

# 2013 Gas Outlook

## Natural Gas Supply, Demand, Capacity and Prices in the Pacific Northwest

### Projections through October 2022

This report, compiled by the Northwest Gas Association (NWGA) and its members, provides a consensus industry perspective of the Pacific Northwest's current and projected natural gas supply, demand, prices and delivery capabilities through 2022. The Pacific Northwest in this case includes British Columbia (B.C.) and the U.S. states of Washington, Oregon and Idaho. Additional information, including white papers on specific natural gas topics, can be found at [www.nwga.org](http://www.nwga.org).



## What's New

The abundance of North American natural gas continues to transform the energy landscape and the direction of public policy. For instance, natural gas figured prominently in the 2012 U.S. Presidential election, giving our industry increased access to policy discussions.

Likewise, the provincial government of British Columbia (B.C.) issued a new Natural Gas Strategy in 2012.<sup>1</sup> The strategy targets developing natural gas for transportation and other uses that will help the province achieve its greenhouse gas (GHG) reduction goals, create more jobs, and boost public coffers with higher royalty revenues. The strategy also encourages development of the liquefied natural gas (LNG) export sector.

Commodity prices reached their lowest level in a decade during early 2012 due to North America's vast and economic supply of natural gas. Although gas prices have increased over the past year, prices are likely to remain favorable for end-users and consumers for the foreseeable future.<sup>2</sup> This is causing a shift in thinking about the role of natural gas in our economy. The dramatic swing in North America's natural gas supply picture has also slashed the need for LNG imports while providing market incentives to explore exports – which could affect the global gas market.

Regionally, the demand growth projections in this 2013 Outlook remain modest across most sectors reflecting expected economic conditions (see 2013 Regional Economic Outlook). Gas use for generating electricity shows the most significant growth in the forecast period. Meanwhile, Northwest consumers are benefitting as regional gas distribution companies (LDCs) pass the lower cost of natural gas through to customers.

*"We produce more natural gas than ever before – and nearly everyone's energy bill is lower because of it...[T]he natural gas boom has led to cleaner power and greater energy independence."*

– U.S. President Barack Obama, State of the Union speech, Feb. 12, 2013

*"[T]here are new and expanded uses of natural gas in North America and British Columbia, including transportation, fuel switching from coal to natural gas for power generation, and as a feedstock to make other products." – B.C.'s Natural Gas Strategy, Feb. 3, 2012*

<sup>1</sup> B.C. Ministry of Energy and Mines, *British Columbia's Natural Gas Strategy*, issued Feb. 3, 2012. [http://www.gov.bc.ca/ener/popt/down/natural\\_gas\\_strategy.pdf](http://www.gov.bc.ca/ener/popt/down/natural_gas_strategy.pdf)

<sup>2</sup> U.S. Energy Information Administration, (EIA), *2013 Annual Energy Outlook - Early Release*, December 2012

## Putting it All Together

Since natural gas is a fundamental economic input (e.g. used in industrial and commercial processes, as a fuel to generate electricity and for space and water heating in homes), the economy remains the key driver influencing natural gas demand in the Pacific Northwest and across North America. The speed at which an economic recovery occurs will dictate how quickly demand grows over the next 10 years. Growth will also depend on federal, state and provincial efforts to maximize the benefits of this abundant resource (boosting energy independence, creating jobs), and actions taken by energy industry participants and energy consumers to comply with GHG-reducing mandates. This, in turn, will influence decisions to expand or invest in additional delivery infrastructure such as pipelines and storage facilities.

For example, in Oregon and Washington, we have seen large investments in renewable wind power, which may lead to future investment in new fast-start gas-fired generation plants to balance intermittent wind generation. In addition, the announced closures of two regional coal plants (in Boardman, Oregon, and Centralia, Washington) portend additional gas demand for electric generation. Both plant operators have publicly expressed their intentions to replace at least some of that generation capacity with gas-fired generation.

At the same time, the low price of North American natural gas is itself playing an important role in economic recovery by stimulating growth of industries that use natural gas<sup>3</sup> and, because global prices are much higher, by bringing overseas manufacturing and related jobs back to North America.

Thanks to the vast shale gas reserves unlocked by breakthroughs in production technologies, the natural gas resource available to serve our energy needs is abundant, secure and accessible across North America. Environmentally responsible production is the key to ensuring a lasting legacy. That is why producers continue their quest to develop new and improved extraction techniques that protect ground water, minimize water use and reduce air emissions.

While the plentiful supply and low cost of natural gas continue to make headlines, we want to emphasize one of the unique attributes of natural gas: its versatility. Directly heating homes, buildings and water with natural gas is a common and highly efficient use of natural gas. It also provides process heat for regional industries like aerospace, steel, glass, wood and paper products, food processing,

fabrication and high technology.

Natural gas is a basic ingredient in a myriad of products from fertilizer and pharmaceuticals to pantyhose.<sup>4</sup> It is also a reliable, low-carbon fuel for generating electricity compared to coal and diesel. And natural gas is safe, clean and more affordable than gasoline or diesel for fueling fleet vehicles like garbage trucks and transit buses, long-haul trucks, ferries and marine shipping.

This is where natural gas truly shines – as a homegrown, low-cost, clean-burning resource with myriad uses. Regional stakeholders can capture the benefits of this newly plentiful resource and help to ensure supply viability for the long-term by encouraging its use in all appropriate industries.

<sup>3</sup>American Gas Association, *The Promise of Natural Gas*, October 2012.

<sup>4</sup>A recent study by the American Chemistry Council noted the potential for 17,000 new knowledge-intensive, high-paying jobs in the U.S. chemical industry, another 400,000 jobs outside the chemical industry and more than \$132 billion in U.S. economic output – all associated with the shale gas revolution. <http://www.americanchemistry.com/Policy/Energy/Shale-Gas>.

## 2013 Regional Economic Outlook

At best, the U.S. and Canadian economies are facing another “2-2” year—that is, real GDP growth and inflation around 2%. As a result, in 2013 we can expect economic growth in Idaho, Oregon, Washington, and British Columbia (B.C.) to be similarly modest.

Regional growth will be partly restrained by sequestration-driven Federal budget cuts, the ongoing European recession, and a slowing Canadian housing market. In each case, these events will continue to suppress the demand for the Pacific Northwest’s goods and services through the rest of 2013.

In terms of employment growth, all three U.S. states matched the nation with 1.7% growth rates in non-farm employment in 2012. B.C.’s employment also grew at 1.7%, outperforming Canada’s overall rate of 1.2% in 2012. Given that 2013 will be at best another 2-2 year, regional employment growth will likely remain in the 1.5% to 2% range.

However, metro area growth will continue to outpace overall state and provincial growth. In 2012, employment growth in the Seattle-Bellevue-Tacoma, WA, metro

area was 2.6% and 2.2% in the Boise-Nampa, ID, area. In 2012, the B.C. metro areas of Vancouver, Victoria, and Abbotsford-Mission also outperformed the province.

One source of optimism in 2013 is a U.S. housing market recovery that started to materialize in the second quarter of 2012. Federal Housing Finance Agency (FHFA) data shows that existing home prices in Idaho, Oregon, and Washington increased by 9%, 7%, and 2%, respectively, in 2012. According to the FHFA, 2007 was the last year that home prices increased in these states.

With residential property values no longer in decline, the region could expect to see a bump in residential lending and permitting in 2013. In turn, this should help durable goods producers in both the U.S. and Canada, especially in light of Canada’s slowing housing market.

With the U.S. Federal Reserve committed to a low interest rate environment (conditional on inflation and unemployment remaining below its stated targets), the U.S. housing recovery is expected to continue through 2013. Weaker than expected growth in the 2012 fourth quarter gross domestic product (GDP) of both the U.S. and Canada means the Bank of Canada also has room to keep interest rates at current levels in the first half of 2013.

– By Grant D. Forsyth, Chief Economist, Avista Corp.

*Primary sources include: Bank of Canada, BCStats, Statistics Canada, U.S. Federal Reserve Board of Governors, U.S. Bureau of Labor Statistics and the U.S. Federal Housing Finance Agency.*

# 2013 GAS OUTLOOK – Supply serving the region

## Key Conclusions

- The innovative application and improved efficiencies of decades-old production technologies has unlocked vast reserves of natural gas that were previously inaccessible or uneconomic. This dramatic supply shock has fundamentally changed the nature of the natural gas market. Scarcity and declining production have given way to abundance.
- Pacific Northwest natural gas consumers benefit from proximity to the prolific Western Canadian Sedimentary Basin (WCSB) and U.S. Rocky Mountain (Rockies) natural gas-producing regions.

**Figure 1. Supply Serving the Pacific Northwest**



## A Closer Look

Shale continues to dominate future production. Shale rock formations several thousand feet below the surface of the earth are the source of hydrocarbons like oil and natural gas. Low permeability of shale means natural gas does not flow readily, but advances in horizontal drilling and hydraulic fracturing have provided economic access.

As a result, natural gas from shale rock

formations has changed the conversation from one of limited and declining supplies just a handful of years ago, to one of abundance and opportunity. North American natural gas resources are now estimated at 100 years or more of supply at current consumption rates.<sup>5</sup> Importantly, shale formations are geographically widespread (Figure 2).

**Figure 2. North American Shale Plays**



*Prepared by Spectra Energy based on information provided by the U.S. EIA.*

<sup>5</sup> Canadian Natural Gas, <http://www.canadiannaturalgas.ca/natural-gas-supply> Natural Gas Supply Association, *Understanding the Size of U.S. Natural Gas Resources*, November 2012.

According to Navigant Consulting, shale plays made up 6 percent of North American natural gas supply in 2007, and are expected to make up more than 60 percent of overall production by 2035 (Figure 3). U.S. natural gas production grew more than 7 percent in 2011, the largest year-over-year volume increase in history, and almost 6 percent in

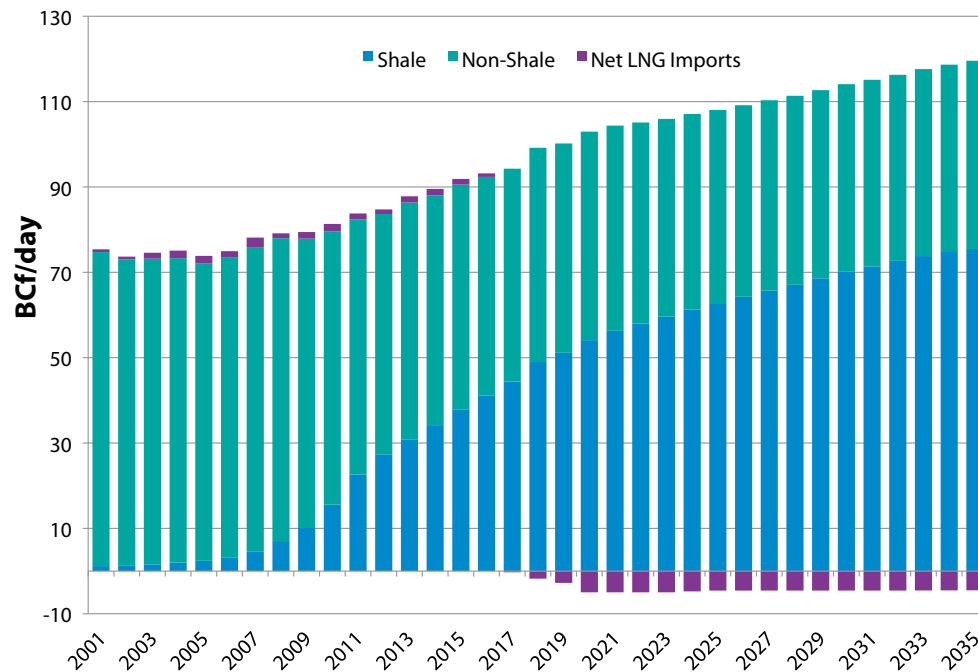
2012.<sup>6</sup> A similar shift from conventional to unconventional gas production is occurring in B.C.

Current gas supplies are plentiful. Figure 4 illustrates that North American production continues to increase in spite of modest economic growth and low natural gas prices. In part this is because natural gas

is oftentimes a byproduct of the more profitable production of oil and natural gas liquids with oil-linked prices (e.g. propane, butane, ethane, condensate). Continuing improvements in shale production also contribute as producers introduce new or enhanced technologies and dial in the most effective techniques for producing from

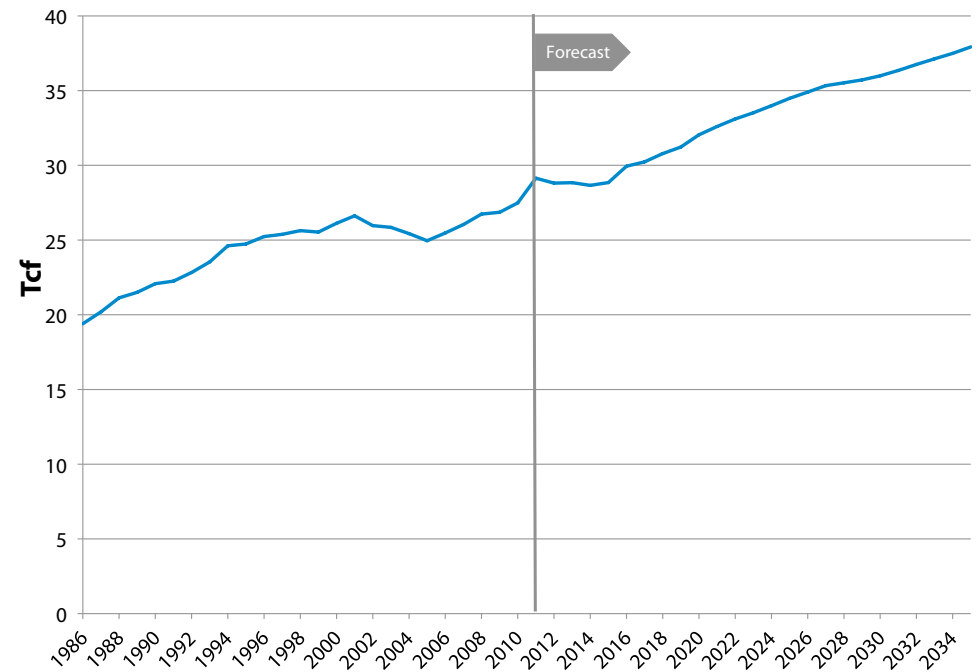
each particular field. Land lease agreements often include requirements that production occur within a certain time frame and many producers have hedged their future production, making it economic to continue producing even with depressed prices.

**Figure 3. Shale Plays Dominate Future North American Gas Production**



Source: Navigant Consulting Inc.

**Figure 4. North American Gas Production History and Forecast**



Source: EIA, StatCan, NEB

<sup>6</sup> U.S. EIA, [http://www.eia.gov/dnav/ng/ng\\_prod\\_sum\\_dc\\_u\\_NYS\\_m.htm](http://www.eia.gov/dnav/ng/ng_prod_sum_dc_u_NYS_m.htm)

Closer to home, the Northwest is immediately adjacent to and supplied by two large natural gas production areas. The WCSB includes the Canadian provinces of B.C. and Alberta and provides about 60 percent of the natural gas consumed in the Northwest. The Rockies region<sup>7</sup> provides the rest of the

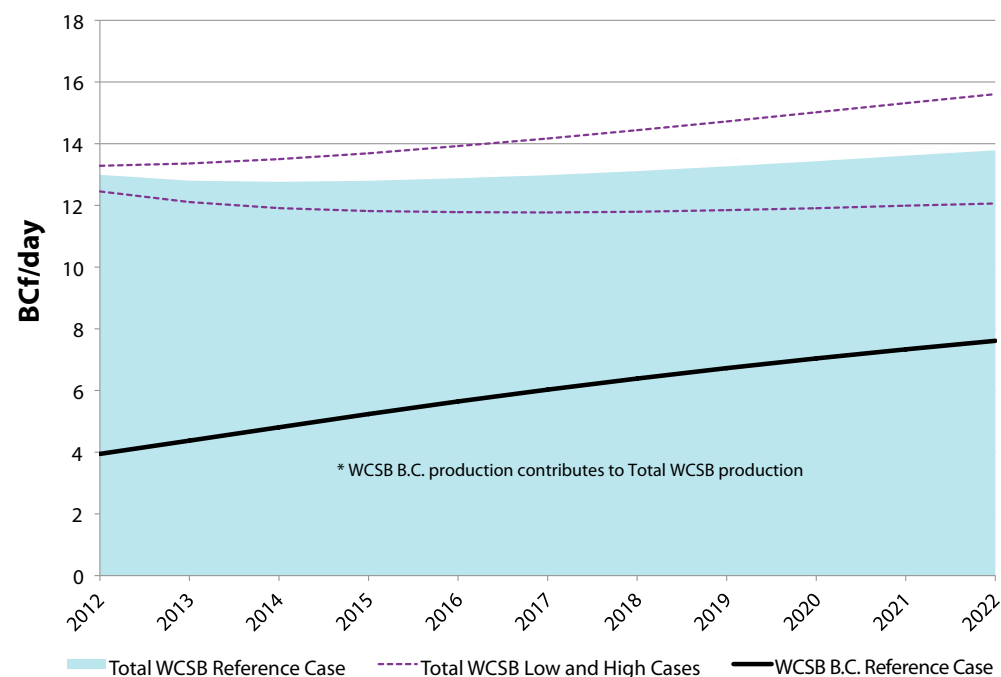
gas consumed here. Combined, these two production areas produced an average of almost 25 billion cubic feet per day (Bcf/d) in 2011<sup>8</sup> – more than one third of North America's natural gas supply. To put this into perspective, the Northwest uses a little more than 3 Bcf/d on average through the winter months

(November through March), although that number can go significantly higher when the weather becomes unusually cold.

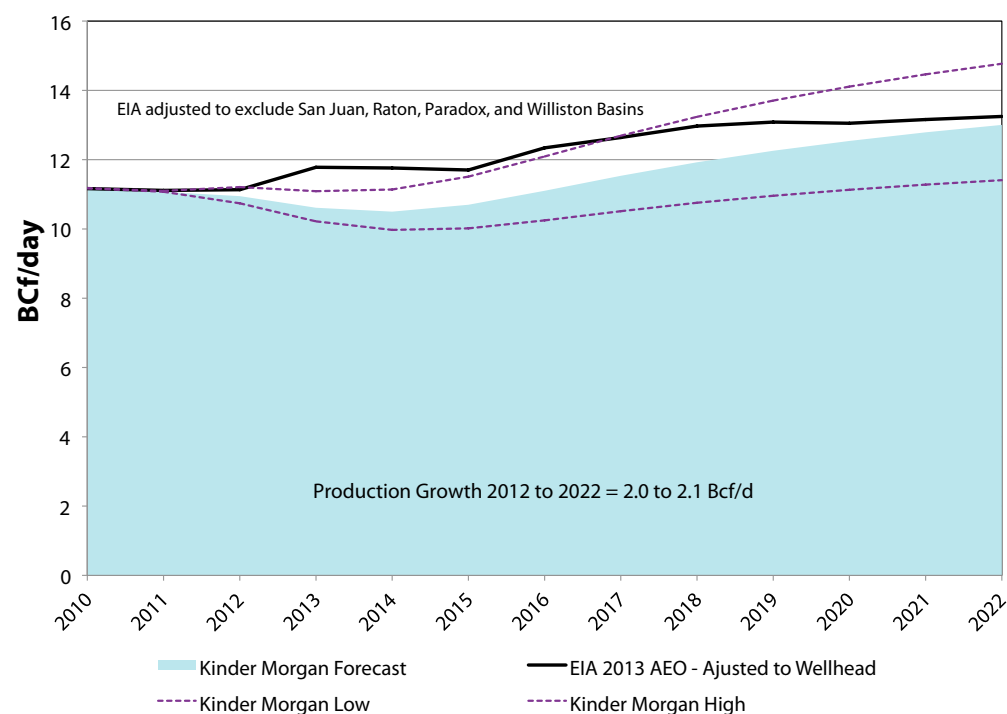
Production from these two areas is expected to approach 28 Bcf/d by 2022, due primarily to anticipated growth in shale and tight sands production in northeast B.C. (Figure 5) and

continued production growth in the Rockies (Figure 6). These forecasts reflect development of the large Montney and Horn River plays in northeast B.C. and continued development of Niobrara shale in the U.S. Rockies.

**Figure 5. WCSB Production Forecast<sup>9</sup>**



**Figure 6. U.S. Rockies Production Forecast<sup>10</sup>**



<sup>7</sup>Colorado, New Mexico, Utah and Wyoming.

<sup>8</sup>StatisticsCanada Table 131-0001 – Supply and Disposition of Natural Gas, Total Marketable Production Alberta/British Columbia (converted from cubic meters), December 2011 *EIA – Natural Gas Production By State*, December 2011.

<sup>9</sup>National Energy Board, *Canada's Energy Future* – Table A4.2-4 Natural Gas Production, November 2011.

<sup>10</sup>Kinder Morgan Pipelines, 2012-2022 Rockies Production Forecast; *EIA 2013 Annual Energy Outlook – Early Release* (adjusted to exclude San Juan and Williston Basins), December 2013.

## **Notes on Natural Gas Supplies**

The natural gas supply picture is a rosy one today and is expected to remain that way for the foreseeable future. However, NWGA members are monitoring a number of evolving issues that could affect supplies, including:

- The development and impact of new or improved production technologies and techniques.
- What natural gas prices are necessary to sustain current production levels as
- producers direct capital to extracting more profitable oil and other liquid hydrocarbons.
- The impact environmental concerns may have on natural gas production.
- The effect on domestic supply dynamics if North American natural gas is exported to more lucrative global markets (e.g., Asia).



# 2013 GAS OUTLOOK - Regional Natural Gas Demand

## Key Conclusions

- Over the next 10 years, natural gas consumption in the Pacific Northwest is expected to grow an average of 1.2 percent per year (see Table 1). Cumulative projected growth through 2022 is 10.3 percent.
- Peak day demand will grow on a year-over-year basis but is lower overall than was projected in the 2008 Outlook. Weather-driven residential and power generation loads continue to grow as a proportion of overall load, implying more variability in demand.
- The use of natural gas to generate electricity will grow over the next decade. How much, how quickly and the nature of the demand for natural gas as a generation fuel is the subject of an ongoing dialogue between regional industry stakeholders.

**Table 1. Projected Regional Demand Growth through 2022**

	Low		Expected		High	
	Annual Rate	Cumulative	Annual Rate	Cumulative	Annual Rate	Cumulative
<b>Total</b>	<b>0.7%</b>	<b>6.4%</b>	<b>1.2%</b>	<b>10.3%</b>	<b>1.8%</b>	<b>14.6%</b>
Residential	0.1%	1.0%	0.9%	7.6%	1.6%	13.6%
Commercial	0.1%	0.6%	0.9%	7.4%	1.6%	13.6%
Industrial	0.5%	4.0%	0.6%	5.2%	0.7%	6.2%
Generation	2.3%	18.4%	2.6%	20.3%	3.0%	23.4%

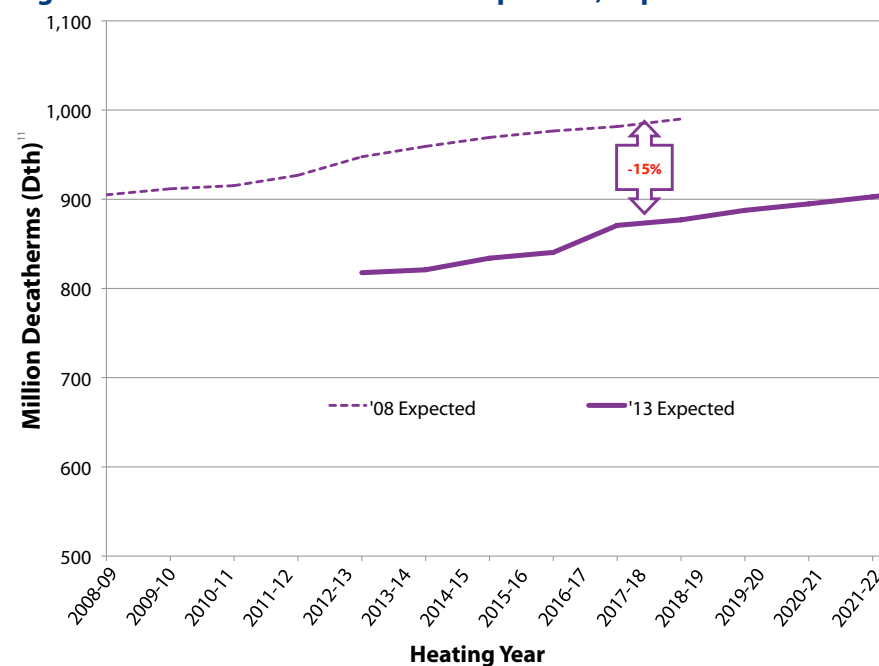
## A Closer Look

Modest economic growth continues across the Pacific Northwest, affecting projections for the demand of natural gas across every sector.

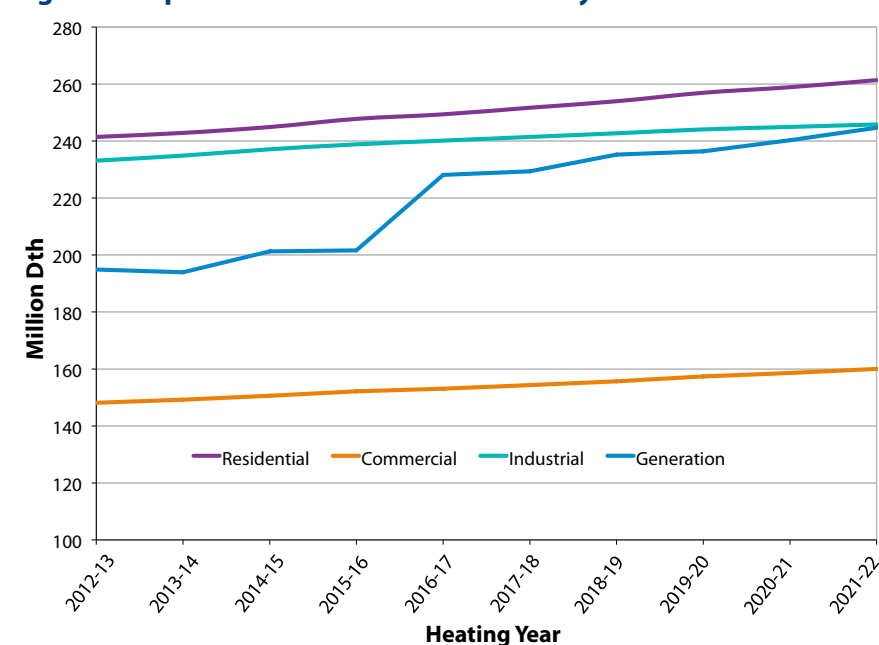
NWGA members project positive year-over-year growth in demand (Table 1), although the overall level of the expected

case demand forecast is about 15 percent lower than the pre-recession 2008 Outlook (Figure 7). Most of the growth is expected to come from gas-fired electrical generation and modest but steady growth in core market demand (residential, commercial) as the economy recovers (Figure 8).

**Figure 7. Pre-Recession Forecast Comparison, Expected Case**



**Figure 8. Expected Case Demand Forecast by Economic Sector**



<sup>11</sup>A decatherm (Dth) is 1 million British thermal units (Btu) and is roughly equivalent to 1,000 cubic feet of natural gas. One Btu is about the same amount of energy as is released when a wooden match is struck.

**Residential** – Residential growth remains slow at 0.9 percent average annual growth (1.1 percent in the 2012 Outlook). New housing construction, long a bastion of dependable growth for the natural gas industry in the Pacific Northwest, continues to lag behind pre-recession levels. Furthermore, natural gas use per customer continues its decades-long decline as consumers install more efficient appliances and weatherize their homes.

**Commercial** – Institutional and other commercial uses of natural gas are expected to grow an average of 0.9 percent per year (1.0 percent in 2012) as modest economic growth continues across the region.

**Industrial** – The recession cost the region more than 20 percent of its industrial gas load since 2007, although industry remains the largest user (Figure 9). A significant portion of that loss of load came from the permanent closure of several regional wood and paper products plants. Looking ahead, we project 0.6 percent average annual growth in industrial gas demand (the same as 2012). Most of the projected growth is in response to favorable gas prices, which is spurring some existing industries to resume pre-recession production levels. Some NWGA members are also reporting increased inquiries for natural gas for process fuel or feed stock to new industrial

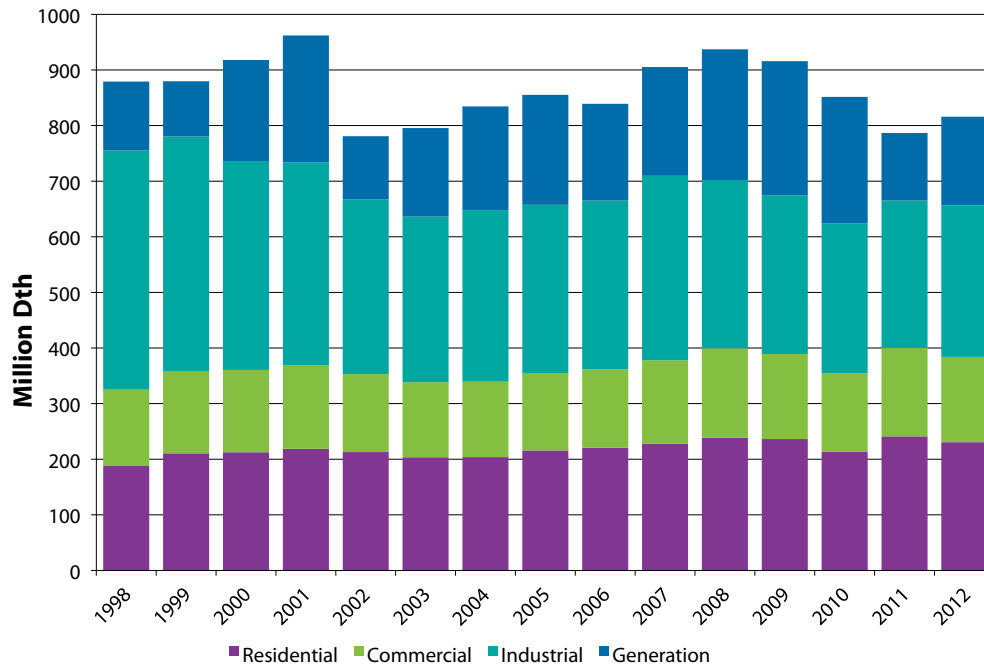
facilities. New markets developed abroad for North American natural gas would also boost industrial load growth.

**Generation** – The trend toward increased reliance on natural gas to generate electricity in the region is expected to continue. We are forecasting an average annual growth rate of 2.6 percent in gas use for generation compared to our forecast of 1.0 percent in 2012. Almost all of the change can be attributed to a 400 MW base-load power plant included in Portland General Electric's (PGE) 2011 Integrated Resource Plan (IRP).<sup>12</sup>

A trend worth noting is the changing nature of the region's load profile. Industrial load

once comprised half of regional natural gas demand. Today, it makes up one third of total annual demand (Figure 10). This is important because industrial load is generally constant year-around, regardless of weather conditions. Conversely, gas-fired generation – a load that can be quite variable depending on weather and other market conditions – once represented a small portion of natural gas demand in the region, but claimed more than 20 percent of regional annual gas demand in 2012. Residential and commercial loads are also largely weather driven and hover around the same proportionate shares of annual demand.

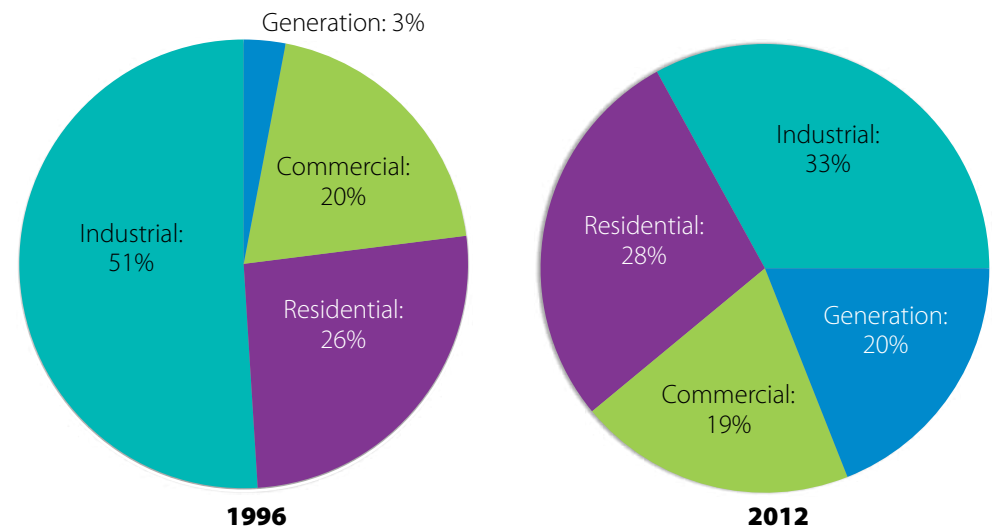
**Figure 9. Historic Natural Gas Demand by Sector**



Source: US EIE, StatCan

<sup>12</sup>A 400 MW Combined Cycle Gas Turbine (CCGT) with a heat rate of 7,200 is assumed. Also assumed are an 85 percent utilization factor and a location in Western Oregon off the Williams Northwest Pipeline. All of these assumptions are made by the NWGA and will be adjusted accordingly when PGE completes its RFP process.

**Figure 10. Changing Annual Demand Composition**

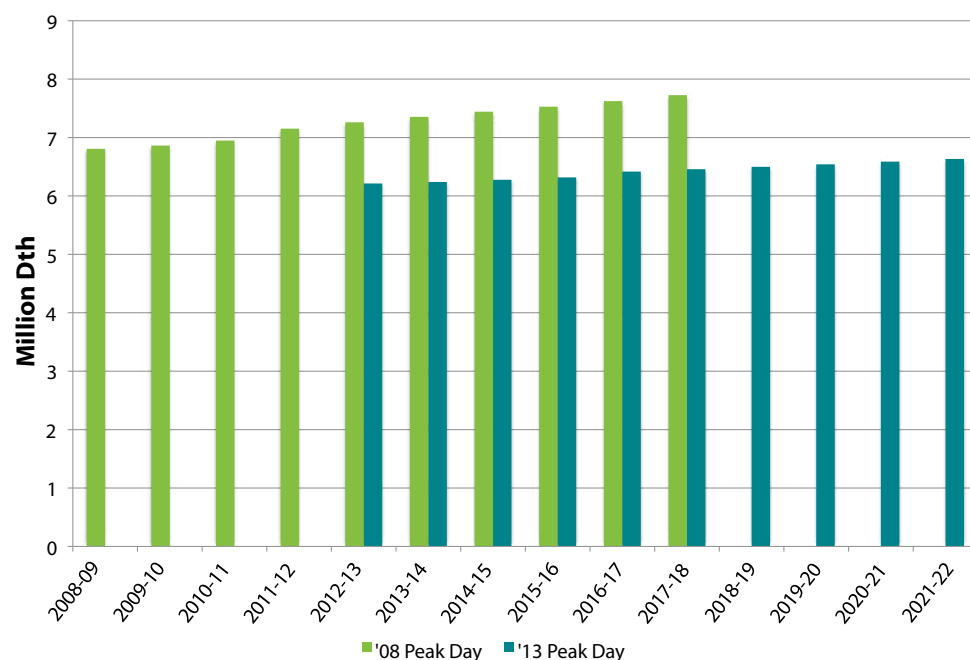


It is important to note that NWGA gas utility member companies plan beyond average or annual demand. To ensure customers are served during extreme weather conditions, planning standards address meeting demand on the coldest day that could occur in their service territory. These “peak” or “design” days are based on

historical 24-hour average temperatures actually recorded at representative locations.

While overall demand across the region is becoming more variable, projected growth in peak day loads of NWGA member companies is lower than forecasts issued prior to the recent recession (Figure 11).

**Figure 11. Aggregated Peak Day Forecast Comparison (Expected Demand)**



### Notes on Natural Gas Demand

Understanding demand – how much, when, where and for what duration natural gas is needed – defines the type and size of infrastructure required to serve it. Regional growth in the use of natural gas has historically been driven by the construction of new housing, commercial and institutional facilities, and new industry. The demand projections in this Outlook anticipate continued modest economic growth.

However, forecast data don't always reflect what's occurring in real-time. The demand for natural gas in the region is changing and NWGA members are watching a number of demand drivers that are yet to be quantified, including:

- The magnitude and nature of the growing use of natural gas for generating electricity to serve growing power demand, to balance

electrical systems as more intermittent renewable energy resources come online, and to help the region transition from coal-fired generation.

- The possibility of new industrial loads due to sustained lower natural gas commodity costs. This may include new industry (such as developing methanol and ammonia-based fertilizer production facilities) as well as fuel-switching by existing industry. It may also include new markets abroad as regional LNG export facilities are developed.
- The use of natural gas as a transportation fuel in a variety of applications. (For more information about natural gas vehicles, click here to view the NWGA whitepaper series.)

## *Coordinating Gas and Power in the Northwest*

Increasing reliance on natural gas to fuel both flexible and base-load generation is on the rise nationally and, as the data in this Outlook demonstrate, in the Pacific Northwest. The challenge is to integrate the operations of two very different physical systems (electric and gas) with different regulatory frameworks and dependability requirements in a way that ensures the reliability of both.

Here are a few facts to consider. A significant driver in the region's gas-fired generation growth has been the development of wind generation. The Renewable Portfolio Standards (RPS) of Oregon, Washington and California catalyzed the construction of nearly 8,000 MW of wind generation in the Northwest.

Intermittent renewable resources – like wind and solar – require backup generation that can deliver electricity on demand. Public policy directly and indirectly limits options for consistent generation resources like coal and nuclear facilities while natural gas generation meets emissions and other environmental standards.

Permitting a natural gas power plant is fairly straightforward and the costs of construction are predictable. The ability to produce natural gas from shale formations has yielded an abundant natural gas resource along with lower, more stable natural gas prices forecast well into the future.

When these dynamics are taken together, it's no wonder we are relying more and more on clean, safe and plentiful natural gas to fuel the generation of electricity. In fact, gas-fired generation has come right along with wind development in the region.

Due to limits on the Northwest hydropower system, the task of balancing wind generation is increasingly falling to natural gas generation units. A decade ago approximately 1,000 MW of natural gas-fueled generation was available

to meet the Northwest's power needs. Today, over 8,000 MW are installed, a number that is projected to increase according to recent regulatory filings by regional utilities.

With this growing interdependence in mind the Pacific Northwest Utility Conference Committee (PNUCC, an association of Northwest investor- and customer-owned electric utilities) and the NWGA are working together to identify and resolve potential issues before they become problems. The joint effort is focused on system operations and planning and on public policies required to promote greater coordination. **[Click here](#)** to see a primer on the issue produced by PNUCC and the NWGA.

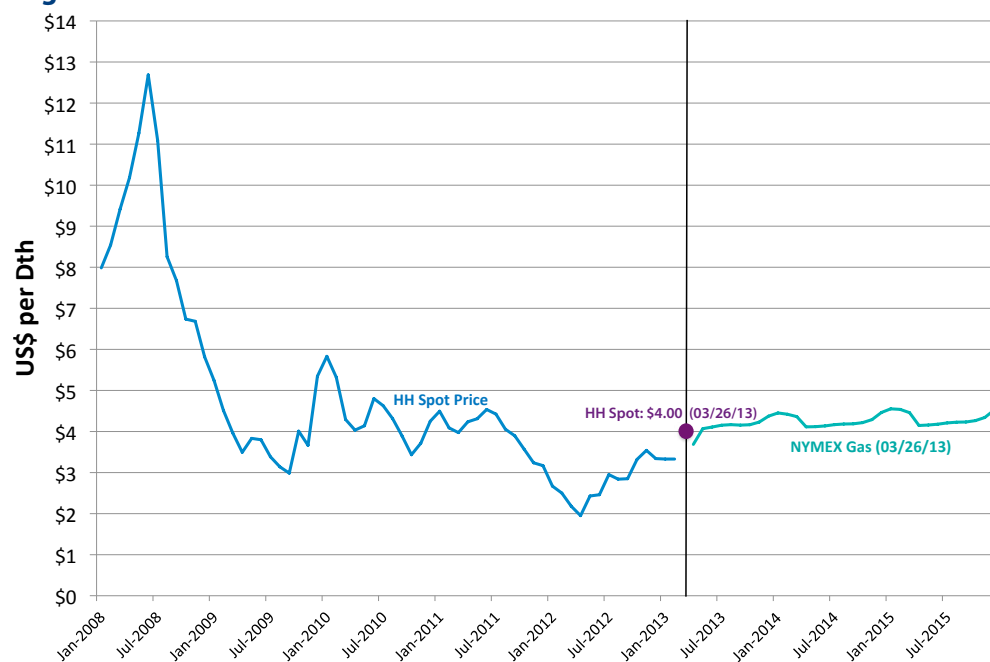
Maintaining and improving the reliability of the region's natural gas and electric delivery systems is of paramount importance as the two become more interdependent. The regional gas and electric industries are working together toward that common objective.

## 2013 GAS OUTLOOK – Regional Prices

### Key Conclusions

- Natural gas prices in the Pacific Northwest continue to reflect abundant supply availability across North America. According to the EIA, daily spot prices averaged \$2.75 per Dth at the Henry Hub<sup>13</sup> in 2012, compared to an average of almost \$9/Dth in 2008.
- Depending on the pace of economic recovery and supply/demand growth, most forecasts project prices to average between \$4 and \$7/Dth through 2022.

**Figure 12. Natural Gas Prices**



Source: EIA Monthly NatGas Report; EIA Short Term Energy Outlook; NYMEX

<sup>13</sup>The Henry Hub in Louisiana is the pricing point for natural gas futures on the New York Mercantile Exchange (NYMEX). The settlement prices at the Henry Hub are used as benchmarks for the entire North American natural gas market.

<sup>14</sup>Northwest Power and Conservation Council (NWPCC), *Update to the Council's Forecast of Fuel Prices*, July 2012; U.S. EIA, *2013 Annual Energy Outlook - Early Release*, December 2012.

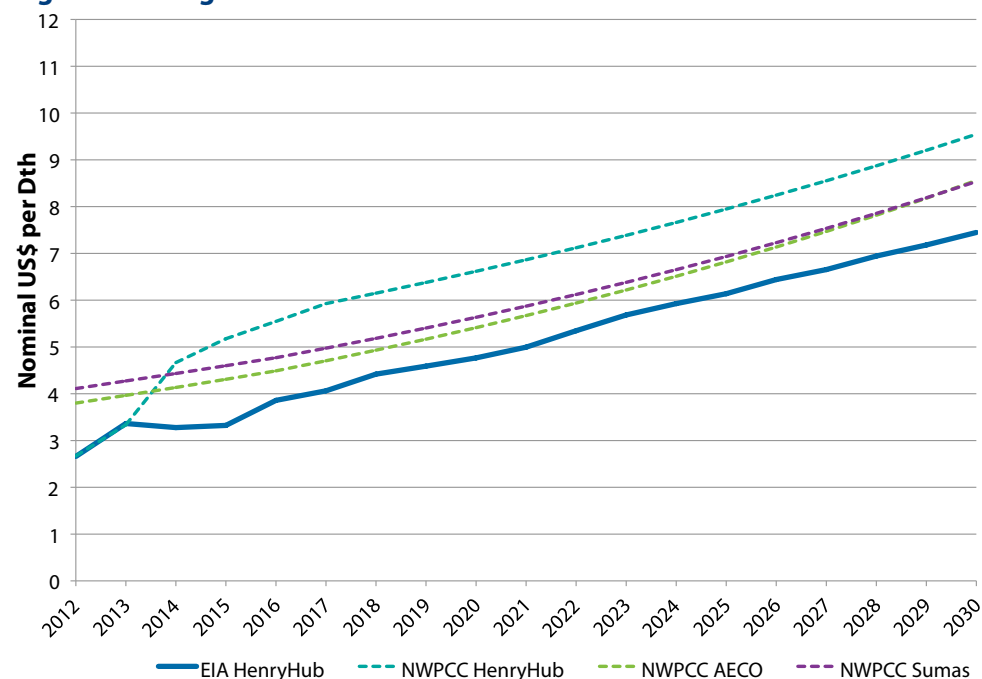
### A Closer Look

Down dramatically from the highs experienced in 2008, natural gas prices fell to their lowest levels in more than a decade in early 2012 (Figure 12). They have rebounded slightly and are now expected to hover around \$3-\$4/MMBtu until the economy begins a sustained recovery and gas demand and supply become more balanced. In response, the region's utilities, which pass through purchased gas costs to customers without markup, have been able to lower commodity rates for the benefit of customers. Even factoring in a growing economy, prices are

not expected to rise substantially in the next decade due to the shale gas dynamics described earlier (Figure 13).

In addition to delivering price-lowering volumes to the market, shale gas has another benefit: geographically diverse sources of supply across the continent. Shorter distances between production and consumption reduce transportation costs and mitigate pricing risks from more distant and clustered conventional sources that are more susceptible to disruption (such as by hurricanes in the Gulf Coast region).

**Figure 13. Long-Term Natural Gas Price Forecasts<sup>14</sup>**



Source: EIA, NWPCC

### **Notes on Natural Gas Prices**

Given the expected continuing abundance of North American supply, consumers are likely to benefit from reasonably stable natural gas prices for the foreseeable future. NWGA members are tracking a number of market dynamics that could influence natural gas prices going forward

- The trend to shift investment away from dry gas production to production of oil and other liquid hydrocarbons.
- The impact of increased regulation on production practices and access to viable reserves.
- The potential effect of new and improved production technologies.
- The pace of economic growth across North America.
- The accelerated adoption of natural gas as a fuel for generating electricity, and as an alternative to petroleum-based fuels in the transportation and industrial sectors.
- The inter-regional price impacts of changing natural gas flows across North America.
- The benefits and costs of exporting North American natural gas to premium overseas markets.

## 2013 GAS OUTLOOK – REGIONAL SYSTEM CAPACITY

### Key Conclusions

- The existing system of natural gas pipelines and storage facilities in the Northwest has reliably served the load requirements of the region. Regional pipeline and storage expansions have been undertaken when needed to maintain reliability.
- Based on current data and assumptions, peak day demand could approach or exceed the region's infrastructure capacity within the 10-year forecast horizon.
- The changing nature of the region's natural gas demand has implications regarding how existing infrastructure is utilized and the timing and type of expansions or additions.

### A Closer Look

The Pacific Northwest's 48,000-mile network of transmission and distribution pipelines safely and reliably serves more than 3.3 million natural gas customers. Combined with underground and peak storage facilities (Table 2), the region's natural gas infrastructure is currently capable of delivering more than 6.5 million Dth/day of gas at peak capacity.

**Table 2. Regional Storage Facilities**

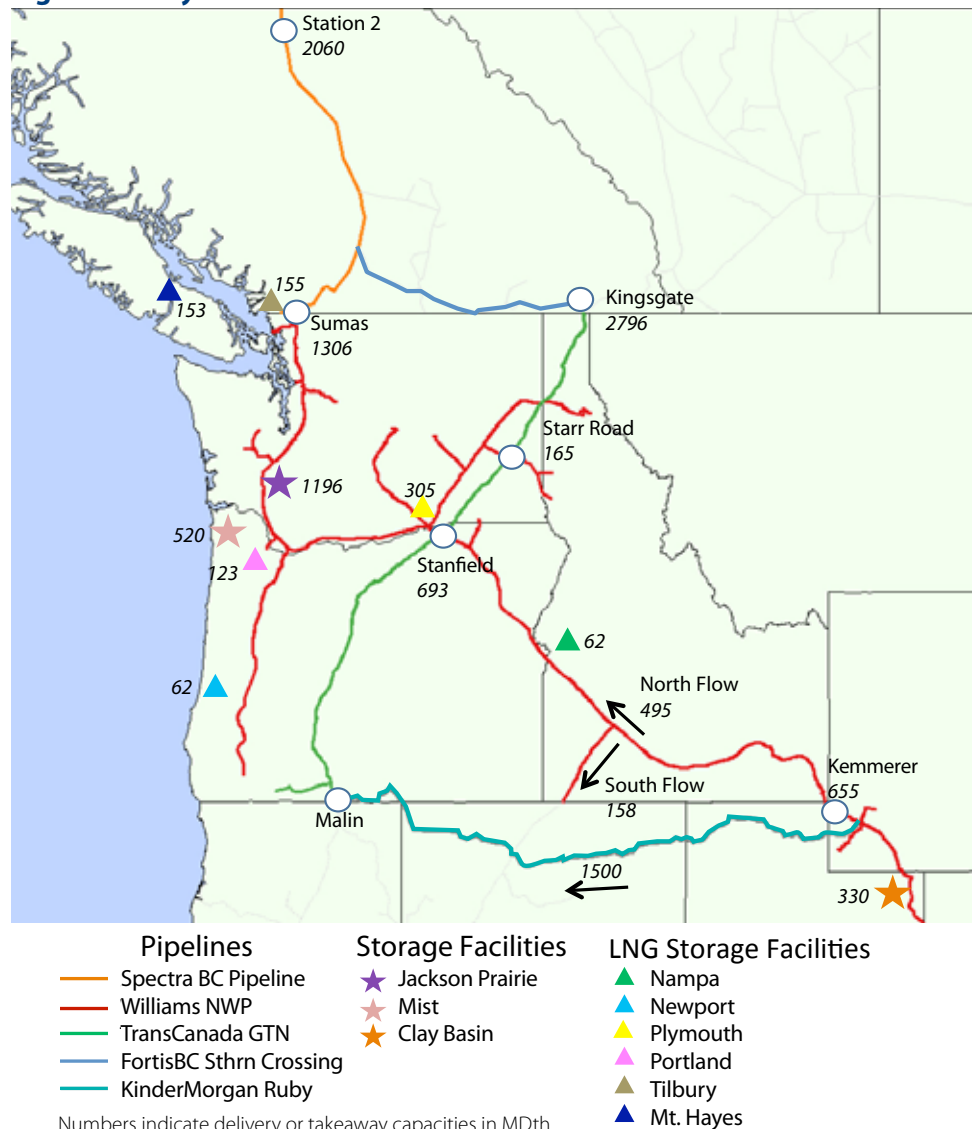
Facility	Owner	Type	Capacity <sup>1</sup> (MDth)	Max Withdrawal (MDth/day)
Jackson Prairie, WA	Avista, PSE, NW Pipeline	Underground	25,448	1,196 <sup>2</sup>
Mist, OR	NW Natural	Underground	16,100	520 <sup>2</sup>
<b>Underground Subtotal</b>			<b>41,548</b>	<b>1,716</b>
Plymouth, WA	NW Pipeline	LNG	2,388	305
Newport, OR	NW Natural	LNG	1,000	60
Portland, OR	NW Natural	LNG	600	120
Tilbury, B.C.	FortisBC Energy	LNG	591	155
Nampa, ID	Intermountain Gas	LNG	588	60
Gig Harbor, WA	PSE	LNG	13	3
Swarr Station, WA	PSE	LPG <sup>3</sup>	130	10
Mt. Hayes, B.C.	FortisBC Energy	LNG	1,530	153
<b>LNG/LPG Subtotal</b>			<b>6,858</b>	<b>866</b>
<b>Total Storage</b>			<b>48,406</b>	<b>2,582</b>

<sup>1</sup>Working gas capacity; gas that can be used to serve the market.

<sup>2</sup>Start of season or full rate; storage withdrawal rates decline as working gas volumes decline below certain levels.

<sup>3</sup>LPG= Liquid Propane Gas and Air mixture.

**Figure 14. Key Infrastructure in the Pacific Northwest**



Because natural gas utilities are committed to preventing service disruptions regardless of the circumstances, they design their systems to accommodate extreme but still plausible weather conditions (peak or design days). Figure 15 aggregates the design days of NWGA gas utility members and plots them against available capacity. Under the expected and high cases, peak day demand could begin to stress the system, approaching or exceeding the region's infrastructure capacity within the forecast horizon.

The Figure 15 forecast assumes that existing capacity in the region is operating at 100 percent of its capability.<sup>15</sup> The forecast also assumes that gas will not flow on a peak day to customers without firm pipeline transportation contracts (typically industrial users or electricity generators with alternate fuels). Finally, it assumes that a peak or design weather day could occur simultaneously across the entire region.

While the probability of design days occurring on every system across the region

on the same day ("coincidental peak day") is small, the possibility of very cold weather occurring simultaneously along the I-5 Corridor is reasonably high. Figure 16 plots the I-5 Corridor against available I-5 pipeline and storage resources. Also included for illustrative purposes is the load without firm interstate pipeline transportation contracts, e.g., potential loads that could expect to be curtailed on a peak weather day.

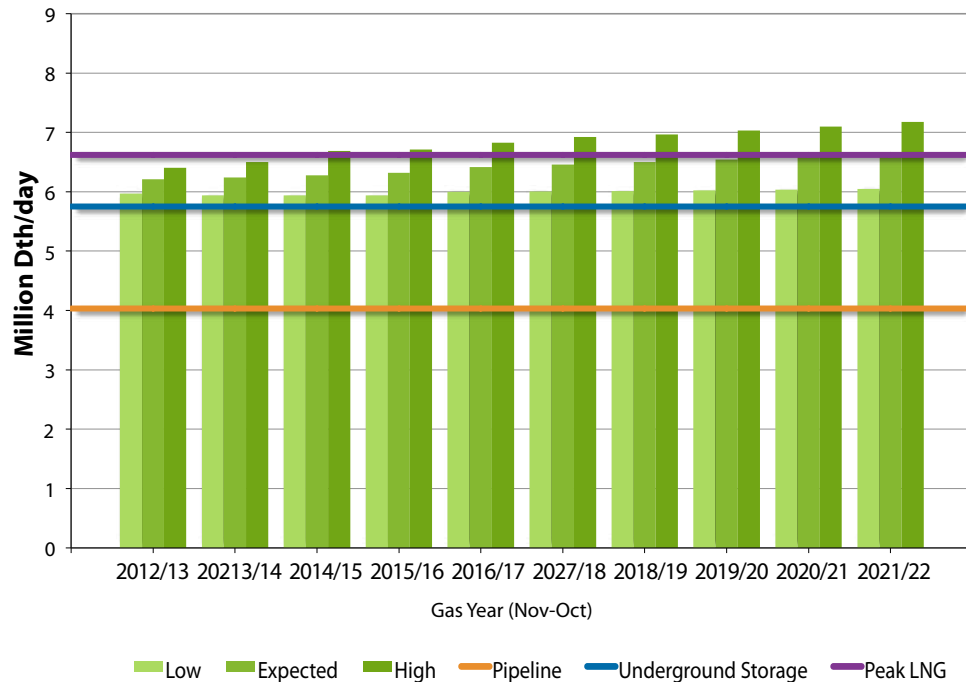
The states of Oregon and Washington have negotiated two coal plant closures

within the planning horizon of this Outlook (Boardman in 2020 and Centralia in two phases, 2020 and 2025). Plant owners have announced their intent to use natural gas-fired generation to replace some or all of the output of those plants. The replacement plants are not included in Figures 15 and 16 because utilities have just begun their planning and the type and size of the plants that may be built have not been determined. However, if these plants are built, they will represent significant gas

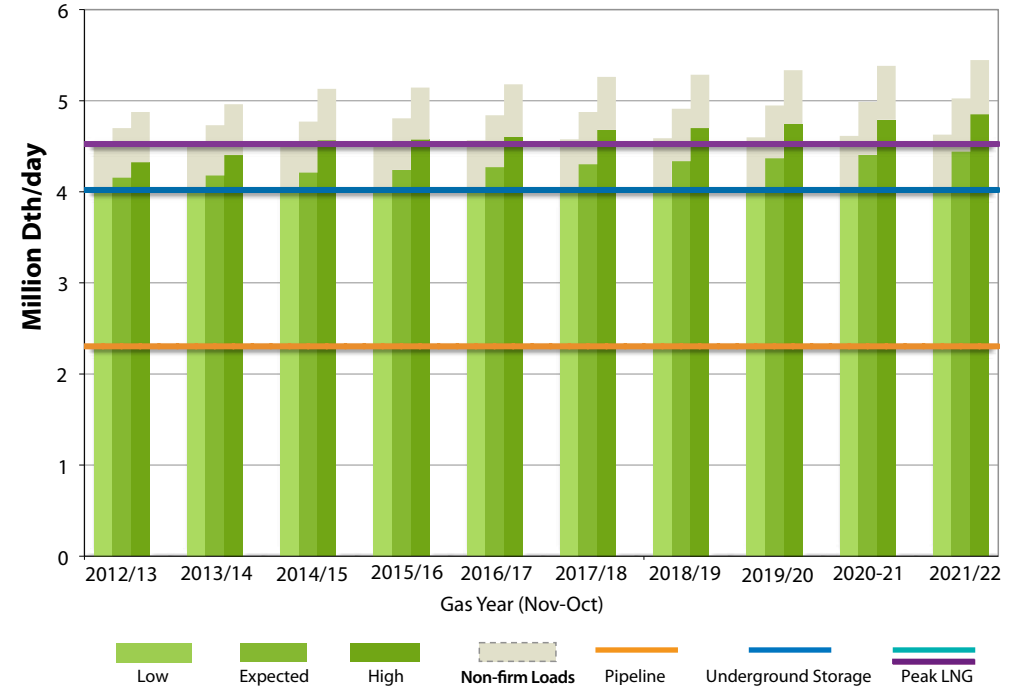
volumes that would require capacity within the forecast period.

Analyses such as these help send signals to the market of an impending need for additional capacity. Market participants weigh the probability of disruptions and the costs of various infrastructure options to make decisions about what is needed and when.

**Figure 15. Regional Peak Supply/Demand Balance**



**Figure 16. I-5 Peak Supply/Demand Balance including Non-Firm Loads**



<sup>15</sup>Regional capacity includes all existing facilities. Proposed projects are not included in capacity.



**Figure 17. Proposed Pipeline Projects**



In response to market signals, several projects have been proposed to accommodate future delivery capacity needs. The first completed – the 683-mile Ruby Pipeline built by El Paso Corporation (acquired by Kinder Morgan in May, 2012) – began operating in July 2011, connecting the Opal trading hub in southwestern Wyoming to the Malin trading hub at the California-Oregon border. Ruby's 1.5 Bcf/d capacity brings gas supply diversity to Northern California and Eastern Oregon and Washington by providing additional access to the prolific Rockies supply basin.

In conjunction with the Ruby Pipeline development, TransCanada GTN developed a firm northbound service to allow delivery of Ruby gas to customers along the GTN system. With this service, GTN became a bi-directional pipeline that now allows customers more gas supply options and flexibility.

Reductions in projected demand and a slow economic recovery have canceled or deferred several other projects. Assuming recovery will occur, and given possible changes in regional demand due to new industry and/or LNG exports, it is only

a matter of time before new capacity within the region will be required.

Figure 17 illustrates the active proposals, which include:

#### **Washington Expansion Project**

In response to a request for an incremental 750 million cubic feet per day (MMcf/d) of capacity, Williams Northwest Pipeline (NWP) is planning to construct the Washington Expansion Project. The project consists of 140 miles of 36-inch diameter pipe to be constructed in 10 different segments in or near NWP's existing right-of-way along the I-5 corridor between Sumas and Woodland, plus additional compression at existing compressor stations. In conjunction with this project, NWP is also proposing an incremental scalable expansion from Sumas to markets in the I-5 corridor as far south as Molalla, OR. This phase

of the project is not contingent upon the aforementioned expansion and could go in service as early as fall 2015.

#### **Northwest Market Access Expansion (N-MAX)/Palomar Expansion**

Williams Northwest Pipeline (NWP) is working with the current Palomar pipeline project sponsors – NW Natural and TransCanada GTN – to develop the Cascade (eastern) section of Palomar in conjunction with an expansion of the existing NWP system. The Cascade section of Palomar would consist of a 106-mile, 30-inch diameter pipeline that would run from GTN's mainline in

central Oregon to a NW Natural/NWP hub near Molalla – enhancing delivery capacity to the I-5 Corridor. Palomar's initial design capacity is 300 MMcf/d, expandable to 750 MMcf/d. It would be linked to the N-MAX on the existing NWP system to deliver gas to other markets along the I-5 corridor.

#### **Spectra/FortisBC System Enhancement**

FortisBC and Spectra Energy continue to evaluate using FortisBC's Southern Crossing system to provide Spectra's T-South shippers with flexible receipt and delivery options between Station 2 in northeast B.C. and the Sumas (WA) and Kingsgate (ID) market hubs. This would involve expanding FortisBC's existing bi-directional Southern Crossing system that connects Spectra's T-South system at Kingsvale, B.C., to TransCanada's System at Yahk, B.C., and requires a 100-mile pipeline looping project on the Kingsvale to Oliver B.C. segment. Incremental capacity from Station 2 on the Spectra system to Kingsgate could be up to 450 MMcf/d. Expanded Kingsgate-to-Sumas (east-to-west) flow capability could also increase supply delivered to Sumas to serve the B.C. lower mainland and I-5 Corridor.

## Notes on Regional Natural Gas System Capacity

NWGA members continuously monitor a number of dynamics to ensure that regional natural gas consumers have the gas they need when and where they need it, including:

- When, where and how much natural gas the region will require to generate electricity to meet growing demand and support intermittent renewable sources of generation.
- Impacts of the region's changing load profile on existing natural gas infrastructure. For example, if any of the new industrial facilities being considered in B.C. are built, they will require large incremental capacity. Where existing pipelines are underutilized, they would be filled. Where pipelines are fully subscribed, expansion will be needed.
- The timing of new or expanded infrastructure. Because projects can take three to five years to develop, foresight is imperative.

## Investments in Safety

While the cost of natural gas itself is lower than it has been in years, the cost of moving that gas from one place to another is increasing. One of the primary drivers of this cost increase is "Integrity Management."

Previously, pipeline maintenance and inspection focused on the pipeline: investigating its physical qualities, supporting systems and the administration of an operator's inspection program.

Integrity Management takes a broader view, encompassing the environment in which the pipeline exists. Pipeline operators are required to know more about the areas their pipelines traverse. Integrity Management requires operators to manage their facilities in the context of the population proximate to the pipeline and the existence of environmentally sensitive areas nearby.

The principles of Integrity Management drive operators to understand the potential consequences of failure of a specific pipeline in a particular area. Operators then set priorities for operations, inspection and maintenance based on the relative risk to people, property or the environment.

The pipeline operators in the Pacific Northwest are investing a significant amount of capital in Integrity Management to ensure that their systems continue to deliver natural gas safely and reliably.

# APPENDICES

## A1. Maximum Capacity (Dth/d)

SUPPLY	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021	2021 / 2022
<b>Pipeline Interconnects</b>	<b>4,033,049</b>	<b>4,033,049</b>	<b>4,033,049</b>	<b>4,033,049</b>	<b>4,033,049</b>	<b>4,033,049</b>	<b>4,033,049</b>	<b>4,033,049</b>	<b>4,033,049</b>	<b>4,033,049</b>
<b>WCSB via TCPL/GTN</b>	1,554,784	1,554,784	1,554,784	1,554,784	1,554,784	1,554,784	1,554,784	1,554,784	1,554,784	1,554,784
Stanfield (NWP from GTN)	692,920	692,920	692,920	692,920	692,920	692,920	692,920	692,920	692,920	692,920
Starr Rd (NWP from GTN)	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000
Palouse (NWP from GTN)	70,459	70,459	70,459	70,459	70,459	70,459	70,459	70,459	70,459	70,459
GTN Direct Connects	439,464	439,464	439,464	439,464	439,464	439,464	439,464	439,464	439,464	439,464
Kingsgate/Yahk BC Interior from TCPL	186,941	186,941	186,941	186,941	186,941	186,941	186,941	186,941	186,941	186,941
<b>Rockies via NWP</b>	495,000	495,000	495,000	495,000	495,000	495,000	495,000	495,000	495,000	495,000
NWP north from NWP south	655,000	655,000	655,000	655,000	655,000	655,000	655,000	655,000	655,000	655,000
Max Demand on Reno Lateral	(160,000)	(160,000)	(160,000)	(160,000)	(160,000)	(160,000)	(160,000)	(160,000)	(160,000)	(160,000)
<b>WCSB via SET</b>	1,983,265	1,983,265	1,983,265	1,983,265	1,983,265	1,983,265	1,983,265	1,983,265	1,983,265	1,983,265
T-South to Huntingdon	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060
T-South to BC Interior	178,705	178,705	178,705	178,705	178,705	178,705	178,705	178,705	178,705	178,705
T-South to Kingsvale	51,500	51,500	51,500	51,500	51,500	51,500	51,500	51,500	51,500	51,500
<b>Storage</b>	<b>2,585,058</b>	<b>2,585,058</b>	<b>2,585,058</b>	<b>2,585,058</b>	<b>2,585,058</b>	<b>2,585,058</b>	<b>2,585,058</b>	<b>2,585,058</b>	<b>2,585,058</b>	<b>2,585,058</b>
Jackson Prairie (NWP from JP)	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000
Mist Storage (NWN)	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000
Plymouth (NWP from LNG)	305,300	305,300	305,300	305,300	305,300	305,300	305,300	305,300	305,300	305,300
Newport/Portland LNG (NWN)	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Nampa LNG (IGC)	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Gig Harbor Satellite LNG (PSE)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Swarr Stn Propane (PSE)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Tilbury LNG (FortisBC)	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466
Mount Hayes LNG (FortisBC)	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,0
<b>Total Available Supply</b>	<b>6,618,107</b>	<b>6,618,107</b>	<b>6,618,107</b>	<b>6,618,107</b>	<b>6,618,107</b>	<b>6,618,107</b>	<b>6,618,107</b>	<b>6,618,107</b>	<b>6,618,107</b>	<b>6,618,107</b>

## A2. Annual Expected Demand Summary - (Dth)

Region/Sector	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021	2021 / 2022
<b>BC Lower Mainland &amp; Van. Island</b>	<b>141,469,232</b>	<b>141,894,104</b>	<b>142,309,982</b>	<b>142,617,622</b>	<b>142,898,953</b>	<b>143,208,340</b>	<b>143,534,130</b>	<b>143,876,922</b>	<b>144,237,344</b>	<b>144,616,045</b>
Residential	54,664,103	54,644,278	54,659,062	54,642,180	54,598,667	54,567,851	54,539,494	54,513,674	54,490,473	54,469,977
Commercial	39,176,189	39,492,160	39,811,069	40,134,372	40,459,217	40,799,420	41,153,566	41,522,179	41,905,801	42,304,999
Industrial	30,760,642	30,889,366	30,971,552	30,972,770	30,972,770	30,972,770	30,972,770	30,972,770	30,972,770	30,972,770
Power Generation	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299
<b>W. Washington</b>	<b>251,515,847</b>	<b>254,216,529</b>	<b>262,518,271</b>	<b>264,395,000</b>	<b>266,135,809</b>	<b>265,965,772</b>	<b>270,741,795</b>	<b>273,862,014</b>	<b>269,523,075</b>	<b>270,494,052</b>
Residential	71,344,400	72,540,674	73,716,495	75,145,031	76,038,562	77,196,740	78,372,143	79,875,322	80,804,066	81,992,312
Commercial	42,997,081	43,806,130	44,492,478	45,187,718	45,525,310	46,010,412	46,531,588	47,272,249	47,686,505	48,215,876
Industrial	75,168,349	75,581,951	76,005,067	76,486,560	76,785,973	77,142,328	77,509,338	77,968,441	78,297,993	78,674,772
Power Generation	62,006,017	62,287,773	68,304,232	67,575,692	67,785,965	65,616,292	68,328,726	68,746,001	62,734,511	61,611,093
<b>W. Oregon</b>	<b>121,120,995</b>	<b>119,927,262</b>	<b>121,465,786</b>	<b>123,054,032</b>	<b>145,859,625</b>	<b>146,948,413</b>	<b>147,962,119</b>	<b>149,373,495</b>	<b>149,761,963</b>	<b>150,483,561</b>
Residential	37,489,972	37,659,062	37,931,245	38,500,454	38,836,451	39,432,642	39,981,311	40,779,532	41,229,364	41,889,379
Commercial	24,488,931	24,390,834	24,427,117	24,514,270	24,454,485	24,519,083	24,593,228	24,774,574	24,773,923	24,868,498
Industrial	42,299,211	42,877,366	44,107,424	45,039,308	45,668,689	46,096,688	46,487,580	46,859,390	46,858,676	46,825,684
Power Generation	16,842,881	15,000,000	15,000,000	15,000,000	36,900,000	36,900,000	36,900,000	36,960,000	36,900,000	36,900,000
<b>BC Interior</b>	<b>49,713,313</b>	<b>49,494,799</b>	<b>49,504,429</b>	<b>49,473,876</b>	<b>49,440,137</b>	<b>49,425,985</b>	<b>49,395,462</b>	<b>49,380,819</b>	<b>49,371,638</b>	<b>49,368,927</b>
Residential	16,568,842	16,510,337	16,450,438	16,376,820	16,300,284	16,227,376	16,154,827	16,082,634	16,010,797	15,939,312
Commercial	10,181,300	10,221,486	10,262,880	10,305,483	10,348,280	10,407,035	10,449,062	10,506,611	10,569,268	10,638,041
Industrial	22,963,171	22,762,975	22,791,111	22,791,573	22,791,573	22,791,573	22,791,573	22,791,573	22,791,573	22,791,573
Power Generation	-	-	-	-	-	-	-	-	-	-
<b>E. Washington &amp; N. Idaho</b>	<b>71,049,266</b>	<b>71,230,084</b>	<b>72,141,770</b>	<b>73,057,932</b>	<b>74,029,284</b>	<b>75,190,339</b>	<b>76,316,431</b>	<b>77,189,820</b>	<b>78,978,867</b>	<b>80,405,382</b>
Residential	19,732,226	19,561,228	19,784,302	20,127,970	20,307,494	20,547,318	20,773,692	21,093,986	21,327,078	21,605,087
Commercial	14,227,910	14,131,375	14,269,471	14,482,152	14,608,328	14,767,786	14,918,388	15,123,584	15,275,016	15,453,300
Industrial	28,083,616	28,434,096	28,779,941	29,018,981	29,305,274	29,613,583	29,926,056	30,244,058	30,556,087	30,868,134
Power Generation	9,005,513	9,103,385	9,308,056	9,428,829	9,808,187	10,261,653	10,698,295	10,728,191	11,820,685	12,478,861
<b>E. Oregon &amp; Medford</b>	<b>106,023,796</b>	<b>106,538,544</b>	<b>107,824,497</b>	<b>109,021,708</b>	<b>113,196,751</b>	<b>116,367,069</b>	<b>119,263,080</b>	<b>120,095,331</b>	<b>129,176,215</b>	<b>134,247,272</b>
Residential	7,668,618	7,631,605	7,693,128	7,784,112	7,845,863	7,919,449	7,988,227	8,077,278	8,148,414	8,228,299
Commercial	5,496,381	5,487,724	5,530,595	5,587,361	5,626,777	5,673,082	5,716,689	5,772,196	5,813,752	5,860,134
Industrial	9,154,613	9,231,319	9,302,266	9,373,206	9,444,675	9,515,817	9,586,138	9,657,245	9,736,547	9,817,084
Power Generation	83,704,184	84,187,896	85,298,508	86,277,029	90,279,435	93,258,721	95,972,026	96,588,612	105,477,501	110,341,756
<b>S. Idaho</b>	<b>76,735,074</b>	<b>77,615,830</b>	<b>78,156,141</b>	<b>78,853,740</b>	<b>79,215,395</b>	<b>79,813,527</b>	<b>80,436,471</b>	<b>81,063,520</b>	<b>81,699,381</b>	<b>82,335,564</b>
Residential	33,987,783	34,327,075	34,699,598	35,212,946	35,462,812	35,817,441	36,175,615	36,537,372	36,902,746	37,271,774
Commercial	11,555,845	11,671,204	11,797,862	11,972,400	12,057,354	12,177,928	12,299,707	12,422,705	12,546,932	12,672,401
Industrial	24,691,446	25,117,551	25,158,682	25,168,394	25,195,228	25,318,158	25,461,149	25,603,443	25,749,703	25,891,389
Power Generation	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000
<b>PNW Annual Demand - Base</b>	<b>817,627,523</b>	<b>820,917,151</b>	<b>833,920,875</b>	<b>840,473,910</b>	<b>870,775,954</b>	<b>876,919,446</b>	<b>887,649,487</b>	<b>894,841,921</b>	<b>902,748,481</b>	<b>911,950,804</b>
Residential	241,455,944	242,874,260	244,934,268	247,789,512	249,390,133	251,708,817	253,985,308	256,959,799	258,912,937	261,396,140
Commercial	148,123,636	149,200,915	150,591,471	152,183,755	153,079,751	154,354,747	155,662,229	157,394,098	158,571,198	160,013,249
Industrial	233,121,047	234,894,623	237,116,042	238,850,793	240,164,184	241,450,917	242,734,605	244,096,921	244,963,350	245,841,407
Power Generation	194,926,895	193,947,353	201,279,094	201,649,849	228,141,886	229,404,965	235,267,345	236,391,103	240,300,996	244,700,008

### A3. Annual Expected Demand Summary - (Dth)

Region/Sector	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021	2021 / 2022
<b>BC Lower Mainland &amp; Van. Island</b>	<b>141,469,232</b>	<b>142,850,133</b>	<b>144,232,236</b>	<b>145,505,321</b>	<b>146,778,834</b>	<b>148,099,252</b>	<b>149,453,431</b>	<b>150,842,726</b>	<b>152,268,554</b>	<b>153,732,401</b>
Residential	54,664,103	55,205,067	55,780,526	56,312,981	56,834,798	57,376,584	57,926,056	58,483,421	59,048,895	59,622,704
Commercial	39,176,189	39,887,402	40,611,859	41,351,271	42,102,966	42,881,599	43,686,306	44,518,235	45,378,589	46,268,627
Industrial	30,760,642	30,889,366	30,971,552	30,972,770	30,972,770	30,972,770	30,972,770	30,972,770	30,972,770	30,972,770
Power Generation	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299
<b>W. Washington</b>	<b>254,138,837</b>	<b>257,633,210</b>	<b>277,430,885</b>	<b>282,836,041</b>	<b>284,979,587</b>	<b>293,381,362</b>	<b>300,403,260</b>	<b>305,712,310</b>	<b>298,979,765</b>	<b>299,843,138</b>
Residential	72,078,261	73,610,909	75,124,724	76,912,803	78,172,796	79,724,818	81,316,807	83,266,225	84,636,423	86,298,561
Commercial	43,639,906	44,704,290	45,642,195	46,594,644	47,186,607	47,941,927	48,746,542	49,792,298	50,504,696	51,351,296
Industrial	76,414,654	77,030,237	77,659,464	78,348,781	78,850,235	79,412,433	79,987,428	80,659,611	81,197,247	81,787,392
Power Generation	62,006,017	62,287,773	79,004,502	80,979,813	80,769,949	86,302,185	90,352,484	91,994,177	82,641,399	80,405,889
<b>W. Oregon</b>	<b>122,699,006</b>	<b>121,742,970</b>	<b>123,556,459</b>	<b>125,406,592</b>	<b>148,495,463</b>	<b>149,886,633</b>	<b>151,216,650</b>	<b>152,973,079</b>	<b>153,674,564</b>	<b>154,727,048</b>
Residential	37,577,119	37,880,912	38,289,915	39,019,798	39,548,610	40,351,199	41,110,625	42,123,182	42,775,318	43,650,856
Commercial	24,578,040	24,549,913	24,646,979	24,782,035	24,785,367	24,921,962	25,079,583	25,372,113	25,479,317	25,689,254
Industrial	43,700,966	44,312,145	45,619,565	46,604,758	47,261,487	47,713,473	48,126,441	48,517,785	48,519,929	48,486,937
Power Generation	16,842,881	15,000,000	15,000,000	15,000,000	36,900,000	36,900,000	36,900,000	36,960,000	36,900,000	36,900,000
<b>BC Interior</b>	<b>49,713,313</b>	<b>49,766,732</b>	<b>50,046,851</b>	<b>50,290,695</b>	<b>50,533,370</b>	<b>50,787,430</b>	<b>51,049,029</b>	<b>51,318,594</b>	<b>51,596,590</b>	<b>51,884,308</b>
Residential	16,568,842	16,677,470	16,785,207	16,879,333	16,970,627	17,065,820	17,161,581	17,257,913	17,354,819	17,452,305
Commercial	10,181,300	10,324,391	10,470,533	10,619,789	10,771,169	10,930,037	11,095,875	11,269,108	11,450,198	11,640,429
Industrial	22,963,171	22,764,871	22,791,111	22,791,573	22,791,573	22,791,573	22,791,573	22,791,573	22,791,573	22,791,573
Power Generation	-	-	-	-	-	-	-	-	-	-
<b>E. Washington &amp; N. Idaho</b>	<b>83,236,602</b>	<b>83,926,935</b>	<b>84,791,965</b>	<b>86,348,287</b>	<b>92,902,870</b>	<b>91,727,781</b>	<b>94,696,086</b>	<b>99,131,618</b>	<b>99,197,328</b>	<b>99,943,255</b>
Residential	20,187,186	20,753,603	21,323,079	21,959,641	22,479,109	23,071,560	23,670,470	24,364,447	24,910,872	25,559,949
Commercial	14,413,408	14,750,975	15,103,620	15,500,476	15,843,518	16,227,835	16,617,055	17,062,606	17,422,646	17,843,917
Industrial	28,515,482	28,887,137	29,244,919	29,494,266	29,793,935	30,116,489	30,444,502	30,778,292	31,106,016	31,435,483
Power Generation	20,120,526	19,535,221	19,120,347	19,393,903	24,786,308	22,311,896	23,964,059	26,926,273	25,757,793	25,103,906
<b>E. Oregon &amp; Medford</b>	<b>124,531,761</b>	<b>131,745,116</b>	<b>135,496,361</b>	<b>138,156,992</b>	<b>142,159,575</b>	<b>145,204,586</b>	<b>147,607,445</b>	<b>149,068,857</b>	<b>151,178,217</b>	<b>152,690,412</b>
Residential	7,875,136	8,024,515	8,185,944	8,363,584	8,521,432	8,695,477	8,871,005	9,066,705	9,231,128	9,417,559
Commercial	5,621,147	5,711,450	5,809,956	5,915,250	6,010,405	6,115,650	6,222,672	6,342,276	6,442,350	6,555,557
Industrial	9,316,622	9,398,486	9,473,640	9,548,511	9,623,803	9,698,914	9,773,432	9,848,690	9,932,114	10,016,881
Power Generation	101,718,855	108,610,666	112,026,822	114,329,647	118,003,934	120,694,547	122,740,336	123,811,186	125,572,624	126,700,414
<b>S. Idaho</b>	<b>78,243,716</b>	<b>79,660,305</b>	<b>80,461,519</b>	<b>81,436,762</b>	<b>82,074,337</b>	<b>82,996,148</b>	<b>83,965,019</b>	<b>84,945,447</b>	<b>85,942,279</b>	<b>86,947,154</b>
Residential	34,014,166	34,532,391	35,099,656	35,820,201	36,276,086	36,820,226	37,372,530	37,933,116	38,502,114	39,079,646
Commercial	11,564,815	11,741,011	11,933,881	12,178,867	12,333,867	12,518,875	12,706,658	12,897,258	13,090,717	13,287,078
Industrial	26,164,736	26,886,903	26,927,982	26,937,694	26,964,384	27,157,047	27,385,831	27,615,073	27,849,448	28,080,430
Power Generation	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000
<b>PNW Annual Demand - Base</b>	<b>854,032,468</b>	<b>867,325,401</b>	<b>896,016,277</b>	<b>909,980,690</b>	<b>947,924,035</b>	<b>962,083,192</b>	<b>978,390,921</b>	<b>993,992,632</b>	<b>992,837,296</b>	<b>999,767,716</b>
Residential	242,964,812	246,684,866	250,589,051	255,268,342	258,803,458	263,105,684	267,429,074	272,495,008	276,459,569	281,081,580
Commercial	149,174,805	151,669,431	154,219,023	156,942,332	159,033,900	161,537,883	164,154,691	167,253,894	169,768,513	172,636,160
Industrial	237,836,272	240,169,145	242,688,232	244,698,355	246,258,188	247,862,699	249,481,978	251,183,795	252,369,098	253,571,467
Power Generation	224,056,579	228,801,959	248,519,970	253,071,661	283,828,490	289,576,926	297,325,178	303,059,934	294,240,115	292,478,509

#### A4. Low Annual Demand Summary - (Dth)

Region/Sector	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021	2021 / 2022
<b>BC Lower Mainland &amp; Van. Island</b>	<b>141,469,232</b>	<b>140,480,811</b>	<b>139,489,596</b>	<b>138,387,441</b>	<b>137,283,780</b>	<b>136,221,064</b>	<b>135,185,308</b>	<b>134,176,263</b>	<b>133,193,690</b>	<b>132,237,361</b>
Residential	54,664,103	53,823,849	53,024,911	52,192,210	51,358,276	50,551,442	49,759,609	48,982,544	48,220,022	47,471,821
Commercial	39,176,189	38,899,298	38,624,835	38,354,161	38,084,434	37,828,553	37,584,630	37,352,649	37,132,599	36,924,471
Industrial	30,760,642	30,889,366	30,971,552	30,972,770	30,972,770	30,972,770	30,972,770	30,972,770	30,972,770	30,972,770
Power Generation	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299	16,868,299
<b>W. Washington</b>	<b>249,734,802</b>	<b>251,814,904</b>	<b>259,435,203</b>	<b>260,585,267</b>	<b>261,598,077</b>	<b>260,675,507</b>	<b>264,691,906</b>	<b>267,012,440</b>	<b>261,905,208</b>	<b>262,081,576</b>
Residential	70,763,767	71,778,964	72,728,964	73,896,836	74,520,892	75,393,915	76,279,342	77,469,317	78,098,306	78,971,760
Commercial	42,443,574	43,083,214	43,584,252	44,084,997	44,231,340	44,517,613	44,837,202	45,362,319	45,572,457	45,889,138
Industrial	74,521,444	74,664,952	74,817,755	75,027,742	75,059,880	75,147,686	75,246,636	75,434,802	75,499,933	75,609,586
Power Generation	62,006,017	62,287,773	68,304,232	67,575,692	67,785,965	65,616,292	68,328,726	68,746,001	62,734,511	61,611,093
<b>W. Oregon</b>	<b>119,515,812</b>	<b>118,020,287</b>	<b>119,266,679</b>	<b>120,532,182</b>	<b>143,039,397</b>	<b>143,827,073</b>	<b>144,578,147</b>	<b>145,747,265</b>	<b>145,951,952</b>	<b>146,538,754</b>
Residential	37,394,769	37,370,110	37,461,377	37,808,902	37,935,345	38,321,166	38,685,281	39,314,236	39,636,099	40,198,700
Commercial	24,393,771	24,193,833	24,147,714	24,165,010	24,043,161	24,039,700	24,056,190	24,182,075	24,138,820	24,199,009
Industrial	40,884,392	41,456,345	42,657,589	43,558,270	44,160,890	44,566,207	44,936,677	45,290,954	45,277,034	45,241,046
Power Generation	16,842,881	15,000,000	15,000,000	15,000,000	36,900,000	36,900,000	36,900,000	36,960,000	36,900,000	36,900,000
<b>BC Interior</b>	<b>49,713,313</b>	<b>49,089,743</b>	<b>48,701,017</b>	<b>48,279,230</b>	<b>47,861,274</b>	<b>47,458,508</b>	<b>47,066,791</b>	<b>46,686,025</b>	<b>46,316,126</b>	<b>46,356,469</b>
Residential	16,568,842	16,259,638	15,954,606	15,641,906	15,332,251	15,031,802	14,737,271	14,448,541	14,165,497	14,165,497
Commercial	10,181,300	10,067,130	9,955,300	9,845,751	9,737,450	9,635,133	9,537,947	9,445,911	9,359,055	9,399,398
Industrial	22,963,171	22,762,975	22,791,111	22,791,573	22,791,573	22,791,573	22,791,573	22,791,573	22,791,573	22,791,573
Power Generation	-	-	-	-	-	-	-	-	-	-
<b>E. Washington &amp; N. Idaho</b>	<b>69,893,987</b>	<b>67,924,278</b>	<b>67,986,609</b>	<b>68,216,438</b>	<b>69,096,517</b>	<b>69,882,552</b>	<b>70,681,710</b>	<b>71,584,161</b>	<b>73,366,041</b>	<b>74,500,312</b>
Residential	19,598,400	18,668,130	18,518,200	18,420,542	18,411,543	18,468,153	18,608,875	18,804,005	18,903,037	19,035,781
Commercial	14,213,754	13,713,251	13,653,878	13,628,601	13,656,053	13,721,511	13,834,102	13,979,120	14,065,596	14,172,951
Industrial	27,943,186	28,287,516	28,632,308	28,868,435	29,155,996	29,465,918	29,782,167	30,103,212	30,417,733	30,732,340
Power Generation	8,138,647	7,255,381	7,182,222	7,298,860	7,872,925	8,226,969	8,456,566	8,697,824	9,979,675	10,559,241
<b>E. Oregon &amp; Medford</b>	<b>99,591,282</b>	<b>92,874,353</b>	<b>92,494,786</b>	<b>93,240,935</b>	<b>98,420,106</b>	<b>101,314,492</b>	<b>103,241,053</b>	<b>104,774,229</b>	<b>115,848,409</b>	<b>120,938,124</b>
Residential	7,606,104	7,444,763	7,449,433	7,466,216	7,504,223	7,556,371	7,626,186	7,707,544	7,768,706	7,837,199
Commercial	5,461,216	5,398,166	5,417,370	5,440,982	5,473,051	5,513,590	5,563,328	5,620,212	5,662,043	5,708,099
Industrial	9,078,770	9,158,139	9,230,199	9,302,329	9,374,183	9,446,663	9,519,087	9,592,184	9,672,317	9,754,591
Power Generation	77,445,192	70,873,285	70,397,785	71,031,408	76,068,648	78,797,868	80,532,453	81,854,289	92,745,343	97,638,234
<b>S. Idaho</b>	<b>76,264,457</b>	<b>76,644,581</b>	<b>76,853,463</b>	<b>77,235,210</b>	<b>77,280,440</b>	<b>77,584,163</b>	<b>77,896,695</b>	<b>78,209,162</b>	<b>78,526,109</b>	<b>78,839,224</b>
Residential	33,956,242	34,086,290	34,228,425	34,503,702	34,515,486	34,688,063	34,861,504	35,035,811	35,210,991	35,387,045
Commercial	11,545,121	11,589,337	11,637,663	11,731,257	11,735,264	11,793,940	11,852,910	11,912,174	11,971,735	12,031,594
Industrial	24,263,094	24,468,955	24,487,375	24,500,251	24,529,691	24,602,160	24,682,281	24,761,177	24,843,383	24,920,585
Power Generation	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000	6,500,000
<b>PNW Annual Demand - Base</b>	<b>806,182,885</b>	<b>796,848,958</b>	<b>804,227,353</b>	<b>806,476,704</b>	<b>834,579,592</b>	<b>836,963,360</b>	<b>843,341,611</b>	<b>848,189,545</b>	<b>855,107,534</b>	<b>861,491,820</b>
Residential	240,552,227	239,431,744	239,365,917	239,930,314	239,578,017	240,010,914	240,558,068	241,761,999	242,002,658	243,067,803
Commercial	147,414,924	146,944,228	147,021,010	147,250,759	146,960,753	147,050,039	147,266,308	147,854,459	147,902,305	148,324,659
Industrial	230,414,698	231,688,247	233,587,888	235,021,372	236,044,984	236,992,980	237,931,192	238,946,673	239,474,744	240,022,491
Power Generation	187,801,036	178,784,738	184,252,538	184,274,259	211,995,837	212,909,429	217,586,044	219,626,414	225,727,827	230,076,866

### A5. I-5 Corridor Peak Day Expected Demand/Supply Balance (Dth/day)

DEMAND (Region/Sector)	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021	2021 / 2022
<b>BC Lower Main &amp; Van. Island (I-5 Corridor)</b>	<b>1,181,399</b>	<b>1,185,497</b>	<b>1,189,938</b>	<b>1,193,924</b>	<b>1,197,768</b>	<b>1,201,977</b>	<b>1,206,407</b>	<b>1,211,066</b>	<b>1,215,963</b>	<b>1,221,114</b>
Residential	591,302	591,141	591,282	590,912	590,369	589,988	589,636	589,313	589,021	588,767
Commercial (Firm Sales & Transport)	418,750	423,009	427,308	431,664	436,052	440,642	445,424	450,405	455,595	460,999
Industrial (Firm Sales & Transport)	133,435	133,435	133,435	133,435	133,435	133,435	133,435	133,435	133,435	133,435
Power Generation	37,913	37,913	37,913	37,913	37,913	37,913	37,913	37,913	37,913	37,913
<b>W. Washington (I-5 Corridor)</b>	<b>1,929,128</b>	<b>1,951,640</b>	<b>1,975,062</b>	<b>1,997,106</b>	<b>2,017,665</b>	<b>2,038,068</b>	<b>2,058,547</b>	<b>2,079,536</b>	<b>2,102,129</b>	<b>2,124,283</b>
Residential	827,203	843,840	860,502	876,504	892,281	908,389	924,409	940,500	957,532	974,327
Commercial (Firm Sales & Transport)	342,639	350,722	359,699	367,927	374,896	381,402	387,992	394,984	402,586	409,973
Industrial (Firm Sales & Transport)	272,937	270,729	268,512	266,326	264,138	261,928	259,797	257,704	255,661	253,634
Power Generation	486,349	486,349	486,349	486,349	486,349	486,349	486,349	486,349	486,349	486,349
<b>W. Oregon (I-5 Corridor)</b>	<b>983,960</b>	<b>982,671</b>	<b>986,652</b>	<b>990,069</b>	<b>1,055,555</b>	<b>1,062,906</b>	<b>1,070,896</b>	<b>1,077,516</b>	<b>1,086,537</b>	<b>1,095,102</b>
Residential	558,321	558,694	563,226	567,878	574,143	581,730	589,954	596,578	605,279	613,540
Commercial (Firm Sales & Transport)	285,733	284,492	284,237	283,271	282,760	282,766	282,773	282,983	283,517	284,006
Industrial (Firm Sales & Transport)	36,905	36,485	36,189	35,921	35,651	35,410	35,169	34,956	34,742	34,555
Power Generation	103,000	103,000	103,000	103,000	163,000	163,000	163,000	163,000	163,000	163,000
<b>Total Peak (Design) Day Demand</b>	<b>4,094,487</b>	<b>4,119,809</b>	<b>4,151,652</b>	<b>4,181,098</b>	<b>4,270,988</b>	<b>4,302,952</b>	<b>4,335,850</b>	<b>4,368,119</b>	<b>4,404,629</b>	<b>4,440,498</b>
<b>SUPPLY</b>										
<b>Pipeline Interconnects</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>
Max north flow on NWP @ Gorge	551,000	551,000	551,000	551,000	551,000	551,000	551,000	551,000	551,000	551,000
Huntingdon/Sumas	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060
T-South to Huntingdon	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060
<b>Underground Storage</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>
Jackson Prairie (NWP from JP)	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000
Mist Storage (NWN)	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000
<b>Peak LNG</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>
Newport/Portland LNG (NWN)	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Gig Harbor Satellite LNG (PSE)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Swarr Stn Propane (PSE)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Tilbury LNG (FortisBC)	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466
Mount Hayes LNG (FortisBC)	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042
<b>Total Supply</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>
Supply Surplus/(Shortfall)	426,581	401,259	369,416	339,970	250,080	218,116	185,218	152,949	116,438	80,570



### A6. I-5 Corridor Peak Day High Demand/Supply Balance (Dth/day)

DEMAND (Region/Sector)	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021	2021 / 2022
<b>BC Lower Main &amp; Van. Island (I-5 Corridor)</b>	<b>1,181,399</b>	<b>1,195,429</b>	<b>1,209,974</b>	<b>1,224,225</b>	<b>1,238,499</b>	<b>1,253,319</b>	<b>1,268,548</b>	<b>1,284,204</b>	<b>1,300,303</b>	<b>1,316,872</b>
Residential	591,302	597,118	603,297	609,013	614,604	620,414	626,308	632,289	638,359	644,527
Commercial (Firm Sales & Transport)	418,750	426,964	435,329	443,865	452,548	461,558	470,893	480,567	490,596	500,997
Industrial (Firm Sales & Transport)	133,435	133,435	133,435	133,435	133,435	133,435	133,435	133,435	133,435	133,435
Power Generation	37,913	37,913	37,913	37,913	37,913	37,913	37,913	37,913	37,913	37,913
<b>W. Washington (I-5 Corridor)</b>	<b>2,095,196</b>	<b>2,158,830</b>	<b>2,298,773</b>	<b>2,285,414</b>	<b>2,292,480</b>	<b>2,344,473</b>	<b>2,335,698</b>	<b>2,356,027</b>	<b>2,371,612</b>	<b>2,402,757</b>
Residential	924,852	967,505	984,010	977,560	984,869	984,087	981,660	997,447	1,010,168	1,032,827
Commercial (Firm Sales & Transport)	395,061	416,950	425,754	421,950	424,219	421,533	418,107	424,699	429,755	439,953
Industrial (Firm Sales & Transport)	286,934	286,026	283,885	280,779	278,267	275,341	272,419	270,369	268,177	266,464
Power Generation	488,349	488,349	605,124	605,124	605,124	663,512	663,512	663,512	663,512	663,512
<b>W. Oregon (I-5 Corridor)</b>	<b>987,821</b>	<b>989,314</b>	<b>996,203</b>	<b>1,002,596</b>	<b>1,071,544</b>	<b>1,082,614</b>	<b>1,094,463</b>	<b>1,105,246</b>	<b>1,118,341</b>	<b>1,131,148</b>
Residential	559,563	561,843	568,329	575,268	584,328	594,888	606,107	615,696	627,317	638,584
Commercial (Firm Sales & Transport)	286,193	285,825	286,274	285,799	285,955	286,706	287,576	288,983	290,671	292,396
Industrial (Firm Sales & Transport)	39,065	38,646	38,600	38,530	38,261	38,019	37,780	37,566	37,353	37,167
Power Generation	103,000	103,000	103,000	103,000	163,000	163,000	163,000	163,000	163,000	163,000
<b>Total Peak (Design) Day Demand</b>	<b>4,264,416</b>	<b>4,343,573</b>	<b>4,504,950</b>	<b>4,512,235</b>	<b>4,602,523</b>	<b>4,680,406</b>	<b>4,698,710</b>	<b>4,745,477</b>	<b>4,790,256</b>	<b>4,850,777</b>
<b>SUPPLY</b>										
<b>Pipeline Interconnects</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>
Max north flow on NWP @ Gorge	551,000	551,000	551,000	551,000	551,000	551,000	551,000	551,000	551,000	551,000
Huntingdon/Sumas	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060
T-South to Huntingdon	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060
<b>Underground Storage</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>
Jackson Prairie (NWP from JP)	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000
Mist Storage (NWN)	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000
<b>Peak LNG</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>
Newport/Portland LNG (NWN)	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Gig Harbor Satellite LNG (PSE)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Swarr Stn Propane (PSE)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Tilbury LNG (FortisBC)	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466
Mount Hayes LNG (FortisBC)	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042
<b>Total Supply</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>
Supply Surplus/(Shortfall)	256,651	177,495	16,118	8,833	-81,455	-159,338	-177,642	-224,409	-269,188	-329,709



### A7. I-5 Corridor Peak Day Low Demand/Supply Balance (Dth/day)

DEMAND (Region/Sector)	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021	2021 / 2022
<b>BC Lower Main &amp; Van. Island (I-5 Corridor)</b>	<b>1,181,399</b>	<b>1,170,460</b>	<b>1,159,986</b>	<b>1,149,193</b>	<b>1,138,396</b>	<b>1,128,076</b>	<b>1,118,083</b>	<b>1,108,417</b>	<b>1,099,076</b>	<b>1,090,064</b>
Residential	591,302	582,175	573,487	564,438	555,369	546,598	537,993	529,552	521,270	513,152
Commercial (Firm Sales & Transport)	418,750	416,938	415,151	413,407	411,680	410,130	408,742	407,518	406,458	405,564
Industrial (Firm Sales & Transport)	133,435	133,435	133,435	133,435	133,435	133,435	133,435	133,435	133,435	133,435
Power Generation	37,913	37,913	37,913	37,913	37,913	37,913	37,913	37,913	37,913	37,913
<b>W. Washington (I-5 Corridor)</b>	<b>1,820,220</b>	<b>1,837,898</b>	<b>1,855,039</b>	<b>1,870,709</b>	<b>1,884,852</b>	<b>1,898,845</b>	<b>1,912,905</b>	<b>1,927,423</b>	<b>1,943,478</b>	<b>1,958,983</b>
Residential	819,372	832,943	845,647	857,622	869,346	881,422	893,441	905,520	918,514	931,195
Commercial (Firm Sales & Transport)	337,981	344,748	351,903	358,303	363,435	368,100	372,822	377,923	383,615	389,081
Industrial (Firm Sales & Transport)	263,620	260,959	258,242	255,537	252,823	250,075	247,395	244,732	242,102	239,459
Power Generation	399,248	399,248	399,248	399,248	399,248	399,248	399,248	399,248	399,248	399,248
<b>W. Oregon (I-5 Corridor)</b>	<b>924,168</b>	<b>918,770</b>	<b>919,110</b>	<b>918,485</b>	<b>980,112</b>	<b>983,504</b>	<b>988,108</b>	<b>991,647</b>	<b>998,105</b>	<b>1,004,782</b>
Residential	557,023	554,531	556,416	557,834	560,934	565,351	570,830	574,997	581,682	588,481
Commercial (Firm Sales & Transport)	285,240	282,755	281,507	279,733	278,530	277,746	277,112	276,697	276,683	276,748
Industrial (Firm Sales & Transport)	31,905	31,483	31,187	30,918	30,649	30,407	30,167	29,953	29,740	29,553
Power Generation	50,000	50,000	50,000	50,000	110,000	110,000	110,000	110,000	110,000	110,000
<b>Total Peak (Design) Day Demand</b>	<b>3,925,787</b>	<b>3,927,127</b>	<b>3,934,135</b>	<b>3,938,387</b>	<b>4,003,360</b>	<b>4,010,425</b>	<b>4,019,097</b>	<b>4,027,487</b>	<b>4,040,659</b>	<b>4,053,829</b>
<b>SUPPLY</b>										
<b>Pipeline Interconnects</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>	<b>2,304,060</b>
Max north flow on NWP @ Gorge	551,000	551,000	551,000	551,000	551,000	551,000	551,000	551,000	551,000	551,000
Huntingdon/Sumas	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060
T-South to Huntingdon	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060	1,753,060
<b>Underground Storage</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>	<b>1,716,000</b>
Jackson Prairie (NWP from JP)	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000	1,196,000
Mist Storage (NWN)	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000
<b>Peak LNG</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>	<b>501,008</b>
Newport/Portland LNG (NWN)	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Gig Harbor Satellite LNG (PSE)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Swarr Stn Propane (PSE)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Tilbury LNG (FortisBC)	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466	155,466
Mount Hayes LNG (FortisBC)	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042	153,042
<b>Total Supply</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>	<b>4,521,068</b>
Supply Surplus/(Shortfall)	595,280	593,940	586,933	582,680	517,708	510,643	501,971	493,581	480,409	467,239