, carbon capture, biodiversity, job potential, neighborhood use, and other indices of benefits on the treated properties. In each city, one vacant lot will be used as a plant nursery to provide greenery to this and other greening projects. The program will engage community members through a series of community meetings to help shape the location and design of the projects. The sites will also host a green jobs training program in urban landscape management. The jobs program will target college age-youth and will incorporate the training developed by Green Corps. The program anticipates hiring 10 young adults per city for this work.²⁸



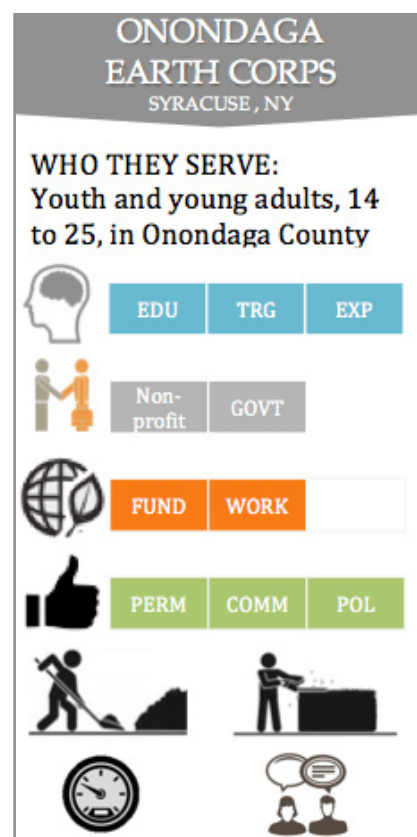
Onondaga Earth Corps (OEC)

Since 2004, OEC's mission has been to empower youth to be active participants in creating positive change for their communities and the environment. OEC accomplishes this by helping youth understand the relationship between people and the urban eco-system, engaging youth in hands-on community and environmental service learning projects, training youth for future jobs and careers in environmental fields, and empowering youth by developing their leadership abilities.

OEC crew members participate in urban forestry projects, stormwater management projects, private property management and community environmental education and outreach. In 2009, OEC was part of a team awarded an outreach and education grant by Save the Rain, a comprehensive stormwater management plan intended to reduce pollution in Onondaga Lake and its tributaries. Today, OEC crew members carry out educational workshops and appear in special events promoting the Save the Rain program in needy neighborhoods.

In 2010, OEC was awarded a county contract to pilot O&M on four newly built green infrastructure parking lot projects in Syracuse. Prior to the county contract, members of OEC's operations and maintenance crews were earning \$7.25 to \$9.25 per hour. Under the county contract, members of the same crew earn between \$11.75 and \$13 per hour.²⁹

Gregory Michel, Director of OEC, believes that the organization's ability to secure contracts and funding through the Save the Rain program had a lot to do with timing and developed community relationships. OEC was a leading entity in community based urban forestry and green infrastructure prior to the current efforts of the county. When discussions began about maintenance for green infrastructure, OEC was well positioned to access work opportunities and the political leadership was favorable to making OEC a part of its green infrastructure strategy. In the past three years, Onondaga County has installed over 100 green infrastructure projects, all of which will require some kind of ongoing, specialized maintenance. As the installation warranties for these projects expire, the county will be looking to community-based groups like OEC to implement maintenance plans. Mr. Michel sees an opportunity for OEC to take on more maintenance work as well as to train other neighborhood-based groups to implement green infrastructure maintenance. He expects that this will help further develop OEC and its mission.



Conclusion

The programs discussed in the previous pages are delivering the triple bottom line benefits that GI investments promise. Their work represents successful private/ public/ nonprofit partnerships that protect the environment, increase access to economic opportunities, and improve the social conditions of disadvantaged groups. They are cultivating a new generation of environmental stewards that come from communities most impacted by environmental and economic crises. These programs are using O&M work to create on-ramps to career opportunities in a variety of professions. They are also performing a critical task that creates real opportunities rather than dead-end, low-quality employment.

However, despite all their success in training participants for work in the green sector, each one of these programs is threatened by insufficient access to outside opportunities, funding, and work. The components that make these programs valuable community assets – good jobs, career planning, benefits, and services – also make the programs less competitive in the private market. Because of their backgrounds, participants in some of these programs face discrimination and preconceived assumptions about their work ethics and skills, which limit their ability to find good, high-wage employment.³⁰

The work required to install and maintain GI projects on public land, using public money, is set to ramp up in the coming years. It's an unmatched opportunity to make work available to organizations committed to achieving triple bottom line benefits, and in the process, lift and steer work away from low-road environments that have historically plagued occupations in O&M. Making resources available to these programs through public work is critical to their sustainability and will establish them as permanent leaders in the GI field. The following section recommends a set of strategies that have the potential to ensure that work gets done using high standards, by skilled workers who have the chance to work in quality jobs while transforming their communities.

O&M TOOLKIT

This practitioner-focused Toolkit for jobs in green infrastructure O&M was created by Green For All to assist new, established, and future GI programs launch and scale initiatives that can deliver the full promise of the green economy. It is intended as a practical resource that offers key examples, best practices, and effective tools. You can find this toolkit in Appendix A of this report.

RECOMMENDATIONS & NEXT STEPS

In this report we have explored the current work conditions of occupations performing O&M work throughout the country. We also identified and studied workforce development programs that train community members for jobs in green infrastructure. In this section we recommend strategies to ensure that work opportunities are accessible to trained participants of workforce development programs and that jobs in O&M are quality jobs that offer access to career development opportunities.

Strategies to Make O&M Work Available to Workers Trained in Green Infrastructure

Training local workers for employment opportunities in green infrastructure does not guarantee that those workers will gain access to future jobs. However, the public sector is encouraging increased adoption of green infrastructure through direct investment and through the disbursement of grants and incentives, which will ultimately result in more work opportunities to install and maintain green infrastructure. The following three strategies can increase work opportunities for participants trained in the types of programs identified in Section II.

1. Generate opportunities for local workers and local businesses by inserting community benefits strategies and metrics into green infrastructure installation and maintenance contracts.

One strategy to channel work and business opportunities to qualified local workers and contractors is to insert community benefit strategies and metrics into large green infrastructure contracts. Examples of community benefit strategies and metrics to incorporate include:

- Requiring that a certain percentage of work hours are performed by targeted workers;
- Requiring “first source” hiring agreements with qualified training programs that work with disadvantaged communities;
- Requiring that a certain number of business dollars are targeted to minority-owned or woman-owned businesses;
- Creating a contractor pool with base wages and other minimum requirements;
- Requiring contractors to invest in certifications and credentials for employees.

Incorporating community benefit strategies and metrics to green infrastructure contracts can create widespread economic opportunity for local businesses and workers and ensure high-quality products and services. For more information on how to incorporate community benefit strategies and metrics to public contracts please refer to Green For All’s High Road Agreements Best Practice Brief.

2. Public agencies that outsource O&M responsibilities should prioritize contracting with local workforce development programs.

Public agencies that need to outsource O&M responsibilities can make public work available to workforce development programs, as the City of Seattle did with Seattle Conservation Corps, or as Syracuse did with Onondaga Youth Corps. This allows those programs to offer valuable work

experience and jobs to their participants, while securing project revenue to sustain the operations of the program and help fulfill other public service goals, such as reducing the high school drop-out rate and helping individuals transition from homelessness.

3. Require the hiring of trained and certified contractors to install and maintain publically-funded green infrastructure on private property.

To ensure that trained workers gain access to jobs and that green infrastructure projects are properly installed and maintained, public grants should require that qualified personnel perform green infrastructure installations and maintenance. The public sector can do this by creating a formal list of pre-qualified contractors for installation and maintenance, who have obtained certifications recognized by the acting public agency. Contractors can become pre-qualified by agreeing to hire directly from workforce development programs that offer training in green infrastructure, or by going through a certified training program administered by the city or a qualified outside entity. One example is North Carolina State University's Best Management Practice (BMP) Inspection and Maintenance Certification for commercial landscapers, property owners, municipal staff, homeowners associations, and other professionals.³¹

Opportunities to Strengthen Workforce Development Programs and Career Pathways

We identified that workforce development programs are using O&M as employment and on-ramp opportunities to careers in green infrastructure and water sustainability. However, we did not identify clearly articulated career pathways that connect O&M work to the following steps in career development, such as union apprenticeships. The following set of recommendations builds upon the success of the workforce development programs profiled in Section II and describes steps that can strengthen the programs and the career pathways available to their participants.

1. Convene workforce development programs, public sector entities, organized labor, and business stakeholders to determine workforce needs and to collaborate on strategies to meet them.

A well-facilitated convening of these diverse stakeholders may reveal overlapping goals, such as employing trained local workers and the business community's need to hire skilled local workers. Such a convening may also help cultivate an understanding of the barriers that are preventing local workers from gaining access to job opportunities. A successful outcome of this type of convening is a commitment to work together and to establish an ongoing committee that can identify and agree on barriers and develop collaborative solutions.

2. Build a career lattice across many sub-sectors rather than a career ladder in one sub-sector.

Rather than training workers in one-subsector, a career lattice would train workers in the wider field of sustainable infrastructure and construction. Sustainable South Bronx and Verde have recognized that workers will have enhanced career development opportunities if they have a wide array of skills that can be applied to different sustainability measures, such as energy efficiency, green infrastructure, and urban agriculture. Both organizations train and offer services in multiple green industries, which creates a more resilient workforce with more options and possibilities for upward mobility.

In a report on Philadelphia's stormwater investments, Estolano, LeSar, Perez (ELP) Advisors identified three required features of a career lattice program.³² The features identified are: (1) "on-ramps" need to be flexible enough to accommodate both workers who need to move as quickly as possible to earning income, and workers who have the ability and desire to invest more time in preparation; (2) employers need to engage in the development of skills and training programs to ensure that workers are being trained to qualify for actual jobs; and (3) the workforce development resources of the city need to be knitted together so that participants can identify the various career pathways available.

3. Strengthen the link between O&M on-ramps and access to union apprenticeships.

Our research did not reveal the existence of solidly established pipelines to career development opportunities, such as union apprenticeships. To ensure that O&M work does not become a dead-end occupation, it is critical that bridges to apprenticeship programs and other career development opportunities be strengthened. Collaboration between trade schools, vocational programs, community colleges, unions, the public sector, and workforce development programs can address missing links in the career development trajectory of workers entering the field through O&M work.

Building solid career pipelines that use union apprenticeships can guarantee that graduates of workforce development programs are prepared for opportunities that require higher skills. Career development also ensures that we can replace retiring workers with quality, highly skilled replacements.

CONCLUSION

Our goal in performing this research was to assess the current work conditions of people doing O&M and to highlight models for connecting this work to disadvantaged communities. We found that O&M jobs are accessible, they provide a decent wage, and they offer career advancement opportunities, especially in the public sector. Our assessment of workforce development programs indicates that O&M work can be an on-ramp to career opportunities in a variety of professions, and that, done right, it can create pathways into the middle class, rather than to dead-end, low-quality employment. Finally, we reveal that water utilities investing in green infrastructure can successfully outsource O&M jobs to workforce development programs that are training individuals in green infrastructure, and that some already do.

The next step in solidifying O&M work as an effective on-ramp for career development is researching and developing models that build upon the lessons learned and recommendations in this study. Over the coming months, Green For All will continue to engage with leading practitioners to develop strategies that fortify existing workforce development programs and build solid pipelines to career development opportunities, while helping green our cities and keep our water clean. Look for additional resources on this topic later in 2013.

APPENDIX A

Operations and Maintenance High Road Toolkit

This practitioner-focused Toolkit for jobs in green infrastructure O&M was created by Green For All to assist new, established, and future GI programs launch and scale initiatives that can deliver the full promise of the green economy. It is intended as a practical resource that offers key examples, best practices, and effective tools.

The framework of the toolkit follows the pillars of High Road Strategies, an economic development strategy characterized by high-quality work, high-quality jobs and broad access to opportunity for a diversity of businesses and workers. The strategy, depicted by the image below has four components: 1) generating demand for green goods and services, 2) ensuring job quality and equitable access to opportunity, 3) supporting businesses that want to thrive in a high-road market and 4) creating workforce training pipelines that connect vulnerable people to green jobs.

High Road Pillars



INCREASING DEMAND:

The purpose of this section is to share programs/policy that increase the demand for green infrastructure goods and services.

Portland Stormwater Management Manual

The Stormwater Management Manual (SWMM), which was updated in 2008, outlines stormwater requirements that all development and redevelopment projects on either private or public property in the City of Portland must meet. The SWMM provides detailed information on stormwater management requirements, site planning, facility design criteria, operations and maintenance requirements, and source controls for both development and redevelopment projects.

Link: <http://www.portlandoregon.gov/bes/article/202884>

Seattle Rainwise Program

The City of Seattle provides a number of tools for its RainWise Program. The RainWise Guide offers a quick overview of the Program's purpose and outlines simple steps homeowners can take to reduce or slow stormwater runoff. The City also provides information on RainWise rebates, including details about eligibility, how to find reliable contractors, how inspections are conducted, and a summary of stormwater projects that people can install on their own properties.

Link: http://www.seattle.gov/util/groups/public/@spu/@usm/documents/webcontent/02_008093.pdf

Onondaga County's Save the Rain Green Improvement Fund

Onondaga County has compiled a number of different sources of information on the Green Improvement Fund (GIF), which promotes stormwater management. GIF reference information provides details about current GIF projects, the type of GI technology used, and costs per project. The County also provides a brief overview of GIF, which properties are eligible, how funds are awarded, project construction and monitoring requirements, and the reimbursement process.

Link: http://savetherain.us/wp-content/uploads/2012/08/GIF_ProgramDescription-Application_Master_Rev080712.pdf

Albemarle County, Virginia Property Owner Agreement on Stormwater Infrastructure Maintenance

In Albemarle County, Virginia, stormwater management is promoted through restrictions on building and development of private property. Property owners in the County who plan to build and/or develop their private property must sign an agreement with the Board of Supervisors of the County. The agreement allows the County to annually inspect the stormwater management (BMP) facilities to ensure that those facilities are in working condition. Each property owner must agree to perform ongoing maintenance of the infrastructure, including maintenance related to improvements, vegetation and structures. The agreement also binds the owner's successors and assigns to ensure the infrastructure is maintained in the future.

Link: <http://water.epa.gov/polwaste/nps/upload/nps-ordinanceuments-d2b-ablemarle.pdf>

City of Durham, North Carolina, BMP Maintenance Certifier Program

Like most jurisdictions in North Carolina, the City of Durham Stormwater Services Division (SSD) requires annual inspections (e.g., maintenance certifications) of all regulated BMPs in operation within the City limits. These annual maintenance certifications are required under the recorded agreement executed by the owner and the City during the construction drawing and permitting process for each Stormwater BMP. Noncompliance with the agreement may subject the owner to specific enforcement actions by the City as outlined in the agreement and in the City Code. The purpose of this document is to specify the inspection certification requirements and procedures for the BMP Maintenance Certifier (BMC) Program, which are to be followed by all who provide annual maintenance certifications of BMPs in the City of Durham.

Link: http://durhamnc.gov/ich/op/pwd/storm/Documents/BMP/bmp2_maintenance_certifier.pdf

HIGH ROAD STANDARDS:

The purpose of this section is to describe strategies to guide O&M work away from low-road environments and encourage good opportunities for disadvantaged communities.

Green For All High Road Agreements Best Practice Brief

The goal of this brief is to provide basic tools to agencies and organizations interested in putting High Road Agreements (HRAs) into practice. HRAs can offer enormous benefits to a broad range of stakeholders and local economies. They create high-quality jobs and career pipelines that can help stabilize communities hit hard by high unemployment. They allow governments and taxpayers to amplify the impact of their program dollars. Finally, HRAs can expand the capacity of contractors, especially Historically Underutilized Businesses, and can help to professionalize the growing home performance industry and ensure its ongoing viability.

Link: [http://greenforall.org/wordpress/wp-content/uploads/2012/06/High-Road-Agreements A-Best-Practice-Brief-by-Green-For-All.pdf](http://greenforall.org/wordpress/wp-content/uploads/2012/06/High-Road-Agreements-A-Best-Practice-Brief-by-Green-For-All.pdf)

Community Workforce Agreement between the City of Milwaukee and the Wisconsin Energy Conservation Corporation

The Common Council of the City of Milwaukee adopted this CWA to govern the Milwaukee Energy Efficiency (ME2) Program, which is part of the Wisconsin Energy Efficiency (WE2) Project in the cities of Milwaukee, Madison, and Racine.

Link: [http://greenforall.org/wordpress/wpcontent/uploads/2012/07/B2_Community-Workforce-Agreement Final Milwaukee.pdf](http://greenforall.org/wordpress/wpcontent/uploads/2012/07/B2_Community-Workforce-Agreement_Final_Milwaukee.pdf)

Community Workforce Agreement on Standards and Benefits in the Clean Energy Works Portland Pilot Project

Community Workforce Agreement standards and benefits in pilot program to ensure equity. Clean Energy Works Portland is intended to save energy, reduce carbon emissions, improve home comfort and home values, and create new jobs and long-term employment opportunities and career paths for Portland area residents.

Link: http://greenforall.org/wordpress/wp-content/uploads/2012/07/B1_CWA-Clean-Energy-Works-Portland-9-30-09.pdf

Common Agreements on Green Jobs – Green NY contracting and job standards

Developed among contractors, community groups, workforce trainers, and union locals, this document sketches out a proposed contracting model and standards for jobs and training for Green Jobs–Green NY, which is a statewide program to promote energy efficiency and the installation of clean energy technologies, reduce energy costs and greenhouse gas emissions, support community development, and create opportunities for green jobs in New York.

Link: http://greenforall.org/wordpress/wp-content/uploads/2012/07/B6_Common-Agreements-on-Contracting-and-Job-Standards-7-26-10.pdf

INCREASING BUSINESS CAPACITY:

The purpose of this section is to highlight social enterprises seeking to gain business opportunities in GI.

Verde

Verde is an enterprise located in Portland, Oregon that hires and trains people of color and people from disadvantaged communities to promote investment in the environment. Verde offers landscaping and energy services, and it conducts outreach and advocacy work. Through its programs and its work with partners, Verde aims to address the disproportionate environmental impacts that marginalized communities around Portland have experienced.

Link: <http://www.verdenw.org/>

Generation Water

Generation Water is an organization based in Los Angeles that aims to reduce water usage while at the same time fostering workforce development and preparing young adults for careers in water efficiency, sustainable landscaping, and habitat restoration. Generation Water provides its team members with training and education, and it offers clients in Southern California a range of services that apply modern technology and principles of environmental sustainability to projects such as landscaping.

Link: <http://www.generationwater.org/>

DC Greenworks

DC Greenworks is a 501(c)(3) social enterprise serving the Washington, DC community by providing training, tools, and technologies that utilize, advance, and protect the environment. DC Greenworks sees a vital connection between ecology and economy, between employment potential and environmental sustainability. They actively promote and deliver cutting-edge solutions that are cost-effective and eco-friendly. Their hope is to make DC's ecology and environment accessible and relevant, bridging diverse peoples and communities.

Link: <http://dcgreenworks.org/>

CAREER PATHWAYS:

The purpose of this section is to highlight organizations and training programs linking workforce development, green infrastructure and opportunities for disadvantaged workers.

Sustainable South Bronx

Through its green job training and community greening programs, Sustainable South Bronx (SSBx) works to address economic and environmental challenges throughout New York City and in the South Bronx. SSB prepares low-income New York City residents for green collar jobs, educates students on environmental justice issues, collaborates with partners to restore the environment, and provides services, including green roof installation, through its social enterprise.

Link: <http://www.ssbx.org/>

Green City Force

Green City Force (GCF) is a Brooklyn based service corps that helps prepare youth from low-income backgrounds for careers that promote environmental sustainability, and it provides training and work experience in areas including green roof installation and weatherization. GCF provides unemployed and underemployed youth in New York City with skills and knowledge, and it inspires them to promote sustainability and participate in service projects that help the environment.

Link: <http://www.greencityforce.org/>

Restoring the Environment and Developing Youth

Restoring the Environment and Developing Youth (READY) is a program designed to promote environmental stewardship while also providing employment to young adults. READY program participants construct projects, such as rain gardens, throughout Howard County, Maryland, in order to reduce stormwater runoff from private property. In addition, program participants learn about relevant environmental issues, and they gain on-site training and experience.

Link: <https://allianceforthebay.org/initiatives/healing-the-land/ready-program/>

Seattle Conservation Corps

The Seattle Conservation Corps is a City of Seattle Parks and Recreation program that provides job opportunities to marginalized groups, including homeless adults, while addressing City needs like habitat restoration, tree maintenance, and landscape work. The Corps helps the City promote environmentally sound practices, including rain barrel usage and erosion control, and it helps program participants learn work and life skills so that they can transition to permanent jobs that will provide them with living wages.

Link: <http://www.seattle.gov/parks/scc/>

Limitless Vistas, Inc.

Limitless Vistas (LVI) is a New Orleans based non-profit organization that provides training and work experience to at-risk youth and disadvantaged young adults. LVI students receive hands-on training in a variety of areas, including urban planning and development, farming, and bioremediation. Additionally, LVI students work with a variety of partners to conduct environmental service projects while adding to their skill sets.

Link: <http://www.limitlessvistas.org/>

Onondaga Earth Corps

Onondaga Earth Corps, which is based in Syracuse, New York, engages youth in environmental service learning projects, such as installing rain gardens, sustaining community farms, and planting trees. The Corps seeks to provide young people with training for future green jobs, it conducts environmental research, and it promotes education and awareness of environmental issues within the local community.

Link: <http://www.onondagaeearthcorps.org/>

Santa Fe iYouthWorks!

iYouthWorks! is a non-profit, community-based organization that helps provide opportunities to underserved youth and marginalized families in Northern New Mexico through a variety of programs. iYouthWorks! provides free education, leadership development, and job training, and participants benefit by gaining practical experience as part of a work crew and by apprenticing with local businesses to restore waterways and improve the local environment.

Link: <http://santafeyouthworks.org/>

TRAINING AND CERTIFICATION PROGRAMS:

NC State BMP & LID Certification

NC State University's Department of Biological and Agricultural Engineering offers courses, workshops, and training in green infrastructure related topics. The workshops and conferences offered are designed to appeal to a wide variety of professionals. Most workshops are offered multiple times a year and in multiple locations throughout North Carolina.

Link: <http://www.bae.ncsu.edu/stormwater/training.htm>

Watershed Management Group

The Watershed Management Group (WGM) Water Harvesting Certification program is a hands-on training course to earn certification in water harvesting design and implementation. The program is designed for professionals, educators, community organizers and others seeking to develop skills in this green career field. Professionals that have participated in the program include: landscape architects, hydrologists, urban planners, consultants, general contractors, and water harvesting installers.

Link: <http://www.watershedmg.org/certification>

Pratt Institute

A cutting edge curriculum created for existing professionals looking to gain expertise in the design, construction, maintenance and monitoring of green infrastructure in NYC. Created in partnership with Pratt's Urban Environmental Systems Management program and the New York City Soil and Water Conservation District. Intended for GI enthusiasts or construction and maintenance professionals with little to no design training.

Link: http://www.pratt.edu/academics/continuing_education_and_professional/professional_studies/pro_certificate_programs/green_systems_clean_water/

Washington State University Pierce County Extension and Puget Sound Partnership

Washington State University offers a series of technical workshops offering training in low impact development. Workshops offered include: Bioretention; Green Roofs, LID Foundations and Rainwater Collection; Permeable Paving; and Site Planning, TESC and Inspection. The workshop series also offers a Low Impact Development Certificate. To be eligible for the certificate, participants must complete all four workshops, must take tests for each workshop, and must take a final test.

Link: <http://cm.wsu.edu/ehome/index.php?eventid=45607&>

Green Roofs for Healthy Cities

Green Roofs for Healthy Cities (GRHC) offers four key courses: Green Roof Design 101, Green Roof Design and Implementation 201, Green Roof Waterproofing and Drainage 301, and Green Roof Plants and Media 401. These courses were developed by multidisciplinary committees with experts in the fields of civil and structural engineering, architecture, horticulture, roofing and waterproofing, and landscape architecture. Courses are offered in over 30 cities nationwide.

Link: <http://www.greenroofs.org/index.php/education>

END NOTES

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- ⁴ New York City Department of Environmental Protection. 2013. S.W.I.M. Coalition Green Infrastructure High Road Strategies Training. New York. PowerPoint.
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- ⁸ Burlin, Matt (Portland Environmental Services). Oct. 25th, 2012. Telephone interview. Tackett, Tracy (Seattle Public Utilities). Oct 24th, 2012. Telephone interview.
- ⁹ Ross, Gordon (AECOM). Feb. 1st, 2013. Telephone interview.
- ¹⁰ Katzenmoyer, Charlotte and McNesby, Jeff (Lancaster Department of Public Works). Feb. 6th, 2013. Telephone interview.
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- ¹⁵ Bureau of Labor Statistics. Jan. 23rd, Union Member Summary. Available from: <http://www.bls.gov/news.release/union2.nr0.htm>
- ¹⁶ Los Angeles Trade Tech and Thaddeus Stevens College of Technology for example.
- ¹⁷ Castain, Marcus (Generation Water). Feb. 1st, 2013. Telephone interview.
- ¹⁸ American Rivers. 2013. Sustaining Green: Strategies to Improve Operations and Maintenance of Green Infrastructure in the Chesapeake Bay Watershed
- ¹⁹ NCSU BMP Inspection and Maintenance Certification, NC State University Cooperative Extension. 2013. Available from: <http://www.bae.ncsu.edu/topic/bmp-im/overview.html>
- ²⁰ Based on forthcoming report by Brendan McEwen, MITCoLab.
- ²¹ City of Durham, North Carolina. 2007. Department of Public Works. BMP Maintenance Certifier (BMC) Program for All Regulated Stormwater BMPs in the City of Durham. Retrieved: March 21st, 2013. Available from: http://durhamnc.gov/ich/op/pwd/storm/Documents/BMP/bmp2_maintenance_certifier.pdf
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