Green Buildings in Susquehanna Township

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Sustainability

Professor Dernbach

I. Introduction

Susquehanna Township, located in Dauphin County, Pennsylvania, was created in 1815.[1] In recent years, Susquehanna Township has made sustainable development within its community a top priority. Those efforts are reflected in Susquehanna Township's achievement in a Gold level status certification through the Sustainable Pennsylvania Community Certification program.[2] Additionally, Susquehanna Township has created and published a list of sustainability goals on the township's website.[3] Additionally, Vartan Group plans to break ground on a sustainable neighborhood called "Susquehanna Union Green" in 2019.[4] Despite the progress Susquehanna Township has made to become more sustainable, the issue is that the Township does not have an ordinance specifically geared to building sustainably.[5] Our hope is that our proposed ordinance will rectify this.

Our proposed ordinance will mandate that all new buildings, as defined by Ord. 39-1955, 10/13/1955, § 1 §4-101, and all renovations to commercial buildings will be highly incentivized to meet one of the Leadership in Energy and Environmental Design (LEED) certification standards. Additionally, we also plan to heavily incentivise residential buildings, new or renovated, to be LEED certified as well. Our LEED-based

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[1] *History,* Susquehanna Township, Dauphin County, PA, (2012), https://web.archive.org/web/20121213112332/http://www.susquehannatwp.com/About.asp

[2] David W. Kratzer, Jr.,*Susquehanna Township recognized as certified sustainable municipality,* Press Release from Susquehanna Township Manager, (March 7, 2018), https://www.susquehannatwp.com/sites/susquehannapa/files/pages/sustainable_pa_community_certification_program_press_release.pdf

[3] *Sustainability A Certified Gold Sustainable Pennsylvania Community*, Susquehanna Township Dauphin County, PA, https://www.susquehannatwp.com/community-development/pages/sustainability

[4] Nicole L. Conway, *Susquehanna Union Green*, Vartan Group, (2018), http://www.vartangroup.com/property/susquehanna-union-green/

[5] §27-401-6 is a Zoning Ordinance that online conservation efforts of Susquehanna Township. This ordinance is the closest the Township has come to creating and implementing an ordinance geared towards sustainable development.

ordinance will include a variety of incentives for achieving certain LEED points in order to emphasize the types of sustainable development that are most important to achieving the sustainability goals set by Susquehanna Township. Additional incentives will be given if buildings achieve the highest levels of LEED certifications. We decided to use LEED as the standard on which to base our ordinance off of because of its popularity and design. LEED was designed with the idea that all future buildings would follow these standards because construction trends are gradually leading towards building sustainably.[6]

By using LEED in conjunction with the goals presented by the Township, our ordinance will be able to address social, economic and environmental concerns. One of Susquehanna Township's main goals is specifically to adopt and implement LEED.[7] More specifically, the township outlines a goal of "[l]ower[ing] township energy uses, and facilitat[ing] use of renewable energy systems."[8] Directly aligning with that of Susquehanna Township, a couple of LEED's primary goals are to "save energy, water, resources, [and] generate less waste."[9] Susquehanna Township desires to become a more environmentally friendly and healthier community"[10] and with the implementation of an ordinance endorsing and incentivizing the LEED certifications to both commercial and residential buildings, the township will be one step closer to achieving its goals.

This paper is intended to lay out the foundation for a proposed ordinance for Susquehanna Township in Dauphin County, Pennsylvania. It will explain the need for an ordinance that focuses on green building to assist the township in its goals of becoming

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[6] Greta Crispen, Columbia University Master's Student, Phone Interview, September 24, 2018.
[7] *Supra* note 3.
[8] *Id.*
[9] *Better Building is Our Legacy*, U.S. Green Building Council, (2018), https://new.usgbc.org/leed
[10] *Supra* note 7.

a more sustainable community. Sustainability is very important to the development of a community in social, environmental, and economic ways. We will examine how other municipalities across the United States have implemented their own kinds of green building ordinances in their own ways and with the push towards LEED certified buildings. This paper will take a broad approach at combining both commercial and residential buildings into the proposed ordinance while going into detail about what the ordinance should entail. The primary goal of this is to educate the municipality on the potential ways a LEED based building ordinance could benefit its community through the implementation of such an ordinance that encompasses its goals of becoming a more sustainable community.

This narrative will entail a detailed description of the problem regarding the lack of green building standards in Susquehanna Township and the recommendations as to how the Township may go about giving this. It will outline the social, economic, and environmental benefits of building sustainably, describe the LEED certification program and standards and exhibit how jurisdictions across the United States have implemented different kinds of green building ordinances to achieve a goal of more sustainable buildings. This paper will conclude by laying out different recommendations for Susquehanna Township adopt a green building ordinance, including the implementation of LEED building standards and incentives for building as such.

II. Why is Building Sustainably Important?

Building sustainably is crucial to waste reduction as well as a more sustainable way of life. The United States alone generates about 548 million tons of unused

materials during construction and demolition projects.[11] It is said that in the United States, buildings account for "39% of total energy use, 68% of total electricity consumption, 30% of landfill waste, 38% of carbon emissions, and 12% of total water consumption."[12] Additionally, building sustainably has been known to improve the social, economic, and environmental impact on the community.

A. The Social Impacts of Building Sustainably

The social impacts that building sustainably has on a community is the way sustainable buildings impact the surrounding atmosphere. Sustainable buildings make living conditions better and have a positive impact on the health of the people within the community. For example, green buildings tend to have better ventilation than traditional buildings, allowing for the toxic chemicals in the air from households or offices to be sucked out of the air, making the air much cleaner and easier to breathe.[13] In general, green building is thought to improve the overall quality of life.[14]

B. The Economic Impacts of Building Sustainably

There are many economic impacts of building sustainably on communities. "Most economic theorists recognize that some level of [...] environmental problems frequently involve significant externalities, require solutions that carry high transaction costs, and

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[11] *C&D Materials in America,* Sustainable Management of Construction and Demolition Materials, EPA, (August 22, 2018), https://www.epa.gov/smm/sustainable-management-construction-and-demolition-materials#America

[12] *Importance of Green Building*, Green Built Alliance, https://www.greenbuilt.org/about/importance-of-green-building/

[13] Brian Clark Howard, *5 Surprising Ways Buildings Can Improve Our Health*, Nat'l Geographic (2017). https://www.nationalgeographic.com/environment/urban-expeditions/green-buildings/surprising-ways-green-buildings-improve-health-sustainability/

[14] *Supra* note 12.

concern threats to a public good, all of which factors may contribute to market failures."[15] These environmental problems are addressed and remediated by sustainable building. It has been said that, "LEED and other green-building regulations create and promote an entirely new and cutting-edge industry with jobs available across all markets."[16] Aside from the addition of jobs to the area, green buildings tend to save the owners money on energy costs due to their energy efficiency; an estimated 1.8 million dollars have been saved between 2015 and 2018 on energy.[17]

C. The Environmental Impacts of Building Sustainably.

A major goal of sustainable building is to make buildings more environmentally friendly. Traditional buildings contribute to about thirty-two percent of the United States' carbon dioxide emissions.[18] "If half of new commercial buildings were built to use 50% less energy, it would save over 6 million metric tons of CO2 annually for the life of the buildings—the equivalent of taking more than 1 million cars off the road every year."[19] Green buildings are expected to assist the fight against climate change, helping not only the environment nearby, but on a global scale.[20] This is done through

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[15] Carl J. Circo, *USING MANDATES AND INCENTIVES TO PROMOTE SUSTAINABLE CONSTRUCTION AND GREEN BUILDING PROJECTS IN THE PRIVATE SECTOR: A CALL FOR MORE STATE LAND USE POLICY INITIATIVES,* 112 PENN. ST. L. REV. No. 3 1, 17 (2008).
[16] Marc Erpenbeck and Colleen Schiman, *The Past, Present, and Future of Green Building*, Natural Resources & Environment, Vol. 24, No. 2, ABA 33 (2009).
[17]Booz Allen Hamilton, LEED® & Green Building Generate Big Economic Impact Study Findings, USGBC. https://www.usgbc.org/sites/default/files/2015%20National%20Economic%20Impact%20National%20Infographic_1.pdf
[18] Buildings and Climate Change, USGBC Fact Sheet
[19] *Id.*
[20] *Id.*

steps to use more sustainable materials, using recycled building materials, incorporating more efficient heating, lighting, and ventilation systems, and much more.[21]

D. Why Do We Need To Build Sustainably In Susquehanna Township?

In Susquehanna Township, the visibility of sustainable development has gradually increased. Nonetheless, natives and frequent visitors to the area do not notice much sustainable development in Susquehanna Township. One such person is Greta Crispen. Greta Crispen was born in Susquehanna Township and lived there for the first few years of her life, after which she and her immediate family moved to Florida. Since most of Ms. Cripsen's extended family is in the area, she has frequently returned to the Harrisburg area over the years. Ms. Crispen has a Bachelors of Design from the University of Florida in Architecture. Currently, she is a master's student at Columbia University Graduate School of Architecture, Planning, and Preservation. Her focus throughout her studies has been sustainable building. She has worked on projects in school and through internships at architecture firms using LEED guidelines, and such projects have attained LEED.[22]

Throughout the interview, Ms. Crispen emphasized the need for all communities, including Susquehanna Township, to openly speak about, advertise, and incentivize building sustainably. Building sustainability takes into account the past, present, and future. As Ms. Crispen said, "everything you build today is going to impact now, tomorrow, ten years from now, and one hundred years from now."[23] Just like anywhere in the world, what is built in Susquehanna Township impacts the surrounding areas, the

[21] *Id.*
[22] *Supra* note 6.
[23] *Id*.

present, and the future. The people that live in Susquehanna Township deserve to have the benefits that come with sustainable buildings. For example, buildings that follow the LEED certification requirements "consume 25 per cent less energy and 11 per cent less water, than non-green buildings."[24] The people of Susquehanna Township would benefit from this cut in energy and water usage, both on a practical and economic standpoint. Aside from just saving money from electric, it is reported that green buildings have a seven percent increase asset value over traditional buildings.[25]

III. Why Does Susquehanna Township Need a Green Building Ordinance?

Currently, Susquehanna Township does not have any ordinance that mandates or encourages building sustainably.[26] The ordinances that Susquehanna does have that do touch on sustainability issues are not related to green building.[27] This means that although Susquehanna Township focuses on sustainability, the current ordinances are not adequate to address the issue regarding lack of green buildings in the township. Susquehanna Township's commitment towards a more sustainable future is exemplified through their list of goals on the community website. Some of the sustainability goals Susquehanna Township is committed to are: lower township energy uses and facilitate use of renewable energy systems; purchase goods and products locally; establish bonds with non profit organizations in the area; and the adoption and implementation of Leadership in Energy and Environmental Design (LEED) operation & maintenance

[24] *Supra* note 12.
[25] *Id*.
[26] The first 'green-certified building' in the area was built in 2013 by a Harrisburg attorney. Luciew, John, *Couple's dream home along Susquehanna River is 'beyond green': Building green*, Penn Live.
[27] Susquehanna Township Municipal Code § 27-101 - § 27-902.

principles and the International Green Construction Code.[28] Though the Township expresses its desire to become more green, the current ordinance in place does not do anything to incentivize or encourage specifically green buildings, so the building code does not address the problem effectively.[29]

A. What is LEED?

Leadership in Energy and Environmental Design, also known as LEED, is the most widely used Green building rating system. LEED uses a point system that allows buildings to gain a LEED certification for sustainable building or remodeling a building. LEED is specifically designed to incorporate the social, environmental, and economic pillars of sustainability into its certification requirements. Builders maintain a sense of autonomy because they can pick and choose how best to make their building sustainable.[30] LEED provides a variety of resources on their website www.usgbc.org. Included in these resources are requirements for the different LEED certifications based on the type of project, guidance for achieving such standards, and a variety of other resources.[31]

There are four Different LEED certification levels. The lowest level of LEED certification is called “Certified.” To meet the “Certified” standard, the building must have between 40-49 points on the respective project types point scale.[32] After the “Certified” LEED certification, the next certification level is “Silver”. The “Silver” certification standard requires 50-59 points. Next is the “Gold” certification level that requires 60-79

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[28] *Supra* note 3.
[29] Susquehanna Township Municipal Code § 27-101 - § 27-902.
[30] LEED Certification, *What is LEED?,* 2018, www.usgbc.org.
[31] LEED v4.1 is here, 2018, www.usgbc.org.
[32] Achieve Better Buildings with LEED, 2018, www.usgbc.org.

points. Lastly, the highest LEED certification standard is “Platinum” that requires 80-110 points out of a possible 110 points.[33]

Point values are assigned to a variety of sustainable building options. The vast majority of point values are assigned to building requirements that benefit the community by building socially, economically, and environmentally.[34]

1. New Construction and Major Renovation LEED Guidelines.

LEED combines, as will we in our ordinance, New Construction and Major Renovations into one cohesive list of certifications requirements and guidance for the different levels of LEED Certifications. LEED separates New Construction and Major Renovations into eight categories in which points can be attained. The categories are: location and transportation; sustainable sites; water efficiency; energy and atmosphere; materials and resources; indoor environmental quality; innovation; and regional priority. Within these categories are different types of sustainable building practices that the builder can choose to incorporate in order to get points towards the different LEED certifications. Guidance for the best practices for each point attaining sustainable practice within each category is provided by LEED to help builders, designers, and construction attain the most points.[35]

a. New Construction and Major Renovation LEED Requirements for Certifications.

[33] *Id.*
[34] Certification guides lead projects through the LEED process, 2018, www.usgbc.org.
[35] LEED v4 for BUILDING DESIGN AND CONSTRUCTION, (2018). https://www.usgbc.org/sites/default/files/LEED%20v4%20BDC_07.2.18_current.pdf

Within the point attaining categories, there are multiple options to acquire points a project may have. These requirements are nonpoint gaining sustainable practices, and failure to fulfill these requirements disqualifies a project from becoming LEED certified.[36] Within the Sustainable Sites category, "construction and activity pollution prevention" is a requirement.[37] Within the Water Efficiency category, "outdoor water use reduction", "indoor water use reduction", and "building-level water metering" are all requirements.[38] Within the Energy and Atmosphere category, "fundamental commissioning and verification", "minimum energy performance", "building-level energy metering", and "fundamental refrigerant management" are all requirements.[39] Within the Materials and Resources category, "storage and collection of recyclables", and "construction and demolition waste management planning" are required.[40] Lastly, within the Indoor Environmental Quality category, "minimum indoor air quality performance" and "environmental tobacco smoke control" are requirements.[41]

2. Homes and Multi-Family Residence LEED Guidelines.

LEED Home Design and Construction combines sustainable practices into a comprehensive list of point attaining best practices in order to obtain the various levels of LEED certifications. Tips for best practices are provided to ensure builders, designers, and constructors know how to and are able to attain the most points possible. LEED separates Home Design and Construction into eight categories in which

[36] *Id.*
[37] *Id.* at 31.
[38] *Id.* at 51-9.
[39] *Id.* at 64-70.
[40] *Id.* at 86-9.
[41] *Id.* at 107-14.

you can get points. The categories are: location and transportation; sustainable sites; water efficiency; energy and atmosphere; materials and resources; indoor environmental quality; innovation; and regional priority. Within these categories are different types of sustainable building practices that the builder can choose to incorporate in order to get points towards the different LEED certifications.[42]

B. Why Should We Use LEED As The Standard For Building Sustainably?

The LEED standard fully integrates the three pillars of sustainability. Points are given for social and environmental factors. Examples of social factors LEED gives points for are: "access to transit" in both the home and new construction/major renovation guidelines[43]; "community resources" in home guidelines[44]; "bicycle facilities" and "green vehicles" in new construction/major renovation guidelines; and "surrounding density and diverse uses" in new construction/major renovation guidelines.[45] Additionally, many of the ways a builder/renovator can get points using LEED will also save the building owner a significant amount of money on energy costs in the long run. By implementing the energy saving measures that allow you to gain points towards LEED certifications, the overall energy cost to run and maintain the project will be less than if those measures were not implemented.[46] Additionally, Susquehanna Township

[42] *LEED v4 for HOMES DESIGN AND CONSTRUCTION,* U.S. Green Building Council, (2013). https://www.usgbc.org/sites/default/files/LEED%20v4%20ballot%20version%20(Homes)%20-%2013%2011%2013.pdf.
[43] *Supra* notes 34 and 42.
[44] *Supra* note 42.
[45] *Supra* note 34.
[46] *Supra* note 51.

has stated that one of its sustainability goals is the use and encourage the use of LEED certifications in its buildings and community.[47]

Working within LEED is not overly difficult. Greta Crispen described multiple projects, some real and some hypothetical, in which she and her class mates created or coworkers created projects that would-be LEED certified. As a University of Florida (UF) student, Ms. Crispen and 18 other architecture students created plans for Sarasota Florida's Newtown neighborhood's new community center. Ms. Crispen, and her partner Pietro Mendanca, specifically used LEED in order to create a sustainable building design. They presented their project to a panel of people affiliated with the Newtown neighborhood and received positive feedback regarding their sustainable design.[48] For Ms. Crispen and Mr. Mendanca, working within the LEED standard required a some degree of trial and error but was overall an easy process. They found that a thoughtful design was key to their success. Ms. Crispen mentioned that the hardest part of using LEED was simply navigating the website not implementing LEED requirements and point attaning practice into the design.[49]

IV. How Has Sustainable Building Been Addressed Outside of Susquehanna Township?

Sustainability, through the promotion of green buildings, has been a major goal for much of the United States. It has been addressed by the government on many

[47] *Supra* note 29.
[48] Will Clewis, *Nineteen UF students may help design a new Sarasota building*, The Independent Florida Alligator, Feb. 1, 2018.
[49] *Supra* note 6.

levels--federal, state, and local.[50] Many different municipalities across the country have implemented different kinds of ordinances to encourage sustainable building and green housing in their jurisdictions. For example, Tucson, Arizona[51]; San Diego, California[52]; and even nearby Penn Township in Lancaster County, Pennsylvania.[53]

A. What Types of Ordinances Do Other Jurisdictions Have?

Some jurisdictions, like Penn Township in Lancaster, allow for a relatively broad understanding of green building and endorse the implementation of LEED certified buildings within the ordinance.[54] Penn Township's Green Design ordinance requires that buildings above a certain square footage, regardless of whether they are institutional, residential, or industrial, submit a "green design assessment" as both a preliminary and final plan that "addresses the applicability and practicality of incorporating the [...] standards into the design, construction, and maintenance of the proposed subdivision or land development."[55] However, other municipalities rely on more direct ordinances with specific directions, like Tucson's that requires all single-family residences and complexes built be "solar ready," meaning that these buildings must have "photovoltaic and solar water heating systems installed or have the necessary hardware to allow installation."[56]

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[50] Carl J. Circo, *USING MANDATES AND INCENTIVES TO PROMOTE SUSTAINABLE CONSTRUCTION AND GREEN BUILDING PROJECTS IN THE PRIVATE SECTOR: A CALL FOR MORE STATE LAND USE POLICY INITIATIVES,* 112 PENN. ST. L. REV. No. 3 1, 17 (2008).
[51] Marc Erpenbeck and Colleen Schiman, *The Past, Present, and Future of Green Building*, Natural Resources & Environment, Vol. 24, No. 2, ABA 33, 34 (2009).
[52] *Id.*
[53] Ord. 2011-03, 6/27/2011, § 22-615
[54] Ord. 2011-03, 6/27/2011, § 22-615
[55] *Id.* Though this specific proposed ordinace will apply to more than just subdivisions.
[56] *Supra* note 44.

Some jurisdictions implement the use of incentive systems to endorse green buildings.[57] For example, some municipalities provide direct subsidies to cover or lessen the initial costs of building sustainable buildings.[58] Others assist the builders and developers by reducing the burden of land use regulations when the builders and developers adopt certain sustainable building techniques "by expediting the environmental permitting process or reducing reporting requirements."[59] Some municipalities, like Rohnert Park, California, even penalize builders who do not follow their sustainable building guidelines with certain reprimands for infractions and other civil penalties.[60]

B. How Effective Have Green Building Ordinances Been?

It is predicted that green building ordinances will be effective when the cost of building green is offset by the environmental and economic benefits in the long run.[61] A study in California found that the implementation of such an ordinance resulted in "energy savings, water and waste reduction, employee productivity, and health improvements."[62] However, though such ordinances may be beneficial in many ways, due to their broadness and semi-ambiguity, they tend to make difficult the search for investors to build sustainable buildings in the first place because often many of the

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[57] *See generally,* Carl J. Circo, *USING MANDATES AND INCENTIVES TO PROMOTE SUSTAINABLE CONSTRUCTION AND GREEN BUILDING PROJECTS IN THE PRIVATE SECTOR: A CALL FOR MORE STATE LAND USE POLICY INITIATIVES,* 112 PENN. ST. L. REV. No.3 1 (2008).
[58] *Id.*
[59] *Id.*
[60] CALGREEN Code, *State and Local Government Green Building Ordinances in California.*
[61] Erin Burg Hupp, *Recent Trend in Green Buildings Laws: Potential Preemption of Green Building and Whether Retrofitting Existing Buildings Will Reduce Greenhouse Gases and Save the Economy*, 41 The Urb. L. 489, 499 (2009).
[62] *Id.* at 496.

ordinances do not explain the specific guidelines for the desired green buildings.[63] The way in which this effectiveness is measured in different municipalities is through the use of different tracking systems. Some municipalities focus on LEED certifications and whether or not the buildings match up to it, others create their own forms of measuring the effectiveness of their ordinance and impact of emission reductions on the buildings within the municipalities.[64] Research is low regarding how effective the ordinances themselves are because the bulk of the research is how effective the sustainable buildings are.

1. Why Were Some Ordinances Effective?

Jurisdictions have found that when mandating a green building ordinance, they are most effective when collaboration with jurisdictions and communities takes place. If such collaboration does not take place or is unsuccessful, many jurisdictions begin with voluntary participation of a green building ordinance with the goal of transitioning to mandatory participation in the future. These types of ordinances work best when the voluntary participation is strong, therefore allowing for a smoother transition to mandatory participation.[65]

Many jurisdictions fear that implementing a mandatory participation in small communities will lead to the loss of development to other neighboring and less restrictive communities. Educating builders and project managers on the benefits of

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[63] Daniel C. Matisoff et al., *Green Buildings: Economics and Policies,* Policy Monitor 329, 332.
[64] *See generally* CALGREEN Code, *State and Local Government Green Building Ordinances in California* and 2016 CALIFORNIA GREEN BUILDING CODE CHECKLIST FOR NEW NONRESIDENTIAL BUILDINGS.
[65] *Going Beyond Code A Guide to Creating Effective Green Building Programs for Energy Efficient and Sustainable Communities,* U.S. Department of Energy, (September 2011). https://www.energycodes.gov/sites/default/files/documents/GoingBeyondCode.pdf

sustainable building helps to combat this problem.[66] Ms. Crispen indicated that showing builders and project managers the monthly cost projections helps demonstrate the benefits to sustainable building, and how much money the owner will save in the long run. Further, Ms. Crispen stated that showing builders and building owners that buildings that are LEED certified have a higher resale value than those that are not LEED certified, and that the monthly costs to run a building are decreased when the building is built to be sustainable has proven incredibly effective and persuasive.[67]

2. Why Were Some Ordinances Ineffective?

Voluntary ordinances have not been effective if they are under incentivised or if there is limited community support for such an ordiancece. Some green building ordinances have been found to be ineffective when the green building requirements are mandated because without proper education on the benefits of green buildings communities run the risk of losing business to other neighboring communities.[68]

V. Recommendations for Susquehanna Township's Green Building Ordinance

Our recommendation is that Susquehanna Township follows the lead of other municipalities in a mixture of ways. It would be beneficial for the township to implement an ordinance that encourages the certifications of new buildings and reconstruction of old ones to the LEED standards. The ordinance should be rather broad, like that of Penn Township[69] to ensure that the builders and renovators have a bit of leeway in their

[66] *Id.*
[67] *Supra* note 29.
[68] *Supra* note 73.
[69] Ord. 2011-03, 6/27/2011, § 22-615.

sustainable building for the builders to choose which green building techniques they choose to pursue. The ordinance should require the builders to follow Susquehanna Township's building guidelines[70] while encouraging the application of LEED certified building techniques whenever applicable.

Aside from favoring LEED standards, Susquehanna Township should incentivize those building owners/constructors to build and remodel under LEED certification standards by offering expedited permits to the constructions of new commercial and residential buildings that are projected to be LEED certified. By expedited permitting, the builders of commercial and residential buildings that are intended to be LEED certified would be put to the top of the list of permits for the municipality to consider; this would "[a]llo[w] developer[s] to significantly reduce the duration of this process,"[71] and ultimately help cut some costs of building greener.[72] The ordinance should contain a section that allows for a variation from Susquehanna Township's general building height and area standards if such LEED standards are met. Also, the ordinance should incentivize green building by offering partial reimbursements for the permit fees. The permitting fees in Susquehanna Township vary depending on project, like forty cents per square foot for residential buildings and 1.5 percent of the cost/value of any industrialized and manufactured housing.[73] Because these permit fees may generate such a large revenue in the township, it would be wise to offer reimbursements for up to fifty percent of the permit fees for commercial and residential buildings. For major renovations, there should be up to a sixty percent permit fee reimbursement to even

[70] Susquehanna Township Municipal Code § 27-101 - § 27-902.
[71] *Good to Know: Green Building Incentive Strategies*, U.S. Green Building Council, (May 2, 2014). https://www.usgbc.org/articles/good-know-green-building-incentive-strategies-0
[72] *Id.*
[73] Susquehanna Township RESOLUTION NO 18–R–11.

more heavily incentivize the reconstruction and updating of older buildings in a more sustainable way.

A. Major Policy Choices in Adopting a New Green Building Ordinance

A major policy behind the implementation of an ordinance based on the LEED standards is that people who invest in green buildings are able to recoup the money they initially set forth in the building process.[74] Another policy that cities, like Austin, Texas, have decided are mandatory energy use disclosures.[75] This policy requires all non-industrial commercial buildings to disclose their energy rating using a premade energy rating tool.[76] This policy choice should be adopted by Susquehanna Township for its commercial buildings as well to help the township determine how successful its implementation of the LEED certification standards is.

Another policy that should Susquehanna Township should consider is to 'nudge' builders into building green buildings as opposed to making green buildings mandatory. This is because if a township requires buildings to be built green, new builders may be deterred from building there because other surrounding areas may not have such stringent guidelines for the buildings. Whereas, if the green buildings are voluntary and heavily incentivized, one might assume that the potential builders may realize they can cut their losses by making up the money they may spend upfront in building green by taking advantage of the incentives and choose to build in the township.

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[74] *Supra* note 33.
[75] *City of Austin - Green Building Policy for Municipal Buildings*, Energy.gov, https://www.energy.gov/savings/city-austin-green-building-policy-municipal-buildings
[76] *Id.*

B. How a Green Building Ordinance will Solve the Problem

As previously mentioned, the problem is that Susquehanna Township has the desire to become a more sustainable municipality[77], but does not have any ordinance regarding green building.[78] Once a green building ordinance based on LEED is implemented, the township will be able to start making steps towards being more sustainable because the newer buildings will be more environmentally friendly and energy sufficient. The incentives within the ordinance will give builders and developers the push needed to stray from the traditional building ways and lean to a more sustainable approach. The township expresses goals to improve stormwater management and economic development on its website.[79] Even these two concerns will be addressed and potentially resolved with this ordinance because LEED addresses water runoff within its green building plans and the economic improvement with both energy saving and the increased asset value of green buildings.[80] Without such an ordinance, the Township may lose out on potential energy reductions and remain where it currently is without any sustainable progression.

C. What Opportunities would a Green Building Ordinance Bring?

A new ordinance that focuses on green buildings would bring many benefits and opportunities to the community. Such ordinances have been shown to enhance communities socially, environmentally, and economically.[81]

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[77] *Supra* note 7.
[78] Susquehanna Township Municipal Code § 27-101 - § 27-902.
[79] *Supra* note 7.
[80] Daniel C. Matisoff et al., at 333.
[81] The benefits of green buildings http://www.worldgbc.org/benefits-green-buildings

1. Social Benefits and Opportunities

There are many benefits of working and living in buildings that are built to be sustainable. A study by the Harvard T.H. Chan School of Public Health showed that people who work in a green, well-ventilated office have a 101 per cent increase in cognitive scores.[82] Other research suggests that when there is a better indoor quality, such as the "low concentrations of CO2 and pollutants, and high ventilation rates" found in green buildings, performance rates increase up to eight per cent.[83] This cleaner air quality leads to better health and wellness.[84] Sustainable building materials are supposed to be made of materials that are free of carcinogens and other toxins, so not only do the people working or living in the building benefit from this, but so do those in the surrounding community who may be exposed to such materials.[85] Susquehanna Township could benefit from these social impacts because as of 2017, the Township had a population of approximately 25,054 people[86] and with such a large population, anything that the township can do to better the social welfare would be beneficial.

2. Environmental Benefits and Opportunities

The environmental benefits and opportunities that arise from ordinances that encourage sustainable building are vast. Buildings that are LEED certified have been shown to "consume 25% less energy, use 11% less potable water, have 19% lower

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[82] Harvard T.H. Chan School of Public Health / Syracuse University Center of Excellence / SUNY Upstate Medical School, 2015.
[83] Park and Yoon, 2011
[84] 5 Benefits of Sustainable Building and Home Construction https://greensparksolar.com/2018/06/01/5-benefits-of-sustainable-building-and-home-construction/
[85] *Id.*
[86] Susquehanna township, Dauphin County, Pennsylvania. U.S. Census Bureau. https://www.census.gov/quickfacts/susquehannatownshipdauphincountypennsylvania

maintenance costs, 27% higher occupant satisfaction, and emit 34% lower greenhouse gas emission."[87] Green building also helps reduce waste streams, protects biodiversity and ecosystems, improves outdoor air quality, and conserves and restores natural resources through the use of sustainable building products and practices.[88] All of these environmental benefits will bring opportunity to the businesses and community of Susquehanna Township by making the municipality have cleaner air and water, presumably making it more appealing to others. The Township could benefit from this because it would help the township align with its goals of being greener[89] and because every municipality could benefit from having a cleaner environment.

3. Economic Benefits and Opportunities

Sustainable building ordinances have many economic benefits and opportunities that will be enjoyed by both residents and businesses in the community. As mentioned above, green buildings are more energy efficient; therefore, they cost less to heat and cool, in turn saving the building owner money in the long run.[90] Also as priorly discussed, builders who follow such ordinances will be building buildings with higher asset values, so when the time comes to sell, the market will be much more desirable.[91] The sustainable building industry has been estimated to contribute 1.1 million jobs in 2018, so this increase in jobs will likely have a very positive impact on both the

[87] Stuart Kaplow, Prospering thru Green Building in a Changing Environment, (2017). https://www.greenbuildinglawupdate.com/2017/04/articles/paris-accord/prospering-thru-green-building-in-a-changing-environment/
[88] Importance of Green Building, https://www.greenbuilt.org/about/importance-of-green-building/
[89] *See* note 3.
[90] *Id.*
[91] *About Green Building*, World Green Building Council, (2018). http://www.worldgbc.org/benefits-green-buildings

commercial industry looking to employ and the residents seeking employment.[92] Susquehanna Township has many businesses and people within its boundaries, so the increase of jobs and better work environments not only helps the people within the township, but also the township itself from the potential increase in revenue.

D. Payment Options

Funding is often a worry for municipalities considering the implementation of a new ordinance that requires such a change in policy. However, the way this ordinance is designed, it should not cost the municipality much because instead of the municipality bearing the additional cost, the municipality's incentives of fee waivers and prioritized processing will incentivize builders without the municipality having to lose income from tax money. This, however, does make the builders bare the burden of the price of green building. There is a solution to this--the many grants and loans available for different kinds of builders, be it individual or company, to fund green building.[93] There are even tax credits already available to builders who build green in both residential and commercial settings.[94] For example, there is a tax credit for residential builders that offers up to thirty percent of a building project's cost when the building project includes solar-electric, solar water-heating, fuel cell properties, small wind energy, or geothermal heating.[95] There are many grants and other financing options like this for commercial builders as well.[96]

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[92] *Supra* note 51.
[93] *Green Building Incentives Guide*, Green Building Alliance, ((2016). https://www.go-gba.org/resources/green-building/green-building-incentives-guide/
[94] *Id.*
[95] *Residential Renewable Energy Tax Credit*, Energy.gov, https://www.energy.gov/savings/residential-renewable-energy-tax-credit
[96] *Supra* note 60.

The implementation of this kind of ordinance will likely not cost anything for the township because there is no creation of any new position or body. However, if any such additional funds are found to be necessary, some of the revenue generated from the permitting fees could potentially be allotted to assist in this ordinance.

V. Conclusion

In conclusion, Susquehanna Township should implement an ordinance that encourages the addition of LEED certified standards into the new commercial and residential buildings within the township. It should implement this because the township recognizes the importance of sustainability in the community and the implementation of such an ordinance will have many benefits. To incentivize this building, the township should offer fee waivers and expedited application processes to those who follow the LEED certification standards in building. This ordinance will improve the community by strengthening the health of the residents and workers from the cleaner air, offering new job opportunities, saving energy, reducing greenhouse gas emissions, and many of the other opportunities and benefits mentioned above.

Bridgette Gillman and Victoria Burguess

Susquehanna Township
Chapter 4: BUILDINGS
Part 3: GREEN BUILDINGS

§ 4-301 **Purpose and Intent**.

1. It is the purpose and intent of Susquehanna Township[97] to encourage the constitution, renovation and maintenance of Green Buildings within the Township or order to further our goal of creating a more sustainable Township. It is the Township's further intent to establish incentives to people who wish the build and renovate buildings in a manner consistent with this chapter.
2. For the protection, maintenance, and welfare of health and safety for citizens of the Township of Susquehanna, the Board of Commissioners hereby establishes the rights of building owners to construct, renovate, and maintain sustainably built Green Buildings consistent with the goals of Susquehanna Township.[98]

§ 4-302 **Definitions**.

The following words, terms and phrases, when used in this Part, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:[99]

[97] Sustainability | Susquehanna PA, https://www.susquehannatwp.com/community-development/pages/sustainability.
[98] Susquehanna Township, Pennsylvania, Municipal Code Chapter 4 § 4-201 (2018).
[99] Susquehanna Township, Pennsylvania, Municipal Code Chapter 4 § 4-202 (2018). Our definitions section is based off of this section.

1. BDC LEED - LEED v4 for Building Design and Construction 2018 reference materials.

2. Building - Any structure permanently situated on real property used for any purpose.

3. Certified Rating - Any residential or commercial building who has achieved 40-49 points on the LEED rating score sheet.

4. Commercial Building - Any building used for the primary purpose of running, operating, or organizing any business.

5. Credit - A term used in the LEED materials that for our purposes means the same thing as a point.

6. Functional Entrance - Any building entrance that allows the public to access the interior of the building during the course of normal business hours.

7. HDC LEED - LEED v4 for Homes Design and Construction 2013 reference materials.

8. Green Building - A whole systems approach to the design, construction, and operation of buildings that helps mitigate the environmental impact of buildings.

Green building practices recognize the relationship between natural and built environments and seek to minimize the use of energy, water, and other natural resources and provide a healthy indoor environment. Green building can also refer to a building built to standards that are more environmentally friendly than normal building standards.

9. Gold Rating - Any residential or commercial building that has achieved 60-79 points on the LEED rating score sheet.

10. Governing Authority - Local, state, or national authority that has jurisdiction over the land, determination, issue, or law in question.

11. Leadership in Energy and Environmental Design (LEED) - The standard by which all Green Buildings will be rated.

12. Maintenance - Any continued upkeep required to operate the building in accordance with Township standards and the level of LEED Green Building status achieved.

13. Major Renovation - The addition or alteration to any building as mentioned in §27-603.

14. Owner - Any person, agent, operator, firm or corporation having a legal or equitable interest in real property; or recorded in the official records of the Commonwealth, County or Township as holding title to the property; or otherwise having control of the property, including the guardian of the estate of any such person, and the trustee, executor or administrator of the estate of such person if authorized by law to take possession of real property, or if ordered or authorized to take possession of real property by a court.

15. Platinum Rating - Any residential or commercial building that has achieved 80-110 points on the LEED rating score sheet.

16. Person - An individual, corporation, partnership or any other group acting as a unit.

17. Points - A valued based measure designated to compilation of LEED requirements.

18. Project- Any building or building plan that would be governed by this section in pursuance of Green Building status and incentives .

19. Renovation - Any activity done to a building as a means of improving, repairing, replacing, or general maintenance to any building used for residential or commercial purposes.

20. Residential Buildings - Any building used for the primary purpose of housing individual people or families, that can be used as a primary place of residence.

21. Score - a score results when points are added together. The score determines what rating the project will be given.

22. Silver Rating - Any residential or Commercial building whom has achieved 50-59 points on the LEED rating score sheet.

23. Township - Susquehanna Township.

24. Uniform Construction Code - The state construction code adopted by the Township.[100]

§ 4-303 **Legal Authority.**

The Township has authority to pass this ordinance pursuant to the Pennsylvania Municipal Code.[101]

§ 4-304 **Additional Authority: Energy Efficiency Performance Standard**

The LEED standards are hereby adopted by reference, and have persuasion and effect as though fully set forth in this chapter.[102]

[100] 034 Pa. Code § 403.21. Uniform Construction Code.
[101] Pennsylvania Municipalities Planning Code Act of Jul. 31, 1968, P.L. 805, No. 247.

§ 4-305 **Application Process for Green Building**

1. A project wishing to obtain a Green Building rating in the Township must follow the following guidelines:
    a. Each person may choose which rating they wish to pursue, and indicate such choice on their application.
    b. Once practices are determined, desired or achieved by the person who owns the building, the point value associated with the practice will be added together. The point range in which the building or project falls will determine the Green Building rating designated to the building.
    c. Achievement of certification levels are given to projects at the discretion of the Zoning Officer. The Zoning Officer bases certifications on the number of points obtained by projects in compliance with LEED HDC standards
    d. Green Building ratings are not compounded. Each building may only achieve one rating. It is assumed that a building that reaches a higher rating also would achieve the ratings below. Therefore, incentives will be compounded.
2. An application for the construction of a residential building must:
    a. Follow all guidelines as provided for in the §27-2603 permitting process and the Uniform Construction Code standards and
    b. Provide all LEED certifiable plans.
3. An application for the construction of a commercial building must:

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[102] Specifically, *LEED v4 BD+C: New construction and Major Renovation* and *LEED v4 for Building Design and Construction: Multifamily Midrise* are hereby incorporated in this chapter. Also see Susquehanna Township, Pennsylvania, Municipal Code Chapter 4 § 4-206 (2018).

c. Follow all guidelines as provided for in the §27-2603 permitting process and the Uniform Construction Code standards and

d. Provide all LEED certifiable plans.

4. An application for any major building renovation must:

e. Follow all guidelines as provided for in the §27-2603 permitting process and the Uniform Construction Code standards and

f. Provide all LEED certifiable plans.

§ 4-306 **Residential Building Requirements**[103]

1. New Residential Buildings built within the Township may achieve a Green Building certification based on compliance with HDC LEED standards. Failure to fully comply with the Application process is automatic grounds for denial of a Green Building certification.
2. The following are areas in which residential building projects may achieve points toward a certification level and further detail can be found in Appendix A:

a. Projects may comply with HDC LEED Integrative process, and may be awarded up to 2 points.

b. Compliance with HDC LEED Location and Transportation may allow projects to achieve as many as 15 points.

i. Projects must comply with Floodplain Avoidance.

[103] Evanston, Illinois, Municipal Code, TITLE 4, CHAPTER 25 – GREEN BUILDING ORDINANCE. We used this ordinance as a model for this section.

ii. Projects may comply with LEED for Neighborhood Development Location, Site Selection, Compact Development, Community Resources, and/or Access to Transit requirements.

c. Compliance with HDC LEED Sustainable Sites may allow projects to achieve as many as 7 points
    i. Projects must comply with Construction Activity Pollution Prevention and No Invasive Plants requirements.
    ii. Projects may comply with Heat Island Reduction, Rainwater Management, and/or Non-toxic Pest Control requirements.
d. Compliance with HDC LEED Water Efficiency may allow projects to achieve as many as 12 points
    i. Projects must comply with Water Metering requirements.
    ii. Projects may comply with Total Water Use, Indoor Water Use, and/or Outdoor Water User requirements.
e. Compliance with HDC LEED Energy and Atmosphere may allow projects to achieve as many as 37 points
    i. Projects must comply with Minimum Energy Performance, Energy Metering and Education of the Homeowner, Tenant or Building Manager requirements.
    ii. Projects may comply with Annual Energy Use, Efficieng Hot Water Distribution, and/or Advance Utility Tracking requirements.
f. Compliance with HDC LEED Materials and Resources may allow projects to achieve as many as 9 points.

i. Projects must comply with Certified Tropical Wood and Durability Management requirements.

ii. Projects may comply with Durability Management Verification, Environmentally Preferable Products, and/or Construction Waste Management requirements.

g. Compliance with HDC LEED Environmental Quality may allow projects to achieve as many as 18 points.

i. Projects must comply with Ventilation, Combustion Venting, Garage Pollutant Protection, Radon-Resistant Construction, Air Filtering, Environmental Tobacco Smoke, and Compartmentalization requirements.

ii. Projects may comply with Enhanced Ventilation, Contaminant Control, Balancing of Heating and Cooling Distribution Systems, Enhanced Compartmentalization, Enhanced Combustion Venting, Enhanced Garage Pollutant Protection, Low Emitting Products, and/or No Environmental Tobacco Smoke requirements.

h. Compliance with HDC LEED Innovation may allow projects to achieve as many as 6 points.

i. Projects must comply with Preliminary Rating requirements.

ii. Project may comply with Innovation and/or LEED AP Homes requirements.

i. Projects may comply with HDC LEED Regional Priority requirements, and may be awarded up to 4 points. [104]

§ 4-307 **Commercial Buildings and Building Renovations[105]**

1. New Commercial Building and Building Renovation projects built within the Township may achieve a Green Building certification based on compliance with BDC LEED standards. Failure to fully comply with the Application process is automatic grounds for denial of a Green Building certification.
2. The following are areas in which residential building projects may achieve points toward a certification level and further detail can be found in Appendix B:
    a. Projects may comply with BDC LEED Integrative process, and may be awarded up to 1 point.
    b. Compliance with BDC LEED Location and Transportation may allow projects to achieve as many as 16 points. Projects may comply with LEED for Neighborhood Development Location, Sensitive Land Protection, High Priority Site, Surrounding Density and Diverse Uses, Access to Quality Transit, Bicycle Facilities, Reduced Parking Footprint, and/or Green Vehicles requirements.
    c. Compliance with BDC LEED Sustainable Sites may allow projects to achieve as many as 10 points.
        i. Projects must comply with Construction Activity Pollution Prevention requirements.

[104] USBGC, *USGBC homepage*| *USGBC,* https://new.usgbc.org.
[105] Evanston, Illinois, Municipal Code, TITLE 4, CHAPTER 25 – GREEN BUILDING ORDINANCE. We used this ordinance as a model for this section

ii. Projects may comply with Site Assessment, Site Development - Protect or Restore Habitat, Open Space, Rainwater Management, Heat Island Reduction, and/or Light Pollution Reduction requirements.

d. Compliance with BDC LEED Water Efficiency may allow projects to achieve as many as 11 points.

i. Projects must comply with Outdoor Water Use Reduction, Indoor Water Use Reduction, and Building-Level Water Metering requirements.

ii. Projects may comply with Outdoor Water Use Reduction, Indoor Water Use Reduction, Cooling Tower Water Use, and/or Water Metering requirements.

e. Compliance with BDC LEED Energy and Atmosphere may allow projects to achieve as many as 33 points.

i. Projects must comply with Fundamental Commissioning and Verification, Minimum Energy Performance, Building-Level Energy Metering, and Fundamental Refrigerant Management requirements.

ii. Projects may comply with Enhanced Commissioning, Optimize Energy Performance, Advanced Energy Metering, Demand Response, Renewable Energy Production, Enhanced Refrigerant Management, and/or Green Power and Carbon Offsets requirements.

f. Compliance with BDC LEED Materials and Resources may allow projects to achieve as many as 13 points.
    i. Projects must comply with Storage and Collection of Recyclables, and Construction and Demolition Waste Management Planning requirements.
    ii. Projects may comply with Building Life-Cycle Impact Reduction, Building Product Disclosure and Optimization - Environmental Product Declarations, Building Product Disclosure and Optimization - Sourcing of Raw Materials, Building Product Disclosure and Optimization - Material Ingredients, and/or Construction and Demolition Waste Management requirements.
g. Compliance with BDC LEED Indoor Environmental Quality may allow projects to achieve as many as 16 points.
    i. Projects must comply with Minimum Indoor Air Quality Performance and Environmental Tobacco Smoke Control requirements.
    ii. Projects may comply with Enhanced Indoor Air Quality Strategies, Low-Emitting Materials, Construction Indoor Air Quality Management Plan, Indoor Air Quality Assessment, Thermal Comfort, Interior Lighting, Daylight, Quality Views, and/or Acoustic Performance requirements.
h. Projects may comply with BDC LEED Innovation, and may be awarded as many as 6 points.

i. Projects may comply with BDC LEED Regional Priority requirements, and may be awarded as many as 4 points.[106]

§ 4-308 **Green Building Incentives.** [107]

1. Owners of residential buildings may receive incentives for complying with LEED standards as follows:
    a. Building permit applications satisfying all requirements as provided for in §27-2603 and containing LEED certified rating building plans may be expedited by the Building Code Official.
    b. Building permit applications satisfying all requirements as provided for in §27-2603 and containing LEED certified rating building plans may have up to fifty per cent (50%) of the §27-2604 fees reimbursed.
    c. The Building Code Official may grant project flexibility with certain development standards provided a commitment to LEED certification standards is made.
2. Owners of commercial buildings may receive incentives for complying with LEED standards as follows:
    a. Building permit applications satisfying all requirements as provided for in §27-2603 and containing LEED certified rating building plans may be expedited by the Building Code Official[108].

[106] USBGC, *USGBC homepage*| *USGBC,* https://new.usgbc.org.
[107] Columbia Climate Law. *Nationwide Database of Local Green Building Incentives.* http://columbiaclimatelaw.com/files/2016/10/Municipal-Green-Building-Incentives-Spreadsheet.xlsx
[108] Ord. 03-12. §27-2603, The Zoning Officer is the first to review permit applications and appeals.

b. Building permit applications satisfying all requirements as provided for in §27-2603 and containing LEED certified rating building plans may have up to fifty per cent (50%) of the §27-2604 fees reimbursed.

c. The Building Code Official may grant project flexibility with certain development standards provided a commitment to LEED certification standards is made.

3. Owners of renovation projects may receive incentives for complying with LEED standards as follows:

a. Major renovation building permit applications satisfying all requirements as provided for in §27-2603 and containing LEED certified rating building plans may be expedited by the Building Code Official.

b. Major renovation building applications satisfying all requirements as provided for in §27-2603 and containing LEED certified rating building plans may have up to sixty per cent (60%) of the §27-2604 fees reimbursed.

c. The Building Code Official may grant project flexibility with certain development standards provided a commitment to LEED certification standards is made.

§ 4-309 **Revocation of Incentives**

1. The Township may have the discretion to revoke any incentive awarded when deemed necessary for noncompliance with the builder's anticipated green building plan.

2. In the event the Township revokes an incentive, the builder must either:
    a. pay back the amount of money to the Township incentivized by the Township within a period of thirty (30) days, or
    b. bring the building into compliance with the approved incentivized building plan within a reasonable period of time.

§ 4-310 **Appeals**

Any person aggrieved may appeal in writing any decision or determination under this chapter to the Building Code Appeals Board and shall contain the required information in §27-2607.[109]

§ 4-311 **Severability**

If any provision of this Chapter or application thereof to any person or circumstance is held unconstitutional or otherwise invalid, such invalidity shall not affect other provisions or applications of this Chapter that can be given effect without the invalid application or provision, and each invalid provision or invalid application of this Chapter is severable.

§ 4-312 **Repeal**

All other ordinances and parts of ordinances are hereby repealed insofar as they are inconsistent herewith.[110]

[109] Susquehanna Township, Pennsylvania, Municipal Code Chapter 4 § 4-209 (2018).
[110] § 19.61. General repeal., 101 PA ADC § 19.61

§ 4-313 **Effective Date**

This Chapter will go into effect ninety (90) days after the date of passage.

APPENDIX A: Residential Buildings

Persons may use the following categories to obtain points by fulfilling the LEED requirements in the point attaining categories and practices they wish to participate in. Based on the points obtained, people may achieve LEED Certified, Silver, Gold or Platinum status.

1. Integrative Process
    a. Projects must have an integrative project team AND/OR
    b. Having a design charrette AND/OR
    c. Conducting a specified number of hours or trades training as enumerated in the BD C LEED materials.
2. Location and Transportation
    a. Floodplain Avoidance
        i. Projects must not develop on areas designated as a flood hazard on a map (such as the Federal Emergency Management Agency (FEMA)100 year flood plain) or otherwise legally designated by the local jurisdiction or the state, unless the building is designed and built in accordance with the flood provisions of applicable building code, the local floodplain management regulations, or, at a minimum, the National Flood Insurance Program Requirements.
    b. LEED for Neighborhood Development Location
        i. Projects may attain point by locating the project within the boundary of a development certified under LEED for Neighborhood Development as enumerated in the HDC LEED materials.
    c. Site Selection
        i. Projects my attain points by complying with the requirements in one or more of the five options as enumerated in the HDC LEED materials.
    d. Compact Development
        i. Projects may attain point by constructing or renovating a building that meets the dwelling unit per acre of buildable land area density as enumerated in HDC LEED materials.
    e. Community Resources
        i. Projects may attain points by constructing or renovate a project such that the building's main entrance is within a 1/2-mile (800 meters) walking distance from the building entrance of the following number of uses, as enumerated in the HDC LEED materials.
    f. Access to Transit
        i. Projects may attain points by locating the project within a 1⁄4-mile (400 meter) walking distance of bus or streetcar stops, or within a

1⁄2- mile (800 meter) walking distance of bus rapid transit stops, light or heavy rail stations, or ferry terminals, and by complying with other requirements as enumerated in the HDC LEED materials.

3. Sustainable Sites
    a. Construction Activity Pollution Prevention
        i. Projects must comply with certain measures designed to reduce pollution from construction, controlling erosion, waterway sedimentation, and airborne dust as enumerated in the HDC LEED materials.
    b. No Invasive Plants
        i. Projects must not introduce invasive species into the landscape of projects.
    c. Heat Island Reduction
        i. Projects may attain points by ensuring that at least 50% of hardscapes and roofs, but not including common roads that serve multiple buildings, on the project site meet one or more of the following requirements as enumerated in the HDC LEED materials.
    d. Rainwater Management
        i. Projects may attain points by participating on low impact development OR
        ii. National pollutant discharge elimination systems as enumerated in the HDC LEES materials.
    e. Non-Toxic Pest Control
        i. Projects may attain points by implementing measures that minimize pest problems and risk of exposure to pesticides as enumerated in the HDC LEED materials.
4. Water Efficiency
    a. Water Metering
        i. Projects must comply with home type specific requirements that support water efficiency effects by monitoring and benchmarking water use over time as enumerated in the HDC LEED materials.
    b. Total Water Use
        i. Projects may attain points by reducing total indoor and outdoor water consumption by at least 10% over standard practice as enumerated in the HDC LEED materials.
    c. Indoor Water Use
        i. Projects may attain points by complying with home types specific requirements to minimize indoor demand for water through high-efficiency fixture and fittings as enumerated in the HDC LEED materials.

d. Outdoor Water Use
    i. Projects may attain points by reducing the landscape area planted to turf grass by landscaping with plants that are native or adapted to the region as enumerated in the HDC LEED materials.

5. Energy and Atmosphere
    a. Minimum Energy Performance
        i. Projects must comply with home type specific requirements to improve the buildings overall energy performance and reduce its greenhouse gas emissions as enumerated in the HDC LEED materials.
    b. Energy Metering
        i. Projects must comply with home type specific requirements to improve the buildings overall energy performance and reduce its greenhouse gas emissions as enumerated in the HDC LEED materials.
    c. Education of the Homeowner, Tenant or Building Manager
        i. Owners of projects must provide to all individuals or organizations responsible for ongoing maintenance of the home (e.g., occupants, building managers, maintenance contractors) an operations and maintenance manual, binder, or digital file that includes all items enumerated in the HDC LEED materials AND
        ii. All owners of projects must conduct a minimum one-hour walkthrough of the home with the occupants. For buildings with building managers, include the building manager. The walkthrough must feature all requirements enumerated in the HDC LEED materials
    d. Annual Energy Use
        i. Projects may attain points by fulling home type specific requirements that improve the home's overall energy performance and reduce its greenhouse gas emissions as enumerated in the HDC LEED materials.
    e. Efficient Hot Water Distribution
        i. Projects may attain points by complying with one or more of the following options in a manner consistent with the HDC LEED materials: Efficient Hot Water Distribution; Performance Tests; Pipe Insulation.
    f. Advanced Utility Tracking
        i. Projects may attain points by complying with specific requirements an enumerated in the HDC LEED materials
6. Materials and Resources

a. Certified Tropical Wood
    i. Projects must meet the requirements of the ENERGY STAR for Homes, version 3, water management system builder checklist (with the exceptions for existing homes listed in EA Prerequisite Minimum Energy Performance) as enumerated in the HDC LEED materials. Midrise projects are exempt from this requirement
b. Durability Management
    i. Projects must have the verification team inspect and verify each measure listed in the ENERGY STAR for Homes, version 3, water management system builder checklist.
c. Durability Management Verification
    i. Projects may attain points by promoting enhanced durability and high performance of the building enclosure and its components and systems through appropriate design, materials selection, and construction practices.
d. Environmentally Preferable Products
    i. Projects may attain points using building component materials that meet one or more of the criteria below. A material must make up 90% of the component by weight or volume as enumerated in the two options
e. Construction Waste Management
    i. Projects may attain points by reducing the total construction waste or divert from landfills and incinerators a large proportion of the waste generated from new construction as enumerated in the HDC LEED materials.

7. Indoor Environmental Quality
    a. Ventilation
        i. Projects must comply with home type specific requirements to reduce moisture problems and occupants' exposure to indoor pollutants from kitchens, bathrooms and other sources by exhausting pollutants to outside and ventilating with outdoor air in a manner consistent with the HDC LEED materials.
    b. Combustion Venting
        i. Projects must not install any unvented combustion appliances and comply with other installation requirements as enumerated in the HDC LEED materials.
    c. Garage Pollutant Protection
        i. Projects must place all air-handling equipment and ductwork outside the fire-rated envelope of the garage and comply with other requirements as enumerated in the HDC LEED materials.

d. Radon-Resistant Construction
    i. Projects must reduce occupants exposure to radon gas and other soil gas contaminants as enumerated in the HDC LEED materials.
e. Air Filtering
    i. Projects have air filters installed with a minimum efficiency reporting value (MERV) of 8 or higher on all recirculating space conditioning systems, per ASHRAE 62.2–2010, and comply with other requirements as enumerated in the HDC LEED materials.
f. Environmental Tobacco Smoke
    i. Projects must mit exposure of building occupants, indoor surfaces, ventilation air distribution systems to environmental tobacco smoke, and comply with other requirements as enumerated in the HDC LEED materials.
g. Compartmentalization
    i. Projects must comply with requirements to limit occupants' exposure to indoor air pollutants by minimizing the transfer of air between units as enumerated in the HDC LEED materials.
h. Enhanced Ventilation
    i. Projects may attain points by complying with one or both minimization of moisture options as enumerated in the HDC LEED materials.
i. Contaminant Control
    i. Projects may attain points by complying with one or more options that reduce occupants' exposure to indoor airborne contaminants through source control and removal as enumerated in the HDC LEED materials.
j. Balancing of Heating and Cooling Distribution Systems
    i. Projects may attain points by complying with one or more options that improve thermal comfort and energy performance by ensuring appropriate distribution of space heating and cooling in the home as enumerated in the HDC LEED materials.
k. Enhanced Compartmentalization
    i. Projects may attain points by performing a compartmentalization blower door test according to RESNET or the ENERGY STAR testing and verification protocols for multifamily midrise buildings, with an allowable maximum leakage of 0.15 cfm50 per square foot (0.04 cmm50 per square meter) of enclosure (i.e., all surfaces enclosing the apartment, including exterior and party walls, floors, and ceiling).
l. Enhanced Combustion Venting

i. Projects may attain points by either building projects without fireplaces or wood stoves, or by enhancing combustion venting measures within the project in a manner consistent with the HDC LEED materials.

m. Enhanced Garage Pollutant Protection
   i. Projects may complying with project type specific requirements as enumerated in the HDC LEED materials.

n. Low Emitting Products
   i. Projects may attain points by complying with requirements that reduce occupants' exposure to airborne chemical contaminants through product selection as enumerated in the HDC LEED materials.

o. No Environmental Tobacco Smoke
   i. Projects may attain points by prohibiting smoking throughout the building, including within living units as enumerated in the HDC LEED materials.

8. Innovation
   a. Preliminary Rating
      i. Projects must, as early as practicable, conduct a preliminary LEED for Homes meeting, with the participation of the principal members of the verification and project team as enumerated in the HDC LEED materials.
   b. Innovation
      i. Projects may attain points for achieving exceptional performance for current credits and promote innovative performance in pioneering areas in a manner consistent with the HDC LEED materials.
   c. LEED AP Homes
      i. Projects may attain points if at least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project.
9. Regional Priority
   a. Regional Priority: Specific Credit
      i. Projects may attain one or more of the Six Regional Priority credits have been identified by the USGBC regional councils and chapters as having special importance for the project's region. A database of these credits and their geographic applicability is available on the USGBC website, at http://www.usgbc.org.

APPENDIX B: Commercial Buildings and Building Renovations

People may use the following categories to obtain points by fulfilling the LEED requirements in the point attaining categories and practices they wish to participate in. Based on the points obtained, people may achieve LEED Certified, Silver, Gold or Platinum status.

1. Location and Transportation
    a. LEED for Neighborhood Development
        i. Projects may attain points if they are located in certified LEED Neighborhood development areas. Projects attempting this credit are not eligible to earn points under the other Location and Transportation credits.
    b. Sensitive Land Protection
        i. Projects may attain point is they are developed on land that has been previously developed, or if projects are located on land that does not meet certain criteria for land sensitive as outlined in BDC LEED Materials.
    b. High Priority Site
        i. Projects may attain points if it is located on an *infillI* location in a *historic district,* or projects located on particular types of cites, or projected located on a *brownfield* where soil or groundwater contamination has been identified and where a governing authority requires remediation.
    c. Surrounding Density and Diverse Uses
        i. Projects may attain points if they are located on a site whose surrounding existing density meets LEED project specific requirements.
    d. Access to Quality Transit
        i. Projects may attain points if they locate any functional entry of the project within a ¼-mile (400-meter) walking distance of existing or planned bus, streetcar, or rideshare stops, or within a ½-mile (800-meter) walking distance of existing or planned bus rapid transit stops, light or heavy rail stations, commuter rail stations, or commuter ferry terminals.
    e. Bicycle Facilities
        i. Projects may attain points is the project's functional entrance must be designed or located within a 200-yard (walking distance) from at least one of the LEED specific areas.
    f. Reduced Parking Footprint

i. Projects may attain point is they do not exceed the minimum parking requirements in Chapter 15 Part 4 of the Township Ordinances.

g. Green Vehicles
    i. Projects may attain points if they designate at least 5% of their parking spaces as preferred parking for Green Vehicles.

2. Sustainable Sites
    a. Construction Activity Pollution Prevention
        i. Projects may attain points if they create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent. Projects must apply the CGP regardless of size. The plan must describe the measures implemented.
    b. Site Assessment
        i. Projects may attain points if they complete and document a site survey or assessment that includes the required information as dictated by BDC LEED.
    c. Site Development - Protect or restore habitat
        i. Projects that preserve and protect from all development and construction activity 40% of the greenfield area on the site (if such areas exist) AND
        ii. Utilize LEED approved On-site Restoration Measures OR
        iii. Obtain financial support equivalent to at least $0.40 per square foot (US$4 per square meter) for the total site area (including the building footprint) from a nationally or locally recognized land trust or conservation organization within the same EPA Level III ecoregion or the project's state (or within 100 miles of the project [160 kilometers] for projects outside the U.S.). For U.S. projects, the land trust must be accredited by the Land Trust Alliance.
    d. Open Space
        i. Projects may attain points if they provide outdoor space greater than or equal to 30% of the total site area (including building footprint). A minimum of 25% of that outdoor space must be vegetated (turf grass does not count as vegetation) or have overhead vegetated canopy.
    e. Rainwater Management

i. Projects may attain points by either designing projects to manage rain rain fall events based on percentile or by using natural land cover conditions consistent with the rainwater management BDC LEED requirements.

f. Heat Island Reduction
    i. Projects may attain points by using one or more of the roof or non-roof measures to minimize the effects on microclimates and human and wildlife habits by reducing heat islands as enumerated in the BDC LEED materials.
g. Light Pollution Reduction
    i. Projects may attain points by meeting uplight and light trespass requirements, using either the backlight-uplight-glare (BUG) method or the calculation method as enumerated in BDC LEED materials.

3. Water Efficiency
    a. Outdoor Water Use Reduction
        i. Projects must either demonstrate that the landscape does not require a permanent irrigation beyond a maximum 2 years established period or
        ii. Projects must reduce the project's landscape water requirement by at least 30% from the calculated baseline for the site's peak watering month. Reductions must be achieved through plant species selection and irrigation system efficiency, as calculated by the Environmental Protection Agency (EPA) Water Sense Water Budget Tool.
    b. Indoor Water Use Reduction
        i. Projects must abide by indoor water use requirements and consumption requirements as enumerated in BDC LEED materials.
    c. Building Level Water Metering
        i. Projects must install permanent water meters that measure the total potable water use for the building and associated grounds. Meter data must be compiled into monthly and annual summaries; meter readings can be manual or automated and
        ii. Commit to sharing with USGBC the resulting whole-project water usage data for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first.
        iii. This commitment must carry forward for five years or until the building changes ownership or lessee.
    d. Outdoor Water Use Reduction

i. Projects may attain points by either showing that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period OR
ii. By reducing the project's landscape water requirement (LWR) by at least 50% from the calculated baseline for the site's peak watering month. Reductions must first be achieved through plant species selection and irrigation system efficiency as calculated in the Environmental Protection Agency (EPA) Water Sense Water Budget Tool.

e. Indoor Water use Reduction
   i. Projects may attain points by further reducing fixture and fitting water use from the calculated baseline in WE Prerequisite Indoor Water Use Reduction. Additional potable water savings can be earned above the prerequisite level using alternative water sources. Include fixtures and fittings necessary to meet the needs of the occupants. Some of these fittings and fixtures may be outside the tenant space (for Commercial Interiors) or project boundary (for New Construction).
f. Cooling Tower Water Use
   i. Projects may attain points for cooling towers and evaporative condensers, conduct a one-time potable water analysis, measuring at least the five control parameters listed in BDC LEED materials.
g. Water Metering
   i. Projects may attain points by installing permanent water meters for two or more of the following water subsystems, as applicable to the project as enumerated in BDC LEED materials.

4. Energy and Atmosphere
   a. Fundamental Commissioning and Verification
      i. Projects must complete commissioning processes activities consistent with BDC LEED materials.
   b. Minimum Energy Performance
      i. Projects must attain points by either completing a while-building energy simulation OR
      ii. By complying with perspective compliance ASHRAE 50% advanced energy design guide as enumerated in BDC LEED materials.
   c. Building-Level Energy Metering
      i. Projects must install new or use existing building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption

(electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc). Utility-owned meters capable of aggregating building-level resource use are acceptable AND

ii. Commit to sharing with USGBC the resulting energy consumption data and electrical demand data (if metered) for a five-year period beginning on the date the project accepts LEED certification. At a minimum, energy consumption must be tracked at one-month intervals as enumerated in BDC LEED materials.

d. Fundamental Refrigerant Management
    i. Projects must not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems and comply with other requirements as enumerated in BDC LEED materials.
e. Enhancing Commissioning
    i. Projects may attain points by complying with enhanced systems commissioning OR
    ii. Complying with enhanced and monitoring-based commissioning AND/OR
    iii. Complying with envelope commissioning guidelines as enumerated in the BDC LEED materials.
f. Optimize Energy Performance
    i. Projects may attain points by complying with whole-building energy simulation guidelines OR
    ii. By complying with perspective compliance: ASHRAE Advanced Energy Design guide as enumerated in the BDC LEED materials.
g. Advanced Energy Metering
    i. Projects may attaining points by installing advanced energy metering that comply with particular characteristics as enumerated in the BDC LEED materials.
h. Demand Response
    i. Projects may attain points by participating in approved demand response programs if available OR
    ii. If demand response programs are not available, projects may attain point by abiding by the enumerated guidance in the BDC LEED materials.
i. Renewable Energy Production
    i. Projects may attain points by using renewable energy systems to offset building energy costs in ways consistent with BDC LEED materials.
j. Enhanced Refrigerant Management

i. Projects may attain points by not using refrigerant or low-impact refrigerants OR
ii. By calculating refrigerant impact consistent with the guidance enumerated in the BDC LEED materials.

k. Green Power and Carbon Offsets
i. Projects may attain points by engaging in practices that reduce greenhouse gas emission through the use of the grid source, renewable energy technology and carbon mitigation projects consistent with the guidance in the BDC LEED materials.

5. Materials and Resources
a. Storage and Collection of Recyclables
i. Projects must engage in practices that reduce the waste that is generated by building occupants and hauled to and disposed of in landfills that are consistent with the guidelines in the BDC LEED materials.

b. Construction and Demolition Waste Management Planning
i. Projects must develop and implement a construction and demolition waste management plan consistent with the BDC LEED materials.

c. Building Life-Cycle Impact Reduction
i. Projects may attain points by Demonstrating reduced environmental effects during initial project decision-making by reusing existing building resources or demonstrating a reduction in materials use through life-cycle assessment by complying with one of the many options enumerated in the BDC LEED materials.

d. Building Product Disclosure and Optimization - Environmental Product Declarations
i. Projects may attain points by completing an environmental product declaration, OR
ii. By using products that meet multi-attribute optimization standards consistent with BDC LEED materials.

e. Building Product Disclosure and Optimization - Sourcing of Raw Materials
i. Projects may attain points by complying with material ingredient reporting in one of two manners, AND/OR
ii. By complying with product manufacturer supply chain optimization in a commer consistent with BDC LEED materials.

f. Building Product Disclosure and Optimization - Material Ingredients
i. Projects may attain points by complying with specified substitutes for materials manufactured with lead, cadmium, and copper in a manner consistent with BDC LEED materials.

g. Construction and Demolitions Waste Management

i. Projects may attain point by complying with diversion of waste in one of two manners, OR
ii. By complying with reduction of total waste material in a manner consistent with the BDC LEED Materials.

6. Indoor Environmental Quality
    a. Minimum Indoor Air Quality Performance
        i. Projects must comply with project dependent requirements that contribute to the comfort and well-being of building occupants by establishing minimum standards for indoor air quality as enumerated in the BDC LEED materials.
    b. Environmental Tobacco Smoke Control
        i. Projects must prohibit smoking inside the building, and comply with other requirements in the BDC LEED materials.
    c. Enhanced Indoor Air Quality Strategies
        i. Projects may attain points by complying with certain requirements that enhance the air quality of buildings as enumerated in the BDC LEED materials.
    d. Low-Emitting Materials
        i. Projects may attain points by installing and utilizing testing methods for volatile organic compound (VOC) emissions in the manner consistent with BDC LEED materials.
    e. Construction Indoor Air Quality Management Plan
        i. Projects may attain points by developing and implementing an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building AND
        ii. Complying with specifications enumerated in BDC LEED materials.
    f. Indoor Air Quality Assessment
        i. Projects may attain points by complying with particular requirements prior to the building's occupancy OR
        ii. By complying with particular requirements during the building’s occupancy OR
        iii. By complying with particular air testing.
    g. Thermal Comfort
        i. Projects may attain points by fulfilling thermal comfort design and comfort control requirements in a manner consistent with BDC LEED materials.
    h. Interior Lighting
        i. Projects may attain points by complying with lighting control requirements AND/OR

ii. By complying with lighting quality requirements as enumerated in the BDC LEED materials.

i. Daylight
    i. Projects may attain points by completing option 1, a spatial daylight autonomy and annual sunlight exposure simulation OR
    ii. By completing option 2, an illuminance calculations simulation as enumerated in the BDC LEED materials.

j. Quality Views
    i. Projects may attain points by achieving a direct line of sight to the outdoors via vision glazing for 75% of all regularly occupied floor area. View glazing in the contributing area must provide a clear image of the exterior, not obstructed by frits, fibers, patterned glazing, or added tints that distort color balance.

k. Acoustic Performance
    i. Projects may attain points by allowing for all occupied spaces, meet the following requirements, as applicable, for HVAC background noise, sound isolation, reverberation time, and sound reinforcement and masking as enumerated in the BDC LEED materials.

7. Innovation
    a. Innovation
        i. Projects my attain points by fulfilling the requirements enumerated in the BDC LEED materials.
    b. LEED Accredited Professional
        i. Projects may attain points by having at least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project.
8. Regional Priority
    a. Specific credit
        i. Projects can earn points by determining if the project is eligible for a regional priority credit by searching LEED's website.[111]

[111] USBGC, *USGBC homepage*| *USGBC,* https://new.usgbc.org/.