

RENEWABLE ENERGY ISSUES AND OPPORTUNITIES

Urban Design & Planning

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I. Introduction

Energy is fundamental to our economy and quality of life. Everything around us is dependent on energy – from moving people and goods, to providing light and heating/cooling for buildings, to powering computers and manufacturing processes. Because of environmental, economic and security concerns, the nation is now at a crossroads about the types of energy we should use and how they should be used.

The City Council's interest in promoting renewable energy is multi-fold:

- *To provide a sustainable quality of life for the citizens of Gresham.* This includes making careful and effective use of available natural resources and ensuring that those resources may continue to exist and enhance the quality of life for present and future generations. Utilizing renewable energy technologies as an alternative to finite fossil fuels may help ensure a sustainable community and achieve this important Council goal.
- *To help reduce greenhouse gases which contribute to global warming.* Mayor Bemis signed the *US Mayors Climate Protection Agreement of 2007* along with the mayors of 500 other cities. The objective of this agreement is to reduce greenhouse gas emissions 7% below 1990 levels by 2012.¹ Carbon dioxide, resulting from the burning of fossil fuels, accounts for the largest portion of these gases. Since most renewable energy technologies generate little or no carbon dioxide or other greenhouse gases, they can help the City meet its commitment under this agreement.
- *To promote economic development.* One of the City's economic development goals is to "Position Gresham as a preferred location for clean technology (wind, electric vehicle, energy storage) and solar manufacturing companies, including support industries along the value chain."² Providing for and encouraging renewable energy development will demonstrate Gresham's commitment to these technologies. Companies involved in this industry tend to locate in areas where these technologies are already being widely applied.

The purpose of this white paper is to provide guidance for the consideration of Community Development Code (Code) amendments that will more easily allow renewable energy systems. The goals of these amendments will be to:

- Promote development of renewable energy systems by removing regulatory barriers and creating a clear path for approval.

¹ See *Mayors Climate Protection Agreement of 2007*.

² See City of Gresham, *Traded Sector Job Goals & Strategies 2009/10*.

- Create a livable community where development incorporates sustainable design elements such as the use of renewable energy.
- Protect air quality, limit the impact of climate change and decrease the use of fossil fuels.
- Encourage renewable energy development in locations where any adverse environmental, economic and social impacts can be mitigated.

This white paper includes:

- Gresham's current approaches to renewable energy.
- An overview of renewable energy systems.
- The reasons for the growing demand for renewable energy.
- The factors to be considered when developing code language for different technologies.
- An examination of how other jurisdictions/entities have dealt with renewable energy.
- The issues identified by staff regarding the current Development Code.
- Opportunities to consider when drafting code amendments.

Current Code Approach to Renewable Energy

The Development Code does not recognize installing renewable energy systems as a regulated use like it does recognize a new school or a particular housing type, etc. The only types of uses that generate power which are regulated by the code as such are "electrical generating facilities," which is listed in GCDC 8.0112(V) but is not defined. It is allowed as a Type III Community Service and requires a public hearing before the Hearings Officer.

The code does have scattered references to renewable energy type systems in association with other requirements in:

- **Section 4.0320, Permitted Uses of Industrial Districts.** Renewable energy development is allowed as a manufacturing use in the Heavy Industrial (HI) and General Industrial (GI) Districts.
- **Section 4.1100, Downtown Plan District and Section 7.0100 Downtown Design Guidelines and Standards.** These have various references to solar panels and other solar collection devices as one of the options a developer can choose to meet the sustainability requirements for new buildings.
- **Section 9.0110.F.2, Buffering & Screening.** Landscaping in required buffers are subject to the solar access requirements of Appendix 8.000.
- **Section 9.0901.B.2, Projections.** Wind generators for private energy generation are allowed to exceed the maximum building height requirement for the applicable land use district.
- **Section 10.1521.A.4, Modification of Regulations.** This section allows the Manager to modify requirements for setbacks, building height, parking, landscaping, lot coverage, and public facilities if the street system is aligned in an east-west orientation for maximum solar orientation or if multi-family buildings will have solar space heating and/or water heating devices.
- **Appendix 8.000, Solar Access.** This section has standards for acquiring solar access or easement for a solar collection device and exceptions to setback requirements for these devices.
- **Appendix 14.004.B.6, Significant Trees.** A Significant Tree is allowed to be removed in order to install solar energy equipment.

II. Renewable Energy Technologies: Overview & Factors

The term “renewable energy” is defined by Webster’s, Princeton and Oxford dictionaries as “Energy derived from sources that do not use up natural resources (fossil fuels, etc.) or harm the environment.” Energy sources for renewable energy include the sun, wind, the decomposition of organic matter, heat from the earth, and ocean waves.

Renewable energy systems come in different scales and produce different amounts of energy:

- **Large scale:** The largest scale applications are typically built by utilities and can occupy many acres. These can include wind turbine farms, ground mounted solar photovoltaic panels and fish friendly hydropower projects. Another form of a large scale facility is one that provides district heating for a central city such has been done in northern Europe and Klamath Falls.
- **Medium scale:** In recent years some private companies have become interested in building renewable energy systems that sell their energy to a local utility or other energy entity. For example, a firm may operate an enclosed biomass facility which would generate gas that is sold to the local natural gas utility; or a neighborhood may purchase solar panels to power an area; or an institution may establish a district wide heating program capturing waste heat from one system to warm another.³
- **Small scale:** These are installed by homeowners and businesses primarily to provide power to a residence or business. Examples include roof mounted solar panels or a backyard wind turbine to produce electricity. In Oregon, a “net metering” law allows such small electric power systems to reduce a property owner’s electric bill by sending surplus (unused) energy back into the electrical grid. The utility then deducts the value of the surplus energy from the electric bill. If the system provides total self sufficiency then the utility mails a check for the surplus power. This eliminates the need and cost for the owner to have a battery system to store surplus power so it can be used at a later time.

It is important to recognize that the development of renewable energy is a dynamic and changing industry. Some of the technologies being researched in laboratories may eventually find their way to commercial and residential applications in the future. Below is an overview of the systems now in prevalent use. A full description of each may be found in the technical appendix.

Solar Power

Solar power is the most widely used form of renewable energy. 17,000 households have solar energy systems in Oregon alone.⁴ There are two kinds of active solar energy systems for deriving energy from the sun – solar hot water and solar photovoltaic systems. Both typically involve roof mounted panels or collectors. An inverter box converts the direct current (DC) energy generated by the panel to alternating current (AC). Solar collectors work best on south facing roofs, though east-west oriented roofs may be suitable as well. There are also pole mounted systems for situations where roof slopes and building orientation are not optimal or where there is significant shading by adjacent buildings, etc.

³ This kind of approach was used at the Olympic Village in Vancouver, B.C., Canada.

⁴ The Portland Plan, Energy Background Report

Electricity produced by photovoltaic panels is expressed in watts and kilowatt hours. A watt is a measurement of electricity and a kilowatt hour (kWh) is the amount of electricity that is transmitted at a constant rate of 1,000 watts per hour. A kilowatt hour is the unit that is used by utilities to determine the amount of power used by a home or business for billing purposes.

The average four person household in the Portland area uses about 12,000 kWh annually. In western Oregon, 100 sq. ft. of panel area can generate about 1,000 kWh annually. A typical residential system producing 3,000 kWh, with 300 sq. ft. of panel area, can contribute one quarter to one third of the electricity consumed annually by a four person household depending on the number of sunny days, etc. The cost of such a system is about \$21,000 before incentives.⁵

The next technological advance in solar electric is the development of thin plastic-like film that has embedded metal semiconductors which conduct electricity when exposed to sunlight. Power output and cost promises to be superior to current photovoltaic panels. The film can be manufactured by printing it out in large sheets which can then be cut into desired sizes and shapes. This material will be able to be integrated into exterior building materials such as asphalt roofing, vinyl siding and windows so as not to be noticeable. Solexant Corporation, who will be building a plant in Gresham, is an example of a firm that produces thin film solar cells.

Factors to be considered:

- Solar access easements. The Code provides a process through which a person may seek a solar access permit when installing a solar feature on his/her property.⁶ However, this has not been used in the recent past. If these are pursued, there may be conflicts with preserving trees city-wide and with encouraging development in centers.
- Visual Impact. Solar panels will be visible where they are mounted and may cause some glare from the materials used in their construction. While screening could be used, it should be considered along with the impacts on renewable energy generation.
- Location and mounting. Mounting a solar panel on a roof may add enough dimension to make the structure taller than the maximum height. Flat roofs may present different issues than a sloped roof. A ground-mounted panel may encroach upon a required yard setback.

Wind Turbines

Wind turbines convert wind energy into electricity and are the second most widely used type of renewable energy. Although wind power accounts for only 1.5% of world wide electricity production, it is growing rapidly, having more than doubled production since 2005⁷. In Denmark it accounts for 19% of electricity production.⁸ Locally, PGE derives 4% of its electricity from wind turbines.⁹

A wind turbine works by having the wind turn its blades or rotor which spins a shaft which connects to a generator that makes electricity. The higher and more constant the wind speed the more electricity is

⁵ <http://www.portlandgeneral.com>, “Renewables & Efficiency/Costs & Incentives.”

⁶ See GCDC Section A.8001.

⁷ Wikipedia.org.

⁸ Ibid.

⁹ <http://www.portlandgeneral.com>, “How We Generate Energy.”

produced, up to the maximum output of the turbine. Wind turbines need to be attached atop a pole or tower for support and to access the wind. Since wind speeds increase with height, the higher the turbine is mounted, the higher its efficiency. In general, the larger the rotor, the larger the amount of wind caught and electricity produced. Wind speed can be highly variable, especially in urban environments where buildings and other structures can deflect wind. Like photovoltaic panels, power production is measured in watts and kilowatt hours (kWh). An inverter is necessary to convert direct current into alternating current, which is usually part of the turbine.

Wind turbines come in two scales: large scale installations such as those found in eastern Oregon; and installations at a residence or commercial building. The latter generates between 1 and 10 kilowatts and typically have tower heights of 60 to 100 ft. and rotors up to 20 ft. in diameter. Recently, small turbine systems have been developed that use vertically oriented rotors and generators. The rotor used to capture the wind is a cylinder shaped device that is narrower than a blade type rotor.

Factors to be considered:

- Visual impact. For greatest efficiency, towers need to be tall to capture sufficient wind. This may mean a pole approximately 60-80 feet tall with blades, up to 20 feet long. Additionally, the color of a wind turbine should be a non-reflective neutral color that will blend into the sky. Other visual impacts relate to tower lighting, tower construction method, and location of electrical lines.
- Safety. Tower setbacks and engineering affect its safety. The American Wind Energy Association (AWEA), the wind industry trade association, recommends that jurisdictions require a setback from the property line or adjacent structures that at least equals the height of the pole (or tower) plus the length of a turbine blade for safety reasons.¹⁰ Energy Trust of Oregon staff recommends requiring a structural analysis for roofs where a roof mounted turbine will be attached.¹¹
- Noise. The noise of capturing wind and the repetitive nature of this noise may have an impact. However, the smaller residential wind turbines produce much less noise than those used in wind turbine farms and are often quieter than other urban noises (people, traffic, airplanes, etc.).
- Wildlife. Wind turbine farms have been an issue for migrating and local wildlife. Energy Trust of Oregon staff has indicated that this is much less of an issue in urban settings.¹²
- Abandonment. An abandoned wind turbine poses a visual and safety hazard. The AWEA recommends that a wind turbine be removed if inoperable for more than 6 months.¹³

Biomass Energy

Biomass energy technologies utilize the solar energy that is stored as carbohydrates in plant materials. Biomass is a renewable energy source because the growth of new plants replenishes the supply. Three percent of all energy produced in the nation is derived from biomass.¹⁴ This renewable energy source is typically done on a large scale on farms or by utilities or industries, not in residential settings.

¹⁰ AWEA, "In the Public Interest: How & Why to Permit for Small Wind Systems."

¹¹ Conversation with Erin Johnston of Energy Trust, June 10, 2010.

¹² Ibid.

¹³ AWEA, "In the Public Interest: How and Why to Permit for Small Wind Systems."

¹⁴ Oregon Dept. of Energy website, "An Overview of Biomass Energy"

The following technologies use biomass:

- Direct Combustion – Biomass such as wood, agricultural waste, or residential fuels are burned to create radiant heat or to heat water. Industrial/utility applications often use the hot water to produce steam to heat buildings, fuel industrial processes, or produce electricity.
- Biogas Production – Biomass such as wastewater treatment plant sludge, animal manure, and food waste when decomposed under anaerobic conditions produce methane or other combustible gas. This gas can be burned in boilers to produce hot water for space heating or directed to a gas generator to produce electricity. Methane gas emitted from landfills and sewage treatment plants can also be captured and used for these purposes. Gresham’s wastewater treatment plant captures methane gas from sewage which is then piped to a cogenerator. This provides about 50% of the electricity needs of the plant.¹⁵
- Biofuels Production – Plant material, such as corn or soybeans, is fermented in tanks where bacteria convert the sugars in the carbohydrates into alcohol (ethanol or methanol). Diesel fuel can be produced by heating oilseed crops and pressing the oil out. Larger quantities can be produced in a distillation process using chemical solvents.

Factors to be considered:

- Odor. Since biomass energy converts waste products to methane, there are opportunities for odors to permeate from the biomass facility. As alternatives are developed regarding biomass, the mitigation of odor should be considered.
- Air Quality. Burning biomass may affect air quality. Oregon DEQ air quality standards and having necessary emission controls should be required.
- Groundwater and soil pollution. If not handled appropriately, biomass may cause groundwater and soil pollution. Biofuels production using chemical solvents increases this risk. Pollution mitigation should be considered when developing alternatives regarding biomass.

Geothermal Energy

Geothermal energy is generated from heat stored in the earth. Geothermal resources range from the modest but constant heat (50-70 degrees) generated at shallow depths in the ground that is found nearly everywhere to the extreme heat generated by hot water and steam found at much greater depths in certain areas, such as southern and central Oregon, where hot subterranean rock layers can be found. Multnomah County has minor low temperature (approx. 70 degrees) geothermal resources.¹⁶

Geothermal energy is utilized in two ways:

- High Temperature Geothermal: Hot water and steam is utilized directly for space heating or to generate electricity. For example, Klamath Falls established a heating district in 1981 that uses geothermal hot water to heat roads/sidewalks, homes, businesses, schools, etc. in and near its downtown.
- Low Temperature Geothermal: This approach uses the constant mild temperature of the earth at shallow depths to provide interior space/hot water heating, cooling, and humidity control through

¹⁵ City of Gresham website, Wastewater Services Division, “WWTP Renewable Energy Fact Sheet.”

¹⁶ See The Portland Plan, Energy Background Report.

the use of a ground source heat pump. This has two main parts: a heat pump and an underground loop system. These components allow the transfer of heat between a space and the earth.

A local example of a building using a ground source heat pump is the Burnside Rocket, a 16,000 sq .ft. mixed use building in east Portland that has office and retail tenants. It utilizes a groundwater heat pump/well system to reduce energy consumption by 40% compared to a conventional HVAC system. It helped the project attain LEED Platinum certification.¹⁷

Factors to be considered:

- Visual impact. Installation of a loop system may disturb a large area of earth, requiring revegetation and erosion control. The heat pump may be considered mechanical equipment.
- Safety. To avoid safety issues such as pipe breakage, electrocution, fire, etc., a certified geothermal technician should install the system.

III. Reasons for Renewable Energy

Environmental Factors

The following environmental factors play a role in generating demand for renewable energy:

- Climate Change. Climate change is one of the defining challenges for humanity in the 21st century. When anomalies in seasonal weather patterns such as warmer summers and wetter winters become commonplace over a long period of time, the term “climate change” begins to apply. Climate change can occur because of both natural and human causes, with the latter accelerating a change that would otherwise occur over a much longer time frame. The burning of fossil fuels (coal, natural gas, petroleum) is the major human contributor to climate change. This action releases greenhouse gases, especially carbon dioxide, which absorb and trap heat in the atmosphere causing shifts in weather patterns and an overall warming of the atmosphere and oceans. Climate changes expected in the northwest include:
 - Declining snow pack in the mountains, negatively affecting regional water supplies.
 - Higher temperatures, increasing risks to forests from wildfires and insect pests.
 - A rise in ocean levels, increasing flooding and erosion in coastal areas.
 - Warmer river temperatures, decreasing habitat for salmon and other cold water aquatic species.¹⁸

Climate change and renewable energy are closely related. Most renewable energy technologies emit no greenhouse gases or relatively little compared to burning fossil fuels. Consumers are attracted to renewable energy as a means to reduce one’s contribution to climate change and thereby help make the earth a more livable place for future generations.

¹⁷ Energy Trust of Oregon website, “Business: HVAC/Geothermal.”

¹⁸ *Climate Change Impacts in the United States*, prepared by U.S. Global Change Research Program, a consortium of 13 federal agencies, 2009.

- Other Environmental Impacts. Renewable energy is also chosen instead of fossil fuels because the burning of fossil fuels can emit pollutants or cause pollutants to form. The extraction of fossil fuels can cause local environmental damage.

Market Factors

The following market factors have driven the demand for renewable energy:

- Rising price of fossil fuels. Declining supplies and increasing world demand of oil and natural gas have resulted in prices for these fuels rising faster than inflation. Oregon prices for residential heating oil, natural gas and regular gasoline increased 129%, 84%, and 115% respectively from 1999 to 2005 (without taxes). General inflation during the same period was a much lower 14%.¹⁹ It is projected that these price trends are likely to continue. U.S. oil production peaked in the 1970s and has been declining since. The consensus forecast calls for global oil production to peak sometime between 2010 and 2020.²⁰
- Declining price of renewable energy. The price of renewable energy systems has declined over time, making it more affordable. The price of wind turbines has come down 80% since the early 1980s. Some utilities can deliver power from wind turbine farms cheaper than from a coal plant and far less than from a nuclear power plant.²¹ The cost of residential photovoltaic panels has dropped 1,700% over the past 40 years and 50% over the past 10 years.²² However, the power generated through photovoltaic panels still costs more than the power generated by a conventional coal or natural gas power plant (20 cents versus 5 cents per kWh)²³. The emerging technology of architecturally integrated thin film photovoltaic promises to close that price gap because of its lower manufacturing costs and increased power output.

Financial Incentives

The following incentives have played a key role in the popularity of renewable energy:

- Federal income tax credits. The federal government offers tax credit to both home and business owners to help offset the cost of renewable energy systems such as solar hot water, solar electric, wind turbines and ground source heat pumps. Business tax credits are similar and cover more technologies such as biomass systems and fuel cells. The federal government also has a program called Energy Efficiency Mortgages to help finance the cost of renewable energy systems for homeowners by including part of the cost into the house mortgage.
- State income tax credits. Oregon offers homeowners tax credits for solar hot water and photovoltaic systems, wind turbines and ground source heat pumps. Business tax credits are also offered.
- Cash incentives. Energy Trust of Oregon offers cash incentives for home photovoltaic systems and wind turbines to reduce their upfront costs, subject to conditions and power output.
- Solar electric buy-back incentive. Oregon customers of PGE, Pacific Power & Light and Idaho Power now have the option to participate in a solar electric buy-back program instead of claiming

¹⁹ State of Oregon Energy Plan, 2007-2009.

²⁰ International Energy Agency.

²¹ Wikipedia.org.

²² Oregon Solar Electric Guide, Oregon Dept. of Energy.

²³ Average cost, derived from various sources.

the State income tax credit. The first subscription period for interested owners met its quota quickly. Seven more subscription periods are scheduled through 2013. This incentive has been used successfully in Germany to greatly expand the use of photovoltaics.

Economic Development

An economy that includes renewable energy industries can generate jobs, new businesses, investments and increase tax revenues while expanding clean energy technologies. Consequently, renewable energy firms have been targeted by Oregon and by Gresham. Oregon is among the three states having the fastest growth rates in the renewable energy/energy efficiency industrial sector.²⁴ The more the local demand for renewable energy products and support services are met by local firms, the more the economic and environmental benefits accrue to the community. When a community encourages both a local demand for these products and services and has the demand satisfied by local firms, the more it can expand local business opportunities in this field and grow a green talent pool and jobs.

Infrastructure Savings

The development of a renewable energy system on a site where most of the energy will be consumed by a residence or business saves infrastructure costs for utilities and ultimately ratepayers. This lessens the need to build new power generation plants to supply power to the electrical grid as well as related infrastructure such as distribution lines and transformer stations.

IV. How Entities Approach Renewable Energy

State of Oregon

Oregon's net metering law and tax credits encourage renewable energy development and are operated by the Department of Energy. This department also does planning studies, distributes publications, helps site larger energy projects, and convenes working groups to promote renewable energy use.

Energy Trust of Oregon

Energy Trust of Oregon, a non-profit organization, was created by the State legislature. It is funded by utilities to promote energy efficiency, conservation and renewable energy development. Energy Trust:

- Provides technical and other assistance to renewable energy developers and customers.
- Works with suppliers of renewable energy systems, utilities and their customers to leverage resources and provide renewable energy to homes and businesses in a cost effective manner.
- Helps to remove barriers to renewable energy and integrates energy efficiency/conservation into its programs. This approach lowers the amount of energy consumed and maximizes the contribution that renewable energy can make to power and heat homes and businesses.

City of Gresham

In addition to utilizing biomass energy at its wastewater treatment plant, Gresham has incorporated renewable energy in its sustainability program by taking the following actions:

²⁴ The Clean Energy Economy (2009), Pew Charitable Trust.

- Installing the first electrical vehicle charging station in east Multnomah County at City Hall.
- Participating in the eTec electric vehicle project to install charging stations throughout the region.
- Installing one of the largest solar photovoltaic systems in Oregon at its wastewater treatment plant which generates 420 kW of electricity. Together with the biomass energy generated at the plant, this facility provides over 2/3 of its power needs to be met by renewable energy.
- Gresham is recognized as one of only 21 cities in the nation as a Green Power Community for its purchases of renewable energy from PGE.
- Gresham exceeded PGE's 2008 Green Power Challenge by signing up over 300 residents for renewable energy purchases from PGE.
- A Solarize Gresham program, modeled after Solarize Portland, is being developed.
- Gresham's economic development strategies include actively recruiting renewable energy firms. Solexant of San Jose, California recently chose Gresham as the location for a new manufacturing plant that will produce thin film photovoltaic cells. The plant will be initially employ about 170 people and eventually will have up to 1,000 employees when it operates at full capacity.

City of Portland

Portland recently adopted development code amendments to encourage greater utilization of renewable energy, including solar and wind energy. These are discussed under Highlights of Sample Codes (below). In addition, Portland:

- Collaborates with Solar Oregon, the Oregon Department of Energy, and Energy Trust of Oregon in the "Solar Now!" program. This program offers a one stop information center for homeowners and businesses interested in utilizing solar energy.
- Partners with neighborhood associations in the "Solarize Portland" program. This program brings together solar contractors and neighborhoods so interested property owners can purchase and install solar energy systems in volume and experience significant cost savings compared to individual efforts.
- Has minimum biofuels standards for gasoline and diesel retail outlets. It requires outlets to only sell gasoline with a minimum of 10% ethanol by volume. Diesel fuel is required to have at least 5% of its volume in biodiesel.²⁵

Highlights of Sample Codes

The following development codes were identified by the Oregon Department of Energy and others for their treatment renewable energy systems.

- *Lincoln City, OR:* Adopted in 2009, this ordinance addresses both small scale wind turbines and solar photovoltaic/hot water systems. Both systems have definitions which describe the main parts of each system, with the small wind energy system definition including a maximum power output limit of 10 kW of electricity. Both systems are allowed as accessory uses in all zones.²⁶

²⁵ Portlandonline, Planning & Sustainability, Biofuels.

²⁶ Lincoln City Ordinance No. 2009-06, Section 2.

Standards for small wind turbines, including vertical types, include:

- Minimum distance between rotor blades and ground must be 20 feet.
- No illumination allowed.
- Automatic braking required to prevent uncontrolled blade rotation during high wind periods.
- All wiring must be located underground.
- Noise not to exceed 55 dba at property line.
- Paint color must be one that reduces visibility, such as flat light gray.
- Diameter of area swept by blades not to exceed 25 feet.
- Minimum setback equal to the height of the tip of a blade when it is at its highest point from the ground, unless adjacent property owner authorizes lesser setback.
- Maximum height for support structure not to exceed 80 feet.
- A maximum of one free-standing turbine is allowed on a parcel with an area of 25,000 sq. ft. or less. One additional system is allowed for every 12,500 sq. ft. of lot area above 25,000 square feet.
- Roof mounted systems may not extend over 5 ft. above the roof. An engineering report is required addressing the ability of the roof structure to withstand wind load, vibration, etc. from the turbine.
- * There are no standards addressing safety/certification or abandonment

Standards for small solar systems are:

- Ground mounted systems are considered structures and must meet applicable setbacks of the zoning district.
 - Roof mounted systems must be mounted flush to the roof and not extend more than 3 feet above the roof.
 - * There are no standards addressing screening of solar panels.
- *Polk County, OR:* The Polk County ordinance, adopted in 2009, addresses photovoltaic solar systems and small scale wind systems.²⁷ It includes definitions for larger scale commercial power generating facilities and small scale wind and photovoltaic systems. Wind turbine towers are regulated along with the towers associated with communication and meteorological facilities, and with different standards for sites outside and inside the Urban Growth Boundary. Wind turbines inside the UGB are permitted for towers no more than 100 ft. in height and are treated as a conditional use. The minimum setback is equal to the tower height. Regulations are less restrictive outside the UGB.
 - *Woodbury, Minnesota:* Adopted in 2009, this ordinance regulates not only wind turbines and solar systems but it was the only ordinance found that also regulates ground source heat pump systems (geothermal).²⁸ It has extensive definitions for all three.²⁹ There are no definitions in regard to scale, although the standards themselves limit their sizes to relatively small residential type systems. All systems are subject to safety /certification requirements and standards for abandonment. Solar and wind energy systems are treated as accessory uses in all districts, while

²⁷ Polk Co. Renewable Energy Ordinance, Ordinance No. 09-06.

²⁸ City of Woodbury, Minnesota, Alternative Energy Systems Ordinance, Division 5. Alternative Energy Systems.

²⁹ Ibid, Section 24-403, Definitions.

wind turbines are restricted to certain residential districts zoned for lot sizes of 3 acres and larger and in certain commercial and industrial zones.

Standards for wind turbines include:

- In residential districts, hub (center of blades) height is restricted to 45 ft above the ground.
- Turbines with hub heights from 46 to 75 ft. are processed as a conditional use.
- Minimum setback is the same as the hub height.
- Roof mounted turbines are not permitted.
- Blade lengths of more than 15 ft. are not permitted.
- Turbines are not permitted in front yards.
- No more than one turbine per property is allowed.
- There are also standards for noise, feeder lines, color, safety and certification.

The standards for roof and ground mounted solar energy systems include restrictions for location, maximum panel area, and screening. Details include:

- Ground mounted solar cannot be higher than 15 ft.
- Ground mounted solar panels are limited to rear yards in residential districts where they must meet a minimum setback of 15 ft. from all property lines.
- Ground mounted solar panels cannot occupy more than 25% of the required rear yard area nor the maximum area allowed for accessory buildings.
- Roof mounted systems must be flush with the roof for sloped roofs and not exceed the maximum height requirement of the district.

Only closed loop (not open loop) ground source heat pump systems are permitted. There are requirements for yard setbacks, above ground equipment, and noise.

- *Portland, OR:* Portland City Council approved a final set of code updates regarding renewable/green energy systems on July 21, 2010³⁰. These primarily address small scale systems in an effort to remove regulatory barriers that impede their installation. The adopted green energy amendments:

General

- Classify and define energy production facilities into small scale and utility scale.
- Clarify that small scale energy production systems are treated as accessory uses to the primary use regardless of where the power is used, i.e. fed into the power grid or used by the home or business. However materials (e.g. biomass) from other sites cannot be used to generate power for small scale systems.
- Allow small scale energy production in the Open Space (OS) District.
- Allow utility scale energy production as a conditional use in the Open Space (OS) and Single Family Dwelling (RF) districts.

³⁰ City of Portland, Ordinance No. 184016.

Solar

- Create specific standards for solar panels in lieu of discretionary design review standards and exempt ground mounted panels from conditional use review.
- Clarify how roof mounted panels are treated relative to building height standards. Such panels are allowed to extend up to 5 ft. above the maximum height for flat roofs and up to 18 inches for sloped roofs. There are also similar standards for panels in design overlay zones, including roofs with parapet walls.

Wind

- Create definitions and standards for both small and utility scale wind turbines. Standards only address the required setbacks and height of turbines for each of the two categories. Also no distinction is made for vertical versus horizontal turbines.
 - Exempt from design review small scale wind turbines that are not in scenic view corridors.
 - Merge definition of large scale wind turbine into new definition of utility scale wind turbine.
- *Astoria, OR*: This ordinance is a work in progress.³¹ The Columbia River Estuary Study Task Force is working with Astoria to establish standards for small scale solar and wind energy systems that could also serve as a model for other coastal communities. It is particularly intended for wind turbines and exempts roof mounted photovoltaic panels and ground mounted photovoltaic panels 400 sq. ft. or less in area. Non-exempt systems will be allowed either with administrative review in some zones or as a conditional use (requiring public hearing) in others. The first draft, issued in March 2010, addresses minimum setbacks, maximum height, noise, color, etc. as they relate to wind turbines.

The draft has environmental and visual standards because of the special scenic and migratory bird/wildlife areas found along the coast. For example, in regard to visual issues, it requires a visual impact analysis using models or photo simulations from at least three perspectives. A landscaping plan is also required. The draft also has standards for abandonment, including posting a bond to cover the cost of removing a system. A second draft is expected in August after further Planning Commission review.

V. Gresham Community Development Plan (GCDC) Issues

Volume 1: Findings

The findings in Volume 1 of the GCDC provide background information about the land use, social/economic, public facilities, and environmental issues that affect Gresham. Volume 1 does address wind and solar energy (pgs. 2-41 through 2-43) but these findings are more than 20 years old.

Volume 2: Goals, Policies, Action Measures

The goals, policies and action measures of Volume 2 give the City's position on important issues and provide direction on the crafting of legislative development code amendments and other appropriate implementation actions. Section 10.222, Energy Sources (pg. 34) is the only part of Volume 2 that

³¹ Columbia River Estuary Study Taskforce (CREST) Memorandum of March 15, 2010 and conversation with Alejandro Bancke, CREST Coastal Planner, June 2010.

discusses renewable energy. However, it was written during the same time period as the Volume 1. It has only one policy which is: “It is the City’s policy to protect energy sources.”

Volume 3: Community Development Code

Volume 3 of the GCDC implements the policies of Volume 2. It has definitions of unique terms used in the code, lists the land use districts, the uses permitted in each district, the development standards for permitted uses, and the procedures for processing various types of development permits.

The introduction of this white paper includes a summary of how the current code addresses renewable energy. With the exception of Appendix 8.000 on solar access, there are only scattered references to some technologies in sections dealing with other issues. The only reference to the production of energy as a regulated or permitted use are “electrical generating facilities”, which are not defined, but do require a Type III Community Service Use permit.

The code does not:

- Define renewable energy or its systems.
- Recognize renewable energy systems as a permitted use in any of the land use districts.
- Have any siting or development/design standards akin to those described for renewable energy systems. These would be the kind of standards that are referenced in the sample codes of Section IV. While Gresham has received proposals for ground and roof mounted solar panels, wind turbines, and a biomass industrial use that would sell its generated power to PGE, there is uncertainty about how these should be reviewed and about which code standards apply.

VI. Conclusions & Opportunities

The sample Codes implemented by other cities described in Section IV highlight opportunities for Gresham as it considers a comprehensive approach to renewable energy. These samples demonstrate technologies, factors, and standards to examine. As this examination gets underway, staff will craft alternatives that provide for a clear process for the review of renewable energy systems. Gresham has the opportunity to fully integrate renewable energy into its Community Development Plan.

- Volume 1, Findings may be amended to reflect current technologies, their applications and a discussion of related land use/design issues.
- Volume 2, Goals, Policies and Action Measures may be amended to provide policy direction necessary for adopting Code language on renewable energy.
- Volume 3, Community Development Code may be amended to:
 - Provide definitions for renewable energy systems in Article 3.
 - Provide guidance in the Permitted Uses Tables on where renewable energy systems are permitted and under what conditions. For example, small scale installations may be permitted outright, while medium or larger scale systems require a review.
 - Develop standards for the location and design of various systems to ensure compatibility with adjacent neighborhoods and land uses. These could include standards for height, setback, and address noise, safety, and screening issues.

- Finally, renewable energy is a dynamic and changing field. Unforeseen technologies will emerge in the future. One way to accommodate these technologies is to provide for an Energy Innovation Pilot Program. Such a program would enable the City to allow on a trial basis a new technology in an appropriate location. This would enable the City to monitor and evaluate it for impacts and determine if the Code should be modified to allow the emerging system on a broader scale. This would enhance Gresham's reputation as a community willing to try and facilitate new ideas that foster sustainability. The code provisions for Innovative Housing Demonstration Projects may serve as a model for such a program.³²

VII. Next Steps

This issues paper has been shared with a staff advisory team and will be shared with the Planning Commission and City Council to ensure that the issues identified are the appropriate issues. It will also be shared with the Neighborhood Coalition, the Development Group, and be part of a community forum for this project. The purpose of these forums will be to ensure issues are comprehensively identified. Staff will also seek feedback on potential alternative approaches.

³² See GCDC 7.0300 for the Innovative Housing Demonstration Project Code.