Reducing Greenhouse Gas Emissions through the Sustainable Morgantown Initiative

Evan Hansen
Joseph James
Jerry Coleman

Downstream Strategies

295 High Street
Suite 3
Morgantown, WV 26505
www.downstreamstrategies.com

Downstream Strategies
building capacity for sustainability

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Evan Hansen, Joseph James, Jerry Coleman

ABOUT THE AUTHORS

Evan Hansen, M.S., Principal, Water Program. Mr. Hansen founded Downstream Strategies, an environmental consulting company in West Virginia, in 1997. He explores resource and environmental problems and solutions in three areas: energy, water, and land. He manages interdisciplinary research teams, performs quantitative and qualitative policy and scientific analyses, provides expert testimony, facilitates stakeholder meetings, and performs field monitoring.

Joseph James, B.A, Staff Scientist. Mr. James is experienced in a broad range of resource management topics. He has professional experience in the public, non-profit, and private sectors and has worked extensively in energy policy analyses, geographic information system development, database management, environmental data analysis, and environmental outreach.

Jerry Coleman, Ph.D., Visiting Scientist. Dr. Coleman is an Associate Professor of Biology at Montgomery County Community College, in Blue Bell, Pennsylvania, where he teaches a broad range of ecology and environmental studies courses. His professional interests include the restoration of degraded ecosystems and the promotion of local sustainable farming systems.

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ABBREVIATIONS

CO_2e	carbon dioxide equivalent
GHG	greenhouse gas
MT	metric ton
PV	photovoltaic
USEIA	United States Energy Information Administration
USEPA	United States Environmental Protection Agency
WV SUN	West Virginia Solar United Neighborhoods

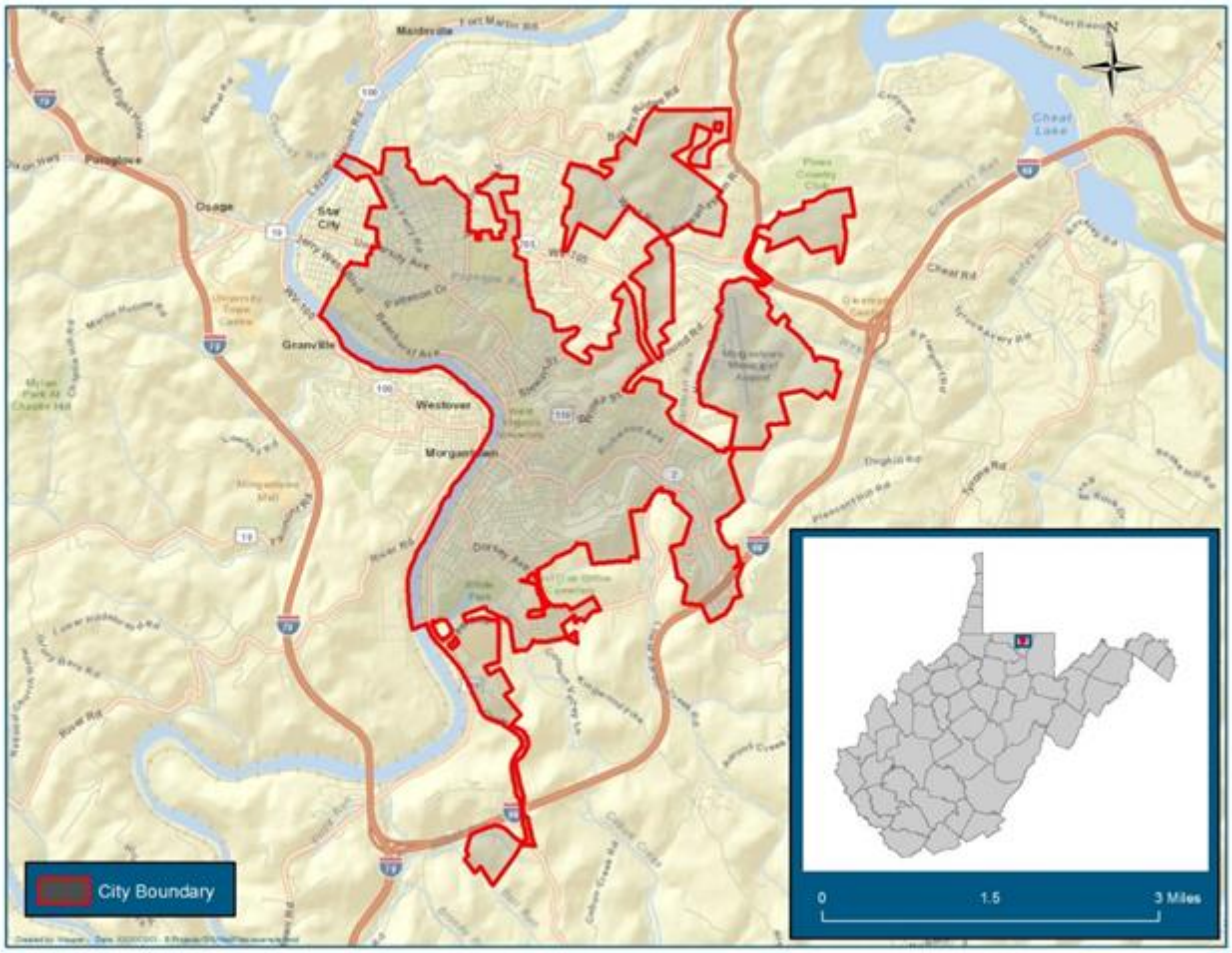
1. INTRODUCTION AND BACKGROUND

Reducing greenhouse gas (GHG) emissions requires actions at the international, national, state, and local levels. Over the past three years, Downstream Strategies has worked with the City of Morgantown, the Morgantown Municipal Green Team, and other partners to complete a three-phase GHG reduction project.

Phase 1, a community GHG inventory, was completed in 2014, and is the first such inventory in West Virginia (Simcoe et al., 2014). Phase 2 identified opportunities in the residential and commercial sectors for cost-effective GHG reduction projects (Hansen and James, 2015). The current report summarizes Phase 3, the Sustainable Morgantown Initiative, which is the implementation phase.

This project can be used as a model for small cities across Appalachia to inventory, investigate, and reduce community GHG emissions.

Figure 1: City of Morgantown



1.1 Phase 1: Community greenhouse gas inventory

Homes and businesses in Morgantown, together with vehicles on its roads, trucks that haul its trash, and pumps that transport the city's water and sewage, generate a significant amount of GHG emissions. According to a 2012 baseline inventory—completed as Phase 1 of this project—the Morgantown community emitted over 800,000 metric tons of carbon dioxide equivalents (MT CO_2e) in 2012.

Morgantown business owners and homeowners have significant opportunities to reduce energy consumption, which would save money and reduce GHG emissions. Within the built environment, the commercial sector is responsible for 72% of emissions—mostly from the use of electricity. The residential sector is responsible for an additional 25% of emissions in the built environment (See next-to-final column in Table 1).

When compared with total emissions—including the built environment and other sectors—commercial emissions make up 40% of the total and residential emissions make up 14% of the total (See final column in Table 1).

Table 1: Emissions in Morgantown from the built environment, by sector and fuel (2012, MT CO_2e)

Sector	Electricity	Natural gas	Other stationary fuels	Total	Percent of built environ. emissions	Percent of total emissions
Commercial	276,395	44,930	0	321,325	72%	40%
Residential	64,505	44,922	537	109,964	25%	14%
Other sectors	6,534	5,925	0	12,459	3%	2%
Total	**347,434**	**95,777**	**537**	**443,748**	**100%**	**55%**

Source: Simcoe et al. (2014). Note: This table shows activity-based and not source-based emissions. Totals do not match due to rounding.

West Virginia is a net exporter of electricity and a national leader in interstate electricity sales. In 2012, the state generated 233% of the electricity consumed within its borders (USEPA, 2014). Approximately 95% of the electricity produced in West Virginia comes from coal-fired power plants (USEIA, 2015a). Despite its relatively low electricity rates, West Virginians pay disproportionately high electricity bills. The state has the highest residential electricity consumption per household among the 13 Appalachian states (Van Nostrand, 2013) and the fifteenth-highest total energy consumption per capita in the nation (USEIA, 2015b).

1.2 Phase 2: Opportunities in the commercial and residential sectors

Following the Phase 1 community GHG inventory, Downstream Strategies and the Morgantown Municipal Green Team undertook an in-depth investigation of opportunities for GHG reductions in the commercial and residential sectors in Morgantown.

1.2.1 *Commercial sector*

To investigate energy-saving opportunities in the commercial sector that would result in GHG reductions, Downstream Strategies compiled data collected during nearly 90 previous commercial energy assessments within Morgantown.

As shown in Table 2, the assessed businesses, on average, would save $833 on energy costs each year if they invested $2,161 in retrofits, for an average payback period of 2.6 years. These averages, however, include all recommendations, including those related to windows that, by far, are the most expensive and have the longest payback periods. Without the window-related recommendations, businesses would only need to invest $1,353 on average, and the payback period would drop substantially—to 1.7 years.

Table 2: Recommendations averaged by business

	Number of businesses	Cost savings ($/year)	GHG emission reduction (lbs CO_2e/year)	Retrofit cost ($)	Payback period (years)
Electricity only					
All recommendations	80	697	14,384	1,892	2.7
All recommendations except windows	78	684	14,210	1,326	1.9
Natural gas only					
All recommendations	18	475	8,831	523	1.1
All recommendations except windows	18	475	8,831	523	1.1
Electricity and natural gas					
All recommendations	6	1,089	16,560	3,824	3.5
All recommendations except windows	4	1,444	5,983	544	0.4
Total					
All recommendations	**85**	**833**	**16,577**	**2,161**	**2.6**
All recommendations except windows	**85**	**797**	**15,191**	**1,353**	**1.7**

Source: West Virginia University Industrial Assessment Center and Downstream Strategies (2010-2014). Note: Recommendations are omitted that are not representative of opportunities at a broad range of businesses. Average payback periods in each row are calculated as the average retrofit cost divided by the average cost savings. GHG emission reductions include direct and indirect emissions of CO_2 and other GHGs, and are calculated in a manner consistent with the Phase 1 Morgantown GHG inventory (Simcoe et al., 2014).

Table 1 summarizes emissions from commercial establishments in Morgantown. After subtracting the emissions from the City of Morgantown and West Virginia University, which are included in the commercial sector, emissions from commercial establishments totaled 220,104 MT CO_2e. If 100 Morgantown businesses implemented the retrofits identified in the Phase 2 analysis, those emissions would decrease to 219,415 MT CO_2e/year—a 0.3% reduction from 2012. If 1,000 Morgantown businesses did so, then emissions would decrease further, to 213,213 MT CO_2e/year—a 3.1% reduction from 2012.

1.2.2 *Residential sector*

In parallel with the investigation of Morgantown's commercial sector, Downstream Strategies and the Morgantown Municipal Green Team conducted a Morgantown Residential Energy Consumption and Efficiency Survey. In addition, 10 focused home energy assessments were completed, along with preliminary solar assessments.

The Morgantown Residential Energy Consumption and Efficiency Survey

Questions in the Morgantown Residential Energy Consumption and Efficiency Survey were borrowed from—or formulated similarly to—questions in the national Residential Energy Consumption Survey. The primary goal of the survey was to identify patterns of energy consumption and energy efficiency across Morgantown.

We found that despite interest in energy-saving programs, the majority of respondents had neither heard of, nor participated in, Mon Power's residential energy efficiency programs. Only 2% of respondents stated that they participated in one of these programs.

Clearly, this highlights a significant opportunity for Mon Power to sign up new participants in Morgantown. This also highlights a ready and willing consumer base for entities offering energy efficiency services.

Home energy assessments

In tandem with the survey, 10 focused home energy assessments were conducted on a diverse set of houses. Data for each home were collected and entered into the Home Energy Yardstick online tool, a standard assessment created by the United States Environmental Protection Agency (USEPA) to allow homeowners and renters to compare their home's energy performance to other homes nationwide (USEPA, 2015). Using statistical algorithms that take into account climate, weather, home size, and home occupancy, a home is rated on a scale of one to 10. A rating of one is assigned to a home with high energy demand, high carbon emissions, and low efficiency, and a rating of 10 is assigned to a home with low energy demand, low carbon emissions, and high efficiency. This system allows homes of various typologies and classes to be compared against each other.

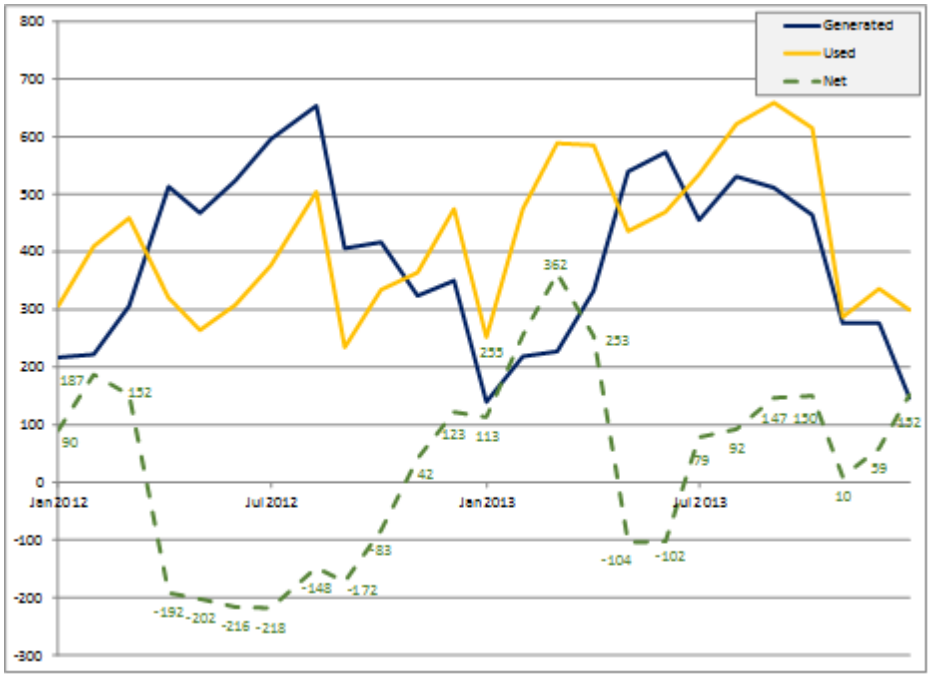
Of the 10 units inspected, the Home Energy Yardstick score averaged 8.5, which is significantly higher than the national average score of five. Four of the homes scored a 10, and the lowest score was a 4.5. Interestingly, the scores for two assessed homes built in the last decade were much lower than those for the older homes.

Preliminary solar assessments

Morgantown residents and businesses had voiced an interest in distributed energy sources (City of Morgantown, 2013a and b). An estimated 22% of all residential roof area and 65% of all commercial roof area are viable for distributed solar in the cool climate zone of the United States—in which Morgantown is located (Denholm and Margolis, 2008). In fact, the National Renewable Energy Laboratory has estimated that West Virginia has 4 GW of technical potential for rooftop solar photovoltaic (PV) installations, approximately 4,000 times more than is currently installed (Lopez et al., 2012).

At one of the 10 homes for which focused home energy assessments were conducted, a 4,000-watt rooftop solar system had been installed approximately five years previously. Generation varied considerably by month, but electricity use also varied. As illustrated by the dashed green line in Figure 2, net generation was positive in some months, meaning that the home produced more electricity than it used. In other months, net generation was negative, and use exceeded generation.

Figure 2: Electricity production and use from a solar array installed at a Morgantown home, 2012-13



Source: Hansen and James (2015).

For the other nine homes for which focused home energy assessments were conducted, we analyzed the potential for rooftop solar PV. On average, these homes had approximately 420 square feet of south-facing roof space, which is large enough for a 5,280-watt system. For seven of the nine homes, systems that fit on the south-facing roof would be large enough to displace over one-half of the home's electricity consumption. In one case, the system that fits on the south-facing roof has the potential to displace the home's entire electricity consumption.

At 10 cents/kWh, an approximation of the current residential electricity rate, the assessed homes would save an average of $15,500 over 25 years. Rates have increased in recent years and will likely continue to increase in the future. If rates increased an average of 15% over the next 25 years, these homeowners could expect an average savings of close to $17,900. These nine solar installations could offset more than 98,000 pounds of CO_2e per year.

2. THE SUSTAINABLE MORGANTOWN INITIATIVE

Phase 3, which is known as the Sustainable Morgantown Initiative and represents the implementation phase of this three-phase project, includes four linked programs to promote investments in energy efficiency and renewables that will reduce GHG emissions.

The overarching goal of the Sustainable Morgantown Initiative is to promote opportunities for Morgantown small businesses, landlords, and homeowners to:

1. reduce energy consumption and related GHG emissions,
2. promote a culture of sustainability, and
3. promote money-saving investments in sustainability.

Tools included in this phase include: the Morgantown Solar Cooperative, the Virtual Power Plant, increased availability of energy assessments, and research on a potential sustainable small business certification program.

These tools were linked together with a unified public relations effort that included billboards, social media, press-releases, and direct contacts with key individuals. Central to the success of Sustainable Morgantown Initiative was SustainableMorgantown.com, a website created by the project team that acts as a central marketplace for information.

Figure 3: Billboard advertisement for the Sustainable Morgantown Initiative

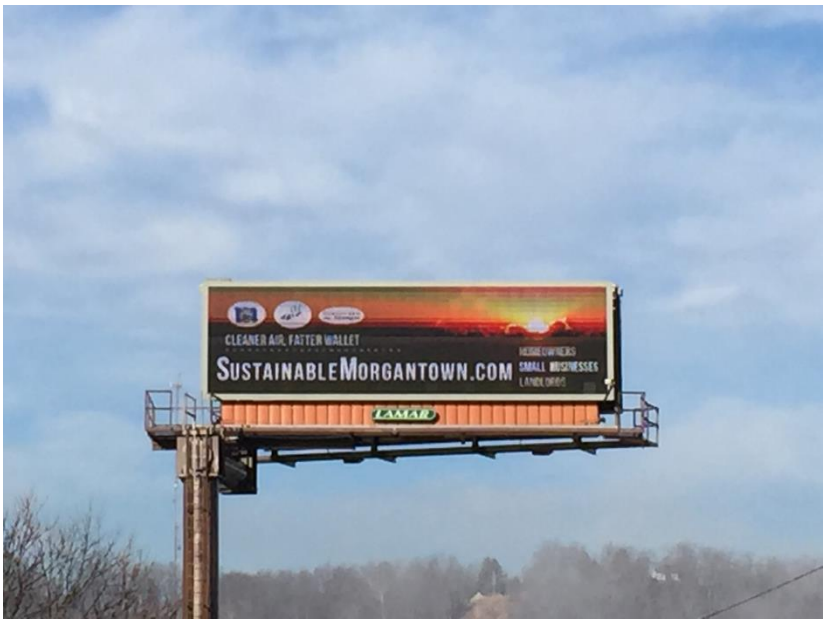


Photo: Evan Hansen.

2.1 Morgantown Solar Cooperative

In February 2015, Downstream Strategies and the Morgantown Municipal Green Team launched the Morgantown Solar Cooperative with its partner, the Community Power Network. Community Power Network is a network of local, state, and national organizations that build and promote renewable energy projects and policies. West Virginia Solar United Neighborhoods (WV SUN) is its local affiliate.

The Morgantown Solar Cooperative aimed to increase Morgantown residents' access and exposure to solar PV systems and to educate them about the benefits of renewable energy. The cooperative model uses the principle of bulk purchasing. As a group, Cooperative members solicited competitive bids from area solar installers and eventually selected Mountain View Solar, a company based in West Virginia's Eastern Panhandle.

By going solar as a group and choosing a single installer, participants were offered a substantial discount from regular retail prices.[1] This discount, in addition to the 30% federal tax credit, shortens the payback period for solar installations. Furthermore, Cooperative members also have the support of their fellow members and WV SUN throughout the process.

The response to the Morgantown Solar Cooperative was substantial. Over 100 people signed up for roof reviews, 91 received preliminary approval, 89 were formally approved and given quotes by the installer, 23 contracts were ultimately signed, and 24 installations were completed.[2] These installations represent 141 kW of new installed solar capacity at a cumulative cost of approximately $430,000. This new capacity represents approximately 7% of the total installed solar capacity in West Virginia in 2015.[3]

While the Cooperative was focused on the Morgantown area, it did not restrict participation to within city limits. Of the 141 kW installed, 60 kW—less than half—was within city limits.

Table 3: Solar installations via the Morgantown Solar Cooperative

	Number of installations	Installed capacity (kW)	GHG emission reduction (MT CO_2e/year)
Within Morgantown	11	60	48
Outside of Morgantown	13	81	65
Total	**24**	**141**	**113**

Sources: Number of installations and kW installed from Ireland (2016). GHG emission reduction calculated for this report assuming a 13.5% capacity factor, 1,511.52 pounds CO_2e/MWh emissions factor, and 8,640 hours/year.

As shown above in Table 1, electricity use in Morgantown's residential sector generated GHG emissions of 64,505 MT CO_2e in 2012. The GHG emissions saved by the 11 homes that participated in the Cooperative within city limits will total an estimated 48 MT CO_2e per year (See Table 3). This represents a savings of 0.078% annually.

While the Morgantown Solar Cooperative was a success, it is just a start. There are several factors that suggest that solar installations will increase over time:

- The first Cooperative resulted in 24 homes in and near Morgantown that can now demonstrate, via reduced utility bills, the payback period that can be achieved in Morgantown. As this information is shared, more homeowners will likely become interested.
- The Cooperative resulted in increased visibility of solar projects to neighbors and people who drive by. This should also lead to additional interest.
- Solar prices continue to fall, and electricity rates are likely to continue to rise, making it easier for people to afford the initial investments and reducing the payback periods.
- A second Morgantown Solar Cooperative is now being organized.

While the Morgantown Solar Cooperative only reduced residential electricity GHG emissions by an estimated 0.078%, if approximately 115 additional homes went solar, these emissions could be reduced by

[1] The exact price offered via the Cooperative is not being made publicly available.
[2] One person signed a contract for two properties.
[3] This estimate assumes an installed capacity of 2 MW before the Morgantown Solar Cooperative.

approximately 1%. Given that there are more than 10,000 households in Morgantown (US Census Bureau, 2016), installing solar at this number of homes is certainly achievable over the next few years.

2.2 Virtual Power Plant

The second component of the Sustainable Morgantown Initiative is the installation of a Virtual Power Plant. Downstream Strategies and the Morgantown Municipal Green Team partnered with Mosaic Power of Frederick, Maryland, to implement this project. The overarching goal was to install Mosaic's frequency regulation devices on electric water heaters in multi-unit buildings around Morgantown, which would generate income that landlords could reinvest into their properties in the form of energy efficiency improvements or renewable energy installments.

West Virginia's electric grid is operated by PJM, a regional grid operator. To match electricity supply and demand on a minute-by-minute and second-by-second basis, PJM operates a Frequency Regulation Market. Mosaic Power participates in this market by remotely adjusting the timing of water heater power usage to match momentary changes in electricity supply and demand by installing frequency regulation devices (See Figure 4). These small efficiencies, multiplied over a fleet of many water heaters, enable electric power plants to reduce unnecessary generation and emissions.

Mosaic Power connects water heaters together to form their Virtual Power Plant, sells the electricity efficiency to the power grid, and pays the building owners $100 per device installed each year. Tenants continue using approximately the same amount of electricity and receive the same hot water—but the water is heated more efficiently.

Figure 4: A Mosaic Power frequency regulation device

Photo: Danny Chiotos.

Mosaic has installed 590 systems on existing electric water heaters at apartment complexes in and around Morgantown. Cumulatively, this will produce $59,000 of income for the complex owners per year—with no additional investment.

While the ultimate goal of the Sustainable Morgantown Initiative is for landlords to use this new stream of income to make improvements to their buildings' energy efficiency, there is no requirement that the money be spent in this manner. Nonetheless, the frequency regulation devices produce tangible GHG reductions on their own.

While the Virtual Power Plant was focused on the Morgantown area, it did not restrict participation to within city limits. Of the 590 units installed, only 85 are within city limits. The others are outside, but very close to the city border.

Table 4: Mosaic Power water heater installations

	Number of Installations	GHG emission reduction (MT CO_2e/year)
Within Morgantown	85	124
Outside of Morgantown	515	735
Total	**590**	**859**

Sources: Number of installations from Chiotos (2016). GHG emission reduction calculated for this report.

As discussed above, Morgantown's residential sector generated GHG emissions of 64,505 MT CO_2e in 2012. The GHG emissions saved by the virtual power plant within city limits will total an estimated 124 MT CO_2e per year (See Table 4). This represents a savings of 0.2%.

Mosaic Power is continuing to market and install its devices in the Morgantown area. As landlords receive their $100 annual payments, and as the technology proves that savings are generated that do not impact tenants' enjoyment of hot water, additional systems will likely be installed. If approximately 1,180 additional systems were installed, Morgantown's residential electricity emissions could be reduced by approximately 3%. Given that 590 systems are already installed in the vicinity of Morgantown and that new multi-family homes are being constructed frequently, installing this number of systems is certainly achievable over the next several years.

2.3 Increased availability of energy assessments

Energy assessments help prioritize efficiency improvements and building upgrades, which help business owners and homeowners decide which actions to take to improve energy efficiency and lower energy costs. There are many different types of energy assessments. Some go into great detail and require work by a professional energy assessor or weatherization expert; others can be completed by untrained building occupants at no charge.

The third component of the Phase 3 Sustainable Morgantown Initiative was to promote the increased availability of energy assessments.[4] During Phase 2, close to 55% of residential energy consumption survey respondents stated that they were interested in having a free energy assessment conducted on their home. Many people expressed a willingness to pay for such an assessment. Throughout the Sustainable Morgantown Initiative, energy assessment services by Leonardo Technologies, Inc. were promoted alongside other initiatives. A brochure has been developed and the services were promoted on the Sustainable Morgantown Initiative website; however, opportunities remain to greatly expand on this marketing effort.

[4] Other than including these assessments in the unified public relations campaign, grant funding was not used to support the energy assessment work.

2.4 Sustainable Small Business Certification

The fourth component of the Phase 3 Sustainable Morgantown Initiative was an exploration of a sustainable small business certification program for the City of Morgantown. Products and businesses perceived as sustainable can benefit from a number of competitive marketing advantages. However, if consumers are not aware of a business's sustainable practices, they may not seek out their products, even if the product itself is sustainable. Publicity of a business's sustainable practices, therefore, is critical to take advantage of the market segment that wishes to send strong environmental signals through its purchasing decisions.

Exploration of a sustainable business certification program was initially stimulated by the interest in reducing Morgantown's overall GHG emissions and energy usage. However, because most sustainable business certification programs are broader, including such considerations as materials usage, water use efficiency, stormwater runoff mitigation, and other environmental practices, the project team explored the potential for a more holistic sustainable small business certification program.

Morgantown has a large number of options if it elects to begin a sustainable small business certification program. The project team explored several existing certification programs to learn more about what would be required to create and maintain such a program; these programs are summarized in Table 5.

Table 5: Summary of sustainable small business certification programs

Certification	Cost to business	Duration of certificate	Type of audit or documentation required
Greater Pittsburgh			
Sustainable Small Business	Free	2 years	Self-declared, confidential
Sustainable Business Compact	$500-1,500	2 years	Higher levels need documentation
Sustainable Pittsburgh Restaurants	$75/year	2 years	Self-declared, public
Dayton, Ohio			
DRG3 Certification Program	$50-100	2 years	5% annually randomly selected for on-site audit
Los Angeles			
Los Angeles Green Business Program	$275	3 years	Self-declared
National			
Green Seal	$1,360-1,950	Annual	Verification documents and on-site audit required
Green Business Bureau	$375-875	Annual	Self-assessed

Sources: Sustainable Pittsburgh (2016a, b, c), City of Dayton (2016), City of Los Angeles (2016), Green Seal (2016), Green Business Bureau (2016).

The Project Team scoped three general options for the City of Morgantown. These options are presented here in order of increasing difficulty and complexity, in terms of investment of energy and time by the City.

2.4.1 *Option 1: Piggy-back onto another program*

Instead of creating its own separate program from scratch, Morgantown could consider instituting a program that would simply recognize and "piggy-back" certification by any of a defined list of other independent groups' certifications, or external monitoring. Applicant businesses would be responsible for achieving certification by one of the other groups, and Morgantown would award the City's certification in addition to that awarded by the other group.

Even though it would be piggy-backing onto another program, the City would still need to take several steps to implement the program:

- A comprehensive website would need to be developed with local information.
- New materials would be needed to promote the program—and to promote the businesses that have become certified. This would include press releases and signage, for example.
- The City would need to define which outside certifications would be accepted. Care would need to be taken to avoid a "race to the bottom," where businesses become certified by the least-stringent program available.
- An agreement with a public certification program, such as Pittsburgh's, may be required for that program to accept and evaluate applications from Morgantown. If a national program is selected, such an agreement would not likely be necessary.
- The City would need to establish a defined entity to oversee and administer the program, verify applicant businesses' certifications, award the Morgantown certification, and oversee ongoing maintenance and updating of the website content, and process business renewals.

By choosing this piggy-back option, the City would avoid the time and effort of independent development of certification criteria. It would not need to put effort into independently verifying or auditing businesses' claims. Overall, this option represents the lowest investment and expense to City, and it could possibly be free to applicant businesses.

Drawbacks, however, include a loss of motivation to achieve higher standards, which could reduce the overall environmental benefits. Also, the credibility of the program would depend on the credibility of certifying organizations, which is outside of the control of the City.

2.4.2 *Option 2: Independent development with no independent verification program*

A second option is for Morgantown to develop and administer its own independent criteria for certification. It would likely be necessary to develop separate checklists for different kinds of businesses, such as restaurants and offices. Checklists would also need to differentiate between businesses that rent their space from businesses that own their own space, because owners have greater control over certain systems such as heating and cooling. Applicant businesses would receive a checklist of possible actions they could take—or are already taking—to accumulate points, and with sufficient points, the business would be certified.

Participation using Option 2 would be based on the honor system, with no independent verification or audit by the City. The Southwestern Pennsylvania Sustainable Small Business Designation Program is an example of this scenario. For this program, a business accumulating even a single point can be certified as "Striver," while 30 points are required for "Bronze," 76 for "Silver," and 131 for "Gold."

The City would need to take several steps to implement the program using this option:

- A comprehensive website would need to be developed with local information.
- New materials would be needed to promote the program—and to promote the businesses that have become certified. This would include press releases and signage, for example.
- The City would need to establish a defined entity to oversee and administer the program, verify applicant businesses' certifications, award the Morgantown certification, and oversee ongoing maintenance and updating of the website content, and process business renewals.
- The City would need to develop, test, and update its certification criteria.

By choosing this option, the program's credibility of program would be dependent on local decisions regarding the strictness of the certification criteria. Because the criteria would be developed locally, it would likely be tailored to local situations and would allow greater flexibility for individual situations. After its initial

development, the program should be relatively low cost to city because audits, auditors, and associated paperwork would not be required. The program could possibly be free to applicant businesses.

Compared with the first option, in which the City piggy-backs on existing programs, this options would require a significant initial investment to develop the program and the certification checklists.

2.4.3 *Option 3: Independent development with independent verification program*

A third option is the same as the second option, except that the City would also develop an auditing process to ensure that applicant businesses are doing what they claim. This process would require a designated entity to conduct on-site verification of claims and to process the paperwork submitted by the businesses. The audit process can range from a largely informal process to a very detailed, paperwork-heavy process.

In addition to the steps listed under Option 2, the City would need to designate an auditor (or group), with support and resources to advise and make recommendations on-site to applicant businesses. This entity would be charged with verifying that certification criteria have been met. Audits could be conducted before certification decisions are made. Alternatively, a certain fraction of certified businesses could be randomly audited at any time—as done by Dayton.

As compared with Option 2, adding an auditing process would increase the credibility and the public perception of the program's quality. It would be more likely that the program results in true environmental gains, and the program would be less open to cheating and to accusations of greenwashing.

However, adding an auditing program would increase the administrative costs and paperwork. Higher costs would make it unlikely that the program could be offered for free to applicant businesses, and higher registration costs to applicants could reduce the number of businesses that wish to achieve certification. In addition, a larger bureaucracy could slow the process down and could create obstacles to initial certifications and to renewals

2.4.4 *Recommendations*

It is recommended that the City of Morgantown only create a sustainable small business certification program that is credible and that can be documented to be effective. Greenwashing a business's image is an all-too-common tactic (Horiuchi et al., 2009; Fleming, 2013) to create a misleading public impression that fails to represent a company's true practices, and the City should be wary of promoting appearance over substance.

A high-quality certification program must set meaningful, but achievable, standards and require both a broad and detailed examination of the applicant's environmental impacts and sustainability practices, and documentable progress towards improving these. Credibility of the certification would be enhanced if it includes an independent auditing process to ensure that applicants are representing themselves honestly and are truly deserving of recognition.

3. UNIFIED PUBLIC RELATIONS EFFORT

A unified public relations effort was implemented to advertise the Morgantown Solar Cooperative, the Virtual Power Plant, and increased availability of energy assessments.

3.1 Website

SustainableMorgantown.com was designed by project partners to act as a central repository for information pertaining to the programs in the Sustainable Morgantown Initiative. The website was built and is maintained by the City of Morgantown. To reduce costs, the project team only purchased a domain, which redirects traffic to a page on www.morgantownwv.gov.

Figure 5: Sustainable Morgantown Initiative website graphic

3.2 Social media

The City of Morgantown has a strong social media following. Working with the City's Public Communications Manager, the project team crafted a social media campaign to take advantage of this exposure. Periodically, from June 2015 to March 2016, programs in the Sustainable Morgantown Initiative were promoted on social media. Selected social media posts can be found in Appendix A.

3.3 Billboards

To direct people to SustainableMorgantown.com, the project team rented two digital billboards for a period of two months. The billboards were situated in high-traffic areas. Based on viewer statistics from the advertising company, it is estimated that the billboards were viewed nearly 500,000 times.[5]

3.4 Direct contact

For the Virtual Power Plant, which required communication with landlords, the project team undertook direct contacts via letters and brochures. The team created a tri-fold brochure to accurately and efficiently explain the Virtual Power Plant. Brochures were sent with a cover letter, signed by the Mayor of Morgantown, asking Morgantown landlords to participate.

[5] This estimate includes multiple views by single individuals.

4. CONCLUSIONS AND NEXT STEPS

The Sustainable Morgantown Initiative has produced tangible results inside the city boundaries and beyond. It appears that implementation of these programs will continue. A second Morgantown Solar Cooperative is already being organized, and Mosaic Power is continuing to expand its Virtual Power Plant. It is not unrealistic to expect to see savings of 2-3% of residential electricity GHG emissions from these two efforts alone over the next few years. In addition, there is still an unmet demand for energy assessment services in the area.

During the fall 2015 funding cycle, Friends of Deckers Creek received a grant from the Appalachian Stewardship Foundation to develop a Green Business Coalition. The goal of this coalition is to initiate a discussion with businesses about sustainability and to identify steps that can be taken to achieve an improved level of sustainability. This project is a natural next step toward the development of a local sustainable business certification program.

Dissemination of the results from all three phases of this project will continue, with a focus on municipalities across West Virginia.

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APPENDIX A: SOCIAL MEDIA POSTS

To the Sustainable Morgantown homepage

Check out SustainableMorgantown.com to learn about the toolkits designed to save money and reduce Morgantown's greenhouse gas emissions. #CleanerAir #FatterWallet

To Mon Power's efficiency program page

Only 2% of respondents to the 2014 Morgantown Residential Energy Consumption and Efficiency Survey identified that they participated in Mon Power's energy efficiency programs. Learn more about those money saving programs here: https://www.firstenergycorp.com/content/customer/save_energy/save_energy_west_virginia/mon_power.html @MonPowerWV #CleanerAir #FatterWallet

Abridged: Did you know Mon Power offers money saving energy efficiency programs? https://www.firstenergycorp.com/content/customer/save_energy/save_energy_west_virginia/mon_power.html @MonPowerWV #CleanerAir #FatterWallet

To the Sustainable Morgantown renewable energy page

The 2015 Morgantown Solar Cooperative is the largest solar cooperative in West Virginia. To date 24 systems have been installed, accounting for 141 kW. That is 7% of the total solar installed in West Virginia. Learn what your roof can do for you! http://www.morgantownwv.gov/residents/sustainable-morgantown/landlords/#RenewableEnergy

Abridged: The Morgantown Solar Cooperative is the largest solar cooperative in West Virginia. Learn what your roof can do for you! http://www.morgantownwv.gov/residents/sustainable-morgantown/landlords/#RenewableEnergy #SustainableMorgantown #CleanerAir #FatterWallet

TWITTER: #Morgantown's Solar Cooperative is the largest one in WV. Learn what your roof can do for you! http://www.morgantownwv.gov/residents/sustainable-morgantown/landlords/#RenewableEnergy (link can be shortened in Hootsuite or Bitly) #CleanerAir #FatterWallet

To the Sustainable Morgantown energy assessment brochure

Find ways to reduce your energy footprint by setting up an energy audit. Learn more about the process and how to sign up here: http://downstreamstrategies.com/documents/home-energy-audits-brochure_2015-10-22.pdf #SustainableMorgantown #CleanerAir #FatterWallet

TWITTER: Find ways to reduce your energy footprint by setting up an energy audit. Learn more & sign up here: (shortened link) http://downstreamstrategies.com/documents/home-energy-audits-brochure_2015-10-22.pdf #CleanerAir #FatterWallet

To the Sustainable Morgantown Virtual Power Plant page

Did you know #Morgantown landlords are building a "virtual power plant"? Learn more about the process here: http://www.morgantownwv.gov/residents/sustainable-morgantown/landlords/#VirtualPowerPlant

Abridged: Landlords in #Morgantown, have you heard about the virtual power plant? http://www.morgantownwv.gov/residents/sustainable-morgantown/landlords/#VirtualPowerPlant #SustainableMorgantown

To the Sustainable Morgantown Small Business Certification Program page

Do you own or work at a sustainable small business? Learn what the Morgantown Municipal Green Team, Downstream Strategies, and Friends of Deckers Creek are doing to recognize you. http://www.morgantownwv.gov/residents/sustainable-morgantown/small-businesses/#SmallBusinesses @FODC_WV @DownstreamStrat #SustainableMorgantown

TWITTER: Own or work at a sustainable small business? The Green Team, @FODC_WV & @DownstreamStrat want to recognize you (shortened link) http://www.morgantownwv.gov/residents/sustainable-morgantown/small-businesses/#SmallBusinesses

To the Sustainable Morgantown Landlords page

The Green Team offers opportunities for landlords to increase overall energy efficiency, save their own or their tenants' money and increase the marketability of their properties. – (shortened link) http://www.morgantownwv.gov/residents/sustainable-morgantown/landlords/

TWITTER: The Green Team can help landlords save money while increasing their property's marketability & energy efficiency – (shortened link) http://www.morgantownwv.gov/residents/sustainable-morgantown/landlords/

To the Sustainable Morgantown Homeowners page

There are cost-effective opportunities for homeowners to reduce overall energy consumption & save money. http://www.morgantownwv.gov/residents/sustainable-morgantown/homeowners/

To the Sustainable Morgantown Small Businesses page

Nationwide, small businesses spend more than $60 billion per year to keep their lights on and the temperature controlled. Morgantown businesses have opportunities to reduce their energy expenditures. http://www.morgantownwv.gov/residents/sustainable-morgantown/small-businesses/

TWITTER: Learn about opportunities for Morgantown businesses to reduce their energy expenditures – (shortened link) http://www.morgantownwv.gov/residents/sustainable-morgantown/small-businesses/