City of Dublin

Office of the City Manager
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Memo

To: Members of Dublin City Council

From: Megan O'Callaghan, City Manager

Date: November 8, 2022

Initiated By: Jennifer M. Rauch, AICP, Director of Planning
Tammy Noble, Senior Planner

Re: Ordinance 70-22 – Amending Zoning Code Section 153.074 regarding Accessory Uses and Structures to add language addressing renewable energy equipment for solar (Case No. 21-151ADMC).

Summary

This Ordinance is a request for modifications to Code Section 153.074 – Accessory Uses and Structures to add language for the installation of renewable energy equipment for solar in residential and non-residential districts.

Background

The proposed amendment is based on an increase in requests for solar panels installations on residential and non-residential properties. A number of the requests were primarily based on financial incentives that are currently available for property owners, which have extended through 2035. Planning has collaborated extensively with several private installation companies, energy providers, local regional partners including the Mid-Ohio Regional Planning Commission and Logan Union and Champaign Regional Planning Commission, as well as national and local advocacy organizations to understand various aspects of solar energy. Staff has also conducted benchmarking of peer communities to understand how they address renewable energy. This information and background was used as the basis for the draft Code language presented for review and determination and is included for reference.

Existing Regulations

The Zoning Code provides regulations for renewable energy equipment for solar within the West Innovation District, Bridge Street District, Historic District, and Mixed Use Regional District, but the remainder of the properties within the City default to the accessory structure regulations, which limit the location to the side or rear of the property. The use of the existing accessory structure regulations provide limited guidance when addressing renewable energy equipment and a more detailed Code amendment is recommended to provide additional regulations. The proposed regulations will be applicable to all properties except those within one of the Zoning Districts listed above, or with restrictions outlined in a development text for a Planned Unit Development (PUD).

Residential Development Regulations

In order to more fully understand the impacts of the installation of renewable energy equipment on residential properties, Planning staff reviewed the development texts for all residential PUDs and found 17 PUDs regulate roof materials and therefore would not permit solar energy equipment (see attached). The remaining residential PUDS would be subject to the proposed renewable energy equipment regulations. In addition to the City's zoning and development ordinances to regulate energy equipment, residential properties may be governed by the neighborhood's homeowners' associations and any rules and declarations established regarding energy equipment. The City of Dublin is responsible for enforcing the zoning and development standards, while individual homeowners associations are responsible for enforcing any deed restrictions.

The State of Ohio recently adopted a new law (effective Sept. 13, 2022) concerning homeowners' association rules that govern the installation of solar panels on residential properties that are within an association. Ohio Substitute Senate Bill 61 of the 134th General Assembly enacts new provisions of Ohio's planned community law to address installations of solar panels in condominium and planned communities (i.e. residential developments with mutual covenants administered by a homeowners' association). The new state law is outside of the City of Dublin's control and does not impact the City's zoning and development standards. City staff shared this information with the HOAs and recommended each association review the bill to determine what effect it might have on the neighborhood's ability to regulate solar energy equipment.

Permit Information

Planning staff also researched information regarding all permits that have been issued for solar panel installation and any properties that have been brought to our attention that do not have a permit (see attached). A total of 74 permits have been submitted to the City from 2011 – 2022 for solar panels. Of these permits, 70 were for residential properties. Additionally, 11 permits indicate solar panels were requested on the front elevation. Staff conducted additional research for front-facing solar panels and determined several of the permits were either withdrawn, are under review for a variance, were reviewed as a corner lot where one frontage was interpreted as a "front", or were approved prior to our current policy to review solar panels as accessory structures.

Board and Commission Discussion

In order to more specifically address the permitted location and aesthetic requirements of renewable energy equipment, staff has raised the topic with the City's various Board and Commissions, and feedback was provided for consideration within the existing Code amendment. The Planning and Zoning Commission discussed renewable energy equipment in October 2021 and in May, August, and September 2022 and made a recommendation of the proposed Code amendment in October 2022. Overall, the Commission was supportive of solar panels in all districts and acknowledged that the City should be supportive of sustainability efforts while also balancing the aesthetics and character of the community. The draft Code language reflects the detailed Commission discussion, including solar equipment in all districts with special attention to location and aesthetics.

Additionally, the Community Services Advisory Commission provided input on solar panels at their September 13, 2022 meeting. The feedback from the Commission members ranged from continuing to limit solar to the side or rear of the home to investigating options on the front of the home if it is determined to be financially beneficial to the resident. Aesthetic considerations were also discussed and recommended design details continue to be part of the conversation and any future Code amendment.

Civic and Homeowners Associations Outreach

Renewable energy equipment information was shared with Dublin's Civic and Homeowners Associations regarding the current review process, state legislation, and information related to solar panels. Staff also surveyed Civic and Homeowners Associations' leadership in October 2022 about existing restrictions related to solar panels and input from their individual communities about solar energy equipment. The survey was sent to 175 neighborhood leader contacts and 27 responses were provided to questions about their neighborhood restrictions, whether solar panels have been installed in their neighborhood, and what should be addressed when considering restrictions. Planning staff shared an overview of the survey results as well as the existing rules and the proposed amendment being considered at the Fall Neighborhood Leadership meeting.

Draft Code Language

The proposed Code amendment incorporates additional regulations within Code Section 153.074 - Accessory Uses and Structures and will be applicable to all residential and non-residential zoning districts, unless regulated in one of the Zoning Districts mentioned above. The draft Code identifies general standards for renewable energy equipment for solar and differentiates between ground-mounted and building-mounted application of the equipment. Overall, the Code permits ground and building mounted equipment to the side and rear of a building or property with specific provisions to height, design, and setbacks. The Code proposes to permit building mounted solar to the front, if it performs as a building material (i.e. shingles, windows, facade materials, etc.). The proposed Code includes the following language to define building materials: *Any solar generating materials that function as a building material such as windows, roof, or other residential or commercial materials shall be reviewed as the building material*. To supplement the regulations, staff is developing a series of reference photos to provide guidance on the design aspects to assist with implementation. The proposed Code outlines the review process by residential and non-residential zoning districts.

Recommendation of the Planning and Zoning Commission

Draft language was presented to the Planning and Zoning Commission on October 20, 2022, and the Commission reviewed the language and made a recommendation of approval to City Council. The Commission requested minor changes be made to omit redundant language and decrease the distance panels can extend above the roof from 18 inches to 12 inches. All modifications have been incorporated into the draft language presented to City Council.

Recommendation

Given the complexity of this topic and the significant amount of research that has been completed, staff recommends allowing City Council additional time to review and consider the proposed Code amendment and supporting materials. In the meantime, staff will continue to

conduct research and solicit public input, including conducting a community survey in December and holding a public input open house in January 2023 (tentative date is January 11, 2023). Additionally, staff recommends holding a portion of the January 17, 2023 City Council Work Session to review and discuss the results of the survey and public input open house. Accordingly, staff recommends the second reading/public hearing on the Ordinance be conducted on February 13, 2023.

RECORD OF ORDINANCES

Dayton Legal Blank, Inc. Form No. 30043

Ordinance No. 70-22 *Passed* _____, *20*____

AMENDING ZONING CODE SECTION 153.074 REGARDING ACCESSORY USES AND STRUCTURES TO ADD LANGUAGE ADDRESSING RENEWABLE ENERGY EQUIPMENT FOR SOLAR (CASE NO. 21-151ADMC).

WHEREAS, it is necessary from time to time to amend Dublin's Zoning Code to protect the health, safety and welfare of the citizens of the City of Dublin, and

WHEREAS, the City of Dublin Zoning Code recognizes the need to ensure the uses provided in the City of Dublin Zoning Code are compatible with surrounding development and character of the area, and

WHEREAS, the City of Dublin Zoning Code ensures uses promote the economic well-being of the City of Dublin and allows the City to remain competitive in the region, and

WHEREAS, the Planning and Zoning Commission reviewed and recommended adoption of the proposed amendment to Sections 153.074 of the City of Dublin's Zoning Code on October 20, 2022 because it serves to improve the health, safety and welfare of the citizens of the City of Dublin,

NOW, THEREFORE, BE IT ORDAINED by the Council of the City of Dublin, _____ of its elected members concurring, that:

Section 1. Section 153.074 of the Codified Ordinances of the City of Dublin is hereby amended and shall provide as attached to this Ordinance:

Section 2. This ordinance shall be effective on the earliest date permitted by law.

Passed this _____ day of _____, 2022.

_____
Mayor - Presiding Officer

ATTEST:

_____
Clerk of Council

DRAFT CODE LANGUAGE
RENEWABLE ENERGY EQUIPMENT - SOLAR

Black Font-Existing Code Language
Blue Front-New Language
Red Font-Changes Based on Planning and Zoning Commission

§153.074 – Accessory Uses and Structures

(A)(3)(a) *Residential.* Storage, recreation, child care, home occupations, leisure and gardening/landscaping uses, renewable energy equipment- solar, and others as permitted by the district in which the property is located or as determined by the Administrative Official.

(A)(4)(a) *Residential.* Garages and carports (attached and detached), sheds, swimming pools, hot tubs, sport courts and similar facilities, gazebos, porches/sunrooms, patios, decks, greenhouses, renewable energy equipment - solar, or similar facilities, and other similar structures as determined by the Administrative Official.

(A)(4)(b) *Non-residential.* Dumpster enclosures, sheds, garages/parking structures, greenhouses, renewable energy equipment - solar, and other similar structures as determined by the Administrative Official.

(B)(3)(c) This section shall not prohibit accessory uses and structures typical of multiple-family residential developments, including but not limited to clubhouses and/or administration offices, pool houses, laundry facilities, gatehouses, mailbox shelters, dumpster shelters or enclosures, recreational facilities, renewable energy equipment - solar, and other similar structures as determined by the Administrative Official, provided all applicable development requirements including but not limited to lot coverage, setbacks, open space, and stormwater management are met.

(E) Renewable Energy Equipment - Solar

Purpose

The purpose of this section is to promote sustainable environmental practices and environmental stewardship while balancing the high-quality development standards that defines the character of the community.

Applicability

Unless otherwise addressed within a PUD, Planned Unit Development District; WID, West Innovation Districts, MUR, Mixed Regional Use Districts; BSD, Bridge Street Districts; or HD, Historic Districts these standards shall apply to all properties within the City of Dublin.

(1) Renewable energy equipment – solar

(a) General Provisions

1. All solar equipment shall be installed to conceal frames, flashing, fasteners, hardware, conduit, wires and similar elements.
2. Any solar generating materials that function as a building material such as windows, roof or other residential or commercial materials shall be reviewed as the building material.

3. All solar energy equipment shall be well-maintained and remain in working order. If not, then all equipment and associated materials shall be removed or replaced.

(b) Ground Mounted Equipment

1. Ground-mounted equipment for the collection of solar energy is permitted to be located to the side or rear of the principal structure and within five feet of the principal structure. Ground-mounted equipment is not permitted forward of a principal structure or along a public right-of-way.

2. Ground-mounted renewable energy equipment - solar shall be sited to minimize view from the public right-of-way and adjacent properties, and shall be ~~camouflaged to the extent that the equipment can function normally~~ screened in accordance with Section 153.133(C) of the City of Dublin Zoning Code.

3. Ground-mounted equipment shall meet all required setbacks. The equipment shall not exceed six feet in height, unless otherwise permitted by this section. This shall be measured from established grade to the top of the equipment.

4. Ground-mounted equipment in non-residential districts shall not exceed 25% of the gross floor area of the principal structure(s), unless otherwise permitted.

(c) Building or Roof Mounted Equipment

1. Building or roof mounted equipment is permitted to be only located to the side or rear of the principal structure.

~~2. Building or roof mounted equipment is permitted to the front of a principal structure only when the equipment is architectural integrated into the design of the building and incorporated as a standard building materials, including but not limited to shingles, windows, and façade materials.~~

3. Roof-mounted equipment shall be a color that is complementary to the roof color.

4. Roof-mounted equipment for the collection of solar energy is permitted provided it extends no more than ~~18~~ 12 inches ~~beyond~~ above the plane of the roof~~line~~ and is non-adjustable or movable.

5. Roof-mounted equipment for the collection of solar energy shall be integrated into the architectural design of the structure to the extent practicable that the equipment can normally function.

6. For pitched roofs, roof-mounted solar equipment shall:
   a) Be mounted parallel to the roof plane,
   b) Limit protrusions,
   c) Not extend above the ridgeline of the roof,
   d) Not extend ~~over~~ beyond the edge of the roofline,
   e) Use a single material type (i.e. all shingles or panels),
   f) Be configured and have an assembly profile complementary to the roof line,
   g) Be installed to minimize the number of corners, and
   h) Avoid complex and nonsymmetrical configurations.

7. For flat roofs, roof-mounted solar equipment is permitted and shall be screened in accordance with §153.077.

(d) Review Procedures

All applications for renewable ~~solar~~ energy equipment - solar within residential and nonresidential zoning districts shall require approval by the required reviewing body, prior to the gaining approval of a building permit.

SECTION 154.074(E)
RENEWABLE ENERGY EQUIPMENT-SOLAR

§153.074 – Accessory Uses and Structures

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SECTION 154.074(E)
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2. Ground-mounted renewable energy equipment - solar shall be sited to minimize view from the public right-of-way and adjacent properties, and shall be screened in accordance with Section 153.133(C) of the City of Dublin Zoning Code.

3. Ground-mounted equipment shall meet all required setbacks. The equipment shall not exceed six feet in height, unless otherwise permitted by this section. This shall be measured from established grade to the top of the equipment.

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2. Ground-mounted renewable energy equipment-solar shall be sited to minimize view from the public right-of-way and adjacent properties, and shall be ~~camouflaged to the extent that the equipment can function normally~~ screened by Section 153.133(C) of the City of Dublin Zoning Code.

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4. Ground-mounted equipment in non-residential districts shall not exceed 25% of the gross floor area of the principal structure(s), unless otherwise permitted.

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City of Dublin

Planning Division
5200 Emerald Parkway • Dublin, OH 43017-1090
Phone: 614-410-4400 • Fax: 614-410-4490

Memo

To: Members of Dublin Planning and Zoning Commission

From: Jennifer M. Rauch, AICP, Director of Planning

Tammy Noble, Senior Planner

Date: October 20, 2022

Re: 21-151ADMC - Renewable Energy Equipment for Residential and Commercial Zoning Districts

Summary
Recently, the Planning and Building Divisions have experienced an influx of requests for the installation of solar panels on residential and commercial properties. In response, Planning has conducted a review of the existing solar panel regulations as provided in the City of Dublin's Zoning Code, and identified opportunities to broaden the scope of allowance in accordance with the Dublin Sustainability Framework. Several initial discussions have occurred with City Council, Planning and Zoning Commission, Board of Zoning Appeals and the Architectural Review Board. Planning presented to the Planning and Zoning Commission on September 15, 2022, and the Commission provided direction on proposed requirements for renewable energy equipment for solar on residential and commercial properties.

Commission Feedback
For commercial properties, the Commission provided direction for building mounted solar based on roof design, stating solar panels on flat roofs were acceptable and recommending limitations for pitched roofs. In commercial parking areas, solar panels should be permitted with height limitations and should appear integrated into the design of the parking area. The Commission did not express support for solar farms or solar energy as a primary use and would not support ground mounted energy equipment to the front of a commercial building. If located to the side or rear of a building, the Commission suggested meeting setbacks, provide screening, require height limitations and be proportionate to the commercial development.

For residential properties, the Commission shared similar feedback regarding the permitted locations of solar equipment, limiting installation to the side or rear unless architecturally integrated. As a general principle, solar equipment that also performed as a building material such as a shingle, window or siding be reviewed as the applicable building material.

Additional Resources
Planning met with several private installation companies, energy providers, local regional partners including the Mid-Ohio Regional Planning Commission and Logan Union and Champaign Regional Planning Commission, as well as national and local advocacy organizations to understand various aspects of solar energy. We utilized this information, as well as the

feedback received by the Commission to compile the draft language provided.

Additionally, a significant number of developments within the City are zoned as Planning Unit Developments and have specific development texts that regulate building materials, including approved roof materials. Planning has researched recently approved PUDs in the City and have noted that many have specific requirements for roofing materials that do not include the permission for solar. Staff has included this research for the Commission's reference. There are also specific zoning districts within the City that contain existing regulatory language that addresses renewable solar energy equipment, including the Historic District, Bridge Street District, West Innovation District and Mixed Use Regional District.

Draft Code Provisions
The draft Code regulations are proposed to be added to Code Section 153.074 - Accessory Uses and Structures within the Zoning Code and will be applicable to all residential and commercial zoning districts, unless regulated in one of the zoning districts mentioned above. The draft Code identifies general standards for solar energy, and then differentiates between a ground-mounted and building-mounted application of the equipment. Overall, the Code permits ground and building mounted solar to the side and rear of a building or property with specific provisions to height, design, and setbacks. The Code proposes to permit building mounted solar to the front, if it is architecturally integrated into the building design and looks and performs as a "typical" building material (i.e. shingles, windows, facade materials, etc.). The proposed Code outlines the review process by residential and non-residential zoning districts. Following the Commission's review, Planning will provide illustrative examples of these requirements to provide further guidance in reviewing these regulations.

Public Outreach
The City of Dublin has been proactive in educational efforts for the community. The City has provided information to the Dublin Civic Associations and HOA, Home Owners Associations regarding the current review process, state legislations, and information related to solar panels. As part of the City's annual HOA meeting on October 18, 2022. Planning will provide background on renewable energy equipment and share results of an informal survey conducted with the HOAs about solar energy. The results of this meeting will be share with the Planning and Zoning Commission at the October 20, 2022 meeting.

Background
The Zoning Code provides regulations for solar panels within the West Innovation District, Bridge Street District, Historic District, and Dublin Corporate Area, and a number of PUD, Planned Unit Developments, but the remainder of the properties within the City would default to the accessory structure regulations which limit location to the side and rear of a property. Renewable energy equipment, such as solar panels would be considered accessory structures and have to adhere to the location requirements. All equipment, including solar panel requires approval from the City prior to installation.

In order to more specifically address the permitted location and aesthetic requirements of renewable energy equipment, staff has raised the topic with the City's various Board and Commissions, and feedback has been provided for consideration with a future Zoning Code amendment. The largest discussion point has occurred around solar panels on single-family

homes and how and where solar panels should be permitted.

Reference information about solar technologies, benchmarking information, and existing code language for comparable communities have been provided for the Commission's information.

Previous Discussions

October 2021

Planning provided an introduction to the Planning and Zoning Commission on this topic specifically requesting feedback regarding regulating solar panels within the City of Dublin. At the time, Planning provided an overview of the existing regulations and provided discussion topics for the Commission's consideration. The Commission supported solar panels in all districts and acknowledged that the City should be supportive of sustainability efforts. The Commission discussed technological advancements of the solar industry and that the City has to be flexible as these advancements continue to occur. The Commission recommended regulating the location of solar panels in instances that they are not visible from the public rights-of-way to the extent possible.

May 2022

In response to the discussion, Planning drafted language that accommodates renewable energy equipment, such as solar, in all residential and commercial zoning districts. The proposed amendments recommended establishing a new section within the General Development Standards that permits renewable energy equipment (i.e. solar panels) in all zoning districts. Roof-mounted renewable energy would be limited to eighteen inches above the roofline of a building and ground-mounted equipment would need to be screened to the extent possible. To facilitate a user-friendly review process, the proposed Code language allowed solar panels to the side and rear of a building with an administrative approval of a Certificate of Zoning Plan Approval. An additional review process was proposed for property owners requesting equipment on the front of the building. The proposed language was reviewed by the Planning and Zoning Commission and they requested additional information be provided prior to making a formal recommendation. The discussion centered on the types of solar technology available, aesthetic components, and where and how solar would be installed, particularly when roof-mounted.

August 2022

City Council, Planning and Zoning Commission, Board of Zoning Appeals and the Architectural Review Board held a joint worksession and the topic of solar panels were raised in the group's discussion. The group discussed the installation of roof-mounted solar panels and how a Code amendment should address the permitted location. Concerns were raised about the aesthetics of solar panels, and the installation of the roof-mounted solar panels on the front elevations of single family homes. Additionally, there was discussion around HOA regulation of solar panels in residential areas and a recently approved state legislative action. It should be noted that the City enforces its own zoning and development ordinances, while homeowners' associations or residents enforce association rules and declarations.

September 2022

Planning plans to engage with the Community Services Advisory Committee on September 13, 2022 as the Committee reviews the Sustainability Framework in order to gain additional insight on renewable energy, particularly solar panels. The outcome of this meeting will be shared with the Commission.

September 2022
The Board of Zoning Appeals heard three applications for residential permits for solar energy to the front of a primary structure. The variance applications were required based on not meeting the current regulations under the Accessory Structure section of the Code which requires roof-mounted solar panels to be located to the side or rear of a primary structure. All applications were tabled for further discussion by the Planning and Zoning Commission.

Recommendation:
Planning requests feedback from the Planning and Zoning Commission regarding the proposed Code language draft following the Commission's direction on September 15, 2022 meeting. If the Commission is satisfied with the Draft Code modifications, Planning requests a recommendation of approval be forwarded to City Council.

DRAFT

NEW CASE

3. Solar Panels, 21-151ADMC, Administrative Request - Code Amendment

A Code Amendment to provide regulations in regard to solar panels for residential and commercial properties within the City of Dublin.

Staff Presentation

Ms. Noble presented the case background. Several previous discussions have occurred with City Council, Planning and Zoning Commission, the Board of Zoning Appeals and the Architectural Review Board regarding the need for a Code Amendment to provide regulations for renewable energy equipment, in particular, solar panels, on both residential and commercial properties. At their September 15, 2022 meeting, the Commission reviewed proposed Code language and provided recommendations have been incorporated into the revised Code amendment for the Commission's consideration tonight. The regulations are proposed to be added to Code Section 153.074 - Accessory Uses and Structures within the Zoning Code and will be applicable to all residential and commercial zoning districts. Staff has researched the number of solar panel installation permits have been issued in the City in the last 10 years, and learned that 74 permits have been issued, primarily for residential properties. Ms. Noble provided an overview of the proposed solar panel regulations. If the Commission is satisfied with the draft Code, staff requests a recommendation of approval be forwarded to City Council.

Commission Questions/Discussion

Mr. Supelak inquired if the proposed language, "architecturally integrated" or "incorporated as a material," is sufficiently effective and future proofed.
Ms. Call responded that the needed clarifications are provided in #2 under General Provisions, which states that, "any solar-generated material that functions as a building material, such as window, roof or other residential or commercial material, shall be reviewed as a building material."
Mr. Supelak inquired if that means solar bricks would automatically be approved because brick is an approved material.
Ms. Call responded that the material would be reviewed. If it is a master development, the application would be reviewed by PZC; individual home applications would be reviewed by Building Standards.
Mr. Supelak stated that the Building Standards' evaluation is limited to the material's structural performance as a brick. Are we comfortable with that? Building Standards staff do not aesthetically evaluate the building material.
Mr. Boggs responded that if the item performs as a building material – has the structural integrity of a brick and look of a brick – it would be evaluated as a non-solar brick. The objective of the Code, as drafted, was to avoid the step of evaluating its solar functionality.
Ms. Call inquired if the Commission was in agreement with that objective.
[The majority of members expressed agreement.]
Mr. Schneier stated that if the brick, window or shingle meets the building material requirements, the fact that it also has solar capability is not relevant to whatever approving body reviews and approves it. The draft language covers that intent. It does not adversely impact a material with solar qualities.
Mr. Supelak stated that Commission members are in agreement that if the material is architecturally integrated, it should be considered as a building material. However, neighborhoods also have protocols in place regarding the choice of bricks, and a solar brick is a different brick.

Mr. Schneier stated that if a solar brick is proposed that, due to its function, looks different than a standard brick, the intent is that it would not be permitted based on the fact that its appearance is different than the approved brick. The solar building material should not be held to either a higher or lower standard.
Mr. Fishman stated that his concern is that the argument will be made that the material functions as a brick and looks fine, although somewhat odd.
Mr. Supelak stated that his concern is that the Building Department does not evaluate the aesthetic factor.

Ms. Rauch stated if it is a commercial development, PZC would be reviewing the building materials. If it is in a standard district, the Commission would not see those applications. The Commission would review and approve the proposed building materials for a PUD.
Mr. Supelak responded that if the Commission sees the application, they have the opportunity to evaluate the aesthetics of the solar brick. However, if the application is not reviewed by the Commission, perhaps because of the district in which it lies, does Planning staff evaluate the aesthetics of the materials?
Ms. Rauch responded affirmatively. The building permit review does not consist only of the construction component; there is a zoning component, as well. Zoning staff looks at the development text to determine what is permitted by that text.
Mr. Supelak stated that was the component he was attempting to determine – the process that ensures that the aesthetic of the material is acceptable for that development district.

Ms. Call suggested that #2 be removed under "Building Roof Mounted," which states that "Building or roof-mounted equipment is permitted to the front of…..only if it is integrated with the architectural detail." #1 could be expanded to include that clarification.
Ms. Noble responded that the language would be revised and #1 would provide the location details.

Mr. Way stated that the proposed language applies to residential and commercial districts. Does the commercial district cover everything, including industrial and institutional?
Staff indicated that clarification would be added.
Mr. Way inquired if it would be better to provide separate regulations for residential and non-residential districts, even if some language is repetitive.
Ms. Rauch stated that staff looked at that possibility. However, because the requirements are essentially the same, the two were consolidated. The only element in a commercial district that is different is the percentage of lot coverage. There is not a separate non-residential section of the Code.

Ms. Call inquired if the requirement that colors shall be complementary to the roof is important to include.
[Consensus was that it was important to include.]

Ms. Call referred to ground-mounted, renewable energy equipment requirement, "shall be sited to minimize view…and shall be camouflaged to the extent that the equipment can function normally." Does that mean that if landscaping would cast a shade part of the day, the argument could be made the equipment is not functioning normally?
Mr. Way responded that functioning normally does not mean 100% of the time.
Ms. Harter stated that it is important that the equipment be camouflaged, regardless of the homeowner's particular site situation.

DRAFT

Mr. Way suggested the word "camouflaged" be revised to "screened."
Mr. Chinnock stated that "shall be camouflaged" could be removed, and leave "minimize the view from the public right-of-way and adjacent properties." The Code does not need to address "function properly."
[Discussion regarding screening continued.]
Ms. Rauch stated that the requirement could default to the service structure screening requirements.

Ms. Call requested Commission consensus on removing #2 under "Building Roof-Mounted," as it is non applicable.
Commission consensus was to remove.

Ms. Call requested Commission consensus on revising "camouflaged" to "screened according to the general standards for service equipment," and remove the language, "can function normally."
Commission consensus was to revise accordingly.

Discussion continued regarding the solar panel extension above the roofline or ridge line of the roof. The Commission recommended that the language be revised from not above 18 inches from the roofline to 12 inches. Staff will investigate the appropriate dimension further and revise as needed before the draft Code is forwarded to City Council for consideration.

Ms. Harter inquired about the stipulation that the solar panels be in working order or be removed. State laws address the aspect of maintenance in greater detail.
Ms. Noble responded that the City's Code already includes regulations for property maintenance.
Mr. Boggs stated that the State law does not address what the City can do in regard to regulations, so the City can address maintenance issues in its usual manner.
Mr. Fishman stated that #3 states that the solar panels must be maintained or removed, so the City can enforce that. He believes there could be a problem when the equipment becomes obsolete and no longer used, similar to the current issue with obsolete TV antennas. If the equipment is not functioning, it must be removed.

Public Comment

Jillian Dyer, 2273 Indian Avenue, Columbus, OH:
"I am not a resident of Dublin, but I work for a solar company based in Dublin and have considered moving to the area. I recently joined a resident to apply for a zoning variance for roof-mounted solar panels, as there was no other viable place to install them. It was disappointing and disheartening to find that there is a Code being enforced that is not actually written. While a resident could a build a shed with a front-facing roof and install solar on that, they cannot put them on their house. However, I am writing today as a resident of central Ohio and as an advocate/activist for climate issues, clean energy alternatives, individual choice and individual property rights. People who end up in homes that are automatically disqualified from solar because of a lack of a zoning code are at a disadvantage. Whether they are looking for financial or environmental benefits, this also impacts a wider community. More people producing power through their solar panels when the excess production goes back onto the grid is good for all of us. Studies have shown that solar panels increase not only the value of the home on which they are installed but the entire neighborhood. People who cannot install are still benefitting. Many jurisdictions have limitations on solar including provisions that do not allow solar to be installed on

street-facing roofs; however, there is usually an avenue for residents to install if they have no other options. This usually occurs when the only usable roof plane faces the street. In central Ohio, roof panels should not be installed on north-facing or excessively shaded planes. They do not produce enough energy for it to make sense. Banning solar outright for people who cannot install on side or rear-facing roofs only creates a vacuum for nonreputable companies to take advantage of people who are not allowed to install the most efficient options. It's 2022. We do not have more time to waste when it comes to climate issues. Taking action has been pushed onto individuals for so long, and we should not be creating roadblocks for people who want to take action and not allowing individuals to pay a role in a systematic issue. Please consider moving quickly on this issue."

The Commission had no further questions or discussion.

Mr. Supelak moved, Mr. Way seconded a recommendation for City Council approval of a Code Amendment regarding Solar Panels.
Vote: Mr. Schneier, yes; Mr. Fishman, yes; Mr. Chinnock, yes; Ms. Call, yes; Mr. Way, yes; Ms. Harter, yes; Mr. Supelak, yes.
[Motion carried 7-0]

City of Dublin
OHIO, USA

RECORD OF DISCUSSION
Planning & Zoning Commission
Thursday, September 15, 2022 | 6:30 pm

The Planning and Zoning Commission took the following action at this meeting:

3. Solar Panel Code Amendment, 21-151ADMC **Administrative Request – Code Amendment**

Proposal:	Request for a future Code Amendment to provide regulations in regards to solar panels for residential and commercial properties.
Request:	Review and informal discussion with non-binding feedback.
Applicant:	Dana L. McDaniel, City Manager, City of Dublin
Planning Contact:	Tammy Noble, Senior Planner
Contact Information:	614.410.4649, tnoble@dublin.oh.us
Case Information:	www.dublinohiousa.gov/pzc/21-151

RESULT: The Commission provided significant feedback regarding potential regulations for both commercial and residential solar energy systems and comments included both ground-mounted and roof-mounted systems. The Commission suggested that commercial use of solar energy allow roof-mounted on flat roofs and on pitched roofs allowed with limitations. For ground-mounted solar energy in commercial districts, should be permitted with limitations and the Commission did not support ground-mounted systems in the front of a principle structure and did not support solar farms. The Commission suggested that solar energy in residential districts be allowed allow roof-mounted on flat roofs and on pitched roofs with limitations. The Commission stated that this should be permitted to the side and rear of a structure, with limitations, and solar energy to the front be limited to solar shingles. The Commission supported ground-mounted systems to the side or rear of a residential structure but did not support to the front.

MEMBERS PRESENT:

Lance Schneier	Yes
Rebecca Call	Yes
Mark Supelak	Yes
Kim Way	Yes
Warren Fishman	Absent
Jamey Chinnock	Absent
Kathy Harter	Yes

STAFF CERTIFICATION

DocuSigned by:
TAMMY NOBLE
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Tammy Noble, Senior Planner

~~A proposal to install a patio and associated site improvements for an existing restaurant on a 17.08-acre site zoned Planned Unit Development, Northeast Quad, Subarea 5A, located northwest of the intersection of Sawmill Road with Hard Road.~~

~~Mr. Supelak moved, Ms. Harter seconded approval of the Amended Final Development Plan with no conditions.~~

~~Vote: Mr. Schneier, yes; Mr. Supelak, yes; Ms. Harter, yes; Ms. Call, yes; Mr. Way, yes. [Motion approved 5-0.]~~

~~2. Sunny Street Cafe at 7573 Sawmill Road, 22-122CU, Conditional Use~~

~~A request to allow an outdoor dining patio for an existing restaurant on a 17.08-acre site zoned Planned Unit Development, Northeast Quad, Subarea 5A and located northwest of the intersection of Sawmill Road with Hard Road.~~

~~Mr. Way moved, Mr. Supelak seconded approval of the Conditional Use with one (1) condition:~~
~~(1) That the patio amenities be stored off-site during off-season.~~

~~Vote: Ms. Harter, yes; Mr. Schneier, yes; Ms. Call, yes; Mr. Supelak, yes; Mr. Way, yes. [Motion approved 5-0.]~~

ADMINISTRATIVE REQUEST

5. Solar Panel Code Amendment, 21-151ADMC, Administrative Request – Code Amendment

An informal discussion of a future Code Amendment to provide regulations regarding solar panels for residential and commercial properties.

Staff Presentation

Ms. Noble stated that this is a topic that has been discussed previously by the Planning and Zoning Commission (PZC), as well as by other City bodies. Currently, the City's Zoning Code remains silent on the issue of solar panels. The Commission is pursuing an amendment to address that. The topic originally was presented to PZC in October 2021 and again in May 2022. The most recent discussion was at the August 31, 2022 Joint Council-PZC-ARB-BZA work session. Currently, requests for installation of solar panels are handled as accessory structures, which permit installations to the side and rear of properties. It does not permit installation of solar panels to the front of properties. At this time, solar panels and sustainable devices are permitted within the Bridge Street District and the West Innovation District, but they are not permitted throughout the City. As part of their analysis, staff looked at surrounding communities and states. They have found that most communities exercise some jurisdiction in regard to solar, wind and geothermal regulation. In term of local regulations, they have benchmarked two other communities that address solar panels as accessory structures, with a variance in regulations as related to Historic Districts. With commercial buildings, it is easier to integrate the panels with the architectural elements of the building. Residential solar panels are more difficult to install aesthetically. This topic was discussed at the Community Services Advisory Commission (CSAC) meeting earlier this week. [Images of different methods of installing solar panels were displayed.]

Ms. Rauch stated that staff also took this item to CSAC for consideration, because they are overseeing the Sustainability Framework topic. Some of the committee members were supportive

of permitting solar panels everywhere; others were supportive of having regulations concerning how and where solar panels could be installed.

Ms. Noble noted that at the Commission's last discussion on this topic, members had requested technical analysis regarding installations and advancements in the industry be provided. Initially, two professionals in the field were scheduled to speak tonight, but due to schedule conflicts, were unable to attend. Tonight, staff is interested in learning Commission members' thoughts on a draft code related to solar panels, specifically in regard to their location.
Ms. Rauch noted that although a professional on this topic was unable to attend tonight, staff has had extensive conversations with the representatives and conducted a significant amount of research. They are able to share what has been learned.

Commission Discussion

Ms. Call stated that discussions on commercial and residential installations would be handled separately, beginning with commercial installation. The discussion should include the desired types and the submission/review process. For instance, should applications be included with the Preliminary and Final Development Plans, or should they be handled differently? Probably the easiest location for commercial installations are flat roof commercial buildings, so discussion will begin with flat-roof installations.

Solar Panel Installations on Commercial Buildings with Flat Roofs:
Mr. Way inquired, for clarification purposes, if the assumption is that the panels also are flat, as they often need to be tilted to optimize their solar collection ability.
Ms. Call responded that they could be canted, but the assumption is that they would be shielded, not visible.
Mr. Way indicated he would be supportive of flat roof installations.
Ms. Harter inquired if they would be visible from the street. Additionally, would there be ground-mounted mechanicals?
Ms. Call responded that roof-mounted solar panels would be subject to the usual requirements for screening of mechanicals. Ancillary ground-mounted installations also would be required to be screened.
Ms. Harter inquired if the assumption is that flat roof-mounted installations would not be visible across the street.

Ms. Rauch stated that this would be handled the same as rooftop mechanicals. The intent is that there would be a parapet that would screen them. There may be some instances, however, in which they would visible.

Mr. Supelak stated that the Code for commercial flat roof installations could be handled the same as HVAC units screened with parapets. Other installations would necessitate different regulations.

Mr. Way inquired if visibility of solar equipment was a negative issue.
Ms. Call stated that some objections are based on their visual impact.
Mr. Supelak stated that if visible, the aesthetics would be a contributing factor.
Mr. Way noted that not every commercial building has a flat roof.

Solar Panel Installations on Canted Commercial Building Roofs:

Ms. Call stated that looking at canted roofs, one way to mitigate the visual impact would be to permit them only on parcels that are not adjacent nor street-facing. The only people who would be visually impacted would be those using the building.

Mr. Schneier stated that it would be helpful to have a spreadsheet depicting the taxonomy of this topic. Within that, there are probably only 20 different types.
Mr. Supelak stated that he believes that is what the discussion is attempting to achieve. It is important also to future-proof our Code. It cannot deal only with the types of solar installations currently known. Technology is accelerating so quickly that there will be many types not yet known. The Code should be both specific, yet over-arching.

Residential Installations:
Ms. Call directed the discussion to residential installations, including roof-integrated solar shingles, roof-mounted panels framed and frameless; ground-mounted solar panels 18 inches or less off the ground; accessory structures roof-mounted; stand-alone solar structures greater than 18 inches; solar windows, etc.

Ms. Call stated that, beginning with roof-integrated solar shingles – she believes these should be addressed as shingles, therefor would be subject to the City's Code regulations related to roofs. Similarly, solar windows should be addressed as windows, not solar panels. Future solar collection devices, such as stucco or paneling, would be addressed by the Code section related to those categories. Thereby, we would be future-proofing regulations related to many solar energy devices.

Ms. Call noted that while she believes that would be the best way to address the residential installations, the Commission does not review individual residential applications.
Commission members had no objections to addressing residential installation in that manner.

Commercial Installations:
Ms. Call asked that, reverting to the commercial installations, what the Commission believed should be addressed by the Code to facilitate the Commission's review of future applications.

Ms. Rauch noted that staff would take the Commission's suggestions, develop draft Code and review it with the industry professionals with whom they are in discussions. Those representatives are anticipated to share their recommendations at a future Commission discussion on the topic.

The Commission discussed the components of the images of different types of rooftop mounted versus integrated installations, such as rain-screen solar panels.
Mr. Supelak noted that it would be important to define integrated versus mounted. Accessory structures are different.

Mr. Way suggested that the smaller commercial buildings could be handled the same as residential solar panel installations, i.e., they would be addressed by the Code section related to that building component, such as roofs or windows.
Mr. Supelak agreed, noting that it also could be itemized/referenced in the new Solar Code section.

Mr. Way stated that he is concerned about stating that solar panels should not be permitted on street-facing roofs. There is evidence that solar panels placed on the incorrect side of roofs do not

perform well. The purpose of installation of solar panels is their anticipated performance, so he is less supportive of making the roof location the controlling factor.
Mr. Supelak stated that if homeowners are not permitted to install them on the south-facing façade, they could be dissuaded from installing any solar panels.

Ms. Noble stated that solar companies have provided an analysis that indicates solar panels can function if located to the side or rear of homes, but not as well; those types of installations are also more costly.

Ms. Call directed the discussion to commercial installations on pitched roofs, beginning with traditional framed or frameless solar panels. Is the Commission supportive of any placement, a percentage of roof coverage and any height elevation from the roof? The elevation we used for ground-mounted panels was 18 inches.
Ms. Noble stated that current City regulations limit the height to 18 inches.
Mr. Way stated that the sample solar panel Codes from other cities regulate panels extending above or hanging over rooflines; he would be supportive of using similar language. Aesthetically, he has an issue with the appearance of staggered cells on roofs with valleys, as they make the roofs look "busy." A rectangular or square shape is cleaner. Those are however, more of a concern on residential buildings than commercial. It would be preferable if the panels mimicked the shape of the roof.

Ms. Rauch stated that with the Bexley Code example, that is one of the stated requirements: "The configuration profile of the assembly shall be complementary to the roofline. Installation should minimize the number of corners and should avoid complexity and non-symmetry."
Ms. Call stated that the Bexley language is clear and accomplishes what is desired.
Mr. Way stated that it should require a relationship consistent to the plane of the roof.
Ms. Call stated that in her opinion, the traditional framed or unframed panels should not be located on the front of homes. The location of integrated solar shingles would not be an issue.

Ms. Harter stated that if the solar shingles have a sheen that could be a concern, as they would look different from other shingles.
Ms. Call stated that solar shingles would not be addressed the same as solar panels. They would be addressed by the section of the Code related to roof shingles. The Tesla shingles look like clay shingles.
Ms. Harter stated that she would like to see a sample of the product.

Mr. Way suggested that, rather than saying no front-mounted solar energy devices are permitted, the Code could state that solar shingles would be required, if front-mounted; installation of traditional solar panels would be required to be rear-mounted. That would permit some flexibility.

Ms. Harter inquired the price difference between solar shingles and traditional solar panels.
Ms. Noble stated that solar shingles are much more expensive. None of the solar panel companies with whom staff has been speaking provide solar shingles. She believes some roofing companies are developing the expertise to install them in connection with other roof repairs.

Ms. Call inquired if there are any other recommendations related to residential installations other than that on the front façade, integrated roof shingles would be required; roof-mounted solar panels would be required to be located on rear facades.

Mr. Schneier stated that neighborhoods, such as Martha's Vineyard, would have the most stringent aesthetic solar installation regulations. Their Code provides for a committee to review each application. In comparison, Dublin prefers a Code that provides guidance. Kiowah Island Code states, "Solar panels may be incorporated into the roofscape or installed on an ancillary structure, provided views are screened from neighboring properties. Solar panels may not be rack-mounted, unless integrated into the roof design, using roof wells or parapets. External piping is not permitted. The views must be approved in advance of the installation." He believes that, in practice, this would be very restrictive.

Mr. Supelak recommended Code language that stipulated rear-mounted panels should be coplanar with elevations no greater than 18 inches.
Ms. Harter stated that it would be important that the Code stipulate that rear-mounted solar panels should not be visible from the front.
Ms. Call noted that utilizing language similar to the Bexley Code would address that element.

Ms. Call stated that the definitions should clarify that solar panels are non-integrated; they *are* mounted to the surface of a structure. Solar shingles are integrated and part of the roof's integrity; they *are not* mounted to the roof.
Discussion continued regarding integrated elements that are part of the structure – stucco, paint rainscreens and complete roofs.
Ms. Call noted that those are design elements.
Mr. Way clarified that he is not opposed to front-mounted installations but would concur with the Commission's consensus.

<u>Ground-mounted Residential Solar Panels:</u>
Commission consensus was that residential ground-mounted solar panels not be permitted in the front yard. Ground-mounted structures with a height no greater than a certain number of inches (staff would insert a recommended height from a safety perspective) would be permitted in the side or rear yards, if landscaping screening of a matching height were provided. The height of stand-alone solar panels should be minimal, so that they can be screened by landscaping. Standard setbacks would apply.
Ms. Call inquired if they would apply to lot coverage.
Mr. Schneier noted that in the Historic District, such devices, such as air conditioner units, do not count toward lot coverage.
Mr. Way inquired if ground installations would be handled different in sideyards that face a principal street.
Ms. Rauch responded that if it is on a public right-of-way, a corner lot is considered to have two front setbacks.

<u>Commercial Ground-Mounted Solar Panels (not accessory)</u>:
Ms. Call inquired if commercial solar farms would be permitted.
Ms. Noble stated that it would be a use question. If it is not a free-standing use, it would not be permitted.
Commission consensus was that the frontage would be addressed in the same manner as residential ground-mounted installations. The amount of screening on a large commercial lot would be greater than the amount required on a residential lot.

Residential Accessory Structures (sheds, detached garages, pergolas):
Commission consensus was that the location be limited to the rear of the lot with similar requirements as other solar panels.

Commercial Accessory Structures (covered parking structures):
Ms. Call stated that the Commission would want to see these included in the Preliminary and Final Development Plans and reviewed at that time.
Mr. Supelak stated that the perimeter screening of commercial lots would buffer the views. The solar panels could be integrated and comprise the roof plane.
Ms. Call noted that if they are not integrated and are mounted, an 18-inch height would be too great.
Commission consensus was to permit them.
Ms. Noble inquired about size, shape and concentration of panels.
Ms. Call stated that language similar to the Bexley Code, which requires that it "be complementary to the roof line," would address size, shape and concentration of panels, as well.
Mr. Schneier noted that regulating the number, size and concentration of panels could impact the output.

Ms. Harter inquired if tree removal could potentially occur with these installations.
Ms. Rauch stated that could occur, although would be discouraged. However, homeowners are permitted to remove trees on their single-family residential lot, regardless of solar panel installation; only a permit is required.

Mr. Way stated that the permitted heights has not yet been specified.
Ms. Call responded that staff is researching the height element further before making a recommendation.
Mr. Way stated that the sample Codes from other cities use a height of 6 to 8 feet, so there are models from which we could draw a height requirement.

Ms. Harter inquired if due to the prohibition of front-facing installations, one side of a neighborhood was permitted to have solar panels but the other side was not, that could change the value of some homes in that neighborhood. The City might want to track that factor.
Mr. Way noted that there could be value in the City offering a renewable energy program to which homeowners could contribute and receive some return. Perhaps a solar farm could be located in the West Innovation District.
Ms. Call stated that is an item that could be proposed to City Council for consideration.
Mr. Way inquired if any City buildings had solar panels.
Ms. Noble responded that, currently, there are none. This is a topic, however, that has also been discussed with Dublin City Schools.
Mr. Way stated that perhaps this is an opportunity that could be considered for all public buildings, along with a strategy for contribution.
Ms. Call stated that there are many related components, and potentially a Pandora's Box, with which she does not believe the City would want to become involved. However, the idea could be passed along to City Council for consideration.

Mr. Way noted that current social media is reflecting the public's opinion that the City is opposed to solar panels. This legislation is an opportunity for the City to change that messaging to its residents.

Ms. Call suggested that the City's public information office take steps to get in front of that messaging.
Ms. Rauch stated that there was discussion to that effect at the recent joint work session, including the suggestion to provide some information for the Fall Homeowners Association meeting.
Ms. Noble stated that the fact that the City is pursuing a Code amendment shows that the City is interested in permitting solar panels. In the interim, solar panels are being handled as accessory structures, which has the risk of being appealed.
Ms. Call stated that it will be important to control the messaging. Many residents perceive any proposed Code amendments to be for the purpose of restriction. That is the opposite of the City's intent, which is actually to free up the restrictions.

Public Comment

No public comments were received on the proposal for a Code amendment related to solar panels.

Staff will draft a Code amendment consistent with tonight's discussion for future review by the Commission.

~~**COMMUNICATIONS**~~

- ~~**PZC Meeting Dates Calendar - October 2022 through February 2023**~~

~~Commission consensus was to confirm the remaining calendar dates.~~
~~Ms. Rauch noted that the 2023 PZC Meeting calendar would be developed for Commission consideration after City Council had adopted its 2023 meeting calendar. The Commission calendar also will include the joint meeting, training and project tour dates.~~

- ~~**Upcoming Commission Education/Training Opportunities**~~

~~1) OKI Regional Planning Conference, conducted by the American Planning Association's Ohio, Kentucky, and Indiana chapters, will be held in Louisville, Kentucky, September 28-30.~~
~~2) Ohio Economic Development Association Annual Summit, "Aligning Housing and Economic Development," will be held October 3-6 at The Exchange. The Conference is sponsored by several local groups, including MORPC and the Ohio Department of Development.~~

~~Ms. Rauch stated that any Commission member interested in attending either of the conferences should contact staff quickly for registration purposes.~~

- ~~**Administrative Approvals**~~

~~Ms. Rauch inquired if the Commission believed there were any additional types of requests that would be appropriate for administrative review. The Commission directed staff to research previous Commission approvals and develop a list of items, which the Commission most often has directed the applicant to work with staff. The list should also include requests typically approved on a Consent Agenda. That list of potential additional Administrative Approval items will be provided to the Commission for consideration and direction.~~

- ~~The next regular meeting of PZC is scheduled for 6:30 p.m., Thursday, October 6, 2022.~~

RECORD OF ACTION

Planning & Zoning Commission

Thursday, April 21, 2022 | 6:30 pm

The Planning and Zoning Commission took the following action at this meeting:

3. Solar Panels
21-151ADMC **Administrative Request – Code Amendment**

Proposal:	A Code Amendment to provide regulations for solar panels in residential and commercial zoning districts within the City of Dublin.
Request:	Review and recommendation of approval to City Council for an Administrative Request for a Code Amendment under the provisions of Zoning Code §153.234.
Applicant:	Dana L. McDaniel, City Manager, City of Dublin
Planning Contacts:	Tammy Noble, Senior Planner
Contact Information:	614.410.4649, tnoble@dublin.oh.us
Case Information:	www.dublinohiousa.gov/pzc/21-151

MOTION: Mr. Schneier moved, Mr. Supelak seconded, tabling the proposed Code Amendment, pending further study.

VOTE: 6 – 0.

RESULT: The Administrative Request – Code Amendment was tabled.

RECORDED VOTES:

Lance Schneier	Yes
Rebecca Call	Yes
Mark Supelak	Yes
Kim Way	Yes
Warren Fishman	Yes
Jamey Chinnock	Absent
Kathy Harter	Yes

STAFF CERTIFICATION

DocuSigned by:
TAMMY NOBLE
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Tammy Noble, Senior Planner

Mr. Way stated that the signs are attractive and designed well with simple, clear messaging. He supportive of the additional signage.

Mr. Supelak, Mr. Fishman, Mr. Schneier and Ms. Call also expressed support.

Mr. Schneier moved, Mr. Supelak seconded approval of the Amended Final Development Plan with one (1) condition:

1) That the applicant obtain sign permit approvals through Building Standards, prior to installation.

Vote: Mr. Fishman, yes; Ms. Call, yes; Mr. Supelak, yes; Mr. Way, yes; Mr. Schneier, yes; Ms. Harter, yes.
[Motion approved 6-0.]

3. Solar Panels, 21-151ADMC, Administrative Request – Code Amendment

Ms. Call stated that this is a request for recommendation to City Council of a Code Amendment to provide regulations regarding solar panels for residential and commercial properties within the City of Dublin.

Staff Presentation

Ms. Noble stated that staff has been working on a proposed Code amendment related to sustainability practices within the City of Dublin for both commercial and residential properties. This proposed amendment relates specifically to solar panels. Due to the influx of requests for solar panels, there is a need for Code language to deal with those requests. In 2018, Council approved the Dublin Sustainability Framework Plan, and staff has been working on the Plan's recommendations. Currently, renewal energy solar panels are permitted in only three areas in Dublin, the West innovation District, the Bridge Street District and the Dublin Corporate Area Plan. This amendment would expand that ability to all commercial and residential districts within the City. There are tax incentives available, limited to this year, to residential property owners to install renewable energy equipment. The Commission reviewed an initial Code amendment proposal in October 2021, and based on that feedback, staff has revised the language. The proposed amendments establish a new section within the General Development Standards, permitting renewable energy equipment – solar (i.e. solar panels) in all zoning districts. Regulations are provided for ground-mounted and roof-mounted equipment. The proposed language indicates renewable energy equipment as an accessory use in all zoning districts and ground-mounted renewable energy equipment as a detached accessory structure. Consistent with the BSD, roof-mounted renewable energy is limited to eighteen inches above the roofline of a building and ground-mounted equipment is screened to the extent possible. The proposed Code language allows solar panels to the side and rear of a building with an administrative approval of a Certificate of Zoning Plan Approval. Staff requests Commission review and feedback, and when a final draft is achieved, a recommendation of approval to City Council.

Commission Discussion

Mr. Schneier stated that the Code contains a definition of renewable energy, however, that could include other forms of renewable energy. There may be a need for a separate definition for solar energy.

Mr. Supelak expressed agreement.
Ms. Call stated that there is a need to address the type, as well. Solar shingles are very different from solar panels. She agrees that a definition is needed. A simple description of ground-mounted is also insufficient. One of the most preferential locations would be on top of a pergola, an accessory structure, which is usually taller than 6 feet. Technically, that is ground-mounted, not roof-mounted, because it is not on the roof of the principal structure.

Mr. Way stated that the proposed amendment attempts to combine all districts, but there is a difference between residential and commercial. He is not opposed to ground-mounted equipment, if it located within a campus in some manner. He would prefer to see the commercial and residential districts separated.
Ms. Call stated that she believes there is consensus on the Commission for that suggestion. Many commercial buildings have flat roofs, but not many homes do.

Mr. Supelak stated that there might be merit in refining the proposed language. In this case, the approach is more economical than environmental. Fuel is a commodity, which continues to increase in price over time. Solar is a technology, which decreases in cost over time. Moore's Law which has proven to be accurate for 60-80 years, is a data-driven trajectory that can be used to project the future. There are also data-driven trajectories around solar energy, i.e. the price decreases by 20% and the amount generated increases x10. At some point, we will be able to get all our energy from the sun. Part of this was included in discussions regarding the 2035 Framework Plan. Solar energy is evolving so quickly that we have insufficient case studies to identify agreeable vs. disagreeable elements. Although we might identify a short-term solution for now, there is a long-term trajectory for which the Commission needs to plan.

Mr. Way expressed agreement. There is a need for a short-term solution, as residents currently are installing solar panels on their homes. The City needs to provide guidance for that.

Ms. Call stated that there is a concern with the traditional framed solar panels in residential neighborhoods. There are other alternatives less disagreeable. She is not comfortable deferring all those projects to staff until Code is adopted that will govern it.

Mr. Schneier recalled that there were past issues with satellite dishes during the time where no appropriate regulatory authority had been established. Is there model legislation on the renewable energy topic?
Ms. Call suggested that the Commission confirm the issues that they have already identified, then direct staff to conduct additional research, engaging industry leaders and experts.
Mr. Schneier suggested that staff contact the Governmental Affairs contact from the American Solar Panel Society and learn what they would recommend, which we may or may not accept.

Mr. Fishman suggested a special meeting be scheduled to provide an opportunity for producers of solar panels to present the technology and future of that technology. Education about solar panels is necessary in order to define our long-term process. Learning from the existing issues with old TV antennas remaining on homes, regulations should be included for this newer technology that will address the disposal of the older elements.

Ms. Harter stated that at the Statehouse, the Senate recently passed a bill that would prevent homeowner associations from banning solar energy elements. That bill will now progress to the House, so the legislation will move quickly.

Mr. Fishman stated that the City does not want to ban the technology, but have Code in place that provides protections and addresses the evolution of that technology. 20 years from now, we do not want to have old solar panels attached to roofs. The intent is not to restrict the technology, but intelligently evolve with the technology.

Ms. Call stated that this is an intelligent community interested in making good choices. We have the opportunity to elevate that thinking. For example, if the City Code were to recommend solar shingles, as opposed to solar panels, because they are more aesthetically pleasing, we could educate our community on how to embrace the technology in a way that is as aesthetically pleasing, as well as future thinking. Tonight's discussion has identified the need for definitions in the Code; to separate commercial and residential districts; separate the technologies, addressing the different types, technologies and placement. As future technologies emerge, the Code should require them to follow an approval process.

Mr. Way stated that staff's research should also include costs. Tesla shingles, for instance, cost much more that traditional solar panels, although the product and costs will evolve. We need to understand over the short term what will be attractive to our residents, and that cost will be an issue. Understanding the cost of each technology should be included in our considerations.

Ms. Call stated that costs can be part of our consideration, but we would not provide a preference for one solution based on costs. We can attempt to understand how the economies affect decision-making.
Mr. Way stated that there should be sufficient flexibility, so our residents can adopt affordable technology, or help them find a way to pay for it, such as subsidization.

Mr. Fishman stated that the Commission needs to recommend the appropriate product for the appropriate place, and also address the removal of obsolete structures.
Ms. Call recommended that staff reach out to technology leaders. There probably is an organization, which draws these technologies together. Staff could also contact the sponsor of the Senate legislation, as they have already conducted the research and might also be able to provide useful contacts.

Mr. Schneier inquired how to expedite the process, when the topic requires extensive study. We want to address the topic correctly. Hopefully, Dublin can create model legislation that other communities might want to emulate. Due to the current demand, however, there is also a need to not stall the topic.
Mr. Fishman reiterated the need for the Commission to have a meeting where knowledge experts explain the issues and options.
Mr. Schneier noted that the public might need to know that the Code development process could take some time to complete.
Ms. Call stated that it is important to place a priority on acquiring the needed information to make a good decision, but we want to expedite the gathering of that data. If residents have pertinent information, they are invited to share in the public comment portion of the Commission's meeting discussion.

Ms. Noble requested clarification of Mr. Fishman's comment regarding either the replacement of old technology with current technology or the removal of abandoned technology.
Mr. Fishman responded that he is suggesting that the Code require the removal of obsolete solar structures.
Ms. Call suggested issuing permits valid for a specific period of time, which either must be renewed to retain the structures or said structures must be removed. A permit process would provide the City an opportunity to offer any associated education regarding solar technology, as well.
Mr. Way stated that use of recyclable technologies would be preferable.

Mr. Fishman suggested that an educational presentation be scheduled as soon as possible for a future Commission meeting.
Mr. Supelak that there are products and applications that are more preferable. He would suggest the Commission be provided copies of images of the different products and applications for discussion purposes. The Code must address the current needs and obsolete structures, but it should also be cognizant of anticipated future technology. It should also include a non-prescriptive, "catch all" phrase concerning appearance standards.

Ms. Call stated that if staff should happen to identify a city that has addressed solar technology in a manner that appears to be consistent with the Commission's direction, discussion should be scheduled as soon as possible for an upcoming Commission meeting.

Mr. Fishman noted that it might be easier to address the commercial use, as solar structures could be hidden in the same manner in which other mechanicals are hidden.
Mr. Supelak stated that identifying the definitions, categories and infrastructure will be important.
Ms. Call stated that it will not be possible to future-proof the Code but addressing the general appearance and equipment that is no longer used would be beneficial.

Ms. Noble requested Commission input on the preferred review process. Would the Commission have any hesitations regarding an administrative review component?

Ms. Call responded that it would depend on the Code language. If it is vague, the Commission would prefer Commission approval; if the requirements can be clearly identified, an administrative review component could be considered.

Mr. Supelak stated that in the long term, an administrative review component might be possible.
Ms. Call noted that, ultimately, the preferred review process would be determined by City Council.

Ms. Noble stated that there could be a short-term solution and eventually, a long-term solution. The process can be revised.
Ms. Call stated that with new development, the solar energy component would likely be part of the Preliminary Development Plan review.
Mr. Way stated that the Commission would not be approving plans for individual parcels within neighborhoods.
Ms. Call stated that staff is inquiring if once the Code is established, the Commission would be agreeable to staff administering that Code. Her view is that it would depend on how well that Code is structured.

Mr. Schneier moved, Mr. Supelak seconded tabling the proposed Code Amendment, pending further study.
Vote: Mr. Schneier, yes; Mr. Fishman, yes; Ms. Call, yes; Mr. Supelak, yes; Ms. Harter, yes; Mr. Way, yes.
[Motion carried 6-0.]

RECORD OF DISCUSSION

Planning & Zoning Commission

Thursday, October 14, 2021 | 6:30 pm

The Planning and Zoning Commission took the following action at this meeting:

6. Solar Panel Code Amendment
21-152ADMC **Administrative Request**

Proposal:	Introduction of a Code Amendment to establish general regulations in regards to solar panels for residential and commercial properties.
Applicant:	Dana L. McDaniel, City Manager, City of Dublin
Planning Contact:	Nichole M. Martin, AICP, Senior Planner
Contact Information:	614.410.4635, nmartin@dublin.oh.us
Case Information:	www.dublinohiousa.gov/pzc/21-152

RESULT: The Commission considered an Amendment to the Zoning Code to accommodate solar energy within commercial and residential districts in the City. Presently, the Code addresses these requests in a very limited manner, and greater guidance for the public, Staff, and Boards and Commissions is sought. The Commission agreed that the City should support and incentivize solar energy, when also meeting aesthetic goals, as well.

MEMBERS PRESENT:

Jane Fox	Yes
Warren Fishman	Yes
Mark Supelak	Absent
Rebecca Call	Yes
Leo Grimes	Absent
Lance Schneier	Yes
Kim Way	Yes

STAFF CERTIFICATION

DocuSigned by:
Nichole M. Martin
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Nichole M. Martin, AICP, Senior Planner

Ms. Fox stated that the ARB Code provides criteria for demolition. It does not provide a penalty for Code violation. What makes it difficult for Historic District property owners is that the pertinent Code sections are in different places. There are Historic Design Guidelines in addition to that Code. It is difficult for them to know and find what is applicable to them. It is important that the City begin to educate the owners of any historic properties. They should be provided educational pamphlets and a handbook with the Code and Guidelines. Otherwise, the property owners may make mistakes and be subject to penalty. She would prefer to focus on demolition of all historic properties within the City. The Appendix G listing is smaller than the total number of historic structures.

Public Comments

Ms. Martin stated that one public comment in support of the proposed amendment was received in advance of this meeting, which was included in the Commissioners' packets. No additional public comments were received.

Staff will revise the proposed Code amendment reflective of the Commission's guidance.

5. Solar Panel Code Amendment, Administrative Request, 21-152ADMC

Introduction of a Code Amendment to establish general regulations in regard to solar panels for residential and commercial properties.

Staff Presentation

Ms. Martin stated that requests for solar energy components have been increasing, both with commercial and residential applications. Existing City Code addresses renewable energy equipment and solar energy in a very limited manner. In reviewing the Code, it was found that solar panels are explicitly regulated only in the West Innovation District (WID) and Bridge Street District (BSD). The City of Dublin Zoning Code permits solar panels in the WID and BSD. In the WID, Renewable Energy is permitted as an accessory use in all districts with use-specific standards. In the BSD, Renewable Energy Equipment is permitted as an accessory use in all districts with use-specific standards. The Accessory Structures section of the Code identifies solar panels, but they are defined as an accessory structure and have no use-specific standards. To inform the discussion, Planning staff contacted municipalities in Ohio and Indiana regarding each city's current regulation of REE (solar panels, geothermal units, and wind turbines). Most of the cities contacted have specific sections within their code that provides details on if, and where, REE may be installed. The communities contacted include Blue Ash, Mason, Grove City, Westerville, Worthington, Upper Arlington, and Montgomery, Ohio, and Carmel, Indiana. Approximately 50% of the jurisdictions allowed a variety of alternative energy solutions, including solar, wind and geothermal. The discussion tonight will focus solely on solar. All of the benchmark research was provided in the meeting packet.

[Representative images shown.] Ms. Martin stated there are a variety of options available for commercial buildings. On a flat roof, the solar panels can be treated as a mechanical structure and be fully screened behind a parapet. On a commercial building with a pitched roof, the solar panels cannot be screened as a mechanical, so judgments must be made according to location on a street-facing façade, sustainability, and the community's character. Additionally, there are architecturally integrated panels available for commercial applications. These could be appropriate in the BSD and the West Innovation District. In regard to commercial sites, there are a variety of site and implementation considerations and options. Two examples are solar farms and solar vehicular

canopies. In regard to residential properties, almost every home in the City has a pitched roof, consistent with the City's Residential Standards. With pitched roofs, solar panels cannot be screened and must be exposed to the sun. There are different installation options; there is also the option of Tesla roof solar tiles. Additionally, there is the option of detached, accessory structures and residential site installations. Staff has provided a number of questions to guide the Commission's discussion:

1) Does the Commission support solar in all, or some, locations (residential, commercial, City-owned property, etc.) within the City of Dublin?
2) Should regulations vary based on land use: specifically, should roof and ground-mounted equipment be permitted in all districts?
3) Should Use Specific Standards regulate the location of solar panels, despite the importance of direct sun? (i.e. solar panels are currently discouraged on the fronts of homes).
4) Should there be guidance for solar panel installation, regardless of location, in order to meet Dublin's aesthetic goals?

Commission Questions/Discussion

Mr. Schneier stated that the images do not reflect anything desired, because the examples are aesthetically lacking. However, we do not want to prohibit these uses when the City is interested in pursuing sustainability objectives and goals. He is supportive of advancing solar energy uses, but guidance for installation or design guidelines are needed.

Mr. Fishman stated that solar panels are becoming increasingly popular. Having them on commercial buildings with flat roofs is not an issue, because they are not visible. The Tesla shingles are the most attractive of the options. There is a need to embrace technology, but it must be done aesthetically. Technology continues to improve, and in time, solar panels likely will not be discernable from the roof shingles.

Ms. Fox stated that she is supportive of solar panels in all locations. She believes that solar energy will become a right, the same as the usual utilities. She does not believe they should be based on land use. Many municipalities are doing this, and we need to do the necessary research. The proposed Code should permit solar energy in a way compatible with the community's aesthetics. She believes the City should allow this new path, with the caveat that the concerns will need to be managed.

Mr. Way stated that the 2035 vision for Dublin should declare Dublin a solar city. This technology is here, but it is changing rapidly. There are now windows that are solar panels. There probably are many solar energy options. The examples shown are old technology; the Commission can encourage pursuing the latest technology for solar energy. We probably do not want free-standing solar panels, but he is supportive of the opportunity for solar.

Ms. Call stated that she is supportive of the opportunity; however, guidance should be provided, and the location should be regulated in a manner so as to meet Dublin's high aesthetics standards.
Mr. Way stated that he does not believe solar panels should be accessory structures. They should be integral to the structure.
Ms. Call stated that she sees two types. The integrated option would be part of the structure. If there is a separation of 18 inches, it is an accessory structure, similar to an air conditioning unit.
Mr. Way stated that it would need to be defined.

Mr. Fishman stated that in Dublin, it is necessary to have a permit for installation of many items. There is no reason a permit should not be required to attach a solar panel.

Ms. Call stated that Tesla roof shingles have been in existence ten years, but they are not perfected nor are they prevalent. There are other similar competitors. Most of the applications the City would receive today would be for the older technology. The standards would have to be applied to those, but the integrated option could be treated differently. If it looks like shingles, it can be treated as shingles; if it looks like a mounted solar panel, it would be treated as such.
Mr. Fishman noted that at this point in time, there might be a need to hide the panels. With future technology, that may not be necessary.

Mr. Way inquired if incentives should be granted for developing solar panel projects.
Ms. Call noted that would not be a Planning and Zoning item.
Ms. Martin stated that Mr. Way may be referring to a density bonus. All of the items being considered by the Commission would require Code changes, which means the Commission would send a recommendation to Council for decision. Several drafts would be prepared for the Commission's consideration before they would make a Code recommendation to Council.
Mr. Kim stated that solar options should be part of the review of development applications, and he would encourage this direction.
Ms. Fox noted that the Commission can make recommendations for any type of changes regarding land use.
Ms. Call stated that there is consensus on the Commission that solar energy in the City is something that the Commission believes should be incentivized. Could the communications shared with Council also include the Commission's encouragement to consider the opportunity to incentive the solar energy with development? If Council is receptive, a recommendation could be drafted and forwarded to Council for approval.
Ms. Martin indicated that it would be shared with Council. She inquired if the Commission would be supportive of requiring solar features on a large-format commercial building. For instance, if a building footprint and roof were over 20,000 square feet, would the City require that 50% of the roof space have alternative energy integrated into it?
Ms. Call stated that she would be more supportive of incentivizing than requiring. She also would encourage that the Code be sufficiently strict and rely less on interpretation. Currently, the Code requires the minimum requirements, so that is what we get.

Public Comment

No public comments were received on the case.

Staff will revise the proposed Code amendment reflective of the Commission's input.

~~COMMUNICATIONS~~

- ~~Ms. Call indicated that she has images of well-done large-scale retail, office and big development in Eldorado Hills, California that she would like to share with staff and the Commission.~~
  ~~Ms. Martin responded that there is an Urban Design subfolder in the Commission's One Drive folder for inspirational images. Commissioners are encouraged to upload any mages they would like to share into that folder.~~

RENEWABLE ENERGY DISCUSSION – SUMMARY MEETING HISTORY

October 2021

Planning provided an introduction to the Planning and Zoning Commission on this topic specifically requesting feedback regarding regulating solar panels within the City of Dublin. At the time, Planning provided an overview of the existing regulations and provided discussion topics for the Commission's consideration. The Commission supported solar panels in all districts and acknowledged that the City should be supportive of sustainability efforts. The Commission discussed technological advancements of the solar industry and that the City has to be flexible as these advancements continue to occur. The Commission recommended regulating the location of solar panels in instances that they are not visible from the public rights-of-way to the extent possible.

May 2022

In response to the discussion, Planning drafted language that accommodates renewable energy equipment, such as solar, in all residential and commercial zoning districts. The proposed amendments recommended establishing a new section within the General Development Standards that permits renewable energy equipment (i.e. solar panels) in all zoning districts. Roof-mounted renewable energy would be limited to eighteen inches above the roofline of a building and ground-mounted equipment would need to be screened to the extent possible. To facilitate a user-friendly review process, the proposed Code language allowed solar panels to the side and rear of a building with an administrative approval of a Certificate of Zoning Plan Approval. An additional review process was proposed for property owners requesting equipment on the front of the building. The proposed language was reviewed by the Planning and Zoning Commission and they requested additional information be provided prior to making a formal recommendation. The discussion centered on the types of solar technology available, aesthetic components, and where and how solar would be installed, particularly when roof-mounted.

August 2022

City Council, Planning and Zoning Commission, Board of Zoning Appeals and the Architectural Review Board held a joint worksession and the topic of solar panels were raised in the group's discussion. The group discussed the installation of roof-mounted solar panels and how a Code amendment should address the permitted location. Concerns were raised about the aesthetics of solar panels, and the installation of the roof-mounted solar panels on the front elevations of single family homes. Additionally, there was discussion around HOA regulation of solar panels in residential areas and a recently approved state legislative action. It should be noted that the City enforces its own zoning and development ordinances, while homeowners' associations or residents enforce association rules and declarations.

September 2022
Planning plans to engage with the Community Services Advisory Committee on September 13, 2022 as the Committee reviews the Sustainability Framework in order to gain additional insight on renewable energy, particularly solar panels. The outcome of this meeting will be shared with the Commission.

September 2022
The Board of Zoning Appeals heard three applications for residential permits for solar energy to the front of a primary structure. The variance applications were required based on not meeting the current regulations under the Accessory Structure section of the Code which requires roof-mounted solar panels to be located to the side or rear of a primary structure. All applications were tabled for further discussion by the Planning and Zoning Commission.

October 2022
Planning staff presented detailed information about the current regulations regarding renewable energy equipment for solar, as well as the pending Code amendment and recent state of Ohio regulations. Staff shared the results of the informal survey conducted to gain input from the HOA representatives.

October 2022
Planning and Zoning Commission reviewed and made a recommendation of approval to City Council on the proposed Code amendment to add language regarding renewable energy equipment for solar. The Commission requested minor clarifications be made to the proposed amendment to be incorporated prior to the amendment proceeding to City Council for determination.

PERMITS ISSUED FOR SOLAR PANELS

Total Issued- 74 Permits (61% Issued in 2021 and 2022)

4 – Non-Residential

70- Residential

2022 (22 Permits)

Permit Number	Date of Permit	Address	Single-Family or Commercial	Location on Structure
RALT-22-01761	9/13/2022	7200 Dominick	SF	Rear
RALT-22-01550	8/9/2022	7312 Claddaugh Ln	SF	Side/Rear
REPR-22-00023	7/29/2022	6240 Post Rd	SF	Front (Current Variance)
RALT-22-01283	6/30/2022	5995 Blunden Dr	SF	Rear
RALT-22-00588	3/31/2022	6365 Albanese Cir	SF	Rear
RALT-22-00706	4/21/2022	7338 Winnipeg Drive	SF	Rear
REPR-22-00026	9/12/2022	6737 Oliver	SF	Rear
REPR-22-00021	7/22/2022	8247 Amberleigh	SF	Rear
REPR-22-00012	4/20/2022	7530 Mill Springs Dr	SF	Rear
REPR-22-00009	4/11/2022	6769 Oliver	SF	Rear
REPR-22-00007	3/25/2022	6548 Westbury Dr	SF	Rear
RALT-22-00550	3/24/2022	6769 Oliver Way	SF	Rear
RALT-22-00022	1/5/2022	5565 Wilcox Road	SF	Side/Rear
REPR-22-0037	10/21/2022	6442 Red Stone Loop	SF	Side
REPR-22-00030	9/24/2022	6974 Parnell Ct	SF	Side
22-131V	9/1/2022	6056 Brigids Close	SF	Front (Current Variance)
REPR-22-00024	8/9/2022	4653 Chatham Ct	SF	Rear
REPR-22-00180	1/13/2022	7660 Quetzal	SF	Rear
RACC-22-00178	1/27/2022	6401 Wynwright	SF	Side
REPR-22-00025	8/30/2022	6866 Gullway Bay Dr	SF	Side
REPR-22-00015	5/13/2022	5379 Aryshire	SF	Rear
RADD-22-00559	3/26/2022	5558 Kinvarra Ln	SF	Rear

PERMITS ISSUED FOR SOLAR PANELS

2021 (23 Permits)

Permit Number	Date of Permit	Address	SF or Commercial	Location on Structure
RALT-21-02212	10/29/2021	7856 Windwood Dr	SF	Rear
RALT-21-01979	10/11/2021	6873 Bryne Ct	SF	Side
RALT-21-01269	6/18/2021	6851 Bowles Ct	SF	Rear
RALT-21-02078	10/12/2021	7453 Christie Chapel Rd	SF	Side
RALT-21-01211	6/11/2021	5705 Tara Hill Dr	SF	Rear
RALT-21-02278	11/8/2021	6548 Westbury Dr	SF	Rear
RALT-21-01997	9/29/2021	6282 Kendall Ridge Blvd	SF	Side/Rear
RALT-21-01954	9/22/2021	8283 Riverside Dr	SF	Rear
RADD-21-01426	7/9/2021	5241 Locust Hill Ln	SF	Rear
RADD-21-02401	11/24/2021	5860 Sandy Rings Lane	SF	Side/Rear
RADD-21-01230	6/15/2021	8567 Gatto Lane	SF	Side
RACC-21-01228	6/15/2021	3259 Martin Lane	SF	Rear
RALT-21-02484	12/9/2021	7098 Old Prose Ct	SF	Side
CALT-21-01463	7/12/2021	4019 W Dublin Granville	Commercial	All
RALT-21-02582	12/29/2021	6647 Westbury Dr	SF	Front (Withdrawn by Applicant)
RALT-21-01980	9/27/2021	4947 Kilmurry Ct	SF	Front (Not Issued-Modifications Expected)
RALT-21-01613	8/3/2021	4118 Borge	SF	Rear
RALT-21-01275	6/21/2021	7622 Kestrel	SF	Rear
RALT-21-00864	5/3/2021	7680 Brandbury	SF	Rear
RALT-21-00628	4/2/2021	7791 Brandonway Dr	SF	Rear
CALT-21-00776	4/21/2021	6271 Perimeter Dr	Commercial	Side/Rear
RADD-21-02572	12/27/2021	5667 Kentfield	SF	Rear
RADD-21-02438	12/1/2021	4157 Macduff	SF	Rear

PERMITS ISSUED FOR SOLAR PANELS

2020 (13 Permits)

Permit Number	Date of Permit	Address	SF or Commercial	Location on Structure
RALT-20-02269	11/6/2020	5674 Hathaway Ct	SF	Rear
RALT-20-01261	6/24/2020	5676 Tara Hill Dr	SF	Front (Corner Lot)
RALT-20-01235	6/16/2020	139 Waterford Dr	SF	Rear
RACC-20-02306	11/13/2020	6623 Greenwsay	SF	Front (Corner Lot)
RALT-20-02136	10/19/2020	4498 Dunleary Dr	SF	Rear
RALT-20-01614	8/5/2020	4401 Wyandot Woods Blvd	School	Rear
RALT-20-01422	7/7/2020	6773 Monticello	SF	Rear
RALT-20-00700	4/3/2020	6152 Jacana Dr	SF	Front (Corner Lot)
RALT-20-00479	3/4/2020	5874 Winslow Ct	SF	N/A (Withdrawn)
RADD-20-01484	7/20/2020	7121 Missy Park Ct	SF	Rear
RADD-20-00232	2/1/2020	4143 Macduff	SF	Rear
RALT-20-00493	3/5/2020	6089 Dublinshire Dr	SF	Rear
RACC-20-00751	4/14/2020	6968 Grandee Cliffs Dr	SF	Front (Corner Lot)

2019 (5 Permits)

Permit Number	Date of Permit	Address	SF or Commercial	Location on Structure
19-20666	5/8/2019	5585 Wilcox Rd	SF	Front
19-21111	7/8/2019	5560 Newtonmore Pl	SF	Side/Rear
19-21615	10/7/2019	5784 Bonaly Ct	SF	Rear
19-20895	6/10/2019	5517 Ashford Rd	SF	Rear
19-20015	1/17/2019	7240 Sundown Ct	SF	Side/Rear

2018 (2 Permits)

Permit Number	Date of Permit	Address	SF or Commercial	Location on Structure
18-20335	3/23/2018	3289 Martin Road	SF	Rear
18-20205	2/16/2018	6449 Red Stone Loop	SF	Side/Rear

PERMITS ISSUED FOR SOLAR PANELS

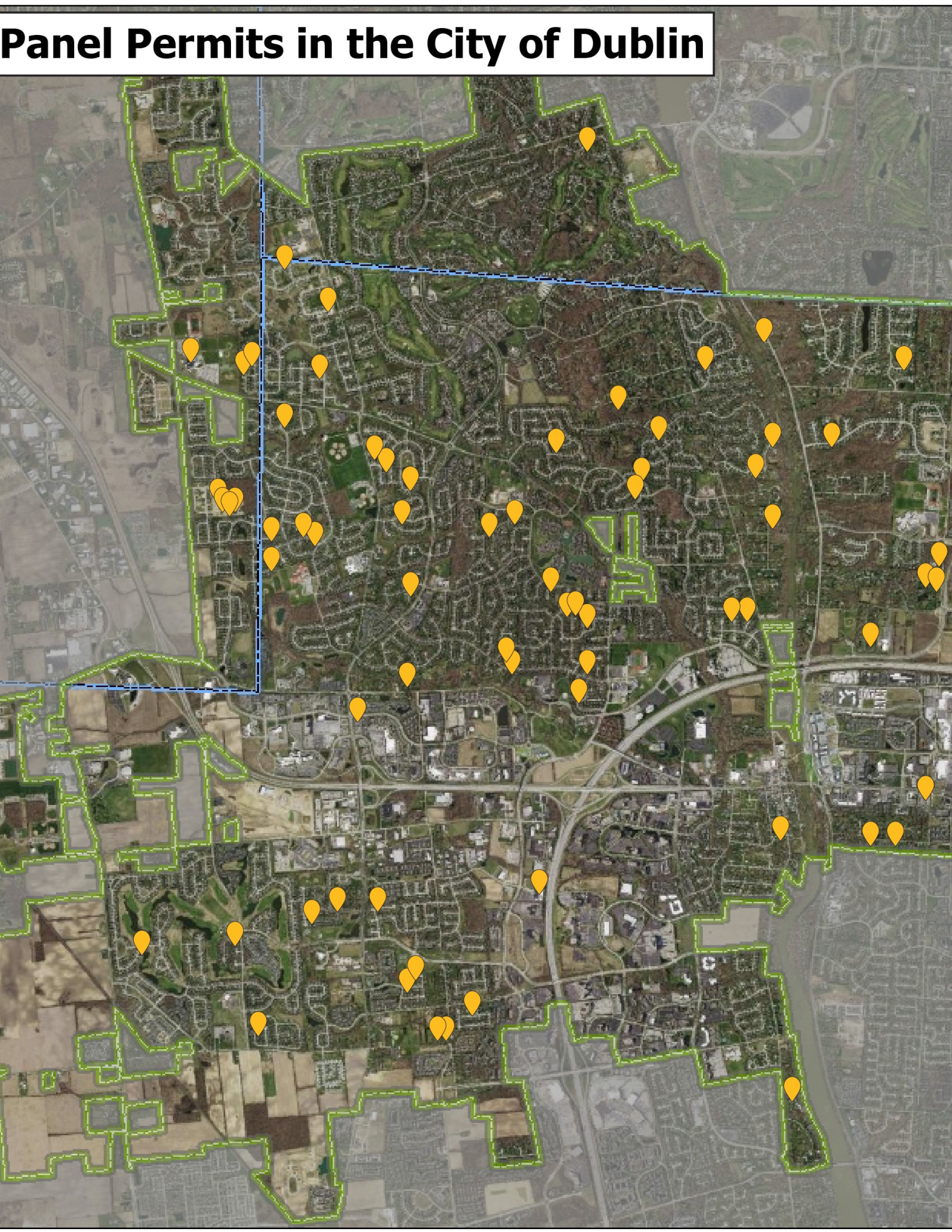
2012-2017 (9 Permits)

Permit Number	Date of Permit	Address	SF or Commercial	Location on Structure
16-23829	5/18/2016	7112 Missy Park Ct	SF	Side
15-22029	8/19/2015	7560 Bellaire Ave	SF	Side/Rear
15-22536	10/23/2015	6417 Wynwright Dr	SF	Rear
11-00200425	3/14/2012	8300 Hyland Croy Rd	School	Rear
12-00201339	10/3/2012	3289 Martin Road	SF	Rear
11-00200166	3/16/2011	6100 Emerald Pkwy	Commercial	Flat Roof
10-00200561	7/21/2010	6100 Emerald Pkwy	Commercial	Flat Roof
17-27251	10/19/2017	7530 Bardston Dr	SF	Side
15-22534	10/19/2015	7511 Heatherwood Ln	SF	Front

No Permits Issued

7416 Wynwright Ct
6856 McDewitt Ct
4860 Calloway Ct
Pebble Creek Drive

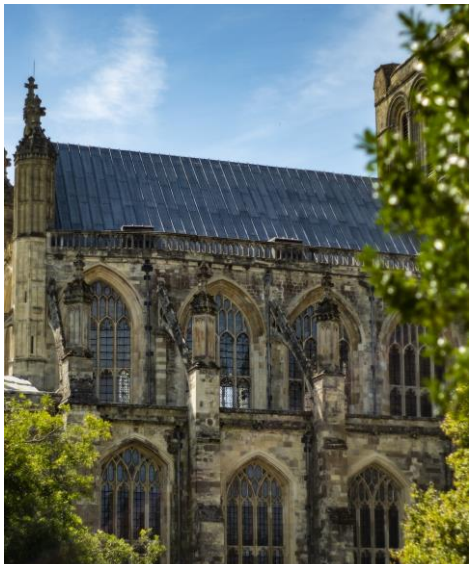
Panel Permits in the City of Dublin



PUD	Roofing Material
Avondale Woods (2016)	Permitted roofing materials include 30 year or better dimensional asphalt composite shingles, wood shingles and shakes, metal tiles or standing seam, slate and ceramic tile. "Engineered" wood or slate, as well as other high quality roofing materials, may be approved
Celtic Crossing (2013)	Dimensional asphalt shingles, wood, slate, concrete, tile, or metal
Coffman Reserve (2013)	Dimensional asphalt shingles, wood, slate, concrete, tile, or metal
Deer Run (2011)	All homes shall have dimensional asphalt shingles, wood, slate, tile, metal, or copper.
Glade at Ballantrae (2005)	Dimensional shingles required
Hamlet on Jerome	Permitted Roofing Materials: dimensional asphalt shingles, wood, slate (including manufactured slate products), concrete, tile metal roof, such as copper or standing seam, and flat rubber membrane may be permitted.
Hyland Glen (2021)	25 year or better dimensional asphalt shingles (minimum 240 lbs/square weight) and metal standing seam.
Kendall Ridge (2007)	Self-sealing fiberglass roof shingles with a25-year warranty
Links at Ballantrae (2013)	Dimensional shingles required
Oak Park (2006)	All homes shall have dimensional asphalt shingles, wood, slate, copper standing seam metal, and/or tile.
Overlook at Tartan (2020)	All homes shall utilize an architectural grade dimensional asphalt shingle, wood shake or wood shingle, or natural or synthetic slate. Metal standing seam materials shall be permitted on porches, hyphens, and dependencies.
Quarry Place (1987)	Gabled roofs with cedar shake shingles or other compatible material
Tartan Ridge (2007)	All homes shall utilize an architectural grade dimensional asphalt shingle, wood shake or

	wood shingle, or natural or synthetic slate. Metal standing seam materials shall be permitted on porches, hyphens, and dependencies.
Tartan West (2003)	Colonial Revival: Shingle, Slate, Metal at low slope English Manor: Shingle, Slate French: Shingle, Slate, Metal at wings / dormers Italian Revival: Tile, Shingles, Metal Neoclassical: Shingle, Slate, Metal at low slope Shingle: Shingle, Shake Tuscan: Tile, Mission, or Spanish
Village at Coffman Park (2004)	Dimensional asphalt roof shingles
Wellington Reserve (2012)	Dimensional asphalt shingles, wood, slate, concrete, tile or metal
Windmiller (1990)	Roofs should be of a better quality asphalt shingles standing seam roofing, wood shake shingles, or masonry or tile product shingles with no vaulted traditional roof tiles allowed. Roof mounted mechanical equipment should not be visible from within Property boundaries and less than 200' from rear property line.

INTEGRATED DESIGN



INTEGRATED DESIGN

SOLAR PANEL RESEARCH										
	Blue Ash, OH	**Mason, OH**	**Westerville, OH**	**Worthington, OH**	**Hilliard, OH**	**Grove City, OH**	**Upper Arlington, OH**	**Montgomery, OH**	**Columbus, OH**	**Carmel, IN**
Is "Renewable Energy Equipment" permitted as a primary or accessory use anywhere in your community?	Not speficically called out as such. One instance where a solar array was installed separate from a building & it was treated as an accessory structure for setback purposes. In every other case, it was considered as part of the principle use & not an accessory structure requiring any additonal regulation.	Accessory structure	Both	Anywhere	It is fully permitted in every zoning district except for industrial districts where they are conditional uses.	Yes	Yes, accessory/conditional	Yes	Yes	Accessory Use
If YES, what types (wind, solar, geothermal)?	All types permitted	Solar panels only	All types permitted	All types permitted	Code only addresses solar panels	Solar panels only	All types permitted	All types permitted	All types permitted	Solar panels only
Specifically, where is solar permitted (commercial, residential, or both)?	Permitted in all districts	Permitted in all districts	Permitted in all districts; (specific exclusions for pitched roofs in non-residential Planned Districts (sub-section a, (2))	Permitted in all districts	Permitted in all districts, except industrial districts which requires a conditional use	Permitted in all districts	Permitted in all districts	Permitted in all districts	Permitted in all districts	Permitted in all districts
What has your experience been with solar panels as a community?	Very positive, no compliants			Influx of requests & permits, no real experience yet		We have had a mixed experience with solar panels and are continuing to have discussions on where to permit them. There was a project within our Historical Preservation Area (HPA) which required City Council approval due to it being considered a substantial update to a building. Typically, we have permitted them if they utilize the same color as the roof and meet Building Code standards.	Very positive	Very positive		Becoming more frequent of a request for residential than it was in the past. So far this year we have had 11 residential solar permits. We have seen it on some commercial but not as frequent. 2 solar permits this year for commercial.
Is there a review and approval process?	Building and electric permit review.	Building and electric permit review.	Building and electric permit review, unless a conditional use is required.	For ARD, yes. Outside of ARD, building and electric permit review.	Building and electric permit review.	Yes, applicants apply for a Certificate of Appropriateness (only needed for commercial properties and properties within the HPA) and permits through the Building Division including a Building Permit and Electrical Permit. If the Certificate of Appropriateness is denied, then applicants can appeal to City Council through a COA Appeal, which the Development Department reviews.	Building and electric permit review.	Standard zoning and building permit review process. We incentivized solar installations for several years by waiving permitting fees for new installs up to a cap of $1000.	Building and electric permit review.	Building and electric permit review. Must also receive HOA approval.

City of Bexley - 1266.14 SOLAR PANELS.

A solar photovoltaic panel, or solar hot air or water panel collector device, which relies upon solar ra generation of electricity or transfer of stored heat, shall comply with the following restrictions:

(a) Location.

(1) Ground mounted solar panels exceeding two (2) square feet in area shall be located in a sid setback of ten (10) feet from property lines.

(2) Roof and flush-mounted solar panels shall be allowed, subject to architectural review.

Architectural review will consider the following:

A. Rear and side locations are preferred. Any installations on the front roof facade shall be jus front facade is necessary in order to generate viable output.

B. The color of the solar panels shall be complementary to roof color as determined by the Arc

C. The configuration and profile of the assembly shall be complementary to the roof line as de Board. Installations should minimize the number of corners, and should avoid complex and/or nonsyr

D. Wiring and supporting infrastructure should be designed in such a way as to minimize visib

E. Installations should be sensitive to the property, surrounding properties, and neighborhood

(b) Height.

(1) Ground mounted solar panels shall not exceed six (6) feet in height.

(2) Roof and flush-mounted solar panels shall not project vertically above the peak of the roof to more than four (4) feet above a flat roof installation.

(c) Aesthetic Consideration. Ground mounted solar panels shall be fully screened at grade from a structures (detached garages, neighboring accessory structures, etc) or a combination of evergreen a installations shall be appropriately screened, as determined by the Architectural Review Board and a

(d) Glare. No glare, lights, or reflection shall be permitted which are a nuisance to other property o the vision of a driver or any motor vehicle or which are detrimental to public health, safety, and welfar

(e) Exemptions.

(1) Solar panels less than two (2) square feet in area and those installed within the right-of-way regulations set forth above.

(2) Solar panels that are not facing an adjacent street right-of-way are exempt from review by th subject to review and approval by the Zoning Officer, applying the standards set forth in this section.

(Ord. 16-17. Passed 10-17-17; Ord. 08-20. Passed 7-14-20.)

City of Hilliard

Solar *Panels.* It is the purpose of this regulation to promote the safe, effective and efficient use of solar energy systems to reduce the on-site consumption of utility-supplied energy and/or hot water, while protecting the health, safety and welfare of adjacent and surrounding land uses through appropriate zoning and land use controls.

(1) The installation and construction of a solar energy system shall be subject to the following development and design standards:

A. A solar energy system is permitted in all zoning districts as accessory to a principal use.

B. A solar energy system shall provide power for the principal use and/or accessory use of the property on which the solar energy system is located and shall not be used for the generation of power for the sale of energy to others; provided, excess power generated from time to time may be sold to an electric utility company.

C. The owner of a solar energy system connected to the utility grid shall provide written authorization from the local utility company to the City of Hilliard acknowledging and approving such connection.

D. A solar energy system may be roof-mounted or ground-mounted, subject to all applicable requirements for that location, as follows:

1. A roof-mounted system may be mounted on a principal building or accessory building.
2. On a flat roof, a roof-mounted system may exceed the maximum principal building height or accessory building height specified in the zoning district by up to 6-feet above the deck of the roof to which it is attached. In no instance shall any part of the solar energy system extend beyond the edge of the roof. Whether mounted on the principal building or accessory building, a roof-mounted system may not exceed the maximum principal building height or accessory building height specified in the zoning district. In no instance shall any part of the solar energy system extend beyond the edge of the roof.
3. A ground-mounted system shall not exceed the maximum building height for accessory buildings.
4. The area covered by ground-mounted solar energy systems, where the ground beneath is permeable or pervious, shall not be included in calculations for lot coverage or impervious cover.
5. A ground-mounted system shall not be located within the front yard.
6. The minimum setback distance for a ground-mounted system from the property lines shall be equivalent to the required setback for the principal building.

E. All mechanical equipment associated with and necessary for the operation of the solar energy system shall comply with the following:

1. Mechanical equipment associated with the solar energy system except for the photovoltaic (PV) panels shall be screened from any adjacent property that is residentially zoned or used for residential purposes. The screen shall consist of shrubbery, trees, or other non-invasive plant species which provides a visual screen. In lieu of a planting screen, a decorative fence meeting the requirements of this code and providing effective screening may be used.
2. Mechanical equipment shall not be located within the front yard.
3. Mechanical equipment shall comply with the setbacks specified for accessory structures in the zoning district, but not less than 10 feet from all side and rear lot lines.

F. Solar panels shall be placed such that concentrated solar radiation or glare shall not be directed onto nearby properties or roadways.

G. Solar panels shall not be placed in the vicinity of any airport in a manner that

would interfere with airport flight patterns.

H. All power transmission lines from a ground mounted solar energy system to any building or other structure shall be located underground.

I. A solar energy system shall not be used to display advertising, including signage, streamers, pennants, spinners, reflectors, ribbons, tinsel, balloons, flags, banners or similar materials.

J. The design of the solar energy system shall conform to applicable industry standards. All necessary permits shall be obtained for a solar energy system prior to installation. The local utility provider shall be contacted to determine grid interconnection and net metering policies. The applicant shall submit certificates of design compliance obtained by the equipment manufacturer from a certifying organization and any such design shall be certified by an engineer registered in the State of Ohio.

K. The solar energy system shall comply with all applicable codes to ensure the structural integrity of the solar energy system.

L. Before any construction shall commence on any solar energy system, the property owner must acknowledge, in writing, that he/she is the responsible party for owning and maintaining the solar energy system.

M. Emergency Access. Roof-mounted solar energy systems shall be located in such a manner as to ensure emergency access to the roof, provide pathways to specific areas of the roof, provide for smoke ventilation opportunities, and provide emergency egress from the roof.

1. For buildings with pitched roofs, solar collectors shall be located in a manner that provides a minimum of one three-foot wide clear access pathway from the eave to the ridge on each roof slope where solar energy systems are located as well as one three-foot smoke ventilation buffer along the ridge.
2. Rooftops that are flat shall have a minimum three-foot wide clear perimeter between a solar energy system and the roofline, as well as a three-foot wide clear perimeter around roof-mounted equipment such as HVAC units.

N. Installation on Building Listed in the National Register of Historic places.

1. A low-profile solar energy system should be installed on a historic building so the device is not visible or is minimally visible from the primary public right-of-way; for example, installation should be on a flat roof and set back to take advantage of a parapet or other roof feature to screen solar panels from view, or on a secondary slope of a roof out of view from the primary public right-of-way.
2. A solar energy system on a historic building should be installed in a manner that does not damage historic roofing material, does not negatively impact the building's historic character, and is reversible.
3. Solar energy systems should be installed horizontally - flat or parallel to the roof slope—to reduce visibility.

(2) If a ground mounted solar energy system is removed, any earth disturbance as a result of the removal shall be graded and reseeded.

(3) If a ground mounted solar energy system has been abandoned (meaning not having been in operation for a period of six months) or is defective or is deemed to be unsafe by the city building official, the solar energy system shall be required to be repaired by the owner to meet federal, state and local safety standards, or be removed by the property owner within the time period allowed by the building official. If the owner fails to remove or repair the defective or abandoned solar energy system, the City of Hilliard may pursue a legal action to have the system removed at the owner's expense.

City of Upper Arlington

Solar panels: A solar photovoltaic panel, or solar hot air or water panel collector device, which relies upon solar radiation as an energy source for the generation of electricity or transfer of stored heat, shall comply with the following restrictions:

(a) Location:

1. Ground mounted solar panels exceeding two (2) square feet in area shall be located in a side or rear yard only, shall maintain a setback of ten (10) feet from property lines, and shall not be located in a platted easement. However, utility companies may install solar panels within an easement, subject to aesthetic considerations and Subsection 6.10(C)(11).
2. Roof and flush-mounted solar panels may be located on any principal residence, detached garage or accessory structure.

(b) Height:

1. Ground mounted solar panels shall not exceed eight (8) feet in height.
2. Roof and flush-mounted solar panels shall not project vertically above the peak of the roof to which it is attached, or project vertically more than five (5) feet above a flat roof installation.

(c) Aesthetic consideration: Ground mounted solar panels shall be fully screened from adjacent properties by fencing or structures (detached garages, neighboring accessory structures, etc) or a combination of evergreen and deciduous plantings.

(d) Exemptions: Solar panels less than two (2) square feet in area and those installed within the right-of-way by a utility company pursuant to Subsection 6.10(C)(11) or by the City are not subject to the regulations set forth above.

City of Westerville - 1176.06 SOLAR ENERGY SYSTEMS.

(a) Permitted Solar Energy Systems.

(1) Roof mounted solar energy systems on flat roofs not visible from any street are permitted in with the performance and design standards.

(2) Roof mounted solar energy systems on pitched roofs are permitted in all districts, EXCEPT t (Chapters 1151, 1156, 1161, and 1162) and Uptown Zoning District (Chapter 1147). Unless prohibited in th energy systems in accordance with this section may be administratively approved for a property zone (Chapter 1128) and PND - Planned Neighborhood Districts (Chapter 1135).

(b) Permitted Solar Energy System Performance and Design Standards.

(1) Location.

A. No portion of any roof-mounted solar energy system may extend below the roof line or abov

B. All solar panels shall be configured contiguous in a regular quadrangular shape, and aligne

C. Shall be positioned within the field of the roof plane with a proportional margin of roof betwe

(2) Height. Roof mounted solar energy systems shall be either integrated into the roof layer or a to the roof surface and shall not project vertically if installed on a pitched roof. The use of standard, lo attach panels to a roof surface shall not be considered a projection. Panels or tubing installed on flat from any street.

(3) Appearance.

A. All solar panels must have a non-reflective coating to minimize glare.

B. Roof mounted installations must be uniform in appearance and color.

C. All mounting brackets and related structural supports shall not extend more than five inches covered in a manner architecturally compatible with the building to screen from public visibility and/or

D. All wires and other associated appurtenances related to a solar energy system shall be inst location and shall not be visible from any street.

(c) Conditional Solar Energy Systems.

(1) Purpose and intent. The purpose of this conditional section is to establish supplementary sta may affect adjacent properties, the neighborhood, a development plan or the community even if all of are met. It is the intent of this section to establish appropriate standards for the location, design, and energy systems to ensure they will be installed and operated in a manner that is consistent with the u compromise adjacent uses.

(2) Roof mounted solar energy systems in the Planned Zoning Districts (Chapters 1151, 1156, 116 (Chapter 1147) are a conditional use and shall adhere to the performance and design standards of Sec

A. Application shall include explanation of how installation is consistent with the Development Text or a proposed amendment to the Development Plan and/or Development Standards Text to prov Planned District and consistent architectural treatment.

(3) Ground mounted solar energy systems shall be conditional in all zoning districts and shall ac standards of Section 1176.05(b)(3) and the following:

A. Location. Ground mounted solar energy systems shall only be placed in the rear or side yar

Solar projects are making it easier for Americans to choose solar energy to power their homes.

Department of Energy

Since 2008, hundreds of thousands of solar panels have popped up across the country as an increasing number of Americans choose to power their daily lives with the sun's energy. Thanks in part to **Solar Energy Technologies Office (SETO) investments**, the cost of going solar goes down every year. You may be considering the option of adding a solar energy system to your home's roof or finding another way to harness the sun's energy. While there's no one-size-fits-all solar solution, here are some resources that can help you figure out what's best for you. Consider these questions before you go solar.

See the Spanish version here. Vea la versión en español aquí.

HOW DOES SOLAR WORK?

There are two primary technologies that can harness the sun's power and turn it into electricity. The first is the one you're likely most familiar with – photovoltaics, or PV. These are the panels you've seen on rooftops or in fields. When the sun shines onto a solar panel, photons from the sunlight are absorbed by the cells in the panel, which creates an electric field across the layers and causes electricity to flow. **Learn more about how PV works**.

The second technology is concentrating solar power, or CSP. It is used primarily in very large power plants and is not appropriate for residential use. This technology uses mirrors to reflect and concentrate sunlight onto receivers that collect solar energy and convert it to heat, which can then be used to produce electricity. **Learn more about how CSP works**.

IS MY HOME SUITABLE FOR SOLAR PANELS?

Solar panels are built to work in all climates, but in some cases, rooftops may not be suitable for solar systems due to age or tree cover. If there are trees near your home that create excessive shade on your roof, rooftop panels may not be the most ideal option. The size, shape, and slope of your roof are also important factors to consider. Typically, solar panels perform best on south-facing roofs with a slope between 15 and 40 degrees, though other roofs may be suitable too. You should also consider the age of your roof and how long until it will need **replacement**.

If a solar professional determines that your roof is not suitable for solar, or you don't own your home, you can still benefit from solar energy. Community solar allows multiple people to benefit from a single, shared solar array that can be installed on- or off-site. Costs associated with purchasing and installing a solar energy system are divided among all of the participants, who are able to buy into the shared system at a level that best fits their budget. **Learn more about community solar**.

Those interested in community solar can take advantage of a tool from SETO awardee EnergySage. The company's **Community Solar Marketplace** aggregates the many available options in one place and standardizes project information, allowing interested consumers to easily locate and compare multiple community solar projects in their area.

HOW DO I START THE PROCESS OF GOING SOLAR? +

CAN I INSTALL SOLAR MYSELF? +

HOW MUCH POWER CAN I GENERATE WITH SOLAR? +

WILL I SAVE MONEY BY GOING SOLAR? +

CAN I GET FINANCING FOR SOLAR? +

HOW CAN I FIND STATE INCENTIVES AND TAX BREAKS THAT WILL HELP ME GO SOLAR? +

How Does Solar Work?

Solar Energy Technologies Office

The amount of sunlight that strikes the earth's surface in an hour and a half is enough to handle the entire world's energy consumption for a full year. Solar technologies convert sunlight into electrical energy either through photovoltaic (PV) panels or through mirrors that concentrate solar radiation. This energy can be used to generate electricity or be stored in batteries or thermal storage.

Below, you can find resources and information on the basics of solar radiation, **photovoltaic** and **concentrating solar-thermal power** technologies, electrical grid **systems integration**, and the non-hardware aspects (**soft costs**) of solar energy. You can also learn more about how to **go solar** and the **solar energy industry**. In addition, you can dive deeper into solar energy and learn about how the U.S. Department of Energy Solar Energy Technologies Office is driving innovative **research and development** in these areas.

Solar Energy 101

Solar radiation is light – also known as electromagnetic radiation – that is emitted by the sun. While every location on Earth receives some sunlight over a year, the amount of solar radiation that reaches any one spot on the Earth's surface varies. Solar technologies capture this radiation and turn it into useful forms of energy.

Solar Radiation Basics

LEARN MORE

Solar Energy Glossary

LEARN MORE

There are two main types of solar energy technologies—photovoltaics (PV) and concentrating solar-thermal power (CSP).

Photovoltaics Basics

You're likely most familiar with PV, which is utilized in solar panels. When the sun shines onto a solar panel, energy from the sunlight is absorbed by the PV cells in the panel. This energy creates electrical charges that move in response to an internal electrical field in the cell, causing electricity to flow.

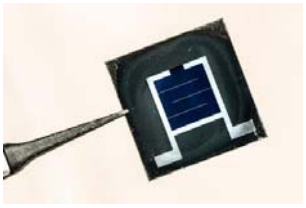
Solar Photovoltaic Technology Basics

Learn more

Solar Photovoltaic System Design Basics

Learn more

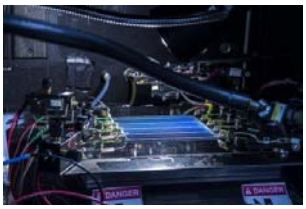
PV Cells 101: A Primer on the Solar Photovoltaic Cell



Learn more

Solar Performance and Efficiency

Learn more



Concentrating Solar-Thermal Power Basics

Concentrating solar-thermal power (CSP) systems use mirrors to reflect and concentrate sunlight onto receivers that collect solar energy and convert it to heat, which can then be used to produce electricity or stored for later use. It is used primarily in very large power plants.

Concentrating Solar-Thermal Power Basics

Learn more

Thermal Storage System Concentrating Solar-Thermal Power Basics

Learn more

Power Tower System Concentrating Solar-Thermal Power Basics

Learn more

Linear Concentrator System Concentrating Solar-Thermal Power Basics

Learn more

Systems Integration Basics

Solar energy technology doesn't end with electricity generation by PV or CSP systems. These solar energy systems must be integrated into homes, businesses, and existing electrical grids with varying mixtures of traditional and other renewable energy sources.

Solar Systems Integration Basics

Learn more

Solar Integration: Distributed Energy Resources and Microgrids

Learn more

Solar Integration: Inverters and Grid Services Basics

Learn more

Solar Integration: Solar Energy and Storage Basics

Learn more

Soft Costs Basics

A number of non-hardware costs, known as soft costs, also impact the cost of solar energy. These costs include permitting, financing, and installing solar, as well as the expenses solar companies incur to acquire new customers, pay suppliers, and cover

their bottom line. For rooftop solar energy systems, soft costs represent the largest share of total costs.

Solar Soft Costs Basics

Learn more

Community Solar Basics

Learn more

Connect the Dots: Innovations in Residential Solar

Learn more

Solar Workforce Development

Learn more

Going Solar Basics

Solar energy can help to reduce the cost of electricity, contribute to a resilient electrical grid, create jobs and spur economic growth, generate back-up power for nighttime and outages when paired with storage, and operate at similar efficiency on both small and large scales.

Community Solar Basics

Learn more

Farmer's Guide to Going Solar

Learn more

Homeowner's Guide to Going Solar

Learn more

Solar Rooftop Potential

Learn more

Solar Industry Basics

Solar energy systems come in all shapes and sizes. Residential systems are found on rooftops across the United States, and businesses are also opting to install solar panels. Utilities, too, are building large solar power plants to provide energy to all customers connected to the grid.

Quarterly Solar Industry Update

Learn more

Solar Energy Resources for Job Seekers

Learn more

Solar Technology Cost Analysis

Learn more

Success Stories

Learn more

Solar Photovoltaic System Design Basics

Solar Energy Technologies Office

Solar photovoltaic modules are where the electricity gets generated, but are only one of the many parts in a complete photovoltaic (PV) system. In order for the generated electricity to be useful in a home or business, a number of other technologies must be in place.

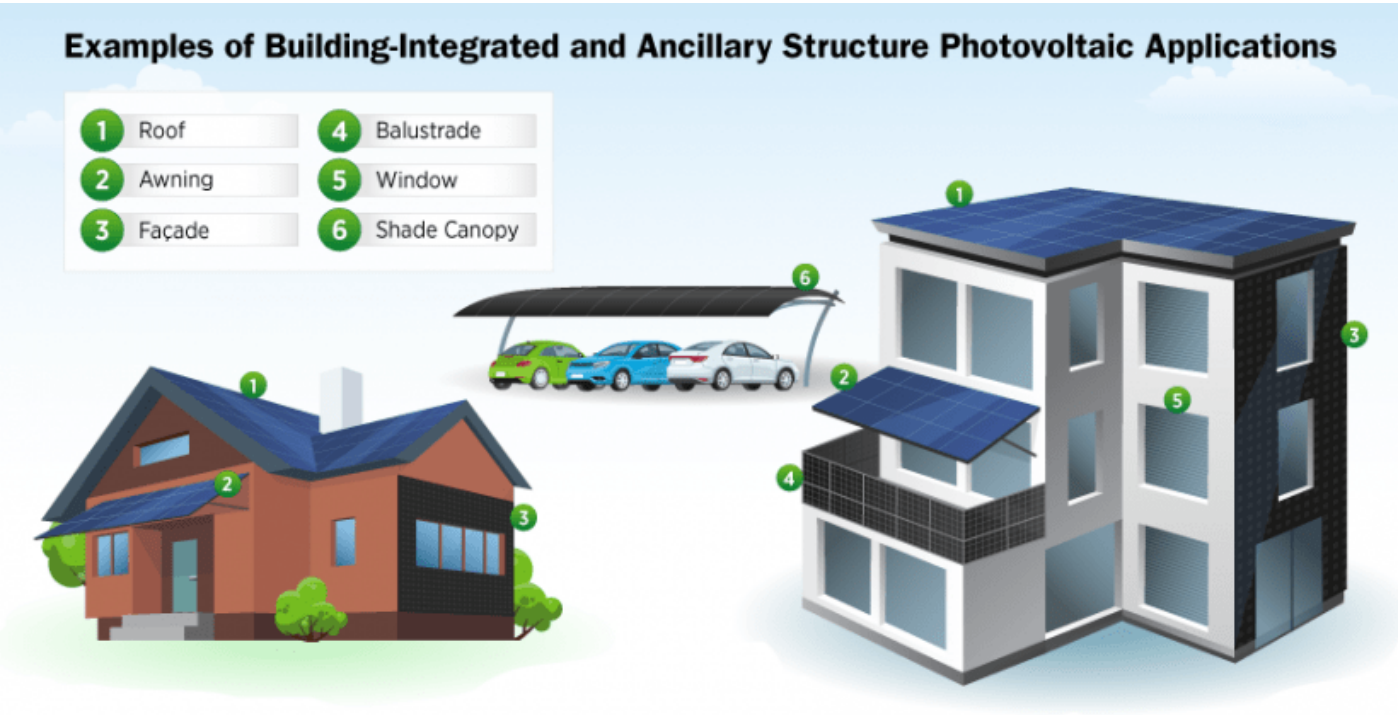
MOUNTING STRUCTURES

PV arrays must be mounted on a stable, durable structure that can support the array and withstand wind, rain, hail, and corrosion over decades. These structures tilt the PV array at a fixed angle determined by the local latitude, orientation of the structure, and electrical load requirements. To obtain the highest annual energy output, modules in the northern hemisphere are pointed due south and inclined at an angle equal to the local latitude. Rack mounting is currently the most common method because it is robust, versatile, and easy to construct and install. More sophisticated and less expensive methods continue to be developed.

For PV arrays mounted on the ground, tracking mechanisms automatically move panels to follow the sun across the sky, which provides more energy and higher returns on investment. One-axis trackers are typically designed to track the sun from east to west. Two-axis trackers allow for modules to remain pointed directly at the sun throughout the day. Naturally, tracking involves more up-front costs and sophisticated systems are more expensive and require more maintenance. As systems have improved, the cost-benefit analysis increasingly favors tracking for ground-mounted systems.

BUILDING-INTEGRATED PV

While most solar modules are placed in dedicated mounting structures, they can also be integrated directly into building materials like roofing, windows, or façades. These systems are known as building-integrated PV (BIPV). Integrating solar into buildings could improve material and supply chain efficiencies by combining redundant parts, and reduce system cost by using existing building systems and support structures. BIPV systems could provide power for direct current (DC) applications in buildings, like LED lighting, computers, sensors, and motors, and support grid-integrated efficient building applications, like electric vehicle charging. BIPV systems still face technical and commercial barriers to widespread use, but their unique value makes them a promising alternative to traditional mounting structures and building materials.



INVERTERS

Inverters are used to convert the direct current (DC) electricity generated by solar photovoltaic modules into alternating current (AC) electricity, which is used for local transmission of electricity, as well as most appliances in our homes. PV systems either have one inverter that converts the electricity generated by all of the modules, or microinverters that are attached to each individual module. A single inverter is generally less expensive and can be more easily cooled and serviced when needed. The microinverter allows for independent operation of each panel, which is useful if some modules might be shaded, for example. It is expected that inverters will need to be replaced at least once in the 25-year lifetime of a PV array.

Advanced inverters, or "smart inverters," allow for two-way communication between the inverter and the electrical utility. This can help balance supply and demand either automatically or via remote communication with utility operators. Allowing utilities to have this insight into (and possible control of) supply and demand allows them to reduce costs, ensure grid stability, and reduce the likelihood of power outages.

STORAGE

Batteries allow for the storage of solar photovoltaic energy, so we can use it to power our homes at night or when weather elements keep sunlight from reaching PV panels. Not only can they be used in homes, but batteries are playing an increasingly important role for utilities. As customers feed solar energy back into the grid, batteries can store it so it can be returned to customers at a later time. The increased use of batteries will help modernize and stabilize our country's electric grid.

ADDITIONAL INFORMATION

Learn more about the **basics of photovoltaic technology** and the solar office's **photovoltaics research**.

Home » **Solar Information Resources** » Solar Photovoltaic System Design Basics

RENEWABLE ENERGY SOURCES
SOLAR POWER

Courtesy: AES Ohio (formerly Dayton Power & Light)

What is solar power?

Solar power is a renewable and environmentally friendly option for energy production. Solar power works by using a photovoltaic system to capture sunlight, most frequently in the form of solar panels. This photovoltaic system consists of tightly woven cells that absorb sunlight. When the sun's rays hit the photovoltaic cells, electrons within the cell become excited and can be used as electricity.

The sun is so powerful that even though only a small percentage of its energy actually reaches Earth, it can be used to run a large thermal electric generation power plant. In this type of plant, heat energy is collected from the sun using curved mirrors that evaporate water into steam that then spins electricity-generating turbines.

Solar power in Ohio

Per data from the Solar Energy Industries Association (SEIA), as of late-2018 Ohio ranks 28th nationwide in solar power generation capacity, with around 21,919 Ohio homes being powered by solar energy and 0.24% of the state's electricity being generated by solar power. Solar prices have fallen 43% over the past five years, and there is projected growth in the industry of 1,023 MW over the next five.

The state is heavily involved with the production of solar panels and other materials needed to harness solar power. Ohio was home to nearly 6,518 solar industry jobs in 2018, with over 292 solar companies within the state. Check out this link for an overview of solar power in our state: www.seia.org.

National solar power outlook

Solar power has seen rapid growth nationwide. According to the Solar Energy Industries Association (SEIA) and the US Department of Energy, solar power generation has increased from 1.2 gigawatts of production in 2008 to around 60 gigawatts in late-2018. That is enough energy to power 11.3 million homes. The industry continues to grow and prices for solar panels have fallen in

Continued on back

Office of the Ohio Consumers' Counsel

Your Residential Utility Consumer Advocate

CONSUMER FACT SHEET

Office of the Ohio Consumers' Counsel
65 East State Street
Suite 700, Columbus, OH
43215

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@OCC4Consumers

E-MAIL:
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WEBSITE:
www.occ.ohio.gov

RENEWABLE ENERGY RESOURCES

SOLAR POWER

CONSUMER FACT SHEET

recent years. From 2010 to 2016, solar panel installation costs have dropped more than 70%.

Continued growth in the solar industry is expected as more renewable energy standards and incentives are adopted in the United States. More than thirty states, including Ohio, have adopted Property Assessed Clean Energy (PACE) legislation that allows property owners to obtain financing for solar projects and pay it back through property taxes over a number of years; however, only three states offer PACE to residential home owners. The federal government also offers a 30 percent tax credit for solar installations, which is available through 2019.

Pros and cons of solar power

As with many of the renewable energy resources, solar power is environmentally friendly and does not emit any pollutants.

Using solar power can:

- Allow for production of energy at home;
- Lower one's electricity bills;

A solar power system can be expensive. A typical installed solar panel system can range in cost from $10,000 to $20,000 depending on scale and location. But as prices fall, demand increases, and financial incentives continue, solar power may be a feasible investment for some. Consumers should carefully weigh the initial costs of installing their solar system versus future savings on their utility bills and make a decision that is right for them.

Additional resources

For additional information on solar power, visit these organizations:

Department of Energy, Office of Energy Efficiency and Renewable Energy

U.S. Energy Information Administration

National Renewable Energy Laboratory

The Office of the Ohio Consumers' Counsel (OCC), the residential utility consumer advocate, represents the interests of 4.5 million households in proceedings before state and federal regulators and in the courts.

The state agency also educates consumers about electric, natural gas, telephone and water issues.

For more information, please visit the OCC website at www.occ.ohio.gov.

The Office of the Ohio Consumers' Counsel is an equal opportunity employer and provider of services.

RENEWABLE ENERGY SOURCES
SOLAR POWER

Courtesy: AES Ohio (formerly Dayton Power & Light)

What is solar power?

Solar power is a renewable and environmentally friendly option for energy production. Solar power works by using a photovoltaic system to capture sunlight, most frequently in the form of solar panels. This photovoltaic system consists of tightly woven cells that absorb sunlight. When the sun's rays hit the photovoltaic cells, electrons within the cell become excited and can be used as electricity.

The sun is so powerful that even though only a small percentage of its energy actually reaches Earth, it can be used to run a large thermal electric generation power plant. In this type of plant, heat energy is collected from the sun using curved mirrors that evaporate water into steam that then spins electricity-generating turbines.

Solar power in Ohio

Per data from the Solar Energy Industries Association (SEIA), as of late-2018 Ohio ranks 28th nationwide in solar power generation capacity, with around 21,919 Ohio homes being powered by solar energy and 0.24% of the state's electricity being generated by solar power. Solar prices have fallen 43% over the past five years, and there is projected growth in the industry of 1,023 MW over the next five.

The state is heavily involved with the production of solar panels and other materials needed to harness solar power. Ohio was home to nearly 6,518 solar industry jobs in 2018, with over 292 solar companies within the state. Check out this link for an overview of solar power in our state: www.seia.org.

National solar power outlook

Solar power has seen rapid growth nationwide. According to the Solar Energy Industries Association (SEIA) and the US Department of Energy, solar power generation has increased from 1.2 gigawatts of production in 2008 to around 60 gigawatts in late-2018. That is enough energy to power 11.3 million homes. The industry continues to grow and prices for solar panels have fallen in

Continued on back

Office of the Ohio Consumers' Counsel

Your Residential Utility Consumer Advocate

CONSUMER FACT SHEET

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RENEWABLE ENERGY RESOURCES

SOLAR POWER

CONSUMER FACT SHEET

recent years. From 2010 to 2016, solar panel installation costs have dropped more than 70%.

Continued growth in the solar industry is expected as more renewable energy standards and incentives are adopted in the United States. More than thirty states, including Ohio, have adopted Property Assessed Clean Energy (PACE) legislation that allows property owners to obtain financing for solar projects and pay it back through property taxes over a number of years; however, only three states offer PACE to residential home owners. The federal government also offers a 30 percent tax credit for solar installations, which is available through 2019.

Pros and cons of solar power

As with many of the renewable energy resources, solar power is environmentally friendly and does not emit any pollutants.

Using solar power can:

- Allow for production of energy at home;
- Lower one's electricity bills;

A solar power system can be expensive. A typical installed solar panel system can range in cost from $10,000 to $20,000 depending on scale and location. But as prices fall, demand increases, and financial incentives continue, solar power may be a feasible investment for some. Consumers should carefully weigh the initial costs of installing their solar system versus future savings on their utility bills and make a decision that is right for them.

Additional resources

For additional information on solar power, visit these organizations:

Department of Energy, Office of Energy Efficiency and Renewable Energy

U.S. Energy Information Administration

National Renewable Energy Laboratory

The Office of the Ohio Consumers' Counsel (OCC), the residential utility consumer advocate, represents the interests of 4.5 million households in proceedings before state and federal regulators and in the courts.

The state agency also educates consumers about electric, natural gas, telephone and water issues.

For more information, please visit the OCC website at www.occ.ohio.gov.

The Office of the Ohio Consumers' Counsel is an equal opportunity employer and provider of services.

Solar projects are making it easier for Americans to choose solar energy to power their homes.

Department of Energy

Since 2008, hundreds of thousands of solar panels have popped up across the country as an increasing number of Americans choose to power their daily lives with the sun's energy. Thanks in part to **Solar Energy Technologies Office (SETO) investments**, the cost of going solar goes down every year. You may be considering the option of adding a solar energy system to your home's roof or finding another way to harness the sun's energy. While there's no one-size-fits-all solar solution, here are some resources that can help you figure out what's best for you. Consider these questions before you go solar.

See the Spanish version here. Vea la versión en español aquí.

HOW DOES SOLAR WORK?

There are two primary technologies that can harness the sun's power and turn it into electricity. The first is the one you're likely most familiar with – photovoltaics, or PV. These are the panels you've seen on rooftops or in fields. When the sun shines onto a solar panel, photons from the sunlight are absorbed by the cells in the panel, which creates an electric field across the layers and causes electricity to flow. **Learn more about how PV works**.

The second technology is concentrating solar power, or CSP. It is used primarily in very large power plants and is not appropriate for residential use. This technology uses mirrors to reflect and concentrate sunlight onto receivers that collect solar energy and convert it to heat, which can then be used to produce electricity. **Learn more about how CSP works**.

IS MY HOME SUITABLE FOR SOLAR PANELS?

Solar panels are built to work in all climates, but in some cases, rooftops may not be suitable for solar systems due to age or tree cover. If there are trees near your home that create excessive shade on your roof, rooftop panels may not be the most ideal option. The size, shape, and slope of your roof are also important factors to consider. Typically, solar panels perform best on south-facing roofs with a slope between 15 and 40 degrees, though other roofs may be suitable too. You should also consider the age of your roof and how long until it will need **replacement**.

If a solar professional determines that your roof is not suitable for solar, or you don't own your home, you can still benefit from solar energy. Community solar allows multiple people to benefit from a single, shared solar array that can be installed on- or off-site. Costs associated with purchasing and installing a solar energy system are divided among all of the participants, who are able to buy into the shared system at a level that best fits their budget. **Learn more about community solar**.

Those interested in community solar can take advantage of a tool from SETO awardee EnergySage. The company's **Community Solar Marketplace** aggregates the many available options in one place and standardizes project information, allowing interested consumers to easily locate and compare multiple community solar projects in their area.

HOW DO I START THE PROCESS OF GOING SOLAR? +

CAN I INSTALL SOLAR MYSELF? +

HOW MUCH POWER CAN I GENERATE WITH SOLAR? +

WILL I SAVE MONEY BY GOING SOLAR? +

CAN I GET FINANCING FOR SOLAR? +

HOW CAN I FIND STATE INCENTIVES AND TAX BREAKS THAT WILL HELP ME GO SOLAR? +

How Does Solar Work?

Solar Energy Technologies Office

The amount of sunlight that strikes the earth's surface in an hour and a half is enough to handle the entire world's energy consumption for a full year. Solar technologies convert sunlight into electrical energy either through photovoltaic (PV) panels or through mirrors that concentrate solar radiation. This energy can be used to generate electricity or be stored in batteries or thermal storage.

Below, you can find resources and information on the basics of solar radiation, **photovoltaic** and **concentrating solar-thermal power** technologies, electrical grid **systems integration**, and the non-hardware aspects (**soft costs**) of solar energy. You can also learn more about how to **go solar** and the **solar energy industry**. In addition, you can dive deeper into solar energy and learn about how the U.S. Department of Energy Solar Energy Technologies Office is driving innovative **research and development** in these areas.

Solar Energy 101

Solar radiation is light – also known as electromagnetic radiation – that is emitted by the sun. While every location on Earth receives some sunlight over a year, the amount of solar radiation that reaches any one spot on the Earth's surface varies. Solar technologies capture this radiation and turn it into useful forms of energy.

Solar Radiation Basics

LEARN MORE

Solar Energy Glossary

LEARN MORE

There are two main types of solar energy technologies—photovoltaics (PV) and concentrating solar-thermal power (CSP).

Photovoltaics Basics

You're likely most familiar with PV, which is utilized in solar panels. When the sun shines onto a solar panel, energy from the sunlight is absorbed by the PV cells in the panel. This energy creates electrical charges that move in response to an internal electrical field in the cell, causing electricity to flow.

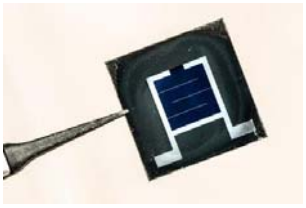
Solar Photovoltaic Technology Basics

Learn more

Solar Photovoltaic System Design Basics

Learn more

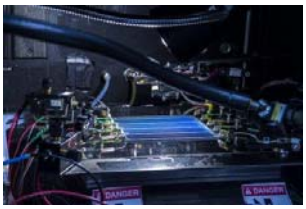
PV Cells 101: A Primer on the Solar Photovoltaic Cell



Learn more

Solar Performance and Efficiency

Learn more



Concentrating Solar-Thermal Power Basics

Concentrating solar-thermal power (CSP) systems use mirrors to reflect and concentrate sunlight onto receivers that collect solar energy and convert it to heat, which can then be used to produce electricity or stored for later use. It is used primarily in very large power plants.

Concentrating Solar-Thermal Power Basics

Learn more

Thermal Storage System Concentrating Solar-Thermal Power Basics

Learn more

Power Tower System Concentrating Solar-Thermal Power Basics

Learn more

Linear Concentrator System Concentrating Solar-Thermal Power Basics

Learn more

Systems Integration Basics

Solar energy technology doesn't end with electricity generation by PV or CSP systems. These solar energy systems must be integrated into homes, businesses, and existing electrical grids with varying mixtures of traditional and other renewable energy sources.

Solar Systems Integration Basics

Learn more

Solar Integration: Distributed Energy Resources and Microgrids

Learn more

Solar Integration: Inverters and Grid Services Basics

Learn more

Solar Integration: Solar Energy and Storage Basics

Learn more

Soft Costs Basics

A number of non-hardware costs, known as soft costs, also impact the cost of solar energy. These costs include permitting, financing, and installing solar, as well as the expenses solar companies incur to acquire new customers, pay suppliers, and cover

their bottom line. For rooftop solar energy systems, soft costs represent the largest share of total costs.

Solar Soft Costs Basics

Learn more

Community Solar Basics

Learn more

Connect the Dots: Innovations in Residential Solar

Learn more

Solar Workforce Development

Learn more

Going Solar Basics

Solar energy can help to reduce the cost of electricity, contribute to a resilient electrical grid, create jobs and spur economic growth, generate back-up power for nighttime and outages when paired with storage, and operate at similar efficiency on both small and large scales.

Community Solar Basics

Learn more

Farmer's Guide to Going Solar

Learn more

Homeowner's Guide to Going Solar

Learn more

Solar Rooftop Potential

Learn more

Solar Industry Basics

Solar energy systems come in all shapes and sizes. Residential systems are found on rooftops across the United States, and businesses are also opting to install solar panels. Utilities, too, are building large solar power plants to provide energy to all customers connected to the grid.

Quarterly Solar Industry Update

Learn more

Solar Energy Resources for Job Seekers

Learn more

Solar Technology Cost Analysis

Learn more

Success Stories

Learn more

Solar Photovoltaic System Design Basics

Solar Energy Technologies Office

Solar photovoltaic modules are where the electricity gets generated, but are only one of the many parts in a complete photovoltaic (PV) system. In order for the generated electricity to be useful in a home or business, a number of other technologies must be in place.

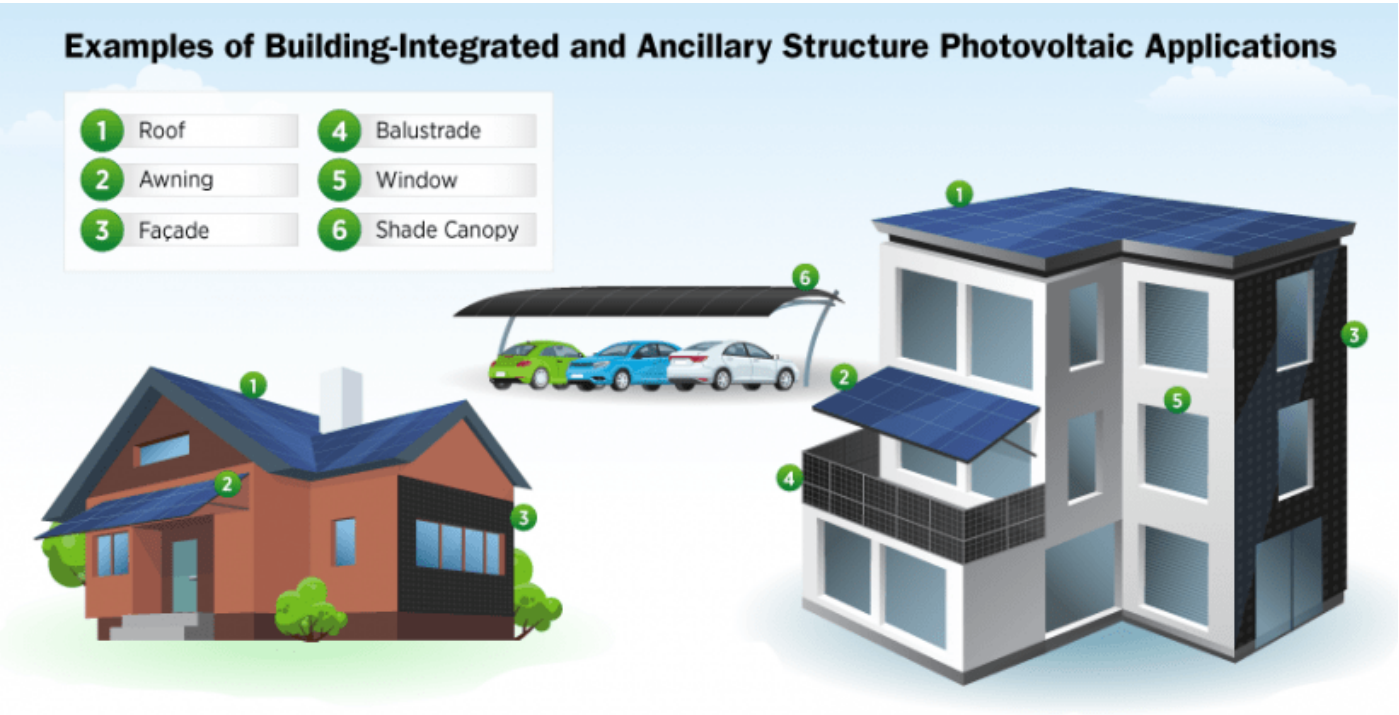
MOUNTING STRUCTURES

PV arrays must be mounted on a stable, durable structure that can support the array and withstand wind, rain, hail, and corrosion over decades. These structures tilt the PV array at a fixed angle determined by the local latitude, orientation of the structure, and electrical load requirements. To obtain the highest annual energy output, modules in the northern hemisphere are pointed due south and inclined at an angle equal to the local latitude. Rack mounting is currently the most common method because it is robust, versatile, and easy to construct and install. More sophisticated and less expensive methods continue to be developed.

For PV arrays mounted on the ground, tracking mechanisms automatically move panels to follow the sun across the sky, which provides more energy and higher returns on investment. One-axis trackers are typically designed to track the sun from east to west. Two-axis trackers allow for modules to remain pointed directly at the sun throughout the day. Naturally, tracking involves more up-front costs and sophisticated systems are more expensive and require more maintenance. As systems have improved, the cost-benefit analysis increasingly favors tracking for ground-mounted systems.

BUILDING-INTEGRATED PV

While most solar modules are placed in dedicated mounting structures, they can also be integrated directly into building materials like roofing, windows, or façades. These systems are known as building-integrated PV (BIPV). Integrating solar into buildings could improve material and supply chain efficiencies by combining redundant parts, and reduce system cost by using existing building systems and support structures. BIPV systems could provide power for direct current (DC) applications in buildings, like LED lighting, computers, sensors, and motors, and support grid-integrated efficient building applications, like electric vehicle charging. BIPV systems still face technical and commercial barriers to widespread use, but their unique value makes them a promising alternative to traditional mounting structures and building materials.



INVERTERS

Inverters are used to convert the direct current (DC) electricity generated by solar photovoltaic modules into alternating current (AC) electricity, which is used for local transmission of electricity, as well as most appliances in our homes. PV systems either have one inverter that converts the electricity generated by all of the modules, or microinverters that are attached to each individual module. A single inverter is generally less expensive and can be more easily cooled and serviced when needed. The microinverter allows for independent operation of each panel, which is useful if some modules might be shaded, for example. It is expected that inverters will need to be replaced at least once in the 25-year lifetime of a PV array.

Advanced inverters, or "smart inverters," allow for two-way communication between the inverter and the electrical utility. This can help balance supply and demand either automatically or via remote communication with utility operators. Allowing utilities to have this insight into (and possible control of) supply and demand allows them to reduce costs, ensure grid stability, and reduce the likelihood of power outages.

STORAGE

Batteries allow for the storage of solar photovoltaic energy, so we can use it to power our homes at night or when weather elements keep sunlight from reaching PV panels. Not only can they be used in homes, but batteries are playing an increasingly important role for utilities. As customers feed solar energy back into the grid, batteries can store it so it can be returned to customers at a later time. The increased use of batteries will help modernize and stabilize our country's electric grid.

ADDITIONAL INFORMATION

Learn more about the **basics of photovoltaic technology** and the solar office's **photovoltaics research**.

Home » **Solar Information Resources** » Solar Photovoltaic System Design Basics