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Exploring Options for Wind Energy and Wildfire Hazard Mitigation

Spring 2021
Troutdale

Ariana Buchanan • Anthony Jannelli • Sarah Adams-Schoen

LAW 688 Land Use Law

UNIVERSITY OF OREGON
ENR
THE CITY OF TROUTDALE OREGON
SCI Sustainable Cities Institute
SCYP Sustainable City Year Program

Exploring Options for Wind Energy and Wildfire Hazard Mitigation

Ariana Buchanan
Report Author • J.D. Candidate, School of Law and Fellow, Environmental and Natural Resources Center: Sustainable Land Use Project

Anthony Jannelli
Report Author • J.D. Candidate, School of Law and Fellow, Environmental and Natural Resources Center: Sustainable Land Use Project

Sarah Adams-Schoen
Assistant Professor • School of Law

SCHOOL OF LAW

UNIVERSITY OF OREGON · ENR Environmental and Natural Resources Law Center · THE CITY OF TROUTDALE OREGON · SCI Sustainable Cities Institute · SCYP Sustainable City Year Program

Acknowledgments

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The authors contributed time to completion of this report as student fellows of the School of Law's Environmental and Natural Resources Law (ENR) Center's Sustainable Land Use Project. The ENR Center brings the intellectual energy of the University of Oregon's faculty and students to bear on some of the most challenging and cutting-edge environmental issues of our day. The Sustainable Land Use Project addresses legal issues surrounding how we develop, or not develop, lands to ensure the sustainable development of our communities. Assistant Professor Sarah Adams-Schoen serves as the faculty lead for the Project and is supported by Center staff and student fellows.

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About SCI

The Sustainable Cities Institute (SCI) is an applied think tank focusing on sustainability and cities through applied research, teaching, and community partnerships. We work across disciplines that match the complexity of cities to address sustainability challenges, from regional planning to building design and from enhancing engagement of diverse communities to understanding the impacts on municipal budgets from disruptive technologies and many issues in between.

SCI focuses on sustainability-based research and teaching opportunities through two primary efforts:

1. Our Sustainable City Year Program (SCYP), a massively scaled university-community partnership program that matches the resources of the University with one Oregon community each year to help advance that community's sustainability goals; and

2. Our Urbanism Next Center, which focuses on how autonomous vehicles, e-commerce, and the sharing economy will impact the form and function of cities.

In all cases, we share our expertise and experiences with scholars, policymakers, community leaders, and project partners. We further extend our impact via an annual Expert-in-Residence Program, SCI China visiting scholars program, study abroad course on redesigning cities for people on bicycle, and through our co-leadership of the Educational Partnerships for Innovation in Communities Network (EPIC-N), which is transferring SCYP to universities and communities across the globe. Our work connects student passion, faculty experience, and community needs to produce innovative, tangible solutions for the creation of a sustainable society.

About SCYP

The Sustainable City Year Program (SCYP) is a year-long partnership between SCI and a partner in Oregon, in which students and faculty in courses from across the university collaborate with a public entity on sustainability and livability projects. SCYP faculty and students work in collaboration with staff from the partner agency through a variety of studio projects and service-learning courses to provide students with real-world projects to investigate. Students bring energy, enthusiasm, and innovative approaches to difficult, persistent problems. SCYP's primary value derives from collaborations that result in on-the-ground impact and expanded conversations for a community ready to transition to a more sustainable and livable future.

About City of Troutdale

Troutdale is a dynamic suburban community in Multnomah County, situated on the eastern edge of the Portland metropolitan region and the western edge of the Columbia River Gorge. Settled in the late 1800s and incorporated in 1907, this "Gateway to the Gorge" is approximately six square miles in size with a population of nearly 17,000 residents. Almost 75% of that population is aged 18-64.

Troutdale's median household income of $72,188 exceeds the State of Oregon's $59,393. Troutdale's neighbors include Wood Village and Fairview to the west, Gresham to the south, and unincorporated areas of Multnomah County to the east.

For the first part of the 20th century, the city remained a small village serving area farmers and company workers at nearby industrial facilities. Starting around 1970, Troutdale became a bedroom community in the region, with subdivisions and spurts of multi-family residential housing occurring. In the 1990s, efforts were made to improve the aesthetics of the community's original core, contributing to an award-winning "Main Street" infill project that helped with placemaking. In the 2010s, the City positioned itself as a jobs center as it worked with stakeholders to transform a large superfund area to one of the region's most attractive industrial centers – the Troutdale-Reynolds Industrial Park.

The principal transportation link between Troutdale and Portland is Interstate 84. The Union Pacific Railroad main line runs just north of Troutdale's city center. The Troutdale area is the gateway to the famous Columbia River Gorge Scenic Area and Sandy River recreational areas, and its outdoor pursuits. Troutdale's appealing and beautiful natural setting, miles of trails, and parkland and conservation areas draw residents and visitors alike. The City's pride in place is manifested through its monthly gatherings and annual events, ranging from "First Friday" art walks to the city's long-standing Summerfest celebration each July. A dedicated art scene and an exciting culinary mix have made Troutdale an enviable destination and underscore the community's quality of life. Troutdale is home to McMenamins Edgefield, one of Portland's beloved venues for entertainment and hospitality.

In recent years, Troutdale has developed a robust economic development program. The City's largest employers are Amazon and FedEx Ground, although the City also has numerous local and regional businesses that highlight unique assets within the area. Troutdale's recent business-related efforts have focused on the City's Town Center, where 12 "opportunity sites" have been identified for infill development that respects the small-town feel while offering support to the existing retail environment. The next 20 years promise to be an exciting time for a mature community to protect what's loved and expand opportunities that contribute to Troutdale's pride in place.

Course Participants

FIRE HAZARD MITIGATION TEAM

SAMANTHA BLOUNT, J.D. Candidate
GRACE BULGER, J.D. Candidate
NILS GREEN, J.D. Candidate
HALEY HAMPSTEAD, J.D. Candidate
BENJAMIN HARDER, J.D. Candidate
ALEX HUNTLEY-ROMANOW, J.D. Candidate
MELISSA MCDONOUGH, J.D. Candidate
KATIE MORELAND, J.D. Candidate
LESLIE NEU, J.D. Candidate
HAYLEY PORTER, J.D. Candidate
JORDAN SHARP, J.D. Candidate
JACK STAUNTON, J.D. Candidate
ANNE WOLKE, J.D. Candidate

WIND ENERGY TEAM

FRANCIS BRUNI, J.D. Candidate
ARIANA BUCHANAN, J.D. Candidate
ANTHONY JANNELLI, J.D. Candidate
L. MAITREYA, J.D. Candidate
ALEC MARLEGA, J.D. Candidate
MICHAEL O'NEIL, J.D. Candidate
MICHAEL ROMANO, J.D. Candidate
REZA SADEGHZADEH, J.D. Candidate
RAY SCHURR, J.D. Candidate
MADELINE SMITH, J.D. Candidate
HILARY THERIEN, J.D. Candidate
BLOSSOM VAN KINKLE, J.D. Candidate

Executive Summary

In Spring 2021, the University of Oregon School of Law's Land Use Law class, led by Professor Sarah Adams-Schoen, was tasked with analyzing and preparing two sets of suggested amendments to the City of Troutdale's Development Code—one set of draft code amendments to facilitate the development of small-scale wind energy conversion systems (i.e., small wind turbines) and another to increase the City's resilience to wildfire. The class was divided into four student groups with two groups of students working on each project. The following report is a compilation of the groups' suggested code amendments and analysis.

Approaches presented in the wind energy development section of this report are intended to provide Troutdale with information to assist the city in determining how to appropriately incorporate wind energy conversion systems into its development code and permitting processes. The suggested ordinance language was designed to properly regulate and site wind energy facilities and address potential complications that can arise. These potential complications include aesthetic and noise impacts, environmental impacts, socioeconomic impacts, and potential risk to wildlife populations and others. The Draft A ordinance also considers small- and medium-scale wind energy systems. Suggested best practices for regulating wind energy systems, relevant zoning and permitting considerations, and case studies of relevant examples from local communities around the country are also presented.

When assessing each proposed code, it became apparent the two wind energy groups developed distinct approaches, either of which may appeal to Troutdale. The two approaches are presented here as Draft Ordinance A and Draft Ordinance B.

Approaches presented in the draft ordinance establishing a Wildfire Hazard Overlay Zone are intended to balance the tremendous socio-economic benefits of implementing best practices against the socio-economic costs of implementing a robust hazard mitigation strategy. The students recognize that some of the proposed approaches may not align with Troutdale's current scope or capacity; however, they are offered as possibilities that can be tailored to fit Troutdale's specific needs. There are suggestions for language to use when creating a wildfire hazard overlay zone and supplementary development regulations to reduce or minimize the potential impacts of wildfire on properties, the occupants of properties, and the occupants of adjacent properties. Recommendations for how to implement robust hazard mitigation are also provided.

Please note that nothing in this report constitutes legal advice.

Wind Energy Development

INTRODUCTION

Wind energy systems offer an opportunity to power a variety of buildings, facilities, and homes with reliable, renewable energy. Wind energy systems are cost-effective, renewable, and viable alternatives to current forms of energy. According to The U.S. Department of Energy's (DOE's) Wind Energy Technologies Office, wind is anticipated to save consumers $280 billion by 2050 due to the decreased vulnerability to price spikes and supply disruption in the coal and natural gas market. Wind energy also has the capacity to reduce air pollution and mitigate the effects of climate change because wind energy systems do not require the burning of fossil fuels. Per the DOE's report, wind energy could avoid the emission of 12.3 gigatons of greenhouse gases such as sulfur dioxide, nitric oxide, nitrogen dioxide, and other particulate matter by 2050.

Wind energy systems can be economically beneficial to the city and the people who live there. The implementation of medium-scale wind energy systems can also increase employment opportunities for residents and municipal revenue from land lease payments by increasing demand for manufacturing, installation, and maintenance.

Depending on the availability of wind resources, small- and medium-scale wind energy systems can lower electricity bills by 100% and can even provide additional income in communities that offer rebates to consumers who produce more electricity than they consume. In rural or remote locations, wind energy can help a consumer avoid the high cost of extending utility power lines to those locations. Moreover, rural wind energy consumers can avoid property damage and other inconveniences that result from power outages from downed or out-of-service power lines, thus avoiding disruptions in the availability of energy all together.

Despite the benefits that accompany the implementation of wind energy systems, many municipal zoning codes fall short of promoting the use of wind as an energy source. Often, where a local code does not designate small- or medium-scale wind energy systems as accessory or conditional uses, the uncertainty and expense of the approval process creates an unsurmountable barrier for homeowners, businesses, or others who would like to offset or eliminate their utility bill by installing a small or medium wind energy system. Barriers to the adoption of a small-wind energy ordinance often include concerns about issues that arise in the large, utility-scale wind farm context—including shadow flicker, noise, disruptions of scenic views, and threats to birds and bats. Public education and engagement throughout the planning and zoning process provides an opportunity for policymakers and the public to learn about the actual impacts of small- and/or medium-scale wind energy systems.

Medium-scale wind energy systems carry with them their own particular benefits and barriers. Their ability to generate more power creates more options for reducing environmental impacts on the planet and reliance on costly non-renewable energy sources. Large manufacturers, businesses, municipal buildings, neighborhoods, or even whole communities can be powered by medium-scale wind. These systems do have their own unique barriers though. They are taller than small wind systems, extending sometimes 250 feet into the air or more. This magnifies the issues small wind systems contend with, including community pushback about aesthetics, sound, and safety concerns. Also, they have high initial investment costs. Additionally, they need winds that have higher speeds and are more consistent in order to be efficient and worth the investment. Troutdale will have to consider how it wants to incorporate and utilize medium-scale wind energy. Troutdale may choose to implement medium-scale wind for municipal buildings, including schools, and/or to power part of the community of Troutdale. At the very least, we suggest addressing medium-scale wind in the development code so that the city is prepared if private entities want to utilize medium-wind.

This document seeks to provide the City of Troutdale with information on how it can appropriately incorporate wind energy systems into its development code and permitting processes. The document includes definitions of relevant wind energy system components, two draft ordinances, relevant zoning and permitting considerations, and case studies of relevant examples from local communities in Oregon.

In general, cities and counties have siting authority over energy projects that are below a certain size or generating capacity. The Oregon Energy Facility Siting Council ("Siting Council") regulates larger energy facilities. The thresholds for Siting Council jurisdiction are determined by the legislature and are defined in Oregon Revised Statutes (ORS) 469.300. By adopting energy ordinances, local governments have the ability to affect energy siting decisions on facilities that have an impact on their city or county but that are outside of local regulatory authority. For example, the Siting Council may apply local land use ordinances when it makes permitting decisions for energy facilities under their statutory authority. Thus, through the adoption of a land use ordinance that addresses energy development, cities and counties have an opportunity to establish local public policy that will apply not just to locally regulated projects, but also to all energy facilities within the local area.

DRAFT WIND ENERGY ORDINANCES

The following draft ordinances are designed to properly regulate and site wind energy facilities and address potential complications that can arise.

Key Differences Between Draft Ordinance A and Draft Ordinance B

Draft Ordinance A requires different approval processes based on the scale of the wind project. Varying zoning and siting procedures based on the size and intensity of a wind energy conversion system, the size of a lot, and the zone designation of a lot can have the positive effect of increasing the ease of WECS installations while, at the same time, allowing for discretionary review and approval processes for larger scale wind projects or wind projects in areas that are potentially sensitive. Under this approach, Type I procedures apply to the development of a very small wind energy conversion systems (WECS) on any lot that is larger than 0.5 acres (20,000 square feet) and a small WECS on any lot that is 1 acre or larger (40,000 square feet). Type II procedures apply to development of a very small WECS on any lot that is less than 0.5 acres (less than 20,000 square feet) and a small WECS on any lot that is less than 1 acre. Type III procedures are required for development of any medium WECS and any WECS in areas the ordinance designates as "potentially sensitive."

Draft Ordinance B simplifies the wind energy regulations by permitting small WECS only and subjecting all WECS development applications to the same approval process (Type I). Additionally, rather than providing for discretionary review of applications to develop WECS in potentially sensitive areas, Draft Ordinance B sets forth zones in which small WECS are allowed subject to Type I approval processes and zones in which small WECS are not allowed. Unlike Draft Ordinance A, Draft Ordinance B does not permit the development of medium WECS as accessory or conditional uses. This streamlined approach to the development regulations may be easier for applicants and regulators to understand and apply. However, by subjecting all WECS to Type I procedures, allowing only small WECS, and not providing for discretionary review of applications to site WECS in potentially sensitive areas, fewer WECS may be developed under Draft Ordinance B.

Shared Provisions
The following provisions are recommended for both Draft Ordinance A and Draft Ordinance B.

1. Purpose and Findings
Troutdale recognizes that wind energy is an abundant, renewable, and non-polluting energy resource particular to their location. Local generation of electricity from wind can also reduce Troutdale's dependence on nonrenewable energy resources and decrease air and water pollution that result from the use of conventional energy sources. Additionally, implementing wind energy will contribute to Troutdale's sustainability and longevity. In adopting this ordinance, Troutdale further recognizes that:

A. It is in the public interest to produce electricity in a manner that serves the needs of the community while minimizing potentially negative impacts.
B. Troutdale is interested in promoting electricity production practices that protect the natural and built environment.
C. Troutdale is interested in harnessing wind's potential in its energy vision/plan.
D. Distributed wind energy projects can enhance grid reliability, reduce peak power demands, and diversify the locale's energy portfolio.

2. Applicability
A. The substantive requirements of this subchapter shall apply to any WECS proposed, operated, modified, or constructed after the effective date of this subchapter to the extent they are not overridden by ORS Chapter 215.
B. No WECS shall be constructed, reconstructed, modified, operated, or decommissioned in Troutdale except in compliance with this subchapter.
C. WECS allowable under this subchapter must be intended to produce energy primarily for on-site energy consumption. Notwithstanding this requirement, nothing in this subchapter should be interpreted to prohibit net metering as defined in ORS 757.300.
D. Pre-existing WECS.
(i) WECS constructed prior to the effective date of this subchapter shall not be required to meet the requirements of this subchapter, except that all modifications, replacements, and decommissionings of such WECS must meet the requirements of this subchapter for modifications, replacements, and decommissionings.
(ii) Any such pre-existing WECS which does not provide energy for a continuous period of 12 months shall meet the requirements of this section before recommencing production of energy.

3. Definitions
The following definitions apply to this subchapter.

A. Distributed Wind Energy System. A wind energy generating system consisting of a turbine, tower and associated equipment, intended to generate electricity for use on the site where the electricity is generated.

B. Freestanding Wind Turbine. A wind turbine and tower that is not attached to any structure with the base of the tower directly on the ground.

C. Rooftop Wind Turbine. A wind turbine with the turbine or base of the tower directly attached to the roof of a house or building.

D. Rotor Swept Area. The rotor swept area is the projected area as defined by the American Wind Energy Associated (AWEA).

E. Site. The lot(s) or parcel(s) of land where the WECS is to be placed including related tower and transmission equipment. The site may be publicly or privately owned by an individual or group of individuals controlling single or adjacent properties. Where multiple lots are in joint ownership, the combined lots shall be considered as one for purposes of applying setback requirements.

F. Total System Height. The height above grade of the fixed portion of the tower, plus the tip of the highest piece of equipment attached thereto. In the case of building-mounted towers the height of the tower does not include the height of the building on which it is mounted.

G. Tower. Support structure, including guyed, monopole, and lattice type support structures, upon which is mounted a wind turbine or other mechanical device for converting the kinetic energy in the wind into a usable form.

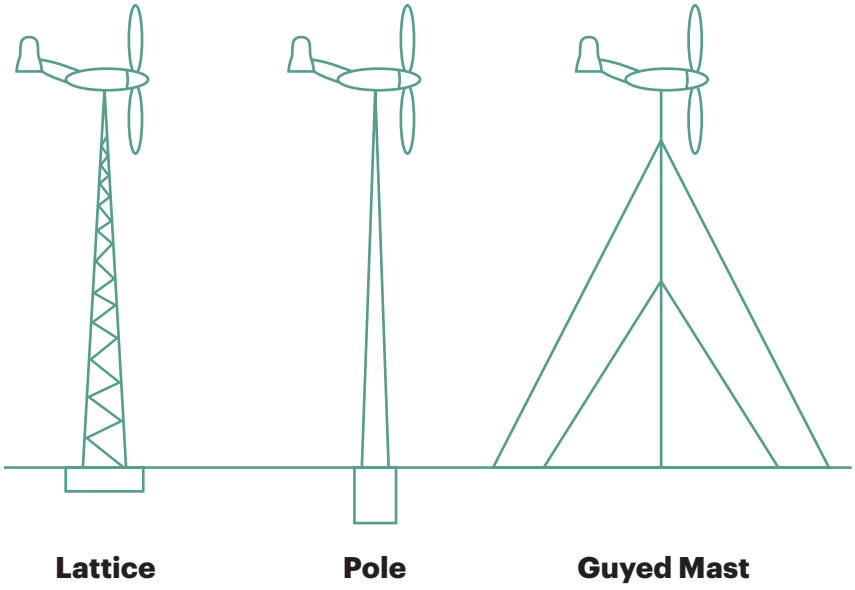

FIG. 1
Illustration of Various Types of Towers

H. Tower Height. The vertical measurement from the base of the tower to the top of the tower.

I. Wind Barrier. Any structure, including, but not limited to, trees and buildings, that blocks the flow of wind.

J. Wind Energy Conversion System (WECS). A machine that converts the kinetic energy in the wind into a usable form (commonly known as a "wind turbine"). A WECS may include one or more wind turbines, towers, associated control or conversion electronics, transformers, maintenance and control facilities, or other components used in the system.

K. Wind Energy Facility. The equipment, machinery and related infrastructure used to convert wind to electricity and transmit that electricity including, but not limited to, any WECS, wind measurement towers, batteries, inverters, on-site transmission and power lines, access roads, and accessory structures.

L. Wind Turbine. See Wind Energy Conversion System (WECS).

4. Generally applicable development standards

A. Construction and Operation. Wind turbines and towers shall be constructed and operated in compliance with all local, state, and federal regulations.

B. Setbacks.

(i) Free-standing wind turbines shall be set back by a minimum distance equivalent to 1.1 times tower height from all property lines and overhead utility or transmission lines.

(ii) Free standing wind turbines shall be set back by a minimum distance equivalent to 1.5 times tower height from all existing residences and other structures.

(iii) Each wind turbine shall be set back by a minimum distance equivalent to 2 times tower height from the nearest school.

(iv) On a single tax lot, multiple wind turbines shall be setback from each other by a minimum distance equivalent to 2 times the height of the tallest tower.

(v) These setback requirements are not applicable to rooftop wind turbines.

NOTE: To function, wind turbines must be tall and unobstructed, which means that issues will inevitably arise regarding the rights of abutting property owners/property lines, inhabited structures, public roads, and electrical lines. To avoid issues related to the height of WECS, Troutdale should consider requiring that wind turbines, particularly in residential districts, be "set back" a certain distance from neighboring property lines, inhabited structures, public roads, and electrical lines. Such mandated setback distances tend to reflect the concerns of neighbors, the WECS owner, and the community.

EXAMPLES:

- WECS shall be set back [1.5] times tower height from all existing residences on a non-participating landowner's property.
- WECS shall be set back [2] times tower height from the nearest school, hospital, church, or public library.
- Each WECS shall be set back [1] times tower height from all property lines, overhead utility or transmission lines, other towers, electrical substations, meteorological towers, and public roads

C. Approved wind turbine design.

(i) Each wind turbine shall be equipped with both manual and automatic controls to limit the rotational speed of the blade within the design limits of the rotor. Manual electrical or overspeed shutdown disconnect switches shall be provided and clearly labeled on the wind turbine structure. No WECS shall be permitted which lacks an automatic braking, governing, or feathering system to prevent uncontrolled rotation, over speeding, and excessive pressure on the tower structure, rotor blades, and turbine components.

(ii) Wind turbines and towers shall meet all state and federal and design requirements.

D. Lighting. No wind turbine or tower shall be artificially lighted unless such lighting is otherwise required by Federal or State law. A light temporarily used to inspect a turbine, tower, and associated equipment shall be permissible, providing the light is only used for inspection purposes and not left on for an extended period of time. Minimal ground level security lighting is permitted.

E. Wiring.

(i) All electrical wires associated with a wind turbine or tower, other than wires necessary to connect the wind generator to the tower wiring, the tower wiring to the disconnect junction box, and the grounding wires, shall be located underground.

(ii) For rooftop wind turbines, all wiring shall be run through the attached building or otherwise out of sight from any public right-of-way.

F. Sound. Audible sound from wind turbines, measured at the property boundary shall not exceed 55 dBA.

G. Climbing. To prevent unauthorized climbing, towers of freestanding wind turbines shall be installed without climbing aids for the first 12 feet of the tower or pole.

H. Rotor Swept Area. In Residential zones, the maximum rotor swept area is 50 square feet. In commercial/mixed use, and campus institutional zones, the maximum rotor swept area is 150 square feet.

I. Multiple WECS. Subject to the requirements of this subchapter, multiple WECS may be deployed on the same lot, parcel or roof, so long as the total rated capacity of the combined SWECS does not exceed the peak demand of the extant buildings.

J. Additional Rooftop Wind Turbine Standards. In Residential Zones, rooftop wind turbines shall not extend more than 20 feet above the highest point of the roof. Rooftop wind turbine towers shall be setback from the edge of the roof a minimum distance equivalent to 1.5 times the height of the tower. On a single roof, multiple rooftop wind turbines shall be setback from each other by a minimum distance equivalent to 2 times the height of the tallest tower.

FIG. 2

Bladeless Rooftop Wind Turbine

Source: Consumer Energy Alliance, https://consumerenergyalliance.org/2021/04/ceas-top-5-favorite-energy-stories-this-week-april-2/

5. Abandonment

If a wind energy conversion system is inoperable for two years, it shall be removed by the owner.

6. Nuisance Exemption

Wind energy conversion systems in compliance with this subchapter are not a public or private nuisance.

7. Property Tax

In accordance with ORS 307.175, a Wind Energy Conversion System in compliance with this subchapter is exempt from ad valorem property taxation.

Draft Ordinance A: Approval Procedures Based on Scale

Draft Ordinance A Contents

1. Findings and Purpose
2. Applicability
3. Definitions
4. Permitted Uses
5. Development Standards
6. Application Process and Approval Procedure
7. Abandonment
8. Nuisance Exemption
9. Property Tax

Draft Ordinance A

1. Findings and Purpose

See Shared Provisions above.

2. Applicability

See Shared Provisions above.

3. Definitions

In addition to the shared definitions above, the following definitions are applicable to this subchapter.

A. Size I/Very Small Wind Energy Conversion System. One wind turbine with a rated nameplate capacity of no more than 15 kW.
B. Size II/Small Wind Energy Conversion System. One or more wind turbines with a combined rated nameplate capacity of 100 kW or less; these facilities typically consist of a single turbine producing electricity for on-site consumption.
C. Size III/Medium Wind Energy Conversion System. One or more wind turbines with a combined rated nameplate capacity of greater than 100 KW but no greater than 1 MW; these facilities typically consist of one to several turbines producing electricity for on-site consumption.

4. Permitted Uses

No wind energy facility shall be constructed, reconstructed, or modified in the City of Troutdale except in compliance with this subchapter. Where a WECS has been granted necessary permits, variances or other land use authorizations by the Troutdale Planning Commission and has been built and is operating under such authorizations, such existing use(s) may continue under the terms of such authorization so long as the use is not changed, extended, enlarged or structurally altered.

4.1 Size I/Very Small Wind Energy Conversion Systems

A. A Size I/very small WECS is allowed as an accessory use in all zones in which structures are permitted.
B. A Size I/Very Small WECS is an allowed accessory use subject to Type I review and approval on any lot or parcel that is 0.5 acres or larger (20,000 sq. ft. or larger) in residential zones, agricultural zones, industrial zones, and commercial zones.
C. A Size I/Very Small WECS is an allowed accessory use subject to Type II review and approval on any lot or parcel that is less than 0.5 acres (5,000- below 20,000 Sq. Ft.) in areas designated as residential zones, agricultural zones, industrial zones, and commercial zones.
D. Notwithstanding any other part of this subchapter, a conditional use permit (Type III review and approval procedure) is required for any Size II/Small WECS in areas designated in this subchapter as "areas of potential sensitivity."
E. Prior to installation of any Size I/ Very Small WECS, a building permit shall be applied for and obtained from the Troutdale Community Development Department.

NOTE: Some municipalities allow for the construction of very small wind turbines based on height and lot size alone.

EXAMPLE: Very small WECS no shorter than 10 feet and no taller than 60 feet are permitted subject to Type II procedures on all lots no larger than 0.5 acres, and very small WECS are permitted subject to a building permit on lots larger than 0.5 acres.

4.2 Size II/Small Wind Energy Conversion Systems

A. A Size II/small wind energy system is allowed as an accessory use in all zones in which structures are permitted.
B. A Size II/small WECS is an allowed accessory use subject to Type I review and approval on lots or parcels 1 acre (40,000 sq. ft.) or larger in areas designated as residential zones, agricultural zones, industrial zones, and commercial zones.
C. A Size II/small WECS is an allowed accessory use subject to Type II review and approval on lots or parcels smaller than 1 acre in areas

designated as residential zones, agricultural zones, industrial zones, and commercial zones.

D. Prior to installation of all Size II/ small WECS, a building permit shall be applied for and obtained from the Troutdale Community Development Department.

4.3 Size III/Medium Wind Energy Conversion Systems.

A. A Size III/medium wind energy system is allowed as a conditional use in all zones in which structures are permitted.

B. No Medium wind energy facility shall be constructed, reconstructed, or modified except pursuant to site plan approval and a conditional use permit issued in accordance with this subchapter.

4.4 Areas of Potential Sensitivity.

A. Notwithstanding any other provision of this subchapter, any Size I/very small WECS or Size II/small WECS in an area of potential sensitivity requires site plan approval and a conditional use permit.

B. Areas of potential sensitivity are:

(i) Areas within a 100-year Flood Hazard zone designated V or AE zone on the FEMA Flood Maps.

(ii) Historic Landmark Protection areas as designated in Section 4.200 of the Troutdale Development Code.

(iii) Land Conservation districts.

(iv) Areas within 100 feet landward of a tidal or freshwater wetland.

(v) Vegetation Corridor and Slope District designated in Section 4.300 of the Troutdale Development Code.

NOTE: This list of potentially sensitive areas is illustrative only. The intent is to provide examples of districts where the City may, after discretionary review of the specific context of an application, deem development of a very small or small WECS to be appropriate.

(vi) Airport Approach Safety Zone designated in Section 4.100 of the Troutdale Development Code.

(vii) Town Center District as designated in Section 4.600 of the Troutdale Development Code.

5. Development Standards

5.1 Generally applicable standards

See shared provisions above.

5.2 System Height.

A. Freestanding wind turbine towers in compliance with the setback requirements of this subchapter are exempt from all other structural height restrictions found in the Troutdale Development Code.

B. Total system height of a Size I/ very small WECS and Size II/small WECS may be at least 30' above both (i) any obstruction within a 500' radius, and (ii) the surrounding tree height, and shall be allowed to be tall enough to facilitate proper functioning of the WECS based on industry standards.

C. Total system height of a Size III/ medium WECS may be no more than [insert City of Troutdale's preference]. Turbines taller than [insert City of Troutdale's preference] may be allowed, subject to approval of a variance.

NOTE: Zoning height limitations can prevent turbines from generating any meaningful amount of energy. Generally, the higher the turbine, the more energy it will generate. Additionally, taller WECS are harder to hear and harder to see. It would be wise to state in the ordinance that wind energy systems should have an allowable height that facilitates a reasonable amount of energy production. Some model ordinances accomplish this by stating that there is no maximum height restriction for very small and small WECS.

EXAMPLE: "Maximum System Height: There is no limitation on system height, except as imposed by FAA regulations and the required setbacks."

5.3 Aesthetics

Subject to any applicable FAA requirements, all visible components of a Size II/small WECS or Size III/medium WECS components shall make use of materials and textures that blend the device or facility into the natural setting and existing environment to the extent possible.

5.4 Blade Clearance

Turbine blades of freestanding Size II/small WECS or Size III/medium WECS must come no closer than 30 feet from the ground or any structure or other obstruction.

5.5 Shadow Flicker

Size II/small WECS and Size III/medium WECS shall be located in a manner that makes reasonable efforts to minimize shadow flicker on any occupied residence, building, or outdoor area on a non-participating landowner's property.

5.6 Signage.

A. Any non-residential or commercial Size II/small WECS or Size III/medium WECS must have a sign that is clearly visible that warns of electrical shock or high voltage and harm from revolving machinery. Signage must include a 24-hour emergency contact number.

B. All signs, other than the manufacturer's or installer's identification, appropriate warning signs, and owner identification on a wind generator, tower, building, or other structure visible from any public right-of-way shall be prohibited. No lettering, company insignia, brand names, logo, or graphics shall be allowed on the tower or blades.

6. Application Process and Approval Procedure

6.1 Application Process

A. Permitted or incidental use permits are required for a Size I WECS on any lot that is larger than 0.5 acres (20,000 square feet) and a Size II WECS on any lot that is 1 acre or larger (40,000 square feet). Permitted or incidental use permits are reviewed under Type I procedures, as defined in Section 2.005 of the Troutdale Development Code.

B. Accessory use permits are required for a Size I WECS on any lot that is less than 0.5 acres (less than 20,000 square feet) and a Size II WECS on any lot or parcel that is smaller than 1 acre (20,000 square feet). Accessory use permits are reviewed under Type II procedures,

as defined in Section 2.005 of the Troutdale Development Code.

C. Conditional use permits are required for Size III WECS and any WECS in potentially sensitive areas. Conditional use applications are reviewed pursuant to Type III procedures, as defined in Section 2.005 of the Troutdale Development Code, which allow the Planning Commission to attach conditions of approval to assure compliance with applicable criteria and standards, mitigate potential adverse impacts where such mitigation is consistent with an established policy of the City, and conform to applicable legal requirements.

6.2 Size I/very small WECS and Size II/ small WECS permit applications

A. The permit application for construction of Size I/very small WECS and Size II/small WECS shall be accompanied by a plot plan which includes the following:

(i) Name, address, and telephone number of the applicant and landowner and affidavit of agreement between landowner and facility owner, if any.

(ii) Address or other property identification of each proposed facility including tax map number, existing use and acreage of parcel, and zoning designation.

(iii) Property lines and physical dimensions of the property.

(iv) Location, dimensions, and types of existing major structures on the property.

(v) The proposed location, elevation, and total height of each WECS, including the location of the proposed WECS tower(s).

(vi) All other proposed WECS facilities on the site including transformers, electrical lines, substations, storage or maintenance units, ancillary equipment or structures, transmission lines, and fencing.

(vii) The right-of-way of any public road that is contiguous with the property.

(viii) Location of any overhead utility lines.

(ix) All WECS specifications, including manufacturer and model, rotor diameter, tower height, tower type (freestanding or guyed).

(x) Adjoining properties within 500 feet of the site including zoning designations, residences, schools, churches, hospitals, and libraries within 1,000 feet of each tower.

(xi) Setback lines.

B. Expiration. A permit issued pursuant to this ordinance shall expire if:

(i) The small wind energy system is not installed and functioning within 24-months from the date the permit is issued; or

(ii) The small wind energy system is out of service or otherwise unused for a continuous 24-month period.

6.3 Size III/Medium WECS conditional use permit applications.

A. An applicant for a Size III/Medium WECS Conditional Use permit must submit an application to the City of Troutdale Planning Department on the form prescribed by the Department.

B. An application for approval of a Size III/Medium WECS Conditional Use permit must include the following:

(i) A general description of the proposed energy project, including a legal description of the property on which the project would be located.

(ii) Maps showing the physical features and land uses of the project area, both before and after construction of the proposed energy project. The applicant must include at least one map printed on a standard 8 1/2" x 11" page. The applicant must include maps or color photographs that show:

1. The project area boundaries.
2. The location, height and dimensions of all existing and proposed structures and fencing.
3. The location, grades and dimensions of all temporary and permanent on-site roads and access roads from the nearest county or state-maintained road.
4. State and federal resource lands and other protected areas near the project site.
5. Existing topography with contours that vary depending on the size and slope of the site.
6. Water bodies, waterways, wetlands and drainage channels.
7. The location of and distance to residences and other noise sensitive properties that could be affected by noise generated by the proposed energy project.
8. The location and distance to public or private airports or airstrips.

(iii) Copies of all baseline wildlife studies applicable to the project site.

(iv) A list of permits, approvals or other actions that the applicant has requested or will request from other government agencies or from public or privately-owned utility companies serving the site.

(v) An explanation of all construction and other development associated with the proposed energy project and how that construction and development complies with the approval standards.

(vi) A transportation plan showing how vehicles would access the site and describing the impacts of the proposed energy project on the local and regional road system during construction and operation.

(vii) A revegetation plan for restoring areas temporarily disturbed during construction.

(viii) A drainage and erosion control plan for construction and operation developed in consultation with the city public works department.

(ix) A fire protection plan for construction and operation of the facility.

(x) A description of actions the applicant would take to restore the site to a useful, non-hazardous condition upon project termination.

C. Expiration. A permit issued pursuant to this ordinance shall expire if:

(i) The small wind energy system is not installed and functioning within 24-months from the date the permit is issued; or

(ii) The small wind energy system is out of service or otherwise unused for a continuous 24-month period.

7. Abandonment
See Shared Provisions above.

8. Nuisance exemption
See Shared Provisions above.

9. Property tax
See Shared Provisions above.

Draft Ordinance B: Small WECS Development Under Type I Procedures

Draft Ordinance B Contents

1. Findings and Purpose
2. Applicability
3. Definitions
4. Permitted Uses
5. Development Standards
6. Abandonment
7. Nuisance Exemption
8. Property Tax

Draft Ordinance B

1. Findings and Purpose
See Shared Provisions above.

2. Applicability.

A. The substantive and procedural requirements of this chapter shall apply to all small-scale wind energy conversion systems (SWECS) that are not governed by other Oregon laws which are proposed, operated, modified, or constructed after the effective date of the City of Troutdale's adopting of this Proposed Ordinance.
B. SWECS for which a required permit has been properly issued and upon which construction has commenced prior to the effective date of this chapter shall not be required to meet the requirements of this chapter.
C. Notwithstanding paragraph 2.B., any such preexisting SWECS that does not provide energy for a continuous period of 12 months shall meet the requirements of this chapter prior to recommencing production of energy.
D. No modification or alteration, excluding regular maintenance and repair, to an existing SWEC shall be allowed without full compliance with this chapter.

3. Definitions
In addition to the shared definitions above, the following definition is applicable to this subchapter.

3.1 Small-scale wind energy conversion systems
A small-scale wind energy conversion system is a wind energy conversion system that generates a maximum of 10 kilowatts kW or less of electrical current.

4. Permitted Uses.

4.1 Small-scale Wind Energy Conversion Systems are accessory uses in the following zone designations:

A. 3.010 R-20 Single-Family Residential
B. 3.020 R-10 Single-Family Residential
C. 3.030 R-7 Single-Family Residential
D. 3.040 R-5 Single-Family Residential
E. 3.050 R-4 Attached Residential
F. 3.060 A-2 Apartment Residential
G. 3.100 NC Neighborhood Commercial
H. 3.110 CC Community Commercial
I. 3.120 GC General Commercial
J. 3.140 MO/H Mixed Office/Housing
K. 3.150 IP Industrial Park
L. 3.160 LI Light Industrial
M. 3.170 GI General Industrial

4.2 Prohibited Uses. Small-scale Wind Energy Conversion Systems are prohibited in the following zones:

A. 3.130 CBD Central Business District
B. 3.180 OS Open Space.
C. 4.100 Airport Landing Field Overlay Zone

4.3 Procedure Type

The Type I procedure, as described in Section 2.050 of this Code, shall apply to Small-scale Wind Energy Conversion System applications.

5. Development Standards

In addition to the development standards set forth in the shared provisions above, Small-scale Wind Energy Conversion Systems must meet the following Development Standards.

5.1 Blade Clearance

Turbine blades of freestanding wind turbines must come no closer than 30 feet from the ground or any structure or other obstruction.

5.2 Signage

A. Any non-residential or commercial SWECS must have a sign that is clearly visible that warns of electrical shock or high voltage and harm from revolving machinery. Signage must include a 24-hour emergency contact number.
B. All signs, other than the manufacturer's or installer's identification, appropriate warning signs, and owner identification on a wind generator, tower, building, or other structure visible from any public right-of-way shall be prohibited. No lettering, company insignia, brand names, logo, or graphics shall be allowed on the tower or blades.

5.3 Total System Height.

A. SWECS in compliance with all setback requirements listed in this section are exempt from all other structural height restrictions found in the Troutdale Development Code.
B. In any case, the maximum total system height of SWECS shall be [insert City of Troutdale's preference]. SWECS taller than [insert City of Troutdale's preference] may be allowed, subject to approval of a variance.

6. Abandonment

See Shared Provisions above.

7. Nuisance Exemption

See Shared Provisions above.

8. Property Tax

See Shared Provisions above.

AMENDING THE ZONING CODE

Communities interested in examining and potentially removing regulatory barriers to small- and/or medium-scale wind energy should begin by reviewing their comprehensive plan to determine how wind fits within the community's values and vision for the future. Communities can take advantage of the planning stage to build community engagement and educate the public and other stakeholders about the attributes of small- and medium-scale wind. This presents an opportunity to educate the community about the benefits of wind, to debunk any myths about wind that community members may harbor, and to explore what risks small- and/or medium-scale wind energy systems pose within the context of the community. Since Oregon law requires that zoning be in accordance with the locality's comprehensive plan, the community should evaluate whether to add a wind energy component to its master plan or to adopt a policy specific to wind energy, either of which would constitute an amendment to the community's comprehensive plan under Oregon law.

The next step will be to assess the zoning ordinance to determine where wind fits within the ordinance, define wind energy systems, and amend district use regulations to allow wind, for example by specifying whether wind is allowed as an accessory use and/or special use; add exceptions to certain limitations, such as height and setback limitations, as needed to facilitate wind; and define development standards for the uses.

To facilitate wind and its benefits, while also preserving other values important to the local community, localities may also consider: a) amending major and minor site plan review requirements, b) evaluating any proposed plan and code revisions under SEQR, (c) evaluating whether wind energy system applications should be subject to review by any other local boards, and (d) considering whether or how to incentivize wind.

Thus, to summarize, communities interested in examining and potentially removing regulatory barriers to small- and/or medium-scale wind energy should consider taking the following steps:

1. Plan for Small- and/or Medium-Scale Wind

A. Engage the public—Explore values of the community and educate the community regarding small- and/or medium-scale wind; be careful to distinguish between data and other information about utility-scale wind versus small- and/or medium-scale wind
B. Add a wind energy component to the comprehensive plan by adding a wind energy component to the community's master plan or adopting a wind energy policy or plan

2. Amend Zoning Code

A. Consider where small- and/or medium- scale wind fits in the code—for example, should the local government add a wind-specific section to the code, or amend existing sections where relevant to address wind?
B. Define small and medium wind energy conversion systems (WECS).
C. Amend district use regulations to allow small- and/or medium-scale wind in all or some districts and specify whether wind is allowed as a Principal, Accessory, Secondary, or Special Use; additionally or alternatively, create a small- and/or medium-scale wind overlay district.

D. Other considerations (outside the scope of this model ordinance)
- Consider amendment to major and minor site plan review requirements,
- Consider whether to require review by other local boards, and
- Consider incentivizing wind.

FURTHER CONSIDERATIONS

Aesthetics

Given the City of Troutdale's proximity to natural beauty, policymakers and the public will likely have concerns about the aesthetics of wind turbines. Some cities respond to such concerns by prohibiting wind development along ridgelines or limiting the height of wind turbines. Unfortunately, such limitations can end up making wind development untenable, and may not even be warranted in the small- or medium-scale wind context. To maximize energy productivity, wind turbines need to be located where there is a substantial wind resource, which requires wind turbines to be located well above surrounding obstructions like trees or buildings; in ridge installations, this will likely be along the ridgeline. A robust public education and participation process is therefore critical to addressing aesthetic concerns and educating the public and policymakers about wind energy technology and the actual visual impacts of small- and/or medium-scale wind turbines—which, unlike utility scale turbines, are often difficult to see from a distance.

Shadow flicker can be mitigated in Completing visual impact assessments and making them accessible to the public is considered by some to be a best practice. The required level of detail can be adjustable, though, to reflect the particular landscape, population density, and proximity to especially valued scenic vistas. To some extent, the retention of high-concern scenic vistas could be managed by exclusion zones and setback criteria.

In instances where federal funds are used or where projects are on federal lands, the process for determining potential aesthetic impacts is relatively well defined under the National Environmental Policy Act (NEPA). In other areas, clear definitions of geographic scope and video or photo simulations have been required. For medium-scale wind projects, early engagement of nearby property owners and residents, effective and accurate forecasting of a project's visual impact, and factual discussions with landowners and community residents are essential to maintain public trust around the potential project. Utilizing similar turbine types to create consistency and uniformity within a project, selecting turbines of higher generating capacity to require fewer turbine installations for a given energy output, and placing as much electrical infrastructure below grade as possible may also help to minimize aesthetic concerns.

Net-Metering, ORS 757.300

Net-metering describes the process through which a renewable energy producer can sell back to the utility excess energy that the producer does not need to meet its energy needs. The statute enables customers to participate in net-metering and requires utility companies to allow net-metering and thus the flow of energy in both directions. Section 8 of the statute clarifies that residential customers are limited to selling back to the utility no more than 25 KW/year.

The full text of the statute can be found here: *https://www.oregonlaws.org/ors/757.300*.

Safety Considerations

Attractive Nuisance

Critics of WECS often voice concerns that WECS could potentially be a dangerous climbing temptation that could result in injury and costly litigation. Thus, the city of Troutdale should consider the following requirements that tend to prevent issues related to attractive nuisance. Note that these concerns may not be applicable to a very small or small WECS.

Fencing

WECS owners could consider fencing around the WECS to deter unauthorized use of the WECS. However, fencing is itself climbable and presents its own problems related to attractive nuisance. Moreover, fencing also prevents quick access to WECS in an emergency. Thus, less cumbersome alternatives should be considered first.

Ladder, step, and rung restrictions

The city of Troutdale should consider mandating that ladders, steps, and rungs be removed and/or safely locked to prevent unauthorized use. Moreover, Troutdale should consider mandating that all access points to accompanying electrical equipment be locked.

Signage

The city of Troutdale should consider requiring WECS owners install appropriate warning signs on wind turbine towers, generators, and other accompanying structures.

EXAMPLE (DWEA Model): "Danger, High Voltage" sign shall be installed where it is clearly visible by persons standing near the tower base.

EXAMPLE (Sabin Center/City of Augusta): There shall be clearly visible signs on all WECS, electrical equipment, and wind energy facility entrances warning of electrical shock or high voltage and harm from revolving machinery. Signage shall also include a 24-hour emergency contact number.

Ice Shedding/Throw

A wind turbine blade is an airfoil. Airplane wings must be de-iced because the wing will lose its aerodynamic qualities if coated with ice; the same is true for a wind turbine blade. Just a small layer of ice will cause a small- or medium-sized wind turbine blade to lose its ability to create lift and will thereby inhibit the turbine from spinning. Thus, because ice inhibits the blades from spinning, the risk of ice landing at a specific location reduces very quickly with distance and any risk related to shedding ice is generally limited to the area immediately beneath the turbine. Therefore, the risk of ice impacts can be mitigated by calculating the maximum distance that ice can be thrown and locating turbines away from any occupied structure, road, or public use area.

Structural and Electrical Failure

Requiring code compliance that applies to installation or construction of accessory use structures will typically be sufficient to protect the private and public interests in safe and reliable installations of size I and size II WECS. To ensure the structural and electrical integrity of such WECS, Troutdale should consider requiring that owners of WECS comply with federal or international standards (National Electric Code, International Building Code) or implement more stringent regulations in local electrical and building codes.

DWEA Example

Compliance with National Electrical Code (NEC): The installation of a Small Wind Energy System shall comply with section 694 (or the most-current applicable section, if updated) of the NEC. Applications must be accompanied by a single line drawing of the electrical components in sufficient detail to allow for a determination that the manner of installation conforms to the NEC.

Shadow Flicker

Another often-cited concern related to WECS is shadow flicker, which occurs when shadows of the rotating blades pass over objects or cross a window. A viewer can only see the shadow flicker when the turbine is between the sun and the viewer or when the blades are perpendicular to the line between the sun and the viewer. On cloudy days, there is usually no flicker. Shadow flicker is also dependent upon wind direction and time of day. **Although shadow flicker presents a real concern for larger-scale systems, shadow flicker is seldom an issue for small and medium wind turbines because the maximum distance that a shadow can be cast is 15 rotor diameters (e.g., 315 feet for a 10-kw turbine).** Accordingly, shadow flicker is not generally recognized as an issue for smaller scale wind energy projects. As a result, very few ordinances address shadow flicker. Among the few that address shadow flicker, municipalities tend to limit the number of hours per year or minutes per day of shadow flicker, stipulate that landscaping or other land uses be designed to counter the effects of shadow flicker, or require that a shadow flicker analysis be conducted to determine the extent of the shadow flicker on neighboring structures.

Shawano County, Wisconsin Example

The facility shall be designed such that shadow flicker or blade glint will not fall on, or in any existing sensitive receptor. Shadow flicker or blade glint expected to fall on a roadway, or a portion of a residential parcel may be acceptable under the following circumstances:

1. The flicker or glint will not exceed 10 hours per year.
2. The flicker or glint will fall more than 100 feet from an existing residence.
3. The traffic volumes are fewer than 500 vehicles per day on the roadway.

Banks County, Michigan Example
Landscaping shall be designed to counter the effects of shadow flicker on any neighboring residences or roadways caused by the rotor rotation in the sunlight.

Long Lake, Michigan Example
During the impact analysis of the large WECS, written documentation shall be provided projecting 1) the shadow flicker on any existing structures located off the property on which the large system will be constructed, and 2) the extent and duration of the shadow flickers on these existing structures.

Sound

Modern Turbines emit sound that is barely discernible from ambient noise. Sound from traffic, rustling trees, airplanes, and people often mask the dull "white noise" of a Size I and II WECS. However, people will inevitably object to construction of WECS based on noise concerns. Thus, the City of Troutdale consider including noise-related provisions in its code. Examples include:

A. Requiring description and map of a wind project's noise producing features and the noise-sensitive environment, including the range of noise levels and the tonal and frequency characteristics expected.
B. Restricting WECS noise production to a statutorily defined level (ordinances typically cap noise levels at 45-60dBA).
C. Except during short-term events like storms and utility outages, Troutdale should consider restricting WECS sound pressure levels, so they do not exceed the definition of "nuisance noise" as established by existing zoning code.
   (i) Example (Town of Barre, Town of Concord): The noise level generated by a WECS shall not exceed [45] A-weighted decibels ("dBA") for more than six minutes out of any one-hour time period, or exceed 50 dBA for any time period, as measured at the [site property line] of a non-participating residence.
   (ii) Example (Town of Holland): The noise level generated by a WECS must also not increase ambient sound levels by more than 3 dBA at any sensitive noise receptors, including residences, hospitals, libraries, schools, and places of worship, within 2,500 feet of the site property line.

Tax Incentives

Tax incentives can encourage the installation of wind turbines and other alternative energy devices. Tax incentives can also play a key role in fostering the support of local governments and building enthusiasm for the development of wind energy. These tax credits can take a variety of forms at the federal, state, and local level. Specifically, Oregon provides for this in two ways. First, Oregon provides a state level tax credit for specific alternative energy devices, and a reduction in the ad valorem tax caused by the installation of an alternative energy device.

Oregon regulations permit a tax credit for wind turbines that does not exceed the lesser of $6,000 or 50 percent of the installation costs. While this has a minimal impact for Troutdale specifically, may be worthwhile to consider implementing some of the Oregon requirements to maintain consistency. These regulations lay out siting, construction, warranty, and other requirements.

Additionally, ORS 307.175, for ad valorem tax purposes, does not assess any property value increase caused by the installation of an alternative energy device. As above, the included reference is due to the additional requirements imposed at the state level. Troutdale could also implement a similar system for any local ad valorem property tax or decide to expand the tax credit. The text in the proposed ordinance is based on the language of a Pennsylvania zoning ordinance.

Wildlife Protection

Ensuring that wildlife is significantly protected is important to local governments, wind advocates, and Oregonians in general. In pursuit of this goal, the proposed ordinance has a broad provision that allows Troutdale to adapt its policies and provision to protect its unique wildlife.

While each city or area will encounter different problems relating to wildlife and wind turbines, birds and bats are often the most impacted animals. That said, studies have indicated the wind turbines pose a minimal threat to birds and bats. Further, the energy savings that alternative energy systems can provide often provide greater benefits to wildlife than any potential harm. Any potential harm can be further mitigated through the use of various proactive steps by the local government. For example, some studies have found turning turbines off for 30 minutes before sunset and after sunrise can protect bat populations. Additionally, aviation nest intervention and anti-perch devices can be effective deterrents for birds.

The impact of wind turbines on trees and on other wildlife due to sounds is likely mitigated by the proposed ordinance. Trees can also be a significant concern in implementing wind turbines. However, the setback and height requirements will ensure that damage to trees is very unlikely. The sound restriction will also help ensure that the sound of wind turbines does not have a significant detrimental impact on wildlife.

Troutdale follows ordinances from the Metro Urban Growth Management Functional Plan. See section 3.07.1330. (https://www.oregonmetro.gov/urban-growth-management-functional-plan). Other plans, including the Park Master Plan, Sandy River, and Multnomah County Multi-Jurisdictional Natural Hazards Mitigation Plan, discuss wildlife protection policies, specifically in wildlife protection areas (*https://www.troutdaleoregon.gov/commdev/page/plans-reports*).

Avian and Bat Harm Mitigation

Designing wind turbines so that they are easier for birds to see and avoid.

Promising research has demonstrated that there are straightforward and cost-effective solutions that materially decrease avian fatality as the result of increased visibility and detectability. Painting a single blade of the turbine black has shown effective decreases in the death of birds. Furthermore, research has also shown that an anti-motion-smear patterns painted on all three blades mitigate avian fatalities. Anti-motion smear patterns constitute "a black bar on one blade that is not

repeated in the same location on the other two blades." Implementing either of these method is easiest and most cost-effective before the wind turbine is installed; however, retroactive painting of one or more blades would also help reduce fatalities, albeit with additional costs and burdens.

Curtailing blade rotation at low wind speeds during peak seasons of bat activity results in substantial reductions in the fatality of bats.
During the summer through the late fall, turning off wind turbines at dusk and night when wind speeds were below 6.5 meters/second can significantly reduce bat fatality. A study showed a reduction in fatality by 44 to 93 percent while only causing a less than one percent reduction in power generation.

Ultra-sonic "boom boxes" deter bats from getting too close to turbines.
This technology emits "continuous high-frequency sounds from 20 to 100 kilohertz," which interferes with the bats' use of echolocation and therefore keeps the bats away at a safe distance.

Siting Wind Turbines and the Need to Protect Habitats and Species

The location of proposed wind turbines is crucial and must be carefully chosen. When deciding, Troutdale should take into account the vegetation and/or habitat that may be infiltrated or degraded if a wind turbine were erected in a certain location. Specifically, Troutdale and its citizens must be aware of any endangered flora in the area as well as the presence of endangered or threatened species and thus whether the site will impact habitat. Potential mitigation measures include:

1. Siting individual turbines away from topographic features that attract concentrations of large raptors.
2. Siting turbines in areas that do not degrade habitat or threaten species.

RESOURCES AND FUNDING AVAILABLE FOR WIND TURBINE PROJECTS

When exploring options for funding wind turbine projects in Troutdale, the city should consider applying for grants and/or assistance from Portland General Electric as well as the Energy Trust of Oregon. Although approval is not guaranteed, both entities have opportunities for Troutdale to receive funding specifically for these renewable projects and they offer a promising way to make these goals a feasible reality.

PGE's Renewable Development Fund

PGE has a program wherein customers can elect to pay additional money in order to support and promote renewable energy. PGE uses this money to purchase renewable energy credits (RECs). Since the program must be revenue neutral, any extra money above the cost of the REC's goes directly to the Renewable Development Fund. This fund operates like a grant fund where PGE will fund up to 85% of the costs associated with a renewable energy project.

Municipalities must submit an application and receive approval from PGE in order to receive funding. Fortunately, PGE has many resources on its website that describe what a strong, compelling application entails. There will soon be webinars that describe at length what PGE hopes to support, located at portlandgeneral.com/rdf. Moreover, Troutdale can email Dan Jasonec at Daniel.Jasonec@pgn.com directly for any clarifying questions. Dan works directly on the grant project and is very happy to help.

While PGE has yet to fund any wind project through its RDF program, they are open to funding small and medium-scale wind projects, so long as they can determine the project will be a sound investment and produce sufficient amounts of energy. Troutdale should note that the projects must be new and that the goal of the program is to enable renewable energy projects that otherwise could not materialize without funding and support for PGE. The application period typically opens April 1st and closes June 1st.

Energy Trust of Oregon

The Energy Trust of Oregon wants to support locally produced renewable energy. The Trust will specifically support wind turbines that are municipally-owned and community-operated. The Trust can help in two main ways: (1) project development assistance, and (2) installation incentives. More information can be found at energytrust.org under the renewable energy section. It is important to note that if the Trust approves the application and provides help, then the Trust receives ownership of all RECs produced from the project in which it invested. The webpage requests that you contact Dave Moldal at (503) 445-2476 in order to determine your eligibility. You may also email him at *Dave.Moldal@energytrust.org*.

EXAMPLES: SMALL WIND IN OREGON

Although many cities in Oregon do not have small wind energy system provisions in their city codes, cities throughout the state have begun discussing and adopting small wind energy provisions. Below are selected sample development code provisions from cities in Oregon that have addressed small WECS development in their development codes.

Dayton

7.2.102.04 Conditional Uses

E. Small wind energy systems including compliance with Section 7.2.413.

7.2.413.01 Process and Accessory Use

The City of Dayton zone districts allow a small wind energy system as an accessory use. Each district establishes the process and requires compliance with Section 7.2.413.02.

7.2.413.02 General Standards

A. The minimum distance between the ground and any part of a rotor blade must be at least 20 feet. Additionally, wind turbines must be placed at least 30 feet above any physical wind barrier (e.g., trees or buildings) within a 300-foot radius unless verified in writing by the manufacturer that a lesser height is allowed.
B. Small wind energy systems may not be illuminated, except as needed to prevent creating a hazard to aircraft, nor may they bear any signs or advertising.
C. Small wind energy systems must have automatic braking, governing, or feathering system to prevent uncontrolled rotation, over speeding, and excessive pressure on the support structure, rotor blades and turbine components.

D. All wiring serving small wind energy systems must be underground.
E. Noise produced by small wind energy may not exceed 55dBA measured at the property line.
F. Small wind energy systems must not cause any interference with normal radio and television reception in the surrounding area, with any public safety agency or organization (including but not limited to sheriff, fire, and ambulance) transmissions, or with any microwavable communications link. The owner shall bear the cost of immediately eliminating any such interference should any occur or must immediately shut down the system or parts of the system causing the interference.
G. A finish (paint/surface) must be provided for the small wind energy system that reduces the visibility of the facility, including the rotors. In most circumstances this condition may be satisfied by painting the support structure and rotors with flat light haze gray paint. If the support structure is unpainted it must be of a single color throughout its height. The owner must maintain the finish, painted or unpainted, so that no discoloration is allowed to occur.
H. The diameter of the area swept by the rotors may not exceed 25 feet.

7.2.413.03 Free-Standing Systems

A. Setback. The minimum setback from any property line, overhead utility line, or public right-of-way shall be a distance equal to the vertical distance from the ground to the tip of the wind generator blade when the tip is at its highest point unless a variance application is approved. In addition to the system's structures, guy wires association with towers shall meet applicable setbacks for the zone district.
B. Height. Support structures for free-standing systems must be at least 60 feet tall and may not exceed 80 feet in height in any zone.
C. Security. Support structures for free-standing systems must be unclimbable from the ground to a height of at least 15 feet.
D. Number. A maximum of one free-standing small wind generator system may be allowed per property.

7.2.413.04 Roof-Mounted Systems, Additional Standards

Small wind energy systems may be mounted on the roof of a structure as an appurtenance.

A. Height. Roof-mounted systems may not be more than 5 feet over the maximum allowed height for the structure.
B. Number. There is no maximum number of roof-mounted systems permitted.
C. Engineering Report. Before any roof-mounted system is mounted the property owner must submit a report prepared by an Oregon Licensed professional engineer attesting to the fact that the structure to which the system will be mounted is or will be sufficient strong to support the system and to withstand the wind, vibratory, and other loads to which would be subjected as a result of mounting the system on it. This report is subject to approval by the City Manager or his/her designee prior to mounting of the system.

7.2.413.05 Small Wind Energy Systems Adjacent to Historic Properties

A. A Conditional Use permit shall be required to place a small wind energy system adjacent to historic properties on an individual lot or parcel adjacent to a significant historical resource as identified in the Dayton Comprehensive Plan. The application shall be subject to the decision criteria contained in Section 7.3.107 as well as the following factors:

1. Location. The system and any accompanying accessory features shall be situated to maintain the greatest possible distance from the adjacent historical site or structure while maintaining compliance with the setback requirements.
2. Screening. Screening and buffering shall be required. Screening may include fencing, berms, vegetation or any combination thereof. The screening shall be designed to maintain the visual integrity of the adjacent historic site or building. For example, a wooden fence may be required instead of a chain-link fence.
3. Intent. It is not the intent of this section to grant a conditional use permit in all circumstances, even if factors 1 and 2 above are successfully met. The Conditional Use shall be granted only under those circumstances which are unique to the subject property and will not impair or adversely impact the integrity of the adjacent to historical site. The burden of proof shall be placed by the applicant to ensure these concerns are adequately addressed.

Lincoln City

17.80.090 Small wind energy systems

A. Accessory Use. A small wind energy system is allowed as an accessory use in all zones in which structures are permitted.

B. General Standards.

1. The minimum distance between the ground and any part of a rotor blade must be at least 20 feet.
2. Small wind energy systems may not be illuminated, nor may they bear any signs or advertising.
3. Small wind energy systems must have automatic braking, governing, or feathering system to prevent uncontrolled rotation, overspeeding, and excessive pressure on the support structure, rotor blades, and turbine components.
4. All wiring serving small wind energy systems must be underground.
5. Noise produced by small wind energy systems may not exceed 55 dBA measured at the property line.
6. Small wind energy systems must not cause any interference with normal radio and television reception in the surrounding area, with any public safety agency or organization (including but not limited to police, fire, ambulance, and Coast Guard) radio transmissions, or with any microwave communications link. The owner shall bear the costs of immediately eliminating any such interference should any occur or must immediately shut down the system or parts of the system causing the interference.
7. A finish (paint/surface) must be provided for the small wind energy system that reduces the visibility of the facility, including the rotors. In most circumstances this condition

may be satisfied by painting the support structure and rotors with flat light haze gray paint. If the support structure is unpainted it must be of a single color throughout its height. The owner must maintain the finish, painted or unpainted, so that no discoloration is allowed to occur.

8. The diameter of the area swept by the rotors may not exceed 25 feet.

C. Freestanding Systems – Additional Standards. Small wind energy systems may be mounted on a tower detached from other structures on the lot.

1. Setback. The minimum setback from any property line, overhead utility line, or public right-of-way shall be a distance equal to the vertical distance from the ground to the tip of a wind generator blade when the tip is at its highest point unless the affected utility, property owner, or governmental entity grants written permission for a lesser setback. In addition to the system's structures, guy wires associated with towers shall meet applicable setbacks for the zone district.
2. Height. Support structures for freestanding systems may not exceed 80 feet in height.
3. Security. Support structures for freestanding systems must be unclimbable from the ground to a height of at least 15 feet.
4. Number. A maximum of one freestanding small wind generator system may be allowed on a parcel of 25,000 square feet or less. One additional freestanding system is allowed for each 12,500 square feet of lot area above 25,000 square feet.

Seaside

17.52.270 Wind Turbines

A. The construction and installation of a wind turbine within City limits must first apply for and be granted a Conditional Use Permit from the Planning Commission.
B. Notice of an application for installation of a small wind turbine shall be provided to property owners within 300 feet of the property on which the system is to be located.
C. Tower heights of not more than 65 feet shall be allowed on parcels between one and five acres and tower heights of not more than 80 feet shall be allowed on parcels of five acres or more; provided, that the application includes evidence that the proposed height does not exceed the height requirements of the manufacturer or distributor or of the system.
D. Setbacks for the system shall be no closer from the property line than the height of the system; provided, that it also complies with any fire setback requirements pursuant to Section 4290 of the Public Resources Code.
E. Decibel levels for the system tower shall not exceed the lesser of 60 decibels (DBA) as measured at the closest neighboring inhabited dwelling, except during short-term events such as utility outages and severe windstorms.
F. The system's turbine must have been approved by the California Energy Commission as qualifying under the emerging renewables fund of the California Energy Commission's renewables investment plan or certified by a national program recognized by the Energy Commission.

G. The application shall include standard drawings and an engineering analysis of the system's tower, showing compliance with the California Building Code or the California Building Standards Code and certification by a professional mechanical, structural, or civil engineer licensed by this state. However, a wet stamp shall not be required; provided, that the application demonstrates that the system is designed to meet the most stringent wind requirements (California Building Code wind exposure D), the requirements for the worst seismic class (Seismic 4), and the weakest soil class, with a soil strength of not more than 1,000 pounds per square foot, or other relevant conditions normally required by the City. The application shall include a line drawing of the electrical components of the system in sufficient detail to allow for a determination that the manner of installation conforms to the National Electric Code.

H. The system shall comply with all applicable Federal Aviation Administration requirements, including Subpart B (commencing with Section 77.11) of Part 77 of Title 14 of the Code of Federal Regulations regarding installations close to airports, and the state Aeronautics Act (Part 1 (commencing with Section 21001) of Division 9 of the Public Utilities Code).

I. The applicant shall provide information demonstrating that the system will be used primarily to reduce on-site consumption of electricity.

J. The application shall include evidence, unless the applicant does not plan to connect the system to the electricity grid, that the electric utility service provider that serves the proposed site has been informed of the applicant's intent to install an interconnected customer-owned electricity generator. (Ord. 1044 § 2, 2017; Ord. 1025 § 19, 2015; Ord. 905 § 2, 2002).

EXAMPLE: "BEST PRACTICE" SMALL WIND CODE PROVISIONS

The following is an example of an accessory use ordinance in Schaumburg, Illinois. Schaumburg's ordinance is featured as a "best" practice for removing code barriers to small wind energy systems as-of-right on Sustainable City Code, a non-profit organization committed to helping "local governments build more resilient, environmental conscious, economically secure, and socially equitable communities."

§ 154.70 - Renewable Energy

B. Small Wind Energy Systems

1. Intent

The intent of these standards is to allow for the safe, effective, and efficient development use of small wind energy systems in the Village of Schaumburg.

2. General Requirements:

A. Accessory Structure: Small wind energy systems are permitted as accessory structures as detailed in this section.

B. Codes: All Federal Aviation Administration (FAA) regulations shall be adhered.

C. On-Site Use: Energy produced through the wind energy system shall be utilized on-site.
D. Signage: No signs shall be attached except for a manufacturer and/or installer identification and those required for safety, provided that they do not measure more than two (2) square feet.
E. Abandonment: If a small wind energy system is inoperable or abandoned for a period of twelve (12) consecutive months; the owner may be notified by the village that the energy system must either be repaired or removed within ninety (90) days.
F. Sound: Measured at the property line, the energy system shall not exceed fifty-five (55) dBA in residential (R) districts and sixty (60) dBA in all business (B) and manufacturing (M) districts; except during such short-term events as utility outage or a severe windstorm.
G. Clearance: Minimum clearance between the lowest tip of the rotor or blade and the ground shall be fifteen feet (15').
H. Utility Provider Notification: Written evidence must be provided at the time a building permit is requested that the utility company has been notified of the customer's intent to install a small wind energy system.
I. Additional Height: Additional height may be requested through the special use permit process. Refer to section 154.44 of this chapter.
1. In reviewing the request for additional height, such factors as height of the system in relationship to existing and potential structures, man-made or natural, and their impact on the systems efficacy shall be considered.

3. Freestanding Systems

Freestanding systems shall be developed according to the following parameters:

A. Special Use Permit: All freestanding systems require a special use permit. Refer to section 154.44 of this chapter.
B. Zoning Districts: Permitted in all districts, except in the R-6, R-6C, and R-7 districts when the lots are utilized for a residential use.
C. Yard Location: Permitted in the interior side and rear yards; front and corner yards may be permitted in nonresidential districts with a special use permit. Refer to section 154.44 of this chapter.
D. Setback: All parts of the freestanding system (tower, rotor blades, etc.), shall be located a minimum of ten feet (10') from all property lines and not in a public utility easement.
E. Height: Height is measured from the average grade at the base of the tower to the highest edge of the system. Refer to subsection (D), Figure 5 of this section.
1. Maximum height of seventy feet (70') is permitted in R-1 and R-4 districts and for nonresidential uses in R-6, R-6C and R-7.
2. A maximum tower height of ninety feet (90') is permitted in all business (B) and manufacturing (M) districts.

F. Distance Between Systems: Freestanding systems on adjacent lots shall be at least five (5) rotor lengths apart, unless written proof of no interference can be provided at the time a building permit is requested.
G. Quantity: One (1) per lot is permitted; a special use permit (refer to section 154.44 of this chapter) may be requested for

additional systems in nonresidential districts.

H. Tower Access: Climbing access (rungs or foot pegs) to the tower shall not start until twelve feet (12') above grade to prevent unauthorized access.

I. Lighting: Freestanding system shall not be illuminated, except as required by the FAA.

4. Building-Mounted Systems

Building-mounted systems shall be developed according to the following parameters:

A. Location: Building-mounted systems are permitted in the following locations:
1. Principal and accessory structures.
2. Any roof face.

B. Height: Height is measured from the roof surface on which the system is mounted to the highest edge of the wind turbine. Refer to subsection (D), Figure 6 of this section.
1. Shall have a maximum height of fifteen feet (15').
2. Shall not extend more than ten feet (10') above the highest peak of a pitched roof.

5. Wind Access Protection:

A. Creation of Easements: Wind access easements across contiguous or nearby lots, tracts, or land may be created to establish a window of exposure to the wind so as to protect an existing or intended wind turbine's ability to harness the wind from obstruction of buildings and trees.
1. Such easements may be purchased, reserved, granted, or otherwise obtained.
2. Adverse possession cannot create such an easement.
3. An easement infringed upon is a compensable property right through private remedy.

B. Recording of Easements: Wind access easements shall be recorded with the Cook County Recorder of Deeds or DuPage County Recorder of Deeds and filed with the community development department.

C. Construction in Easement Areas: Any person seeking a building permit to construct or modify any structure or building so as to increase the consumption of airspace over that lot shall certify in writing that no wind access easement exists over that lot.

D. Denial of Permit: Should the community development department determine that the proposed construction would intrude upon the easement, no building permit shall be granted.

FREQUENTLY ASKED QUESTIONS

The following questions and answers are from Adams-Schoen & Zablow (2017) and Marion City, Oregon, Wind Power Regulations.

What is wind power generation?

Wind power generation is the conversion of wind into a form of energy, such as using wind turbines to make electricity.

What is a wind turbine?

A turbine is a rotary engine that extracts energy from a fluid source and converts it into another form of energy. The simplest wind turbines have a shaft or drum with two or three blades attached to the top of a tower. As the blades move, they impart energy to the rotor. Early examples of turbines are windmills and water wheels.

How do wind turbines make electricity?
In simplest terms, wind turbines work the opposite of a fan. Wind turns the large blades, spinning the shaft or drum, which is connected to a generator that makes electricity usable in a home's electrical system.

How is this power used?
Wind energy is used for simple residential purposes or commercial utility use. For most residential use, wind power is combined with traditional electricity from your local utility company. Single small turbines below 100 kilowatts are used for homes, usually along with diesel generators, batteries or solar-power systems. These systems can be used along with your electrical system (called grid-connected) or as a stand-alone system that is not connected to the utility grid. The small grid-connected turbines are often used by homeowners for lighting, appliances and electric heat. If the turbine cannot provide sufficient power, the utility makes up the difference. When the turbine produces more electricity than needed, the excess is "given" to the local utility company. The stand-alone wind turbines are often used for homes and farms far from the nearest utility lines.

Utility or commercial turbines range in size from 100 kilowatts to several megawatts. The very large turbines are often grouped together as a wind farm to produce bulk power to the electrical grid. The power is transferred through transmission lines.

What are the benefits of installing small wind turbine?
Using a small wind turbine can help reduce pollution and electrical costs. Deciding to install a wind system is complicated and involves many factors to consider, primarily the length of time before the utility bill savings exceeds the system cost. This often depends on the type of system chosen, wind resource in your area, electric rates, and how you use the system. Generally speaking, wind turbines are most practical for areas with an average wind speed of at least 9-10 miles per hour.

What is the average volume of sound that small wind turbines create?
Standing at its base, a small wind turbine produces about 75-100 dB(A) of sound (sound strength/sound power level). The same turbine produces 40-65 dB(A) one hundred feet away from the rotor hub (which is 30 to 80 feet in the air depending on the specific turbine size and design).

Note that a bedroom registers at 40 dB, a quiet office at 50 dB, a living room with quiet music or television at 60 dB, conversational speech at 70 dB, a busy residential road at 80 dB, the inside of a bus at 90 dB, the inside of an underground train or alongside a mainline railway at 100 dB, and a loud car horn three feet away at 120 dB.

How much wind is needed to produce wind energy?

Most small turbines require a minimum wind speed of 15 km/hr (4 m/s) or higher just to operate. In general, annual average wind speeds of at least 18 km/hr (5 m/s) are required for grid-connected applications. Note that an average annual wind speed of 22 km/hr (6 m/s) is considered a "moderate" wind resource, but the average wind speed is not always the best indicator of a site's suitability due to seasonal advantages and application considerations. Wind maps (such as www.windatlas.ca) can give you an approximate idea of whether your area gets enough wind, but local geography may influence whether your site is better or worse than the regional average. A 10% change in wind speed can result in as much as a 30% change in available power, so you may want to monitor wind speeds at the height and location of the specific sites that seem most promising.

What is a "vertical axis" wind turbine?

Vertical axis wind turbines are a type of wind turbine where the main rotor shaft is set transverse to the wind while the main components are located at the base of the turbine.

Do small and medium WECS interfere with telecommunications signals?

The literature suggests that interference with telecommunication signals is not an issue for smaller-scale WECS. The blades of small wind turbines are not large enough to cause interference. In addition, modern small and medium wind turbine blades are constructed out of materials like fiberglass and plastic, which do not obstruct signals. Indeed, companies even install small turbines on their own Internet receivers and transmitters.

Wildfire Hazard Mitigation

INTRODUCTION

The City of Troutdale is vulnerable to wildfire due to its location in the Columbia River Gorge and the forest areas to the east of the city. The Gorge creates a wind tunnel, which can lead to wind gusts ranging from 20 to 50+ miles per hour. As the 2017 Eagle Creek Fire demonstrated, these high winds can cause wildfires to move quickly and shift direction causing fire to spread quickly. The forested areas east of the city are wildfire fuel, and high winds in the area increase the risk that fire from forested areas could spread to the city. Also, the terrain of the Gorge, including steep slopes and canyon walls, make the Gorge and cities within the Gorge unique fire environments, often with extreme fire risks.

In late summer of 2020, the Pacific Northwest experienced a period of severe fire danger that intensified the spread of wildfires throughout the region. The Labor Day windstorm, along with high temperatures and low relative humidity, contributed to the ignition or reignition of fires that burned over 515,000 acres in Oregon and Washington within a 24-hour period. Initial estimates predict the fires, which killed nine people in Oregon and left thousands homeless, caused around $1 billion in damages, not including anticipated costs for fire suppression and cleanup which could amount to hundreds of millions of dollars. Studies suggest that the annual acres burned in the American West may increase two to six times by the middle of this century, and lightening ignitions may increase 30 percent by 2060.

The recognition that homes are vulnerable to wildfire in the wildland-urban interface (WUI) has been established for decades; but with a recent surge in structures burning, this issue is now receiving widespread attention in policy, the media, and the scientific literature. As discussed above, massive single fire events, like what we witnessed in the summer of 2020, have resulted in scores of lost lives, thousands of structures burned, and billions of dollars in expenditures. With fire conditions projected to become more severe as a result of climate change, it is clear that more effective fire-risk reduction solutions are needed.

Effective land-use planning presents a critical tool for communities facing increasing wildfire risks. When planners, policymakers and the public understand the reality of wildfire threat, localities can adopt robust wildfire risk reduction regulations to save lives and structures, and contribute to forest health, ecosystem sustainability, and watershed protection. To most effectively reduce wildfire risk, land-use and development codes can:

- be applied to existing, new, and redeveloped areas alike;
- deal with issues of bulk and density standards and design guidelines;
- provide requirements for site reviews and conditions of approval;
- establish out-of-city service extensions and annexation conditions;
- set subdivision requirements for wildfire concerns;
- allow planners to balance concerns about fire protection and the building site, landscape, and structure; and
- provide incentives and opportunities for public engagement and education.

Thus, there is little theoretical question that proper land-use controls and site design standards can mitigate (reduce) the risk of wildfire damages. Land-use planning has been used to address hazards like flooding, hurricanes, and earthquakes. With more people choosing to live in the fire-prone WUI and the increasing frequency of wildfire, incorporation of wildfire risk reduction measures in a community's land-use planning is critical.

With the implementation of this overlay zone, Troutdale has the opportunity to shape the present and future protection of its community, of people and of place. Hazard mitigation activities, such as those detailed below, are vital to this community protection, to the health of the surrounding ecosystem, and the local economy. When considering community education and rollout of this overlay zone, Troutdale may look to existing programs for resident wildfire risk education to ease implementation. One example is the Wildland Urban Interface Home Assessment program which is conducted by Portland Fire and Rescue and extends to Troutdale residents. The assessment program allows residents to request an inspection through their website, during which firefighters will come to the home, walk the resident through their property's potential wildfire hazards, and recommend solutions. Encouraging residents to take advantage of this existing program that identifies their individual needs could increase interest in wildfire hazard mitigation steps and make the implementation of a new hazard zone more palatable.

Troutdale should also consider adopting the Oregon Residential Specialty Code: Rule 327.4, Wildfire Hazard Mitigation building standards for new developments or substantial redevelopments in the Wildfire Hazard Zone. The rule was created by the State of Oregon Building Codes Division and outlines increased building construction standards for wildfire hazard reduction.

DRAFT ORDINANCE FOR WILDFIRE HAZARD OVERLAY ZONE

Contents

1. Purpose

A. The purpose of this overlay zone is to promote and protect the health, safety, and welfare of the residents of Troutdale and in the Wildfire Hazard Overlay District; minimize the risk of loss of life and property by the ignition and spread of wildfire; encourage sensible development and land use within the Wildfire Hazard Overlay Zone so

as not to increase the danger to the public health, safety and property; reduce the demands for public expenditure for relief and protection of structures and buildings within the zone.

B. The regulation of uses within this district is designed to:

(i) Improve the City of Troutdale's resilience to fire hazard;

(ii) Recognize the increasing risk and associated danger of fire hazards;

(iii) Reduce the spread of fire hazards;

(iv) Reduce the damage caused by fire hazards;

(v) Protect the areas within the City of Troutdale with the highest risk of fire hazard;

(vi) Help maintain a stable tax base by providing for sound use and development;

(vii) Protect human life, health, and property in areas subject to high risk of fire hazard;

(viii) Ensure continuity of City services, access to City facilities, and minimal prolonged business interruptions during times of fire hazard;

(ix) Minimize the need for rescue and relief efforts associated with fire hazard and generally undertaken at the expense of the general public;

(x) To advance these purposes, where not required, creation of open space tracts is encouraged within areas designated as natural hazards on the Comprehensive Plan and official zoning maps;

(xi) Compel those who occupy the areas of high fire hazard assume responsibility for their actions;

(xii) Ensure that potential buyers are notified that property is in an area of special fire hazard;

(xiii) Minimize damage to public facilities and utilities, such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in high risk fire hazard areas;

(xiv) These provisions are also intended to minimize maintenance costs, eliminate potential hazards before they occur, and protect properties and persons adjacent to high risk fire hazard areas and to other natural hazard areas;

(xv) Implement fire hazard requirements in relation to Statewide Planning Goal 7--which relates to areas subject to natural disasters and hazards; and

(xvi) Promote inter-community cooperation.

2. Applicability

A. In order to carry out the provisions of this overlay district, there is hereby created and established a Wildfire Hazard Overlay Zone, which includes all of the land within its designated borders, as indicated on the City of Troutdale Widlfire Hazard Overlay Map.

B. In addition to complying with the provisions of the primary zoning district, uses and activities shall comply with the provisions of this overlay district. In the event of any conflict between any provisions of this overlay district and the primary zoning district, the more restrictive provision shall apply.

c. In addition to complying with the provisions of the Troutdale Development Code Chapter 14 Flood Management, uses and activities shall comply with the provisions of this overlay district. In the event of any conflict between any provisions of this overlay district and any provision under Troutdale Development Code Chapter 14 Floor Management (or other floodplain regulations), the more restrictive provision shall apply in order to maintain compliance with federal flood regulations.

NOTE: The City of Troutdale can utilize Multnomah County's Overall Fire Risk Map and work with the state to determine the most appropriate applicability (e.g., based on state hazard mapping, advanced GIS data, etc.). Based on the risk map alone, it appears the Wildfire Hazard Overlay Zone should apply to the following areas: (1) east of Buxton Road and South Troutdale Road; and (2) south of I-84. This zone represents the area within the City of Troutdale with the highest risk of fire hazard (according to Multnomah County's Overall Fire Risk Map, this includes the area where Troutdale's risk of fire hazard transitions from medium to high risk).

3. Definitions

The following definitions apply to this subchapter.

A. Amortization

A process by which nonconforming uses and structures must be eliminated or made to conform to requirements of the current zoning regulations at the end of a certain period.

B. Combustible

Any material that, in the form in which it occurs or is used, and under the conditions anticipated, will ignite and burn.

C. Defensible Space

A natural or man-made area, where vegetation capable of carrying a fire has been sufficiently treated, modified, or removed to slow the rate of spread and reduce the intensity of a fire; provide a safe area for fire suppression operations; and slow or prevent a fire from traveling - in either direction -between a structure and the vegetation.

D. Flame spread rating

As used herein refers to rating obtained according to tests conducted as specified by a nationally recognized standard.

E. Fuel

All combustible material available to be consumed by a wildfire, including natural and planted vegetation and human-made structures.

F. Fuel break

An area, usually a long strip strategically located, wherein vegetative fuels are reduced in volume and maintained to cause a reduction of fire intensity if ignited by a wildfire. Fuel breaks are strategically located to divide fire-prone areas into smaller areas for easier fire control and to provide access for fire fighting.

G. Fuel Load

The total quantity of combustible contents of a building, space, or fire area, including interior finish and trim, expressed in heat units or the equivalent weight in wood.

H. Fuel Modification

A method of modifying fuel load by reducing the amount of non-fire-resistant vegetation or altering the type of vegetation to reduce the fuel load.

I. Noncombustible

As applied to building construction material means a material that, in the form in which it is used, is either one of the following:

(i) Material of which no part will ignite and burn when subjected to fire.

(ii) Material having a structural base of noncombustible material as defined in Item 1 above, with a surfacing material not over 1/8 inch (3.2 mm) thick, which has a flame spread rating of 50 or less.

(iii) "Noncombustible" does not apply to surface finish materials. Material required to be noncombustible for reduced clearances to flues, heating appliances or other sources of high temperature shall refer to material conforming to Item 1. No material shall be classed as noncombustible that is subject to increase in combustibility or flame spread rating, beyond the limits herein established, through the effects of age, moisture or other atmospheric condition.

J. Public Nuisance

An act, condition, or thing declared incompatible with the public health and welfare for its interference with the rights of the public. The abatement of which is usually required either by the private party or at the expense of the party by the city.

K. Roadway

Any surface improved, designed or ordinarily used for vehicular travel.

L. Slope

The rise and fall of land numerically expressed with a percentage change in elevation over a given distance (e.g., 6% slope means the land rises or falls 6 feet for every 100 feet of horizontal distance).

M. Tree Crown
The primary and secondary branches growing out from the main stem, together with twigs and foliage.

N. Wildfire Hazard Area
An area containing or directly affected by wildfire.

O. Wildland
An undeveloped area in its natural state containing plants, shrubs, and trees characteristic of the region and undisturbed topographical conditions.

P. Wildland-Urban Interface (WUI) Area
That geo- graphical area where structures and other human development meets or intermingles with wildland or vegetative fuels. Communities adjacent to and surrounded by wildland are at varying degrees of risk from wildfires.

Other definitions and terms to consider

A. Critical Fire Weather
A set of weather conditions (usually a combination of law relative humidity and wind) whose effects on fire behavior make control difficult and threaten increased fire hazard and firefighter safety.

B. Fire Area
The floor area, in square feet, used to determine the adequate water supply.

C. Fire Chief
The chief officer or the chief officer's authorized representative of the fire department serving the City of Troutdale, currently Gresham Fire and Emergency Services.

D. Fire-resistance-rated construction
The use of materials and systems in the design and construction of a building or structure to safeguard against the spread of fire within a building or structure and the spread of fire to or from buildings or structures to the Fire Hazard Overlay Zone area

E. Fire Weather
Weather conditions favorable to the ignition and rapid spread of fire. In wildfires, this generally includes high temperatures combined with strong winds and low humidity. See "Critical fire weather."

F. Fuel, Heavy
Vegetation consisting of round wood 3 to 8 inches (76 to 203 mm) in diameter. See Fuel Models G, I, J, K and U described in Appendix XX.

G. Fuel, Light
Vegetation consisting of herbaceous plants and round wood less than 1/4 inch (6.4 mm) in diameter. See Fuel Models A, C, E, L, N, P, R and S described in Appendix XX.

H. Fuel, Medium
Vegetation consisting of round wood 1/4 to 3 inches (6.4 mm to 76 mm) in diameter. See Fuel Models B, D, F, H, O, Q and T described in Appendix XX.

I. Fuel Mosaic
A fuel modification system that provides for the creation of islands and irregular boundaries to reduce the visual and ecological impact of fuel modification.

J. Fuel-Loading
The oven-dry weight of fuels in a given area, usually expressed in pounds per acre (lb/a). Fuel-loading may be referenced to fuel size or timelag categories, and may include surface fuels or total fuels.

K. Green Belt
A fuel break designated for a use other than fire protection.

L. Ignition-resistant Construction, Class 1
A schedule of additional requirements for construction in the Hazard Overlay Zone based on extreme fire hazard.

M. Ignition-resistant Construction, Class 2
A schedule of additional requirements for construction in the Hazard Overlay Zone based on high fire hazard.

N. Ignition-resistant Construction, Class 3
A schedule of additional requirements for construction in the Fire Hazard Overlay Zone based on moderate fire hazard.

O. Noncombustible Roof Covering
One of the following:

1. Cement shingles or sheets.
2. Exposed concrete slab roof.
3. Ferrous or copper shingles or sheets.
4. Slate shingles.
5. Clay or concrete roofing tile.
6. Approved roof covering of noncombustible material.

P. Unenclosed accessory structure
An accessory structure without a complete exterior wall system enclosing the area under roof or floor above.

Wildfire will always be a part of Oregon's ecosystem. These naturally occurring events have the potential to inflict significant damage on our communities, despite our best efforts. It is important to plan for this hazard by implementing measures consistent with best practices to mitigate the risk of wildfires and to avoid regulating primarily for short-term economic benefit. The National Fire Protection Association (NFPA) has developed some recommendations to assist communities threatened by wildfires which are designed to protect the lives of residents and first responders, limit property damage and protect community assets, save taxpayer money, and compliment voluntary wildfire safety efforts. Among the steps recommended by the NFPA is gathering information on best practices. This step can help identify practical lessons from communities that may be diverse, yet facing similar challenges. For this reason, we have drawn on municipal codes from cities such as Bend and Ashland, which have been identified in recent studies as communities that are effectively implementing best practices to mitigate the risk of wildfire.

Among these practices are the use of regulations incorporating defensible space, which NFPA identifies as a common and popular land use tool to reduce the risk of wildfires, and regulations requiring the use of specific building materials, such as fire-resistant roofing. According to the NFPA, learning from other communities is an essential part of the process of updating and implementing wildfire hazard mitigation measures.

This process can also yield valuable information about the public adoption procedure and ongoing enforcement efforts. Additionally, it can also help communities identify opportunities to obtain outside funding for hazard mitigation efforts. For example, it was recently announced that the City of Ashland will receive millions of dollars from the Federal Emergency Management Agency to help create defensible space for 1,100 homes and replace wood-shake roofs with new fire-resistant roofs.

4. Wildfire Prevention and Control Plan

A.

A Wildfire Prevention and Control Plan shall be required with the submission of an application for plan approval, preliminary plat of a subdivision, land partition, Commercial Site Design Review increasing a building's footprint by 200 square feet or greater, or Residential Site Design Review for developments of three units or greater. The plan shall be prepared by a qualified professional.

B. Plan Submission

A Wildfire Prevention and Control Plan shall be prepared at the same scale as any required development plan.

C. Plan Content

A Wildfire Prevention and Control Plan shall:

(i) Identify (a) water supply; (b) building materials, location and design of existing and proposed structures; and (c) ignition potential of existing and proposed structures.

(ii) Designate the location of existing or proposed fuel breaks, as applicable.

(iii) Designate additional fire precaution measures that will be taken to reduce fire risk in the following areas:

(a) Where slopes in or adjacent to proposed development are in excess of 20%, and

(b) Where the local fire protection agency identifies a specific danger.

(iv) Include a tree and vegetation management plan that identifies:

(a) Areas where shrubs and brush will be removed.

(b) Areas where trees will be removed to reduce interlocking canopies.

(c) New trees, shrubs, and brushes that will be planted.

(d) Ecologically significant trees to be retained.

(e) Identification of species and size for all of the above.

(v) Use National Fire Prevention Association standards, as applicable, to the extent such standards do not conflict with this subchapter.

D. Approval of the Fire Marshal

The Fire Marshal shall approve the mitigating measures relative to access, defensible space, water supply, and construction based on the relative risk and hazard rating.

5. Setbacks and Permitters

A. Purpose

It is the purpose of the development standards to provide supplementary development regulations to underlying zones to reduce or minimize the potential impacts of wildfire on properties, the occupants of properties, and the occupants of adjacent properties. These standards function to balance the need to preserve natural habitat, prevent erosion, provide for aesthetic and functional landscaping, and to facilitate access to manmade structures by firefighters in the event of a wildfire.

B. Setbacks

The following standards apply to new structures in the Wildfire Hazard Overlay Zone.

(i) The minimum separation between buildings in residential districts is half the height of the taller building, measured from the closest exterior walls.

(ii) In non-residential districts, a building shall be a minimum of 30 feet from any other building, except that a building that exceeds 2 stories and is not protected by an automatic sprinkler system shall be a minimum of 50 feet from any other building.

The requirements for setbacks vary by district. The Code should provide for setbacks which are appropriate for the density of the developed area, taking into consideration such features as slope, flood plain, soil conditions, etc.

Example:
"The minimum separation between two buildings must be half of the height of the tallest building, where building height is measured at the two closest exterior walls, and the maximum required separation is 12 feet." (City of Ashland, Oregon, Municipal Code, AMC 18.3.9.070(B) (2020), https://ashland.municipal.codes/LandUse/18.3.9.070).

Example:
"Persons owning, leasing or controlling property within areas requiring defensible spaces are responsible for maintaining a defensible space on the property owned, leased or controlled by said person, of not less than thirty feet (30') (9.144 m) around any building or structure. Distances may be modified by the Fire Code Official because of a site-specific analysis based on local conditions." (City of Petaluma Municipal Code, § 17.20.050, Sec. 304.1.2.1 Defensible Space— Neighboring Property (2017), https://petaluma.municipal.codes/Code/17.20.050).

C. Fuel Modification Area

(i) For all new buildings on a vacant lot that increases lot coverage by 200 square feet or greater, the fuel modification area consists of the entire lot.

(ii) For additions and modifications to existing properties, the fuel modification area extends 30 feet from the furthest extent of the addition or modification, or to the lot line, whichever is less.

To limit property damage and slow the spread of wildfires, best practices include restriction on vegetation that may serve as a wildfire hazard. Local fire officials should be consulted to compile a list of prohibited or restricted vegetation for buildings within the Overlay Zone. If landowners maintain the prohibited vegetation, a warning or citation with a specified period to come into compliance may provide an adequate incentive to comply. Fines may be appropriate but should not be pursued without prior warning and opportunities to comply voluntarily. The City should carefully consider social equity when adopting enforcement mechanisms and provide economic or other assistance to landowners who lack the means or ability to comply.

Example:
Provisions for annual weed and brush abatement of the wildland-urban interface fire area and the developed area shall be the responsibility of the developer or property owner. A plan may be required that outlines the provisions for weed abatement and shall be prepared by the property owner and/or developer. When required, the plan shall include, but not be limited to, the following elements:

- A defensible space of thirty feet (30') to one hundred feet (100'), depending on grade and other factors around all structures, either manmade or natural, in which material capable of allowing fire to spread unchecked must be cleared, treated or modified to slow the rate and intensity of an approaching wildfire.

- A ten-foot (10') firebreak on each side of hillside roads or driveways used for emergency access; such firebreaks may be landscaped with fire resistive vegetation.
- Where required, fire breaks and/or disked trails up to thirty feet (30') wide shall be identified on the plan and maintained throughout the fire season; the location of such breaks/trails shall be approved by the Fire Code Official.
- Other fire protection measures based on best management practices for wildfire exposure protection as required by the Fire Code Official. (City of Petaluma Municipal Code, § 17.20.050, Sec. 4907.1 Defensible Space (2017), https://petaluma.municipal.codes/Code/17.20.050).

Maintaining appropriate setbacks and vegetation perimeters and wise selection of building materials and building design are crucial to wildfire hazard mitigation. In many cases, homes ignited in wildfires are ignited when flammable vegetation near the home or the home's flammable building materials are struck by wildfire-generated embers and not by the flames of the wildfire. By implementing vegetative fuel modification standards and requiring the use of fire-resistant building materials, Troutdale can limit the damage to homes and other structures in the event of a wildfire.

6. Fuel Modification Standards.

A. Purpose:

To reduce the spread of fire to and from structures on the property, and to adjoining properties, and to establish standards for the maintenance of vegetation, guidelines for the selection and control of vegetation should promote fire safety while remaining adaptable for local ecological conditions.

B. In fuel modification areas:

(i) Dead or dying trees and shrubs shall be removed except where ecologically beneficial.

(ii) Existing trees on the flammable list shall be maintained to provide 10 feet or more of clearance from structures and the lesser of 8 feet or ⅓ the tree's height clearance from the ground.

(iii) To the maximum extent possible, existing shrubs on the flammable list shall be maintained to provide 10 feet or more of clearance from structures.

(iv) Newly planted trees and shrubs on the flammable list shall have a minimum clearance of 30 feet from structures.

C. Within five feet of a new building, addition, or deck:

(i) Existing vegetation on the flammable plant list should be removed, with the exception of significant trees.

(ii) Existing trees on the flammable plant list should be maintained to provide 10 feet or more of clearance from structures or additions and the lesser of 8 feet or ⅓ the tree's height clearance from the ground.

D. Fuel breaks:

(i) An area designated by an applicant or the City as a fuel break shall be maintained to be free of dead or dying vegetation and vegetation on the flammable plant list.

(ii) Notwithstanding 5(C)(i), existing vegetation may be retained when necessary for erosion control, slope stability, ecological preservation, enhancement of wetlands, beneficial functions in water resource protection, or when consistent with the fire control plan or with written approval from the municipality.

(iii) Notwithstanding 5(C)(i), native, fast-burning species that are sufficiently thinned may be retained.

NOTE: The establishment of a fuel break does not require stripping the ground of all native vegetation or removal of ecological significant trees.

E. Fuel modification standards:

The fuel modification standards may be reduced or waived by a municipal official, in consultation with the fire code official, if it is demonstrated that the fire risk has been reasonably reduced, such as in cases where ignition-resistant materials and construction methods, or vegetation type and separation, function to enhance the structure's protection from wildfire.

Three Zones of Defensible Space

An alternative or complimentary approach to wildfire fuel management in residential areas is through neighborhood or other community adoption of ignition zone guidelines. These guidelines were developed through research into how homes ignite due to the effects of radiant heat. These guidelines help minimize the risk of damage and control the spread of wildfire.

Zone 1

The Immediate Zone includes the home and the area within five feet from the furthest attached portion of the exterior of the home.

- Clean roofs and gutters of dead leaves, debris, and conifer needles that could catch embers.
- Replace or repair any loose or missing shingles or roof tiles to prevent ember penetration.
- Install ⅛-inch metal mesh screening on vents in eaves and attics to reduce the probability of embers entering the home.
- Clean debris from exterior attic vents.
- Repair or replace damaged or loose window screens and any broken windows. Screen or box-in areas below patios or decks to prevent combustible materials from accumulating.
- Move any flammable materials away from wall exteriors. Remove anything stored beneath decks or porches.
- Require owners to remove or otherwise abate weed and brush collections to further reduce the amount of hazardous vegetation in Troutdale.

Zone 2

The Intermediate Zone is located 5 feet to 30 feet from the furthest exterior point of the home.

- Clear vegetation from under stationary propane tanks.
- Create fuel breaks with driveways, patios, decks, and walkways.
- Keep lawns and native grasses mowed to a height of four inches or less.
- Remove vegetation under trees so a surface fire cannot reach the canopy.
- Prune trees to six to ten feet above the ground; for shorter trees, pruning is not to exceed ⅓ of the height of the tree.
- Space trees to have a minimum of eighteen feet of open space between the crowns with the distance increasing proportional to slope.
- Ensure that the mature tree canopy is not within ten feet of the structure.
- Trees and shrubs should be located in small clusters to break up the continuity of vegetation in this zone.

Zone 3

The Extended Zone is located 30 feet to 100 feet from the furthest exterior point and may extend up to 200 feet.

- Clear heavy accumulations of debris and ground litter.
- Remove dead vegetation.
- Remove small conifers located between larger trees.
- Remove vegetation adjacent to outbuildings and sheds.
- Maintain space between tree canopies as follows:

(i) Twelve feet between canopies for trees located 30 - 60 feet from the home.

(ii) Six feet between canopies for trees located 60 -100 feet from the home.

Consider limitations on residential construction in certain areas. Sixty percent of houses built in the last 10 years have been built in the wildland urban interface (WUI).

7. Building Material and Design

A. Purpose

In addition to setbacks and perimeter, a wise selection of building materials and building design are the most important factors for an individual to have a wildfire-safe home. In many cases, most homes ignited in wildfires are ignited by wildfire-generated embers and not by the flames themselves. By implementing the use of fire-resistant building materials and practices in the WUI, Troutdale can limit home damage in the event of a fire.

B. Roofing

(i) All new structures in the Wildfire Hazard Overlay Zone shall be constructed with Class B or better non-wood roof coverings, as determined by the Oregon Structural Specialty Code.

(ii) All re-roofing of existing structures in the Wildfire Hazard Overlay Zone where at least 50 percent of the roofing area requires re-roofing shall be constructed with Class B or better non-wood roof coverings, as determined by the Oregon Structural Specialty Code.

RECOMMENDED: Increase wildfire resilience citywide by require roof covering assemblies rated Class A or Class B for all new or replaced roofs constructed within the City of Troutdale. Class A roof coverings include clay tiles, slate, asphalt glass fiber composition shingles, and concrete tiles. Class B roof coverings include pressure-treated shakes and shingles. Note that classes of roofs take into account more than just building materials.

Example:

Roofing—All structures shall be constructed or re-roofed with Class B or better non-wood roof coverings, as determined by the Oregon Structural Specialty Code. All re-roofing of existing structures in the Wildfire Lands area for which at least 50 percent of the roofing area requires re-roofing shall be done under approval of a zoning permit. No structure shall be constructed or re-roofed with wooden shingles, shakes, wood-product material or other combustible roofing material, as defined in the City's building code. (City of Ashland, Oregon, Municipal Code, AMC 18.3.10(B) (2018), https://ashland.municipal.codes/LandUse/18.3.10.100.B.1).

C. Building Foundation

(i) Newly constructed buildings in the Wildfire Hazard Overlay Zone shall use concrete or masonry for building foundations.

(ii) For any vented rainscreen used in the wall assembly of a newly constructed or substantially remodeled structure in the Wildfire Hazard Overlay Zone, the top and bottom opening into the air space shall be screened with maximum 1/8th-inch screening.

Screening can help keep airborne embers out of structures.

D. External Building Materials

Newly constructed buildings in the Wildfire Hazard Overlay Zone shall use Class B or better fire-rated materials as designated by the American Society for Testing and Materials.

E. Windows

Newly constructed buildings in the Wildfire Hazard Overlay Zone shall use tempered glass for windows and thermally broken metal and pultruded fiberglass window frames.

F. Decks and Patios

With the exception of fully enclosed decks and patios, new and substantially remodeled decks and patios shall:

(i) Be constructed with fire-retardant-treated wood or other building materials having no less than a 2-hour fire resistive rating, or include a concrete or other non-combustible barrier wall between the deck and any adjacent building and floor beneath the deck;

(ii) Not include canopies or trellises constructed with combustible materials; and

(iii) If a deck or patio is above ground level, the underside of the deck or patio shall be sealed off with skirting or a wall constructed with fire-retardant-treated wood or other building materials having no less than a 2-hour fire resistive rating.

Most decks are highly combustible structures; their shape traps hot gasses, making them heat traps. Full enclosure of decks or patios eliminates the heat trap, while partial enclosure with canopies or trellises increases the heat trap. The use of non-combustible barrier walls and floors helps prevent the spread of fire from a deck to an adjacent structure.

Examples of hazard reduction standards for decks and patios

- Construct patios, sun decks, and balconies of concrete or other nonflammable material wherever possible; but in no case, use any materials having less than 2-hour fire-resistive rating as specified in the Uniform Building Code.
- Do not allow carpet in any unenclosed portions of these accessories.
- If canopies or trellises are employed, provide means for quick enclosure so that windblown flames and heat cannot be trapped beneath them.
- If the deck or floor level of a patio or sun deck is above ground level, seal off the underside of the deck or floor by skirting or by a wall to keep fire from burning beneath it. (Protecting Residences from Wildfires, USFS, https://www.fs.fed.us/psw/publications/documents/gtr-050/accessories.html).

FIRE RATED MATERIALS: The American Society for Testing and Materials assigns fire ratings to materials based on their flame spread index (FSI). Class A or B materials are recommended. Class A materials have a flame spread index (FSI) of 0 - 25. Class B materials have a FSI of 26-75.

8. Emergency Responder Access

A. Purpose

It is important that emergency responders, including but not limited to firefighters, have adequate access to a lot and the structures on the lot. The following access requirements will help ensure that homes and other structures in the Wildfire Hazard Overlay Zone are accessible to emergency responders.

B. Within one year of adoption of this subchapter, the City shall:

(i) Identify, and, where necessary, create two or more routes in and out of each neighborhood in the Wildfire Hazard Overlay Zone. Such routes must be accessible to emergency vehicles.

(ii) Ensure that all street names and numbers in the Wildfire Hazard Overlay Zone are clearly legible.

(iii) Identify all lots or parcels in the Wildfire Hazard Overlay Zone that do not have a driveway that is at least 12 feet wide with at least 15 feet of vertical clearance.

(iv) Identify all streets in the Wildfire Hazard Overlay Zone that are less than 24 feet wide, exclusive of lanes where on-street parking is allowed.

IMPLEMENTATION RECOMMENDATIONS

Wildfire mitigation must facilitate collaborative efforts for wildfire preparedness between the varied stakeholders in an at-risk region. Research has emphasized the importance of this process being conducted in partnership between communities and governments. Such collaboration ensures the recognition of a community's resources and adaptive capacities, which may be built upon to improve community resilience eventually leading to the success of planned reforms. This could also be useful in rebuilding communities, where preventative steps can help to minimize the risk of repetitive loss. Most land-use planners and natural resource managers acknowledge the need to mandate public involvement in such decision-making.

Community Engagement & Education

Oregon's Statewide Planning Goal 1 is citizen involvement. This goal states that each city and county in Oregon "develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the planning process." The City has created many committees so that citizens can be involved in different aspects of the planning process. Some of these committees include the Budget Committee, Parks Advisory Committee, and the Citizens Advisory Committee (CAC).

The following recommendations were developed to further demonstrate the City of Troutdale's commitment to community outreach. Ensuring that citizen engagement and education about wildfire mitigation efforts create safer, more resilient communities with the goal of decreasing the spread of, and damage caused by, wildfires.

1. Natural Disaster Advisory Committee

A. **Membership:** 11 residents and electors of the city or Troutdale business owners.
B. **Appointment:** Recommended by Selection Committee. Appointed by the City Council.
C. **Term:** 3 years—staggered terms.
D. **Authority:** LCDC Goals 1, 2, and 7; Section 2.20.XXX of this chapter.

2. Natural Disaster Advisory Committee

A. The natural disaster advisory committee shall be composed of eleven members appointed at large to represent the citizenry of the city.
B. Each member shall be a resident and elector or a Troutdale business owner of the city. Although representation on the advisory committee is not based on geographical districts, when appointments are made to the citizens advisory committee, consideration shall be given to geographical distribution of its membership.

3. Natural Disaster Advisory Committee Duties

A. The advisory committee shall review all legislative amendments to the city's comprehensive plan related to natural disaster mitigation and prevention; to include fire prevention and control plans & flood management plans.

B. The planning commission may seek the advice of the natural disaster advisory committee on quasi-judicial amendments to the comprehensive plan.

C. The natural disaster advisory committee may periodically review and advise the planning commission and council on natural disaster education programs. The committee will report recommendations on natural disaster land use issues to the planning commission.

D. The committee shall meet whenever there is a natural disaster land use matter requiring its review and at other times deemed necessary by the committee.

E. The committee will create and disseminate educational material for the general public about wildfire risk and mitigation efforts.

F. Aforementioned material must include:

- A variety of visual & audio material
- Multi-lingual material
- Material for all age group
- Any other accessible mediums of communication for community members will be created and disseminated as needs of the community evolve and change.

G. The natural disaster advisory committee shall also perform any other duties or functions assigned by the council. Those duties shall be specified by motion or resolution of the council. In this regard the committee operates to provide policy guidance to the council on matters of natural disaster and to act as a liaison between neighborhoods and interest groups and the city's elected and appointed officials. The natural disaster advisory committee will report recommendations to the council regarding issues assigned by the council.

4. Natural Disaster Advisory Committee's Educational Recommendations

A. Recommendations to the City Council must consider the topography, risk, and community needs of Troutdale.

B. Recommendation can include:

- Keeping roof and gutters free of all leaves, needles, and debris throughout the fire season
- Checking that all vents in foundation and eaves are screened with ⅛ inch or finer mesh to prevent ember intrusion.
- Maintaining 3–5-foot buffer areas around the foundation with no combustible plants or materials in contact with siding (no bark mulch) and cleaning up all leaf and needle debris.
- Ensuring the area under deck is clean of combustible debris and no combustibles (firewood, lumber, fuel) are stored underneath.
- Screening off or enclosing open areas under decks and overhangs with ⅛ inch metal mesh to prevent ember intrusion.
- Keeping tree limbs pruned at least 10 feet from the house and 10 feet from chimney.

- Limb up lower branches 5-6 feet on trees within 30 feet of your home
- Storing firewood 30 feet away or in ember-proof shed
- Keeping dry grass and weeds mowed to four inches or less throughout the fire season.
- Keeping the home address clearly posted and visible from the street.

Inter-community Cooperation

A. In light of the fact that wildfire poses a serious threat to wide areas of land both inside and outside the city limits of Troutdale, it is important to consider how intercommunity and intergovernmental cooperation can promote an improved prepared and coordinated response.

B. These considerations include the following potential partnerships:

- The unincorporated community of Springdale;
- The unincorporated community of Corbett; and
- The general suburbs of Troutdale

C. The following options are not necessarily independent of one another and the council may have the opportunity to combine certain options to ensure the council's objectives are met.

Development Agreements

Development agreements are suburb oriented. Development Agreements are defined within the following uses:

(i) A legally binding contract between property owners/ developers and local government. They can specify various elements of the development process ranging from phasing of a larger master-planned community, tax-sharing for retail development, or critical infrastructure responsibilities; and

(ii) Can be used to guarantee that a proposed development reduces risk to hazards by requiring it to meet certain use requirements, site development standards, conservation practices, or long-term maintenance provisions not already required by land development regulations.

In terms of wildfire mitigation, this option enables the city of Troutdale to tailor the mitigation tactics as expressed in the recommendations contained in this document to current and planned developments within the city by negotiating with developers directly. Therefore, the hope would be that development practices would be consistent with fire mitigation objectives set by city council.

Advantages of development agreements:

- Leads to the creation of a separate contract that developers would be beholden to;
- Can tailor specific mitigation actions to development and tie these actions to conditions of approval of development;
- Promotes periodic review of the agreement; and
- Allows developers to attain vested rights, giving them the confidence to develop properly under the conditions of the agreement.

Disadvantages of development agreements:

- Requires third-party involvement to draft agreements;
- Concerns about "back-door dealing" from the general public;
- May be difficult for planners to track; and
- Negotiating and Drafting the agreement is a time-consuming process.

Community Wildfire Protection Plans (CWPPs)

A CWPP is designed specifically to address a community's unique conditions, values, and priorities related to wildfire risk reduction and resilience. Communities with CWPPs are given priority for funding of hazardous fuels reduction programs carried out under the federal Healthy Forest Restoration Act (HFRA). The current CWPP for Multnomah County provides implementable strategies to help educate citizens and mitigate wildfire hazards. Therefore, by further implementing parts of the Multnomah County CWPP into Troutdale-specific policy, communities can better mitigate against wildfire hazards.

A CWPP emphasizes stakeholder engagement and public input. Communities facing parallel risks can join together and build a plan that keeps them coordinated with one another.

Advantages of CWPPs:

- Provides the opportunity to establish a locally appropriate definition and boundary for the Wildland-Urban Interface (WUI) and enables communities to identify local priorities and actions;
- Enables access to additional state funding opportunities; and
- Reinforces existing stakeholder partnerships and establishes relationships among a wide variety of non-traditional partnerships.
- There is already research and observations of wildfire risks within the County Natural Hazards Mitigation Plan.

Disadvantages of CWPPs:

- The creation of another plan may be burdensome to the council as well as other stakeholders depending on how the work is portioned; and
- CWPPs are time intensive and they require specialized local knowledge.

Intergovernmental Agreements

Governed by ORS 190.003-190.130, a city in Oregon can enter into an agreement with another Oregon government. The entity created out of the agreement can carry out any rules necessary to meet its duties and objectives that are contained within Oregon law.

Due to Troutdale sitting on the edge of the WUI as well as on the border between Rural Fire Protection Districts (RFPD) #10 and #14, it may be an important consideration to create intergovernmental agreements between the city and the communities within RFPD #14 for further consistency in wildfire protection strategies. Current CWPP policy only appreciates Troutdale and RFPD #10. It is integral that the communities that lie within the Interface can properly coordinate with Troutdale. This includes, but is not limited to, evacuation plans, mitigation strategies, and recovery efforts. Cooperation may mean the difference between lives saved and lives lost; a fire starting in the East of the County may mean thousands of evacuees passing through Troutdale.

Advantages of intergovernmental agreements:

- The intergovernmental entity has autonomy in achieving its goals of fire protection. Therefore, it may alleviate burdens upon local governments and organizations;
- Offers a way for the area around and within Troutdale to be well-informed in the instance of an emergency; and
- Provides a consistent path towards mitigation, evacuation, and recovery.

Disadvantages of intergovernmental agreements:

- Negotiations can be time-consuming and results are not guaranteed;
- Creates a new entity that requires additional funding; and
- Burdens may fall unevenly depending on how the agreement is implemented.

Community Evacuation Planning

The majority of material that prepares people residing in WUI's for fire evacuations has an individualistic approach that puts the responsibility on individual homeowners. While this material is still relevant and helps residents in WUI's prepare for fire evacuation, preparing for evacuation at a hyper-local community level could also be beneficial. The recommendation below for a community evacuation planning approach is based on a 1995 study that took place in a Berkeley, California neighborhood.

Recommendations:

- Within a WUI neighborhood, homes are organized into clusters (5-10 homes)
- Each cluster has a leader who communicates with other clusters in the neighborhood.
- Each Cluster has access to maps that identify all houses within the cluster, evacuation routes, and emergency shut-off points
- Each Cluster has their own emergency shed with supplies
- Each Cluster occasionally participates emergency preparedness courses and emergency drills

Advantages:

- Builds sense of community
- Inter-dependence encourages preparedness
- Encourages education on natural hazard issues

Disadvantages:

- Likely only works in areas where people reside year-round
- Potential problems if some cluster members are not willing to equally participate or lose interest
- Cost challenges around funding courses and supplies

Enforcement

One of the most difficult aspects of planning for wildfire is how a local government can enforce its wildfire provisions. Here are some recommendations of how local governments can enforce wildfire provisions when they are being violated.

Recommendations:

- HOA CC&Rs: Today, much development is subject to HOA Covenants, Conditions, & Restrictions (CC&Rs). Many of these CC&Rs have specifications for vegetation management and building material that a HOA can hold homeowners accountable for.
- Local Governments as 3rd-Party Beneficiaries of Maintenance Agreements: To ensure that HOA's are maintaining and enforcing their CC&Rs, some local governments have, at the time of entitlement, retained a "third-party beneficiary status with a right of enforcement" for wildfire provisions in the CC&Rs. This gives the HOA the primary obligation to enforce wildfire preparedness, but gives the local government opportunity to enforce.

EXAMPLE CODE LANGUAGE: Laguna Beach, CA Community Wildfire Protection Plan and Other Natural Disasters § 1.1.4.5

"In furtherance thereof, the City shall have the right, but not the obligation, to enforce the performance by the Association of its duties and any other fire prevention requirements, which were imposed by the City or other Public Agency as a condition of approval for the Development (e.g., prohibition of parking in fire lanes, maintenance of the blue reflective markers indicating the location of fire hydrants, etc.) and shall also have the right, but not the obligation, to enforce compliance by any Owner with any Fuel Modification Zone or designated interior/manufactured slopes restrictions applicable to his Lot (or Condominium) as set forth in the Fuel Modification Plan."

- Development Agreements: Many large-scale developments are governed by development agreements with the local government. For large developments in the WUI, the local government can negotiate with the developer to ensure the development meets wildfire preparedness. The local government could also negotiate for emergency access easements, dedication of land for firefighting facilities, and on-going maintenance of those facilities. This allows the city to keep growing while ensuring its citizens are better prepared for wildfire.
- Zoning Maintenance Requirements: Local governments can have zoning ordinances that require an approved project to maintain wildfire preparedness. These are subject to the zoning codes enforcement provisions, which often offer many ways to compel.

EXAMPLE CODE LANGUAGE: Coeur d'Alene, ID Development Code

"Maintenance requirements and responsibility shall be clearly identified for all projects where best management practices are employed, including those for erosion and sedimentation control, storm water management, and fuel modification for wildfire mitigation. When a storm water system is designed to service more than one lot, a maintenance agreement between all parties that benefit from the system must be established, including assurance of adequate funding. Easements across private property for maintenance access to community storm water systems shall also be required where necessary. All private maintenance agreements and required easements must be executed prior to issuance of certificate of occupancy, recordation of final plat, or similar approvals of the city."

Nuisance Abatement for Wildlife Hazards

Local governments can adopt nuisance ordinances that define nuisance to include actions that violate wildfire preparedness. For an example, see Town of Paradise, California, Code of Ordinances, § 8.58.020(A).

Funding Opportunities

Federal Emergency Management Agency: Assistance to Firefighters Grant

This program includes funding opportunities for Municipalities seeking to fund fire prevention and safety programs.

Federal Emergency Management Agency: Emergency Management Performance Grant

This program assists local governments in preparing for hazards. The grants issued help local emergency management agencies obtain required to support the National Preparedness Goal of a secure and resilient nation

Oregon Department of Forestry: Wildland-Urban Interface (WUI) Grants

These grants help communities reduce their vulnerability to wildfire.

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SCI Directors and Staff

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