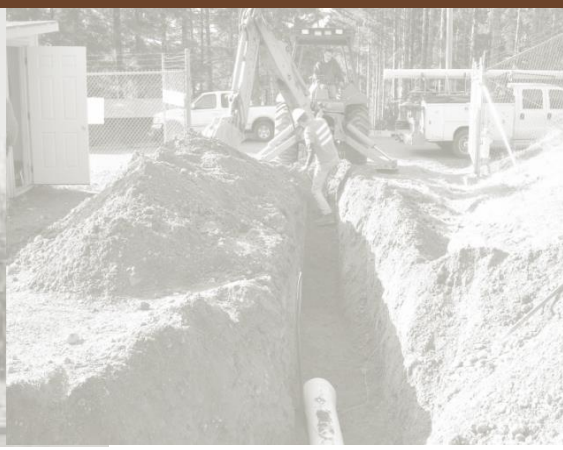
Attachment D

Tumwater City Plan 2036
Utilities Element





CITY OF TUMWATER

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1.1 Introduction

The Utilities Element ensures that utility services provided by both public and private suppliers are consistent with the City of Tumwater's Comprehensive Plan and can support the community's growth and development as anticipated over the 20-year planning period.

The Utilities Element is based on the same assumptions and is consistent with the Land Use Element, which establishes the overall growth strategy for the City of Tumwater and its Urban Growth Area. The system design and timing for extension of utility services supports the land use pattern and policies proposed throughout the Comprehensive Plan. The level of service standards established for public utilities determines capital facilities costs and revenue analysis in the Capital Facilities Plan and provides a foundation for analysis of the existing utility delivery system and proposed improvements, which are necessary to meet the City of Tumwater's rapidly changing demands in six primary areas including:

- Natural gas
- Electricity
- Telephone
- Utility pipelines
- Cable television
- Cellular
- Broadband internet

Water and wastewater services are addressed as part of the Lands for Public Purposes Element.

The Utilities Element, as required by the Growth Management Act, must include an inventory of the general location of all existing and proposed utility facilities and a description of the current capacity and the expected future capacity of each utility. This Element identifies ways of improving the quality of these services and includes policies that ensure utilities are coordinated with land use. The City of Tumwater will implement these policies through its franchise agreements with the utilities and

through the land use permit process. Table 1 provides a list of the plans that provide the foundation for this element of the Comprehensive Plan.

1.2 Utility Regulations

Both public and private agencies are involved with regulation, coordination, production, delivery, and supply of services. This section of the Utilities Element identifies the major pieces of legislation and organizations that are most prominent in the utilities sector in Table 1 below.

Table 1. Foundational Plans and Data

Topic Index	Supporting Plans and Materials
Natural Gas	• Pipeline and Hazardous Materials Safety Administration Strategic Plan (2012-2016) • Pipeline Safety Act, Washington State (Chapter 81.88 RCW) (2007) • Land Use Planning in Proximity to Natural Gas and Hazardous Liquid Transmission Pipelines in Washington State, Washington Utilities and Transportation Commission (2006)
Electricity	• Northwest Regional Forecast of Power Loads and Resources 2016 through 2025, Pacific Northwest Utilities Conference Committee (2015) • Pacific Northwest Loads and Resources Study, Bonneville Power Administration (2015) • Pacific Northwest Power Supply Adequacy Assessment for 2020, Northwest Power and Conservation Council (2015) • Public Utility District No. 1 of Thurston County Electric Initial Business Assessment, Thurston County PUD (2012) • Seventh Northwest Conservation and Electric Power Plan, Appendix M Climate Impacts, Northwest Power and Conservation Council (2016) • State Energy Data System, U.S. Energy Information Administration (2015) • Sustainable Thurston Energy White Paper, Thurston Regional Planning Council (2011)

Topic Index	Supporting Plans and Materials
Puget Sound Energy (Natural Gas and Electricity Provision)	• Comprehensive Assessment of Demand-Side Resource Potentials 2016-2035, Puget Sound Energy (2015) • Integrated Resource Plan, Puget Sound Energy (2015) • Puget Sound Energy Annual Statistics (2015) • Puget Sound Energy Franchise Agreement, City of Tumwater and Puget Sound Energy (2015)
Telecommunications	• Broadband Feasibility Assessment with Cities of Olympia, Tumwater and Lacey, Thurston County Public Utility District (2015)
Comcast (Telecommunications Service Provision)	• Comcast Franchise Agreement, City of Tumwater and Comcast (2009)
General	• Land Use Element • County-Wide Planning Policies, Thurston County (2015) • Sustainable Thurston, Thurston Regional Planning Council (2013) • Climate Action Plan, City of Tumwater (2008) • Lands for Public Purposes Element • Capital Facilities Plan (2016-2021) • City of Tumwater Resource Conservation Management Program (Phase 1 and 2) - Energy Conservation Assessment, State General Administration and Washington State University Extension Energy Program (2008) • Natural Hazards Mitigation Plan for the Thurston Region (2009)

1.2.1 State Regulation

Investor-owned utilities are regulated in Washington by the Washington Utilities and Transportation Commission, which is composed of three members appointed by the Governor. The commission is empowered by Title 80 of the Revised Code of Washington (RCW) to regulate electrical, gas, irrigation, telecommunications, and water companies. State law directs the commission to regulate the rates, charges, services, facilities, and practices of the utilities. Any change in customer charges or service provision requires commission approval.

The commission, under Title 81 RCW, also regulates the rates and safety practices of the transportation of solid waste (garbage), intrastate petroleum and gas products via

pipeline, and scheduled auto transportation services. As part of its mission to protect consumers, the commission maintains a call center for customer complaints at 1-888-333-9882 and coordinates the 811 Call Before You Dig line, a free service for locating utilities on public or private property that anyone can use.

1.2.2 Federal Regulation

The Federal Energy Regulatory Commission is an independent five-member commission working with the U.S. Department of Energy. The Commission regulates the interstate transmission of natural gas, oil, and electricity, as well as licensing natural gas and hydropower generation projects.

The Federal Communications Commission regulates interstate and international communications by raid, television, wire, satellite, and cable. An independent U.S. government agency overseen by Congress, the five-member commission is the United States' primary authority for communications laws, regulation, and technological innovation. The commission maintains a consumer call center at 1-888-255-5322, as well as an online help center.

1.2.3 Franchise Agreements

All private utilities have existing franchise agreements to provide service in the City of Tumwater. The franchise agreements are a non-exclusive right to occupy the public right-of-way.

Several private service providers are available in the community that provide television, cable, internet, and telephone services. Some companies lease underground utility conduit from the City of Tumwater. The City of Tumwater has a special franchise agreement with Xfinity cable services that provides public education funding to support Tumwater TV, Channel 26 (Xfinity only), operated by Thurston Community Television (TCTV). The City of Tumwater provides limited liaison assistance in resolving escalated service requests with Xfinity.

1.3 County-Wide Planning Policies

The Growth Management Act requires that comprehensive plans be consistent with Thurston County's County-Wide Planning Policies, as amended in 2015. The following is a list of the relevant policies that apply to this Element. All County-Wide Planning Policies are adopted as Appendix B to the Comprehensive Plan. The relevant sections of the County-Wide Planning Policies to this Element are cited below.

I. General Policies

1.12 Champion energy efficiency and renewable energy strategies that contribute to energy independence, economic stability, reduced climate impacts, and long-term household and community health.
The Utilities Element contains goals, policies, and actions that address County-Wide Planning Policy 1.12. These goals, policies, and actions contribute to energy independence, economic stability, reduced climate impacts, and long-term household and community health.

II. Urban Growth Areas

2.2 The boundaries of designated urban growth areas must meet the following criteria:

[…]

b. Be served by or planned to be served by municipal utilities.

The purpose of the Utilities Element is to plan the provision of utilities to the City of Tumwater and its Urban Growth Area.

III. Promotion of Contiguous and Orderly Development, Provision of Urban Services, and Protection of Rural Areas

3.1 Concentrate development in urban growth areas and protect rural areas by:

[…]

h. Where urban services & utilities are not yet available, requiring development to be configured so urban growth areas may eventually infill and become urban.

3.2 Coordinate Urban Services, Planning, and Development Standards through:

a. Maximizing the use of existing infrastructure and assets, and leveraging the value of these in building vital, healthy, and economically viable communities.

b. Making public investments that further multiple community

goals, target identified priorities, and leverage additional investment.

[…]

d. Providing and maintaining municipal services (water, sewer, solid waste, public safety, transportation, and communication networks) in a sustainable, and cost-effective manner.

e. Coordinating planning and implementation of polices regarding urban land use, parks, open space corridors, transportation, and infrastructure within growth areas. Developing compatible development standards and road/street level of service standards among adjoining jurisdictions.

f. Developing, and ensuring the enforcement of, agreements between Thurston County and the cities and towns within its borders, that ensure development occurring within unincorporated urban growth areas is consistent with city utility and stormwater planning and conforms to the development standards and road/street level of service standards of the associated city or town.

3.4 Provide capacity to accommodate planned growth by:

a. Assuring that each jurisdiction will have adequate capacity in transportation, public and private utilities, storm drainage systems, municipal services, parks, and schools to serve growth that is planned for in adopted local comprehensive plans;

The Utilities Element seeks to find the most effective way to serve the greatest amount of people at the lowest cost possible through examining how utilities are currently provided, what private utility providers have planned, and how future demand will shape utility distribution.

VII. Economic Development and Employment

7.3 Provide in comprehensive plans for an adequate amount of appropriately located land, utilities, and transportation systems to support desirable economic development. Create and maintain regulatory certainty, consistency, and efficiency.

7.5 Build a vital, diverse, and strong local economy, including job opportunities that support community and household resilience, health, and well-being by:

[…]

c. Providing opportunities for a range of business types to succeed.

d. Emphasizing polices that support locally owned businesses including home-based, entrepreneurial, and nonprofit business and organizations.

[…]

j. Adding incentives for businesses to demonstrate their environmental sustainability including reduction in greenhouse gas emissions.

In addition to the provision of natural gas and electricity, the Utility Element outlines the provision of telecommunication networks, which supports businesses of all types as internet access becomes increasingly vital to the success of a business.

IX. Transportation

9.2 Increase opportunities for riding transit, biking, walking, ridesharing, allowing and encouraging flexible work schedules, and teleworking.

Teleworking is supported by the provision of internet as covered in Section 5.1.

X. Environmental Quality

10.4 Take action to conserve resources, increase use of renewable resources, and decrease dependence on non-renewable resources by:

a. Reducing energy consumption and reliance on nonrenewable energy sources.

Goals U-2 and U-4 of this element address reducing energy consumption and increasing energy generation from renewable sources to minimize

the City of Tumwater's carbon footprint.

1.4 Sustainable Thurston Goals

The City of Tumwater adopts as part of the Utilities Element the following Sustainable Thurston Goals:

1.4.1 Priority Goals

Priority Goal 5: Plan and act toward zero waste in the region.

Priority Goal 11: Provide opportunities for everyone in the Thurston Region to learn about and practice sustainability.

Priority Goal 12: Make strategic decisions and investments to advance sustainability regionally.

1.4.2 Economy Goals

EC-4: Provide robust infrastructure to support economic development.

1.4.3 Housing Goals

H-7: Encourage the construction, weatherization, and operation of homes to boost energy efficiency.

1.4.4 Energy Goals

EN-1: Increase energy generation from renewable resources to reduce the region's carbon footprint.

EN-2: Enhance the region's electricity distribution, monitoring, and storage infrastructure to support adoption of cleaner technologies and practices.

EN-3: Increase energy efficiency and conservation to reduce the region's carbon footprint.

1.4.5 Solid Waste Goals

SW-1: Plan and take action to reduce, reuse, and recycle as much waste as possible and meet the needs of current and future populations.

SW-2: Continue to plan for, educate, assist, and offer access to safely and efficiently manage disposal and reduce hazardous waste.

1.4.6 Environment Goals

E-1: Reduce air pollution that endangers human health.

E-2: Reduce the region's carbon footprint and protect critical infrastructure in case of extreme weather or sea level rise.

2. NATURAL GAS

The City of Tumwater and the surrounding urban growth area are served entirely by Puget Sound Energy. Puget Sound Energy serves all municipalities within Thurston, King, Pierce, Lewis, Snohomish, and Kittitas Counties, an approximate 1.1 million electric and 775,000 gas customers. This service area has experienced over 70% increase in customers since 2004.

2.1 Regulatory Context

The activities of Puget Sound Energy are regulated by both federal and state legislation. This legislation is primarily concerned with promoting competition among gas suppliers and controlling the cost of natural gas to the consumer. Puget Sound Energy is subject to the general regulations and oversight by the energy agencies, such as the Washington Utilities and Transportation Commission and the Federal Energy Regulatory Commission. Other pieces of legislation that have specific implications for the natural gas industry are described below:

2.1.1 Natural Gas Policy Act 1978

The National Gas Policy Act encouraged competition among fuels and suppliers across the United States. As a result, natural gas has essentially been de-controlled. The Act also contained incentives for developing new natural gas resources and a tiered pricing structure aimed at encouraging the development of national transmission pipelines.

2.1.2 The Clean Air Act Amendment of 1990

The passage of the Clean Air Act amendments in 1990 has shown a federal intent to promote the diversification of fuel sources for motor vehicles. This is in response to the need to both reduce carbon dioxide atmospheric emissions and to reduce the nation's reliance on gasoline for strategic reasons.

The Olympic Region Clean Air Agency serves Clallam, Grays Harbor, Jefferson, Mason, Pacific, and Thurston counties and it is one of seven such regional air pollution control agencies in the state of Washington. Olympic Region Clean Air Agency works cooperatively with the State Department of Ecology and the regional United States Environmental Protection Agency to measure criteria ambient air pollutants, meteorological parameters, and other air-related data. It currently operates and maintains air monitoring equipment for measurement of three of the six criteria pollutants: particulate matter (PM2.5), ozone (O3), and carbon monoxide (CO).

2.1.3 The Clean Air Rule

The State Department of Ecology has set a cap on carbon pollution to help slow climate change and limit the projected effects on the state's coastal communities, agricultural industries, and drinking water supplies.

Under the new rule to cap and reduce carbon pollution, businesses that are responsible for 100,000 metric tons of carbon pollution annually are required to cap and then gradually reduce their emissions. Organizations regulated by the Clean Air Rule are required to reduce emission beginning in 2017. Beginning in 2020, the threshold reduces by 5,000 metric tons every three years. By 2035, the compliance threshold will be 70,000 metric tons of carbon dioxide equivalent or more. The threshold will remain constant at 70,000 MTCO2e after 2035.[1]

2.1.4 Olympic Region Clean Air Agency

The Olympic Region Clean Air Agency is a local government agency responsible for enforcing federal, state, and local air pollution standards and governing air pollutant emissions from new and existing sources in Clallam, Grays Harbor, Jefferson, Mason, Pacific, and Thurston counties.

2.2 System Analysis

The 2,889 residential natural gas customers in the City of Tumwater use an estimated 37 million cubic feet of natural gas in December 2015. This is 0.3% of Washington's total residential natural gas consumption.

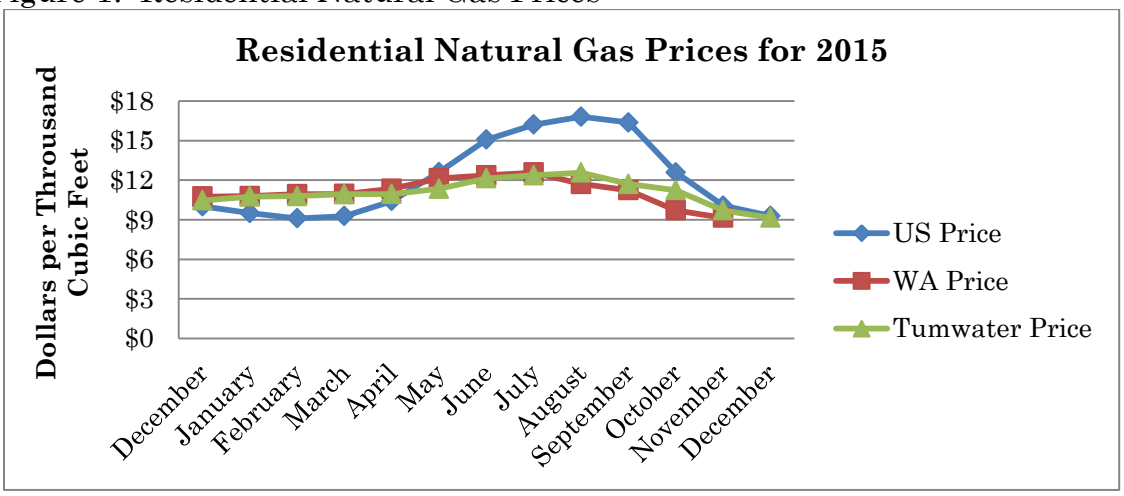
The City of Tumwater's natural gas supply system currently serves existing customers. Washington Utilities and Transportation Commission regulations prohibit Puget Sound Energy from extending gas facilities to areas that are not expected to pay for themselves from the outset. While this keeps the existing ratepayers from financing improvements to other areas, it does limit service delivery of natural gas to marginally profitable areas.

2.2.1 Residential Rates

Residential natural gas prices in the City of Tumwater averaged $9.15 per thousand cubic feet in 2015. This average rate was approximately 1.5% less than the U.S. average rate of $9.29 per thousand cubic feet for residential customers in that month.

[1] The City of Tumwater started the update process in 2015 using data from 2015 and did not receive 2016 data until it was too late to incorporate in the update process.

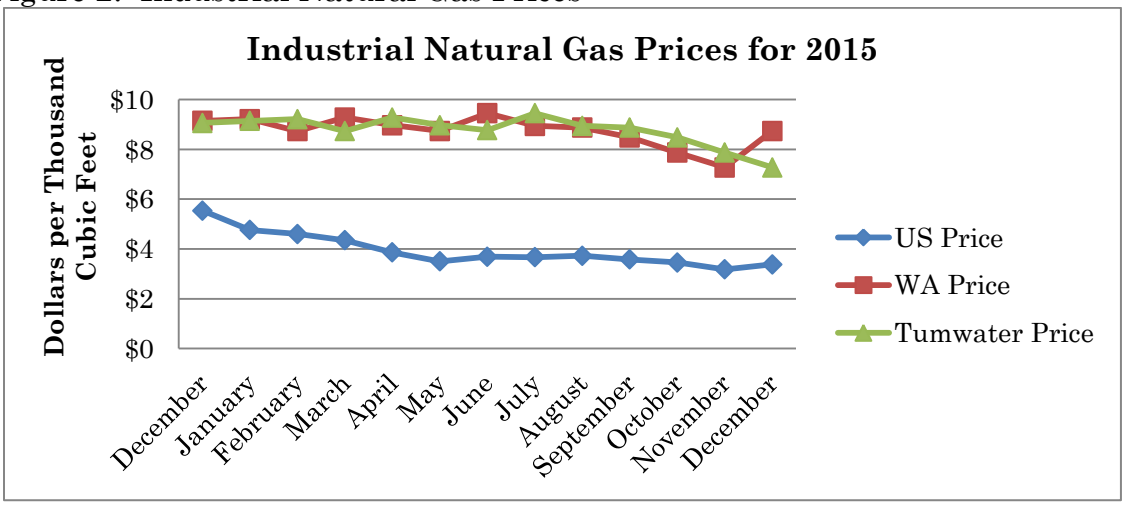
Figure 1. Residential Natural Gas Prices



2.2.2 Industrial Rates

The City of Tumwater's industrial natural gas prices in 2015 averaged $7.27 per thousand cubic feet, which was approximately 115% more than the national average rate of $3.38 per thousand cubic feet. The average industrial natural gas rate in the City of Tumwater decreased 19%, from $9.06 per thousand cubic feet in December 2014 to $7.27 per thousand cubic feet in December 2015.

Figure 2. Industrial Natural Gas Prices

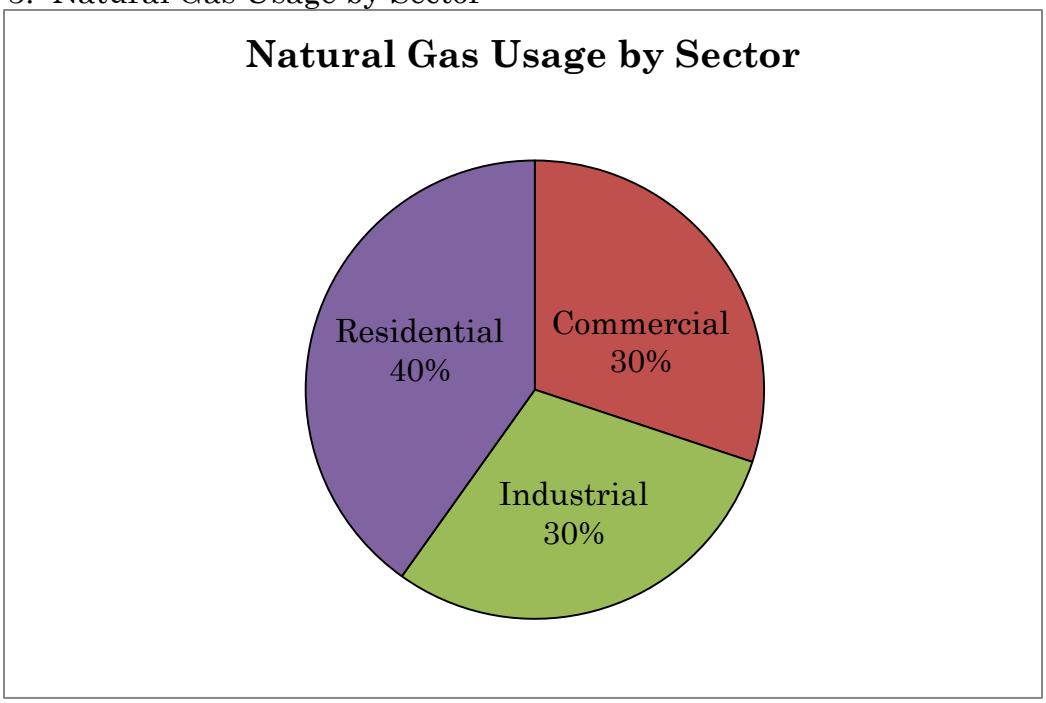


Puget Sound Energy expects nominal retail gas rates to rise between 2.9% and 3.4% per year, depending on the class, between 2016 and 2033.

2.2.3 Natural Gas Usage

The City of Tumwater used natural gas to create 6.45 million therms of heat energy in 2015. Residential uses consumed about 10% more natural gas than commercial or industrial uses.

Figure 3. Natural Gas Usage by Sector



3. ELECTRICITY

Puget Sound Energy, the City of Tumwater's energy provider, is an investor-owned public utility incorporated in the State of Washington. The utility delivers local service to more than 1.1 million residential, commercial, and industrial customers in a nine county, 4,500 square mile service territory. Approximately 450,000 customers have been added to this service territory in the past ten years, an over 70% increase in service area population. Puget Sound Energy builds, operates, and maintains an extensive electrical system consisting of generating plants, transmission lines, substations, and distribution systems.

The Bonneville Power Administration, a power-marketing agency of the U.S. Federal Government, owns and operates the principal high voltage bulk transmission lines serving the Puget Sound region. Puget Sound Energy relies on Bonneville Power Administration for bulk transmission services of power generated by federal hydro dams and Energy Northwest generators.

3.1 Regulatory Context

Puget Sound Energy and the Bonneville Power Administration activities are coordinated by the policies of the Western Electricity Coordinating Council and Northwest Power and Conservation Council. The Federal Energy Regulatory Commission and the Washington Utilities and Transportation Commission provide regulation for the system. The role and structure of the Washington Utilities and Transportation Commission, which regulates all utilities, has been described in Chapter 1. Organizations and regulations that are specific to electricity supply are described below:

3.1.1 The Western Electricity Coordinating Council

Western Electricity Coordinating Council is responsible for coordinating electricity supply across the western United States. It covers all of the United States west of the Rockies and parts of Mexico and Canada. Its primary function is to coordinate wheeling of power between the regions and to provide safeguards in the national grid so that a power disturbance in one part of the country will not leave another region without power.

3.1.2 The Northwest Power Pool

Northwest Power Pool is an integrated system of generating resources and transmission facilities owned by Northwest Utilities. The pool was formed in 1942 to coordinate sales and interchange of power within the region. Puget Sound Energy is a member of the Northwest Power Pool.

3.1.3 The Northwest Power and Conservation Council

The Northwest Power Act of 1980 authorized the Council and it was approved by a vote of the legislatures of all four northwestern states, Washington, Oregon, Idaho, and Montana. The governor of each of the four states appoints two members to serve on the Council. The Council's focus is on the generation of electricity; however, its policies have implications for gas service. The act contains three principal mandates for the council to carry out:

1. Develop a 20-year electric power plan that will guarantee adequate and reliable energy at the lowest economic and environmental cost to the Northwest. Energy conservation, renewable resources, such as wind power, solar, geothermal, and biomass, and high-efficiency resources, such as those that use heat from manufacturing processes to generate electricity, are listed in the Northwest Power Act as priorities.

2. Develop a fish and wildlife program to protect and rebuild populations affected by hydropower development in the Columbia River Basin.

3. Conduct an extensive program to educate and involve the public in the council's decision-making processes.

The plans and policies the Council develops and approves are implemented by numerous agencies including Bonneville Power Administration, U.S. Army Corps of Engineers, Bureau of Reclamation, and Federal Energy Regulatory Commission as well as both investor-owned and public utilities. State, tribal, and local governments often work closely with the Council as it develops its power and fish and wildlife plans, and these entities implement measures in those plans. The Power Plan and the fish and wildlife program are updated at least every five years.

3.1.4 Washington Energy Independence Act

The Washington State Energy Independence Act (RCW 19.285) sets annual targets for utilities to use eligible renewable resources or acquire equivalent renewable energy credits. These targets increase over the years, for example the target percentage was 3% in 2012, 9% in 2016, and by 2020 utilities should have 15% of their power production come from renewable resources or energy credits.

3.1.5 Western Interstate Energy Board

The Western Interstate Energy Board was created Western Interstate Nuclear Compact. It is an organization of governors and premiers of the eleven western states and three western Canadian provinces. The Board's purpose is to provide the

instruments and framework for cooperative state efforts to enhance the economy of the West and contribute to the well-being of the region's people. Most of the Board's work is conducted through its three committees:

1. The High-Level Radioactive Waste Committee works with the U.S. Department of Energy to develop a safe and publicly acceptable system for transporting spent nuclear fuel and high-level radioactive waste under the Nuclear Waste Policy Act.

2. The Energy Minerals Reclamation Committee works to improve the administration of the Surface Mining Control and Reclamation Act in coal producing states.

3. The Committee on Regional Electric Power Cooperation works with the Western Conference of Public Service Commissioners to improve the efficiency of the western electric power system.

3.2 Electricity Supply

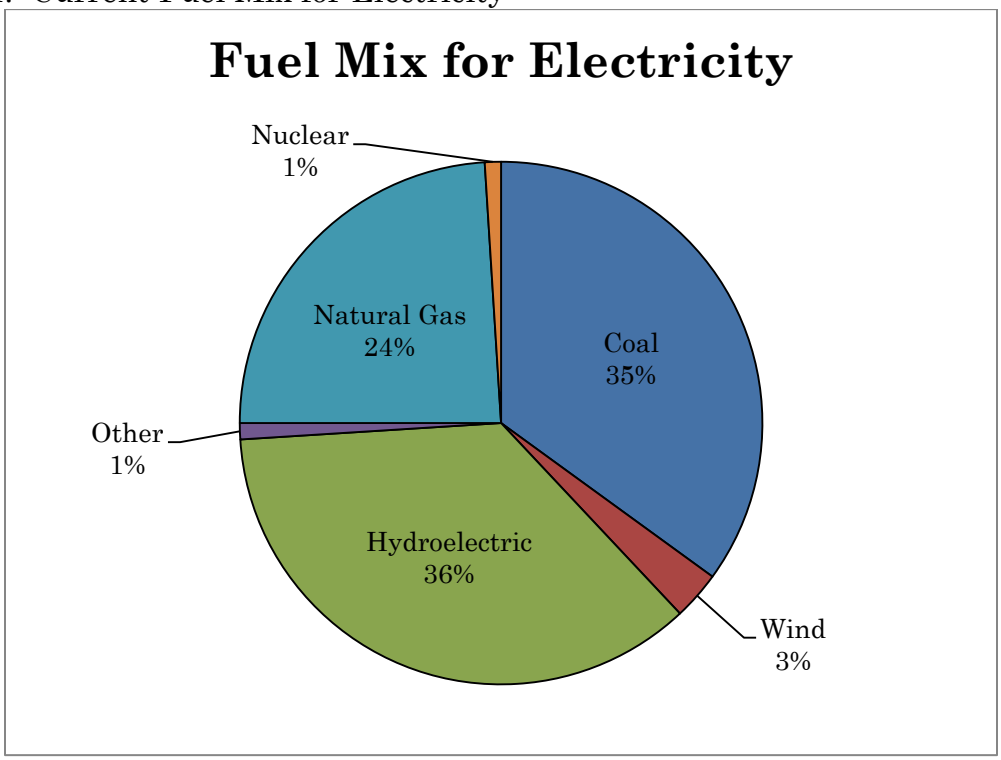
The first tier of PSE's electrical supply system is generation. Hydroelectric plants generate a large proportion of the electricity consumed in the Pacific Northwest. Much of the power comes from dams on the Columbia River to the east of the Cascades. Puget Sound Energy owns or has long term operating contracts on:

- Hydroelectric plants: 14
- Coal fired plants: 5
- Natural gas fired plants: 7

Three of PSE's coal fired sources will be shut down by 2025 to meet clean air standards, regulations, and goals in Washington and Montana.

In 2003, the company's energy production was 40% hydro resources and 60% thermal plants. Thermal plants take a number of forms, including coal-fired, natural gas-fired, and oil-fired. Puget Sound Energy does not presently own any nuclear generating facilities.

Figure 4. Current Fuel Mix for Electricity



3.2.1 Understanding Electricity Transmission and Distribution

The "transmission system" is the second tier in the electricity supply system. Puget Sound Energy's transmission system covers Thurston County and the City of Tumwater. It is a grid, which provides a link between Bonneville Power Administration's Bulk Transmission System and the local feeder system, which connects with customers. It has the function of moving power around Puget Sound Energy's service area.

The City of Tumwater is included in a Puget Sound Energy service area, which also covers the Cities of Bucoda, Lacey, Olympia, Rainier, Rochester, Tenino, and Yelm, and the unincorporated areas of Thurston County. There is one power generation station in the City of Centralia near the sub-area that feeds electricity into Puget Sound Energy's transmission system. Other sources of power outside this subarea flow through three transmission stations in Thurston County.

Power from generating plants along the Columbia River is delivered through existing 500 Kilovolt (kV) lines to the Bonneville Power Administration Raver Station in King County, to the Bonneville Power Administration Paul Station near the Centralia Generating Plant. The Tono Station just south of Thurston County steps the 500 kV voltage down to 115 kV, supplying two 115 kV lines north into central Thurston County.

The 500 kV system continues north to the Bonneville Power Administration Olympia Substation located west of the City of Tumwater in Thurston County, where the power is stepped down to the 230 and 115 kV levels. A 230 kV line originating at the White River Generating Plant in Pierce County also provides power to the Bonneville Power Administration Olympia Substation, where the power is stepped down to the 115 kV level. From there, two 115 kV lines run east from the Bonneville Power Administration Olympia Substation to serve Puget Sound Energy's Olympia Transmission Substation. This transmission station then serves the Saint Clair and the West Olympia Substations in the Olympia area. A 115 kV line originating at the White River Station runs southwest to the Saint Clair Transmission Station, which serves substations in the Lacey area.

Power is transformed from 115 kV to 55 kV by one transformer at the Olympia Transmission Substation to serve some distribution substations with 55 kV lines. The Saint Clair and West Olympia Transmission Substations have a similar transformer used to serve 55 kV distribution substations in Thurston County.

Because the power system in the Thurston County area is connected to a larger transmission grid throughout the Northwest, power must be able to flow north and south as the needs of the system evolve. As mentioned previously, the demand for electricity in the Puget Sound area varies throughout the year. In the spring, heavy water flows from the winter snowpack cause large amounts of imported power to flow across our system from Canada to California. In the fall, when local water reservoirs are low, power is imported from California to the Puget Sound Energy system.

The "distribution system" is the third and final tier in the electricity supply system. Power is supplied from the transmission system into the City of Tumwater's local feeder system at five distribution sub-stations, three of which are located in the City of Tumwater and its Urban Growth Area. The remaining two are located in the City of Olympia and its Urban Growth Area.

3.3 System Analysis

Programs to ensure a reliable and economic power system over the next 20 years and reduce the potential for system overload were identified in the Bonneville Power Administration's *Puget Sound Reliability Study* (2014) and Northwest Power and Conservation Council's *Seventh Northwest Conservation and Electric Power Plan*. These programs included the following:

- Increase energy efficiency measures.
- Develop the capability to deploy demand response resources or rely on increased market imports to meet system capacity needs under critical water and weather conditions.

- Invest in new natural gas-fired generation.

At the local level, Puget Sound Energy continues to pursue energy efficiency programs. Puget Sound Energy offers grants and consultation for energy conservation measures in industrial facilities. There is also an active program to raise consumer consciousness regarding energy efficiency. Puget Sound Energy upgrade their existing transmission substation in the City of Tumwater in 2012 and constructed a new distribution and transmission switching station and 12 miles of local transmission lines between the Cities of Lacey and Tumwater between 2012 and 2015.

Both the Bonneville Power Administration and Puget Sound Energy are working to manage demand. The aim is to reduce demand at peak times, and spread demand more evenly over the daily and seasonal cycle. Encouraging commercial customers to carry out high-energy consumption processes when supply is plentiful in off peak periods can encourage and use power when greater supply is available. The Bonneville Power Administration is undertaking programs to develop the bulk transmission system. The aim of these programs is to increase system capacity, to deliver more power, and to protect the consumer from power loss.

Almost all of the forecast data is affected by uncertainty in economic conditions, weather, environmental and governmental policies, and other factors that could significantly affect the magnitude, duration, and timing of projected surpluses or deficits. Some of these uncertainties include:

- Natural variations in weather;
- Potential increases or decreases in retail loads due to changes in local, regional, and national economic conditions;
- Future local, state, and national policy requirements;
- Cost and availability of fuel;
- Changes in existing or contracted generating resources;
- Availability of new and existing uncommitted regional resources;
- Availability and reliability of import/export markets and transmission limits; and
- Future climate change impacts to retail loads, stream flows, and resources.

The City completed an energy conservation assessment in 2008 to identify opportunities to save energy and other resources. Because of the assessment, the City adopted the *Climate Action Plan,* which implemented recommendations from the assessment such as retrofitting lights and improving the heating, venting, and air conditioning systems in City-owned buildings.

3.3.1 Electricity Rates

The average commercial electricity rate in the City of Tumwater is 9.46 cents/kWh. This is 23% greater than the Washington average rate of 7.68 cents/kWh and 6% less than the national average rate of 10.09 cents/kWh. Commercial rates in the U.S. range from 6.86 cents/kWh to 34.88 cents/kWh.

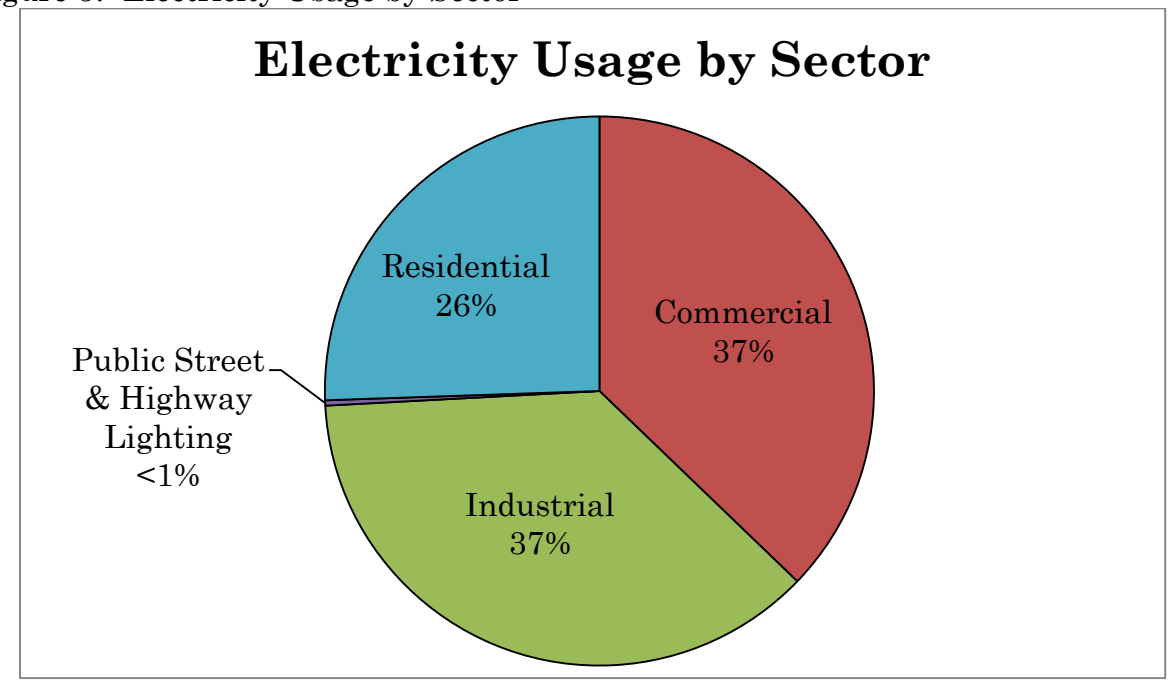
For residential, the average electricity rate in the City of Tumwater is 10.36 cents/kWh which is 21% greater than the Washington average rate of 8.53 cents/kWh and 12% less than the national average rate of 11.88 cents/kWh.

Puget Sound Energy projects that between 2016 and 2033, nominal retail electric rates will grow at an average annual rate of between 1.1% and 1.3%.

3.3.2 Electricity Usage

The City of Tumwater used about 315 million kWh in 2015. The sectors that used the most were commercial and industrial with 118 million kWh and 115 million kWh respectively.

Figure 5. Electricity Usage by Sector



4. NATURAL GAS AND FUEL PIPELINES

Two major natural gas and fuel pipelines pass within the City of Tumwater and its urban growth area:

- Olympic Pipeline (2.8 miles located within the City of Tumwater)
- Williams Northwest Pipeline (2.5 miles located within the City of Tumwater)

4.1 Olympic Pipeline

The Olympic Pipeline spur was used to carry liquid fuels from Olympic Pipelines' main north-south pipeline east of the City of Tumwater to a bulk storage tank facility at the corner of Linderson Way and Tumwater Boulevard. The lease for that bulk storage facility has lapsed and it is no longer a conforming land use for that location. The spur pipeline and easement remains in place but is currently inactive. No plans are currently on file to relocate the bulk storage facility or reactivate this pipeline spur.

4.2 Williams Northwest Pipeline

The Williams Northwest Company pipeline conveys natural gas from Williams Northwest Company Pipeline main north-south pipeline east of the City of Tumwater to the Satsop Business Park in Grays Harbor County. This pipeline consists of two parallel 16-inch diameter gas pipelines located within a right of way that passes through the southern portion of the City of Tumwater and its urban growth area. This pipeline is active and no further expansion of this pipeline is planned at this time.

4.3 Puget Sound Energy Natural Gas Pipelines

Puget Sound Energy maintains an extensive network of pipelines that distribute natural gas to customers throughout the City of Tumwater.

The Williams Northwest Company supplies natural gas to Puget Sound Energy through four gate stations in the Olympia area.

1. Olympia Gate Station at Flying Carpet and Fir Tree. This gate station also serves the Cities of Olympia and Lacey.
2. Olympia Town Border Station at 42nd and Boulevard. This station also serves the Cities of Olympia and Lacey.

3. Littlerock Gate Station at 90th Lane SW and Littlerock Road.

4. Black Lake Gate Station at Delphi and 62nd Avenue SW.

Other additional gas facilities serving the City of Tumwater include the following:

- A six-inch gas main from Olympia Gate to the Capitol, serving about 5,000 residential customers.

- A four-inch West Olympia Main from Black Lake to Evergreen College serving about 1,600 residential customers.

- A four-inch main from Littlerock to the City of Tumwater serving about 1,600 residential customers.

5. TELECOMMUNICATION

The telecommunications industry is currently undergoing large advances in technology. Cellular and optical fiber technology have changed the way telecommunications service is delivered. In addition to this, technology is evolving that will eliminate current physical barriers that separate data, video, and voice technologies.

5.1 Broadband

With the rise of broadband-enabled services and applications, and the increasing migration of many aspects of modern life online, a lack of broadband connectivity can increasingly have a negative impact on social and economic development by excluding those who lack broadband access or do not see the relevance of broadband services. The Federal Communications Commission currently defines broadband access in the United States as 25Mbps when downloading data and 3Mbps when uploading data. It is becoming an increasingly important utility since more educational, occupational, communicative, and entertainment opportunities are dependent on this service.

In the City of Tumwater, 25 internet service providers offer broadband connections over a variety of methods to both residences and businesses. CenturyLink and Xfinity are the leading providers in the City of Tumwater. According to BroadbandNow, an organization that assesses broadband access, currently 92% of the City of Tumwater has access to CenturyLink's digital subscriber lines, 97% has access to Xfinity cable services, and Hughes Net's satellite coverage is accessible to buildings with a satellite dish and a clear view of the southern sky. The general types of broadband connections include:

5.1.1 Digital Subscriber Line (DSL)

Digital subscriber line uses existing phone lines to connect to the internet, similar to dial-up, but still allows for simultaneous phone and internet usage.

5.1.2 Cable

Cable uses existing television cables to connect to the internet without interfering with the television signals.

5.1.3 Wireless

Wireless internet connections are broadcast over the airways via a ground station provider to antennas. This method requires a clear line of sight between the antenna and the ground station making it susceptible to weather conditions.

5.1.4 Satellite

Satellite internet is a form of wireless internet that uses geosynchronous satellites to connect to the internet. This method requires a clear line of sight between the satellite dish and the orbiting satellite making it susceptible to weather conditions.

5.1.5 Mobile

Certain phones and smart devices are able to access the internet using the cellular phone network.

5.1.6 Fiber Optic

Fiber optic technology uses thin glass fibers to convert electrical data signals into light for faster and more reliable connections. The City has some fiber conduits around the city and is currently planning how to best use these assets.

Many providers of digital subscriber line, cable, or satellite phone and television services use the same infrastructure to provide internet services. Table 3 includes a current inventory of this infrastructure that is registered by the Federal Communications Commission, the national regulator of interstate communications.

Table 3. Current Inventory of Infrastructure

Infrastructure	Number
Cell Phone Towers	1
Antenna Towers	95
Commercial Land Mobile Towers	3
Private Land Mobile Towers	30
Microwave Towers	22
Paging Towers	13
Maritime Coast & Aviation Ground Towers	3
Amateur Radio Licenses	122

5.2 Television

Cable television is available to residents through Xfinity. Service is through a franchise agreement. Lines installed in public rights of way provide cable transmission. The lines are usually required to be underground. All of the City of Tumwater currently has access to cable TV including recently annexed areas. Xfinity plans to accommodate future population as market conditions demand. It is not bound by the level of service and concurrency requirements under the Growth Management Act.

6. MEETING FUTURE DEMAND

In the six county service area of Puget Sound Energy, an inflow of more than 775,000 new residents between 2016 and 2035 will increase Puget Sound Energy's electric service territory population to almost 4.8 million by 2035. Additionally, employment is expected to grow at an average annual rate of 0.7% between 2016 and 2035, manufacturing employment is expected to decline annually by 0.4% on average between 2016 and 2035, and local employers are expected to create about 297,000 jobs between 2016 and 2035.[2]

Growth in the City of Tumwater follows closely with growth trends in other parts of the Puget Sound Energy service area. There were 20,610 jobs in the City of Tumwater in 2015. Over the 20-year planning period, the City of Tumwater is projected to add an additional 11,055 jobs for a 54% gain in total employment primarily in the areas of government, professional services, and retail. The biggest changes in employment occur in information, construction, and utilities.

These projections form the basis of the utility forecast for the City of Tumwater helping ensure adequate services are in place and identify potential changes or adjustments needed.

Table 5. The City of Tumwater and Urban Growth Area 20-Year Population Projection

	2015[1] Population	**2035[2] Population**	**Population Increase**	**Percent Increase 2015-2035**
Tumwater	21,939	34,680	12,741	58%
Urban Growth Area	3,250	8,203	4,954	152%
Combined Areas	**25,188**	**42,883**	**17,695**	**70%**

Source: [1] Office of Financial Management, Forecasting Division
[2] The Profile, October 2015, Thurston Regional Planning Council, and the Population and Employment Forecast for Thurston County Final Report

Note: The City of Tumwater started the update process in 2015 using data from 2015 and did not receive 2016 data until it was too late to incorporate in the update process.

[2] The City of Tumwater started the update process in 2015 using data from 2015 and did not receive 2016 data until it was too late to incorporate in the update process.

Table 6. The City of Tumwater and Urban Growth Area 20-Year Housing Projection

	2015 Housing Units[1]	2035 Housing Units[2]	Housing Increase	Percent Increase 2015-2035
Tumwater	8,680	13,840	5,160	60%
Urban Growth Area	2,710	5,330	2,620	97%
Combined Areas	**11,390**	**19,170**	**7,780**	**68%**

Source: [1] Office of Financial Management, Forecasting Division
[2] The Profile, October 2015, Thurston Regional Planning Council, and the Population and Employment Forecast for Thurston County Final Report

Note: The City of Tumwater started the update process in 2015 using data from 2015 and did not receive 2016 data until it was too late to incorporate in the update process.

One simple measure of the energy intensity is the gross measure of total energy consumed divided by the population. This per capita indicator is a good measure of energy consumption because decisions by individual consumers have an important effect on overall energy consumption. Combined with energy efficiency projections outlined in Section 6.1 of this document, this measure provides a straight-line projection that provides a conservative picture of anticipated demand.

Table 7. The City of Tumwater and Urban Growth Area 20-Year Energy Consumption Projection

	2015 Households[1]	2035 Households[2]
Tumwater	**8,470**	**13,390**
Natural Gas	276,400 MBTU	346,800 MBTU
Electricity	116,956,800 kWh	153,459,000 kWh
Urban Growth Area	**1,255**	**3,167**
Natural Gas	41,000 MBTU	82,030 MBTU
Electricity	17,325,800 kWh	36,298,300 kWh
Combined Areas	**9,725**	**16,557**
Natural Gas	317,400 MBTU	428,830 MBTU
Electricity	134,277,200 kWh	189,757,300 kWh

Source: U.S. Energy Information Administration (EIA) State Energy Data System, Puget Sound Energy, and the 2010 Census

Notes: [1] In 2015, the estimated per capita uses were approximately 12.6 Million BTU per capita for natural gas and 5,331 kWh per capita for electricity.

[2] In 2035, the estimated per capita uses will be approximately 10 Million BTU per capita for natural gas and 4,425 kWh per capita for electricity due to estimated improvements in efficiency.

Average household size was estimated to be 2.59 people.

The City of Tumwater started the update process in 2015 using data from 2015 and did not receive 2016 data until it was too late to incorporate in the update process.

6.1 System-level Impacts of Energy Efficiency

The Energy Independence Act requires electric utilities with 25,000 or more retail customers in Washington to use renewable resources and conservation to help meet their customers' energy needs. The utilities must report annually to the State Department of Commerce on their compliance.

Currently, the utilities in Washington State are using wind power for about 80% of their renewable supplies and efficiency improvements and hydroelectric projects for about 15%. In 2016, the renewable energy target increased from 3% to 9% of customers' electricity load, and in 2020, the target will increase again to 15%.

In 2005, in response to WAC 458-20-273, Puget Sound Energy, which serves the City of Tumwater and many other communities in the Puget Sound area, launched a renewable energy production incentive payment program. Under this program, Puget Sound Energy makes payments to interconnected electric customers who own and operate eligible renewable energy systems that include solar PV, wind, or anaerobic digesters. Average annual credits range from $0.12 to $1.08 per kWh of energy produced by their system. Puget Sound Energy receives a state tax credit equal to the payments made to customers. By the end of 2014, Puget Sound Energy had paid $3,130,000 to 2,000 customers eligible for production payments.

Puget Sound Energy anticipates that electric demand side efficiency efforts have the potential to reduce consumption 20% and similar efforts for natural gas efficiencies may reduce consumption by 17% by 2035.[3]

[3] The City of Tumwater started the update process in 2015 using data from 2015 and did not receive 2016 data until it was too late to incorporate in the update process.

7. POTENTIAL IMPACTS OF CLIMATE CHANGE

There are at least two ways in which climate change can affect utility demand and availably. First, long-term changes in temperature will alter electricity demand and change precipitation patterns, river flows, and hydroelectric generation. Second, policies enacted to reduce greenhouse gases will affect future resource choices.

Northwest Power and Conservation Council analysis and planning shows that climate induced changes to loads and river flows will not affect resource choices during the period 2016 through 2021. However, beyond 2026, resource decisions may be impacted. Their prediction for the Northwest is for less snow and more rain during winter months, resulting in a smaller spring snowpack and lower summer flows. Winter electricity demands would decrease with warmer temperatures, easing generating requirements. In the summer, demands driven by air conditioning and irrigation loads would rise. The power supplies projected through 2026 are anticipated to meet demand, even under a climate change scenario.

After applying the climate induced shift in river flows and load to assumptions in Northwest Power and Conservation Council's modeling scenarios, the likelihood of a shortfall in 2035 grows to 15%, which is above adequacy standard of 5% established by this organization and Puget Sound Energy.[4]

Other potential climate change impacts include increased flooding concerns in fall and winter, reduced salmon migration survival due to lower summer river flows combined with higher water temperatures, and increased summer electricity prices.

Utility agencies recommend that research continue in this area and suggest that while no immediate actions regarding reservoir operations are indicated, the region should consider alternative reservoir operations that could potentially mitigate future climate change impacts.

[4] The City of Tumwater started the update process in 2015 using data from 2015 and did not receive 2016 data until it was too late to incorporate in the update process.

8. UTILITIES GOALS, POLICIES, AND ACTIONS

8.1 Utilities Goals, Policies, and Actions

Goal U-1: Increase efficiency when planning for and siting utilities.

Policy	Action
U-1.1	Communicate with private utility companies when siting utilities to discuss anticipated growth projections and how to size utilities appropriately to meet anticipated demand.
	U-1.1.1 Cooperate and participate with Puget Sound Energy in the formulation of policy and development of an underground management plan with respect to Puget Sound's aerial facilities with the City of Tumwater.
U-1.2	Be aware of public service obligations when local review of utility improvements occur.
U-1.3	Utilize transportation rights-of-way for utility corridors whenever feasible.
U-1.4	Provide timely notification to all affected utilities prior to road construction.
U-1.5	Approve utility permits when the project to be served is approved whenever feasible and as quickly as possible.
U-1.6	Coordinate with Thurston County, and the Cities of Lacey and Olympia to ensure consistency of the respective utility plans in order to facilitate orderly utility service.

Goal U-2: Increase energy generation from renewable resources to reduce the region's carbon footprint.

Policy	Action
U-2.1	Explore incentives to support the installation of distributed electrical generation equipment, (e.g., rooftop solar panels).
	U-2.1.1 Encourage developers and homeowners to take advantage of existing national incentive programs (e.g., the tax credit program for the installation of solar systems in homes).

U-2.2 Investigate large-scale, multi-jurisdictional renewable energy projects (e.g., large-scale solar arrays).

U-2.3 Adopt uniform building codes and permitting practices in jurisdictions to make the installation of solar panels, or other distributed generation technologies, easier and faster.

Goal U-3: Enhance the region's electricity distribution, monitoring, and storage infrastructure to support adoption of cleaner technologies and practices.

Policy	Action

U-3.1 Monitor system, or grid-scale, energy storage innovations, and learn from the experiences of communities that begin to deploy them.

U-3.2 Support energy suppliers' equipment upgrades, new programs, and service offerings related to adding information technology to the system or grid.

U-3.3 Collaborate with energy providers to test innovative system-scale, grid-scale, energy storage solutions in isolated, controlled conditions. If, and when, technological progress is proven, collaborate with energy providers for deployment of such storage solutions.

U-3.4 Support voluntary programs for adding vehicle chargers to homes, businesses, and public parking infrastructure.

U-3.5 Promote integration of electric vehicle infrastructure into residential building codes and public and private facilities, including allowances in zoning regulations for charging stations in locations where they are needed.

U-3.6 Create local projects to increase the existing electric vehicle fleet.

U-3.7 Encourage a change in state policies to increase the utility share of funding for undergrounding of overhead wires to reduce power outages.

U-3.8 Protect and reserve existing electrical transmission corridors to maintain their usefulness in meeting future needs.

U-3.9 Coordinate with the Natural Hazards Mitigation Plan to reduce service interruptions and provide services that are more reliable during hazard events.

Goal U-4: Increase energy efficiency and conservation to reduce the region's carbon footprint.

Policy	Action
U-4.1	Develop new incentives for green buildings, (e.g., Leadership in Energy & Environmental Design – LEED programs).
U-4.2	Offer incentives for the use of roof-mounted solar water heaters.
U-4.3	Continue conversion of public fleets to hybrid, natural gas, and electric vehicles. Lead by example.
U-4.4	Consider adopting policies that require residential and commercial properties to undertake an energy audit at time of sale or during substantial remodel, including, if deficiencies are found, encouraging energy retrofits to upgrade properties to a specified level.

Goal U-5: Ensure vital utilities are created, operated, and maintained in a safe manner.

Policy	Action
U-5.1	Encourage the undergrounding of utilities to increase public safety.
	U-5.1.1 Consider strengthening the standards for the undergrounding of utilities and utility corridors.
	U-5.1.2 Work with neighborhood associations to encourage the development of local improvement districts to provide funding for undergrounding existing utilities.
U-5.2	Encourage pipeline safety through public awareness and regulations.
	U-5.2.1 Consider adopting code language, which limits high-risk uses near pipelines to protect both the public and the pipelines themselves.
	U-5.2.2 Consider strategies to educate the public on pipeline safety and pipeline locations within the city.