NW Natural's 2018 IRP Presentation to the Washington Utilities and Transportation Commission

November 27, 2018

NW Natural®

FORWARD LOOKING STATEMENT

This and other presentations made by NW Natural from time to time, may contain forward-looking statements within the meaning of the U.S. Private Securities Litigation Reform Act of 1995. Forward-looking statements can be identified by words such as “anticipates,” “intends,” “plans,” “seeks,” “believes,” “estimates,” “expects” and similar references to future periods. Examples of forward-looking statements include, but are not limited to, statements regarding the following: including regional third-party projects, storage, pipeline and other infrastructure investments, commodity costs, competitive advantage, customer service, customer and business growth, conversion potential, multifamily development, business risk, efficiency of business operations, regulatory recovery, business development and new business initiatives, environmental policy and social trends, environmental remediation recoveries, gas storage markets and business opportunities, gas storage development, costs, timing or returns related thereto, financial positions and performance, economic and housing market trends and performance shareholder return and value, capital expenditures, liquidity, strategic goals, carbon savings, supplies and characteristics of the same, avoided costs, resource options, renewable natural gas, power to gas, carbon reductions, gas reserves and investments and regulatory recoveries related thereto, hedge efficacy, cash flows and adequacy thereof, return on equity, capital structure, return on invested capital, revenues and earnings and timing thereof, margins, operations and maintenance expense, dividends, credit ratings and profile, the regulatory environment, effects of regulatory disallowance, timing or effects of future regulatory proceedings or future regulatory approvals, regulatory prudence reviews, effects of regulatory mechanisms, including, but not limited to, SRRM and the Company’s infrastructure investments, effects of legislation, including but not limited to bonus depreciation and PHMSA regulations, and other statements that are other than statements of historical facts.

Forward-looking statements are based on our current expectations and assumptions regarding our business, the economy and other future conditions. Because forward-looking statements relate to the future, they are subject to inherent uncertainties, risks and changes in circumstances that are difficult to predict. Our actual results may differ materially from those contemplated by the forward-looking statements, so we caution you against relying on any of these forward-looking statements. They are neither statements of historical fact nor guarantees or assurances of future performance. Important factors that could cause actual results to differ materially from those in the forward-looking statements are discussed by reference to the factors described in Part I, Item 1A “Risk Factors,” and Part II, Item 7 and Item 7A “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” and “Quantitative and Qualitative Disclosure about Market Risk” in the Company’s most recent Annual Report on Form 10-K, and in Part I, Items 2 and 3 “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and “Quantitative and Qualitative Disclosures About Market Risk”, and Part II, Item 1A, “Risk Factors”, in the Company’s quarterly reports filed thereafter.

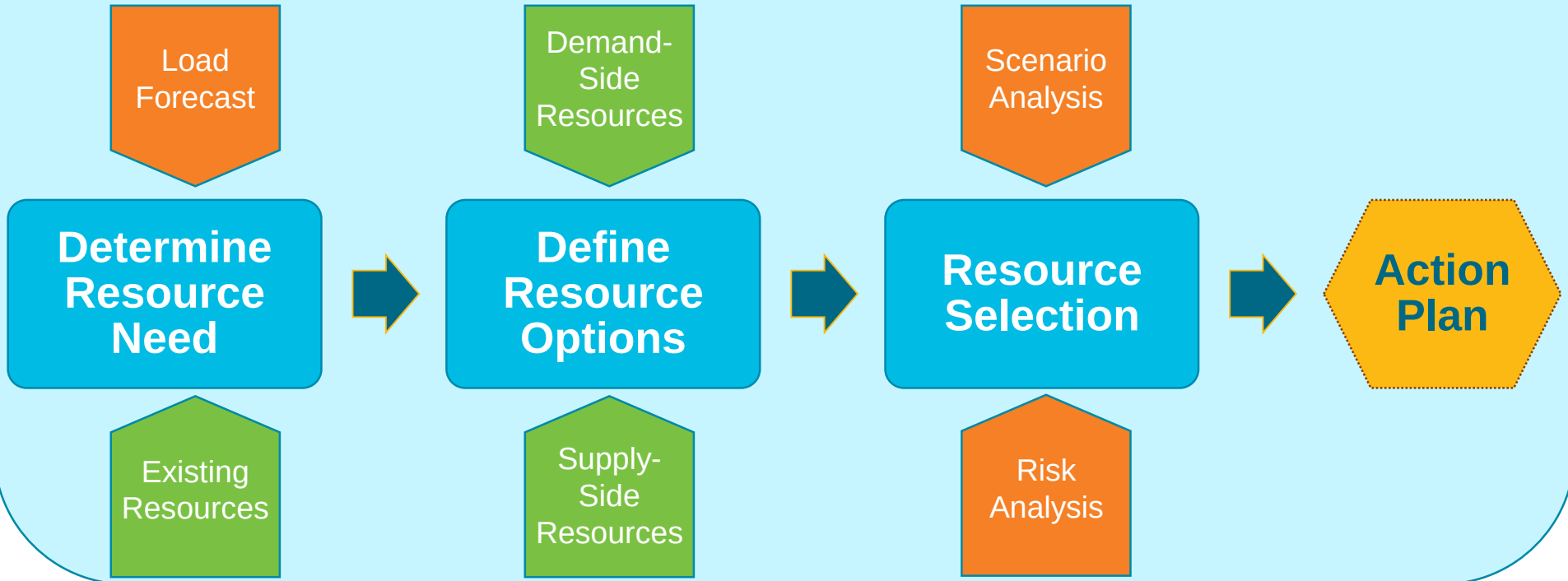
All forward-looking statements made in this presentation and all subsequent forward-looking statements, whether written or oral and whether made by or on behalf of the Company, are expressly qualified by these cautionary statements. Any forward-looking statement speaks only as of the date on which such statement is made, and we undertake no obligation to publicly update any forward-looking statement, whether as a result of new information, future developments or otherwise, except as may be required by law.

Agenda

1. Planning Environment
2. Load Forecast
3. Potential Resource Options
4. Portfolio Analysis Results
5. Distribution System Planning
6. Action Plan Items

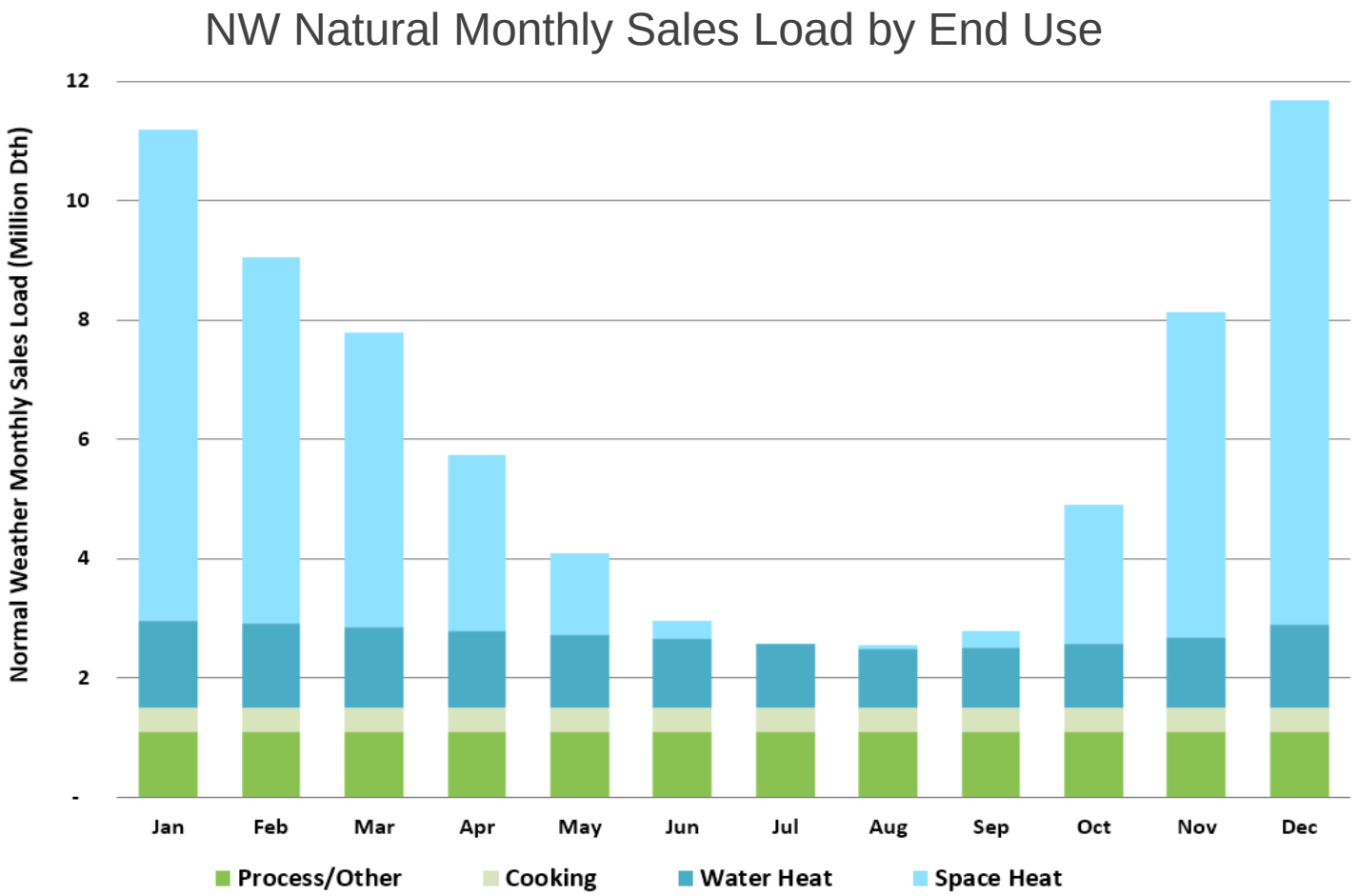
IRP PROCESS

Planning Environment

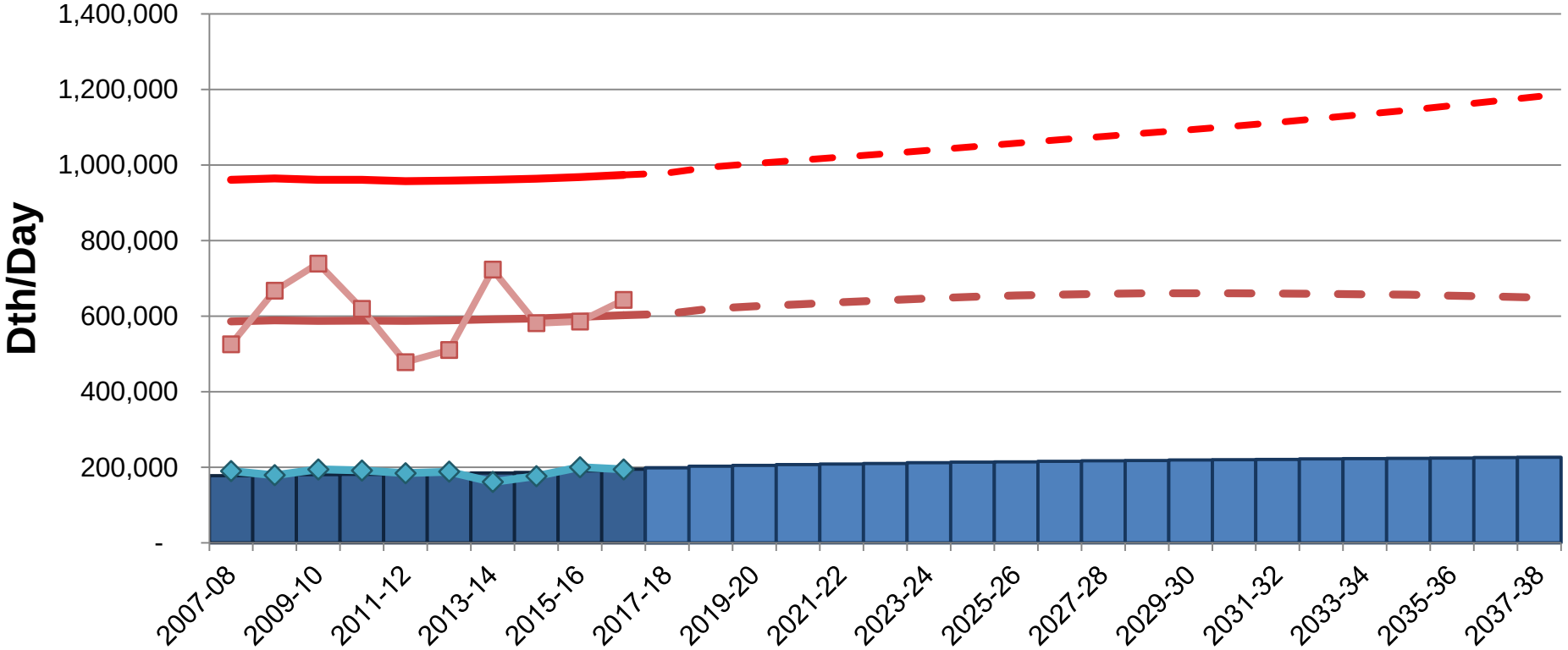


Green = Resources Orange = Tools

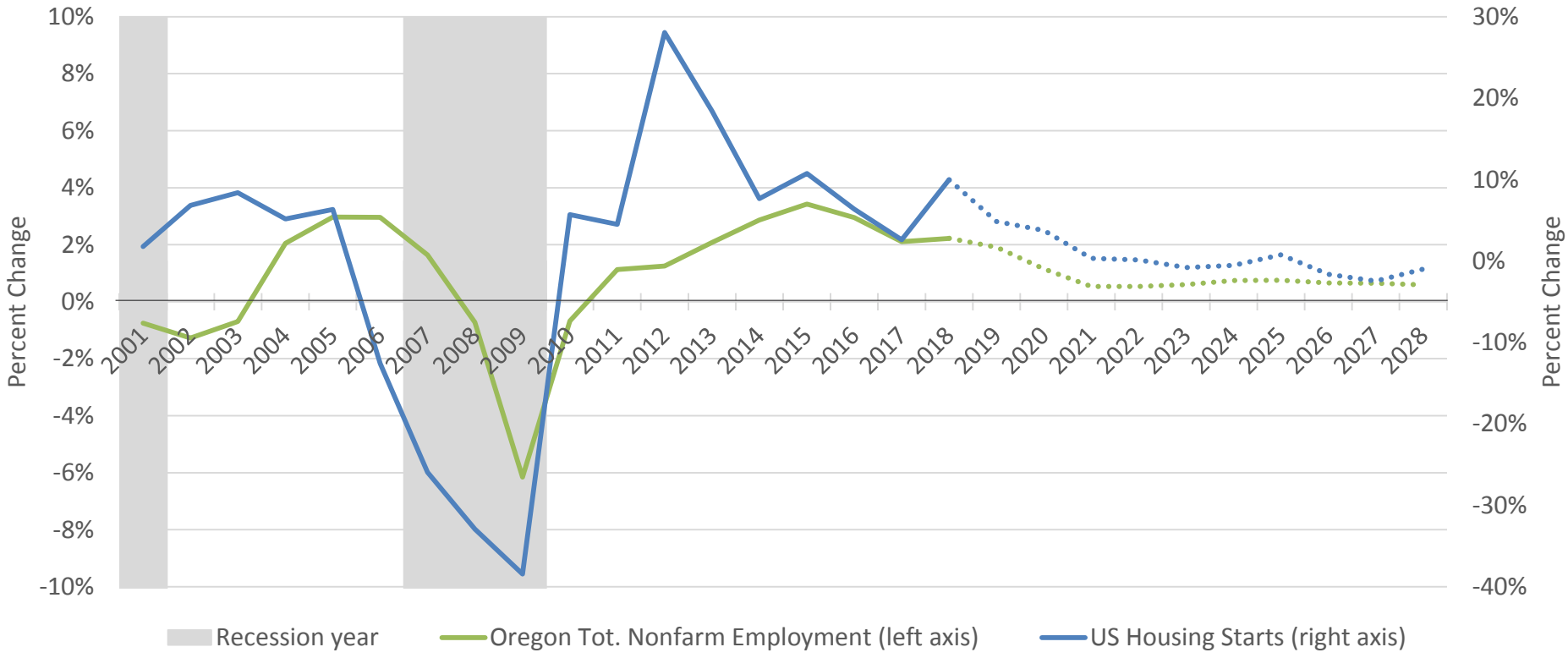
NW Natural Load is Seasonal



DAILY SYSTEM FIRM SALES: AVERAGE VS PEAK

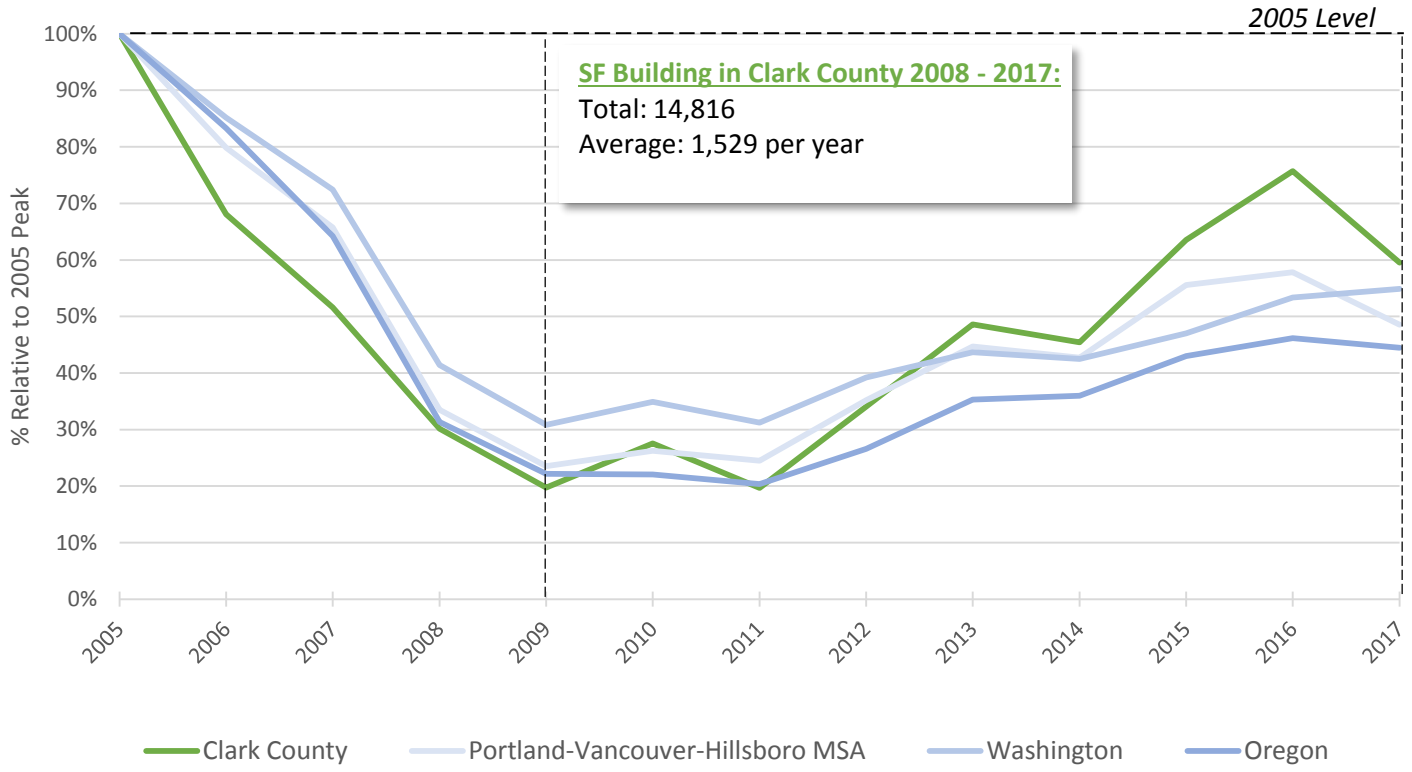


Economic Outlook

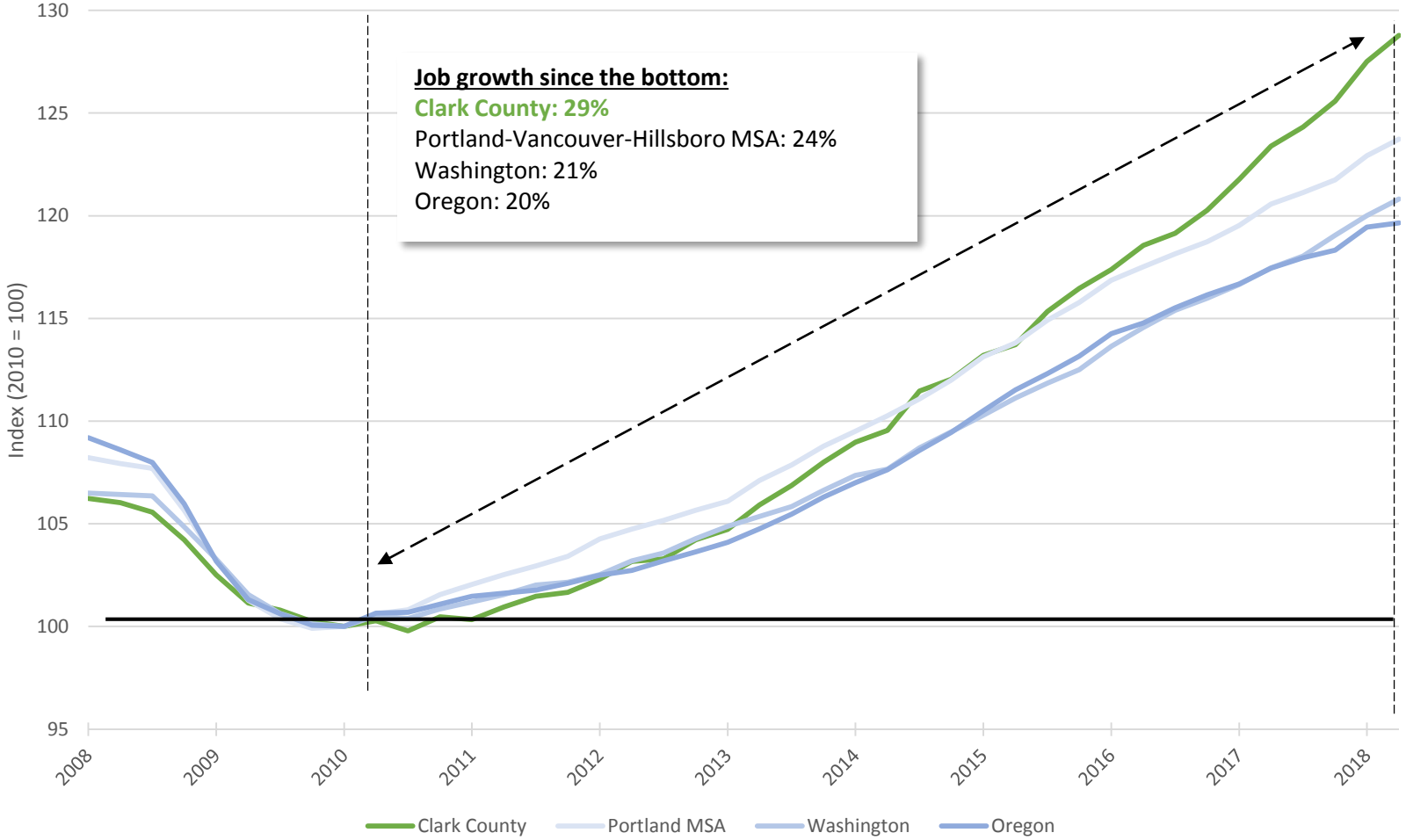


Source: Oregon Office of Economic Analysis, Oregon Economic and Revenue Forecast, Sept. 2018

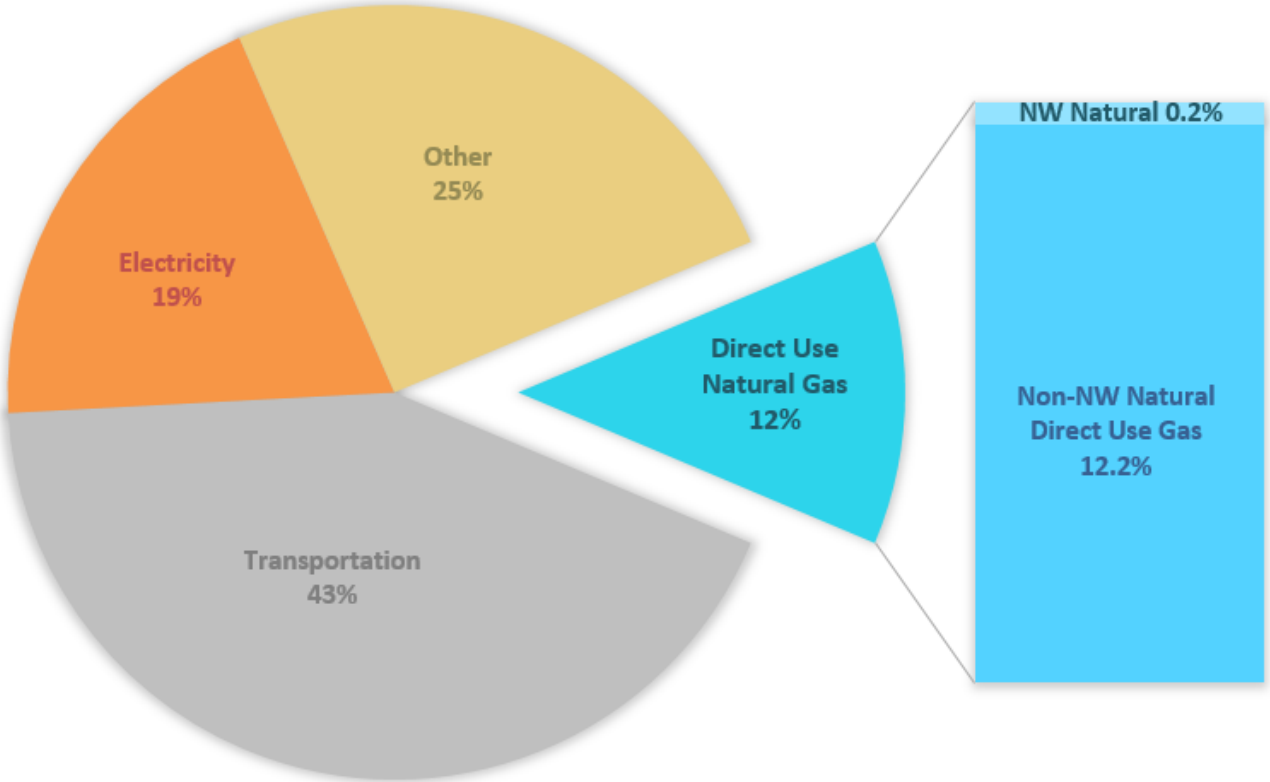
Economic Outlook – Single Family Building



Economic Outlook – Job Growth

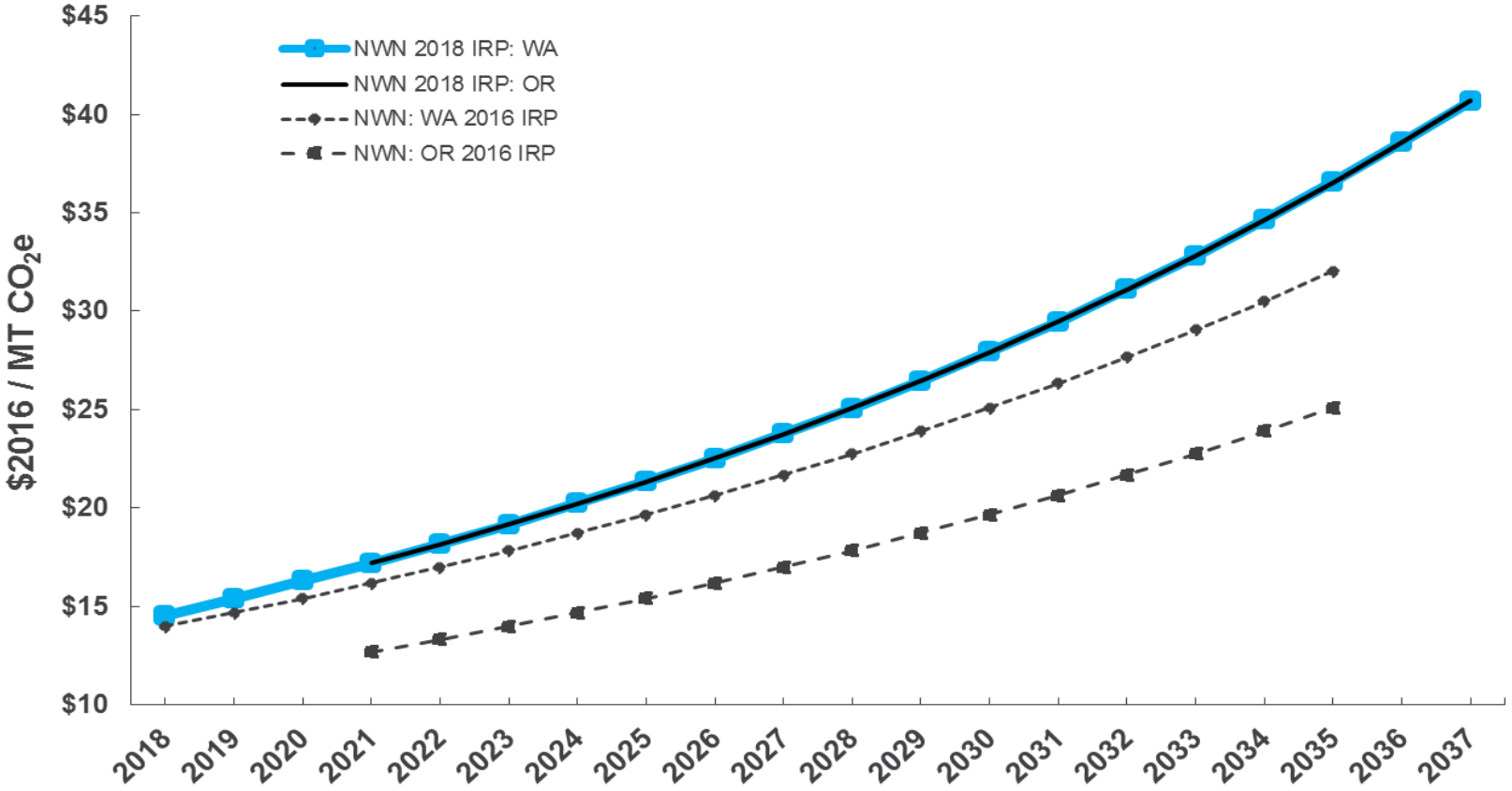


2013 Washington Greenhouse Emissions

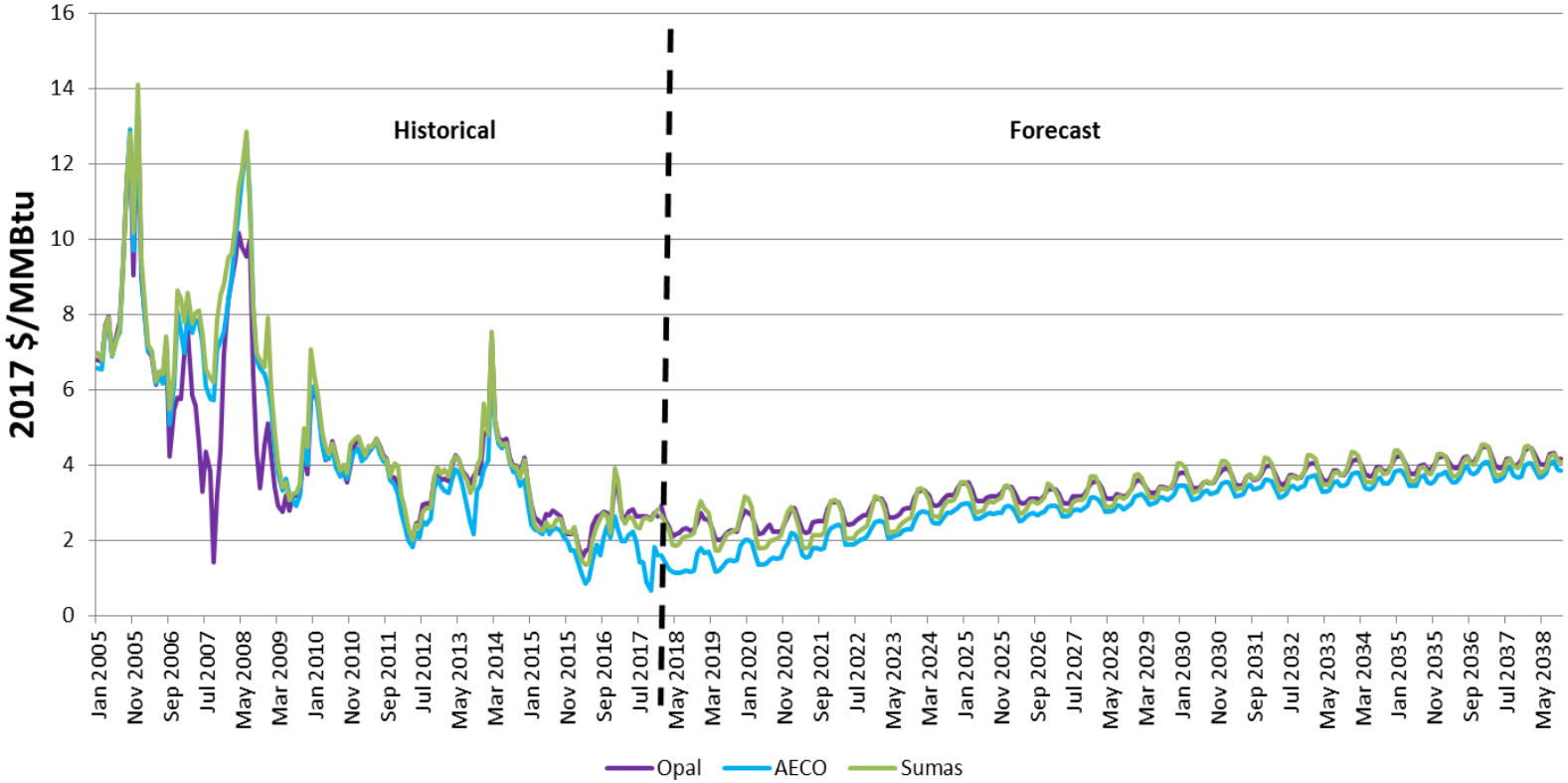


Data from Washington Department of Ecology

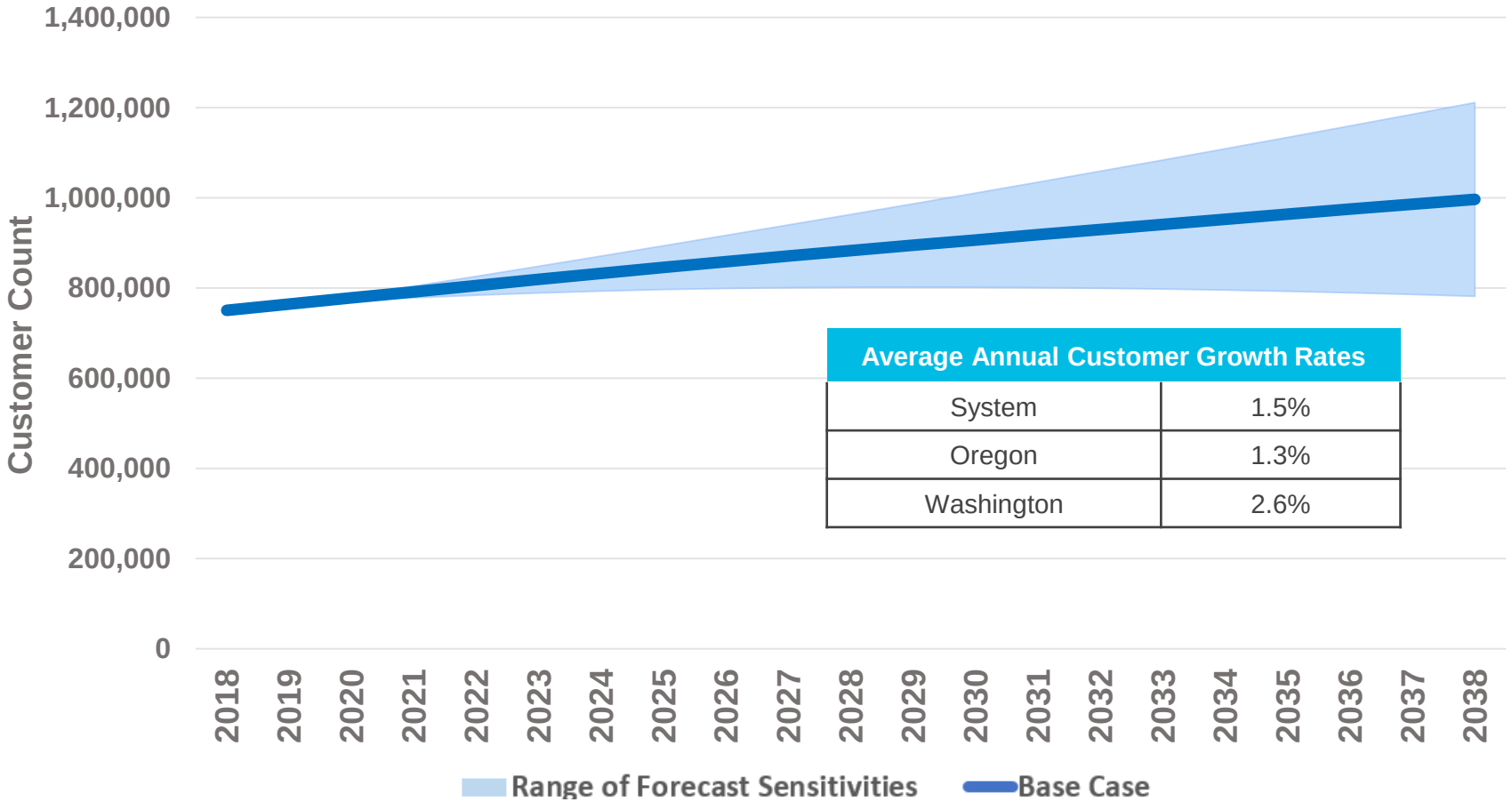
Emission Forecast
Expected GHG Compliance Cost



Gas Price Outlook

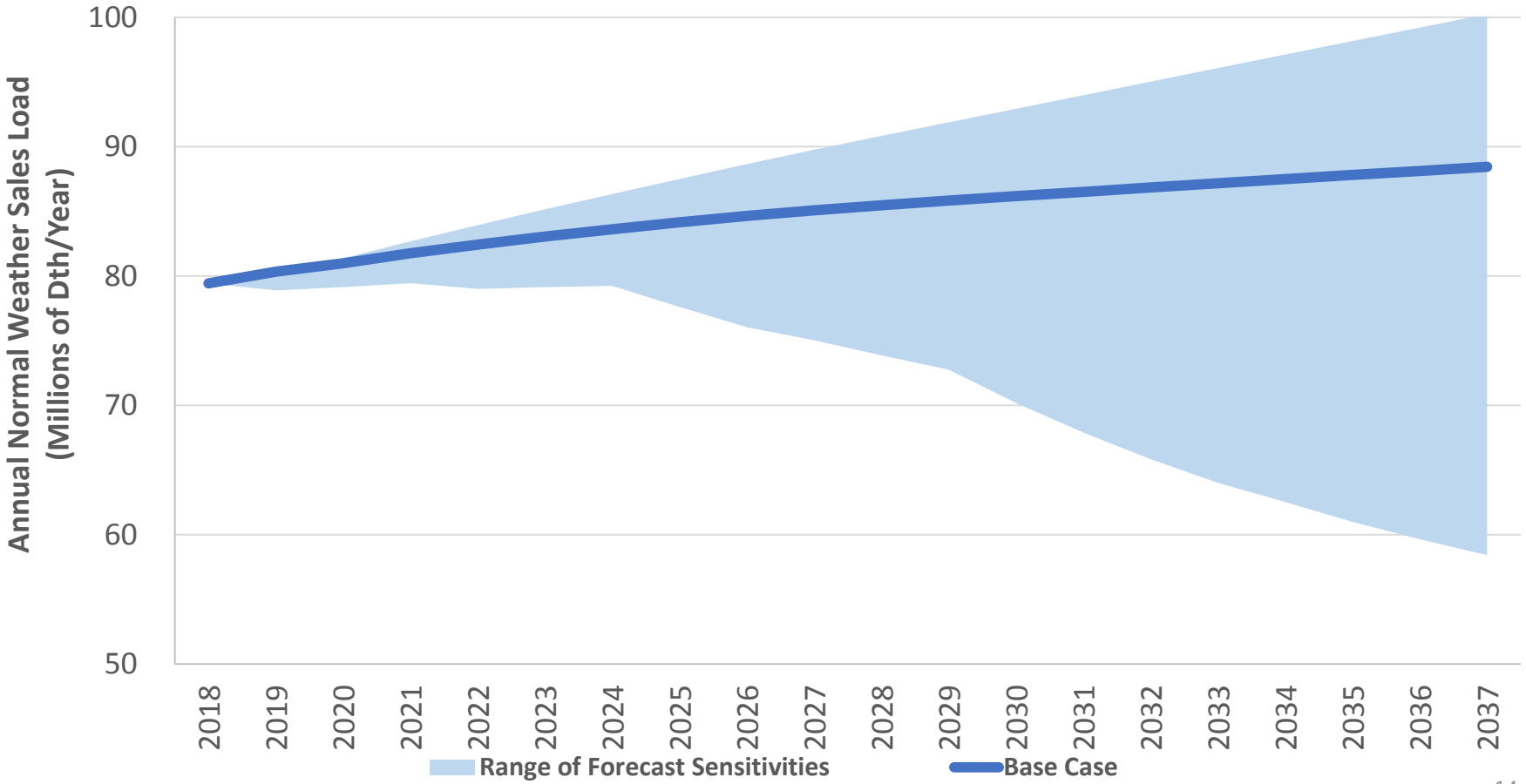


Customer Growth Forecast



Average Annual Customer Growth Rates	
System	1.5%
Oregon	1.3%
Washington	2.6%

Annual Load Forecast



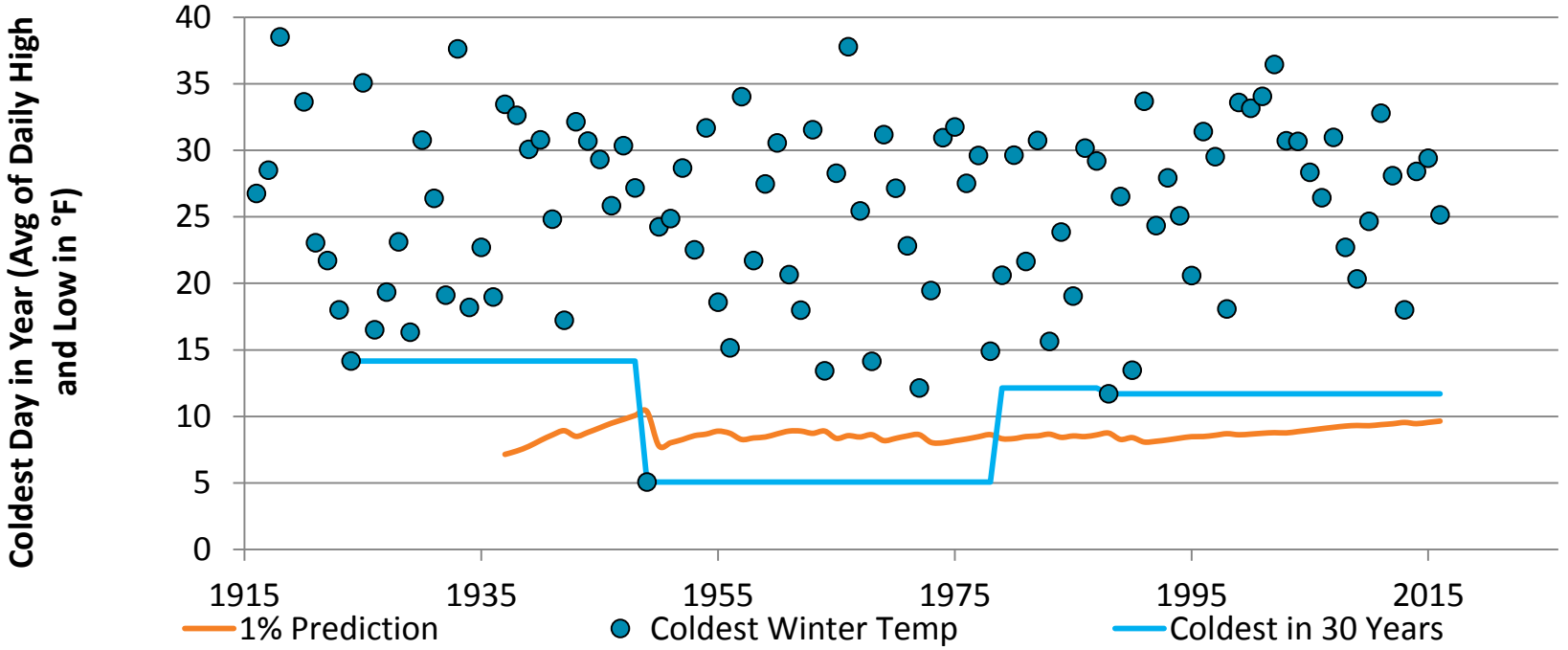
Capacity Planning Standard

NW Natural has chosen to use a peak day planning standard where there is a 99% chance of firm resources being able to meet the highest firm sales demand day in a gas year

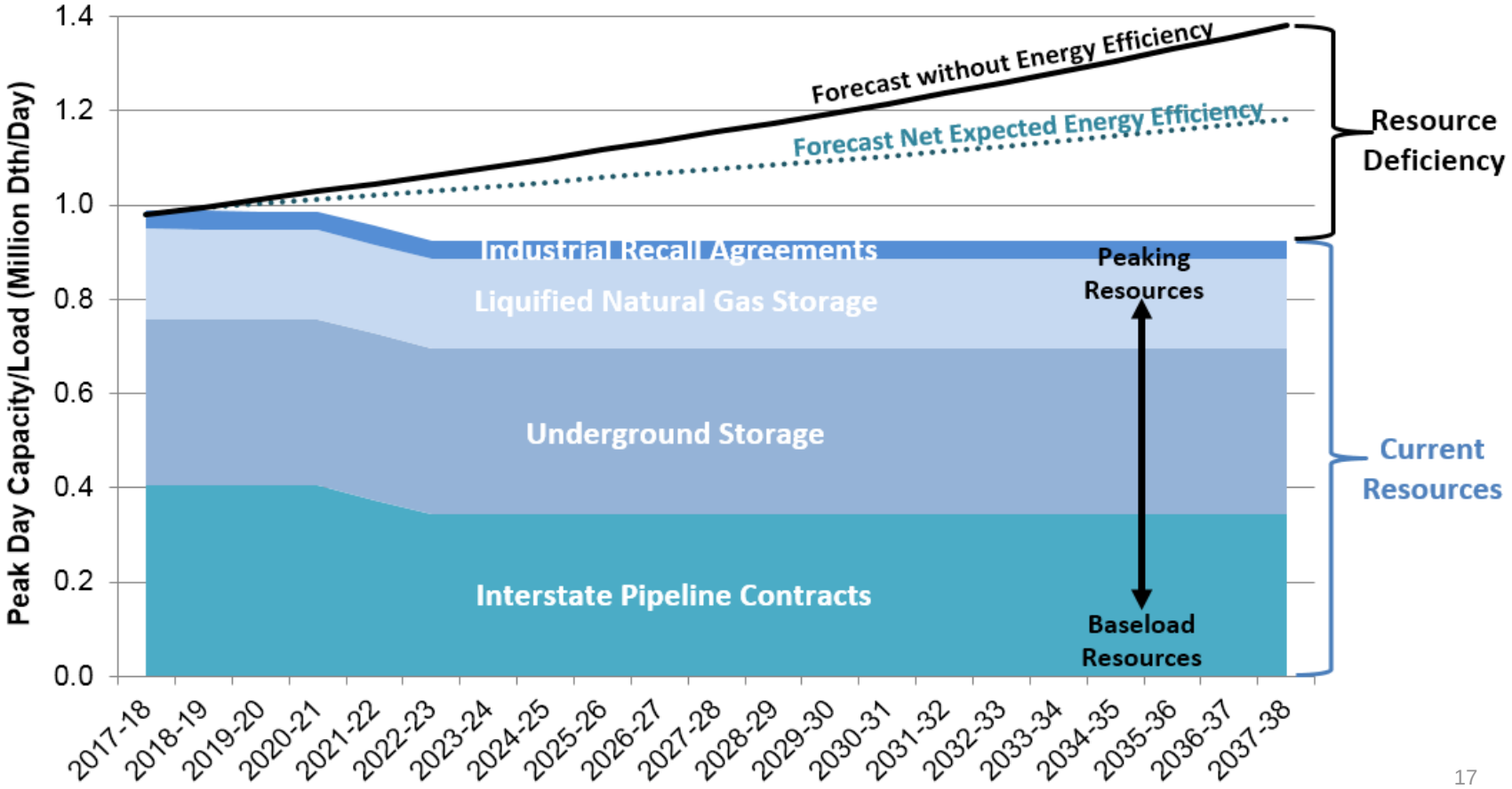
Reasonable given

- Increased stability in planning
- Our previous peak day demand level represented a 99.2%
- Assumes our resources are always available (i.e. no forced outages)

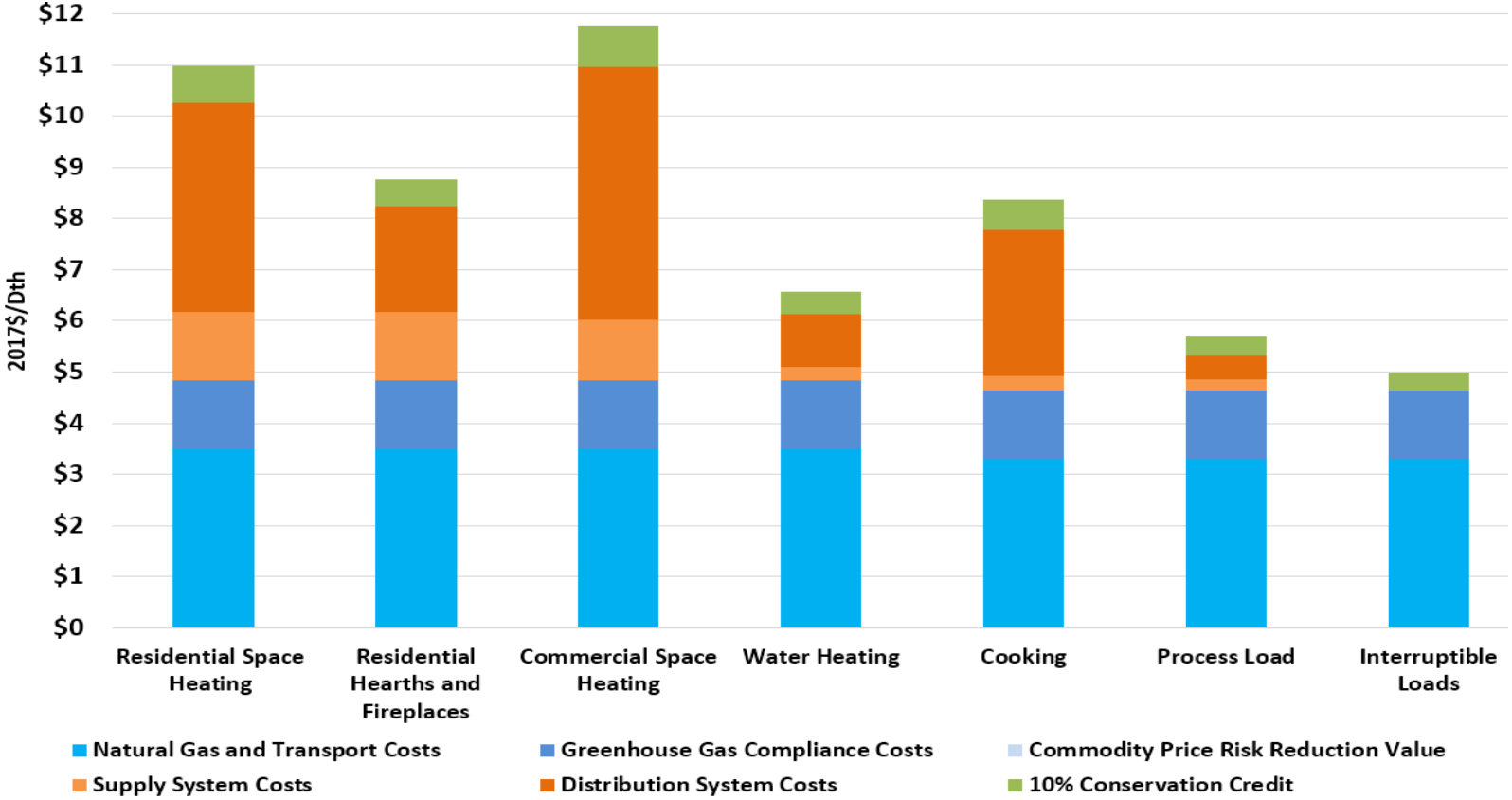
Capacity Planning Standard – Why change?



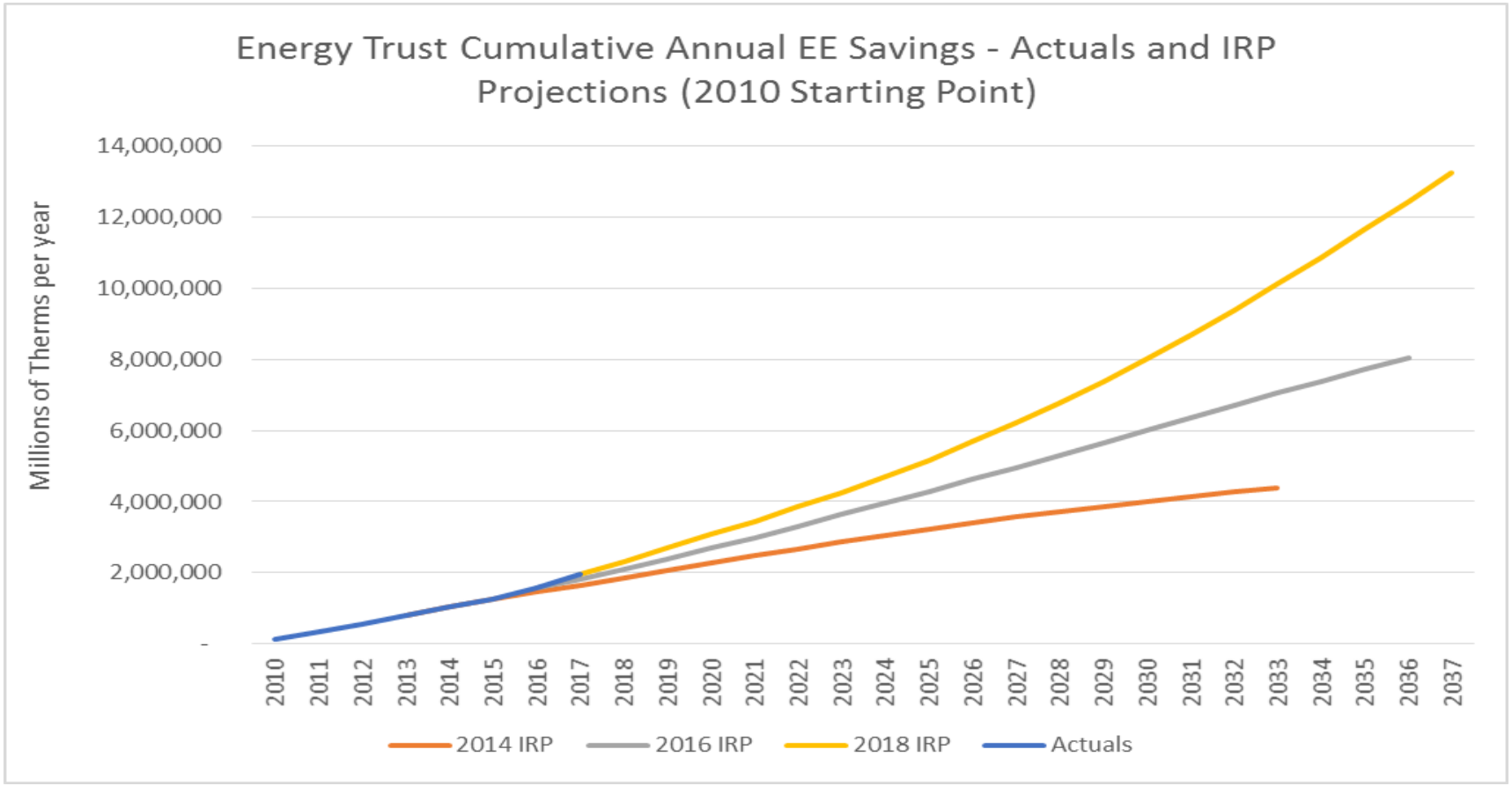
Peak Day Load Forecast and Load Resource Balance



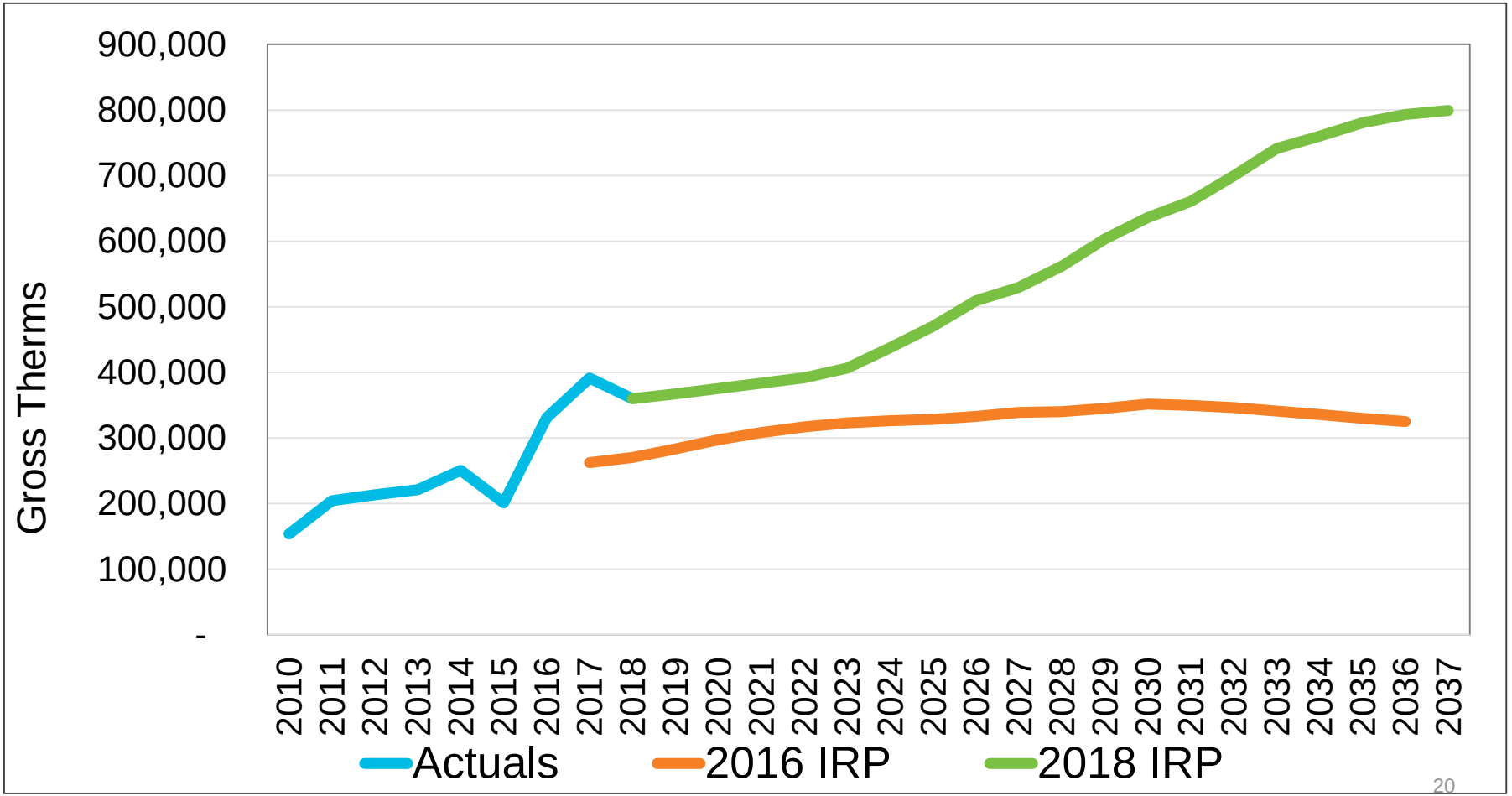
Washington 20-year Levelized Avoided Costs by End Use



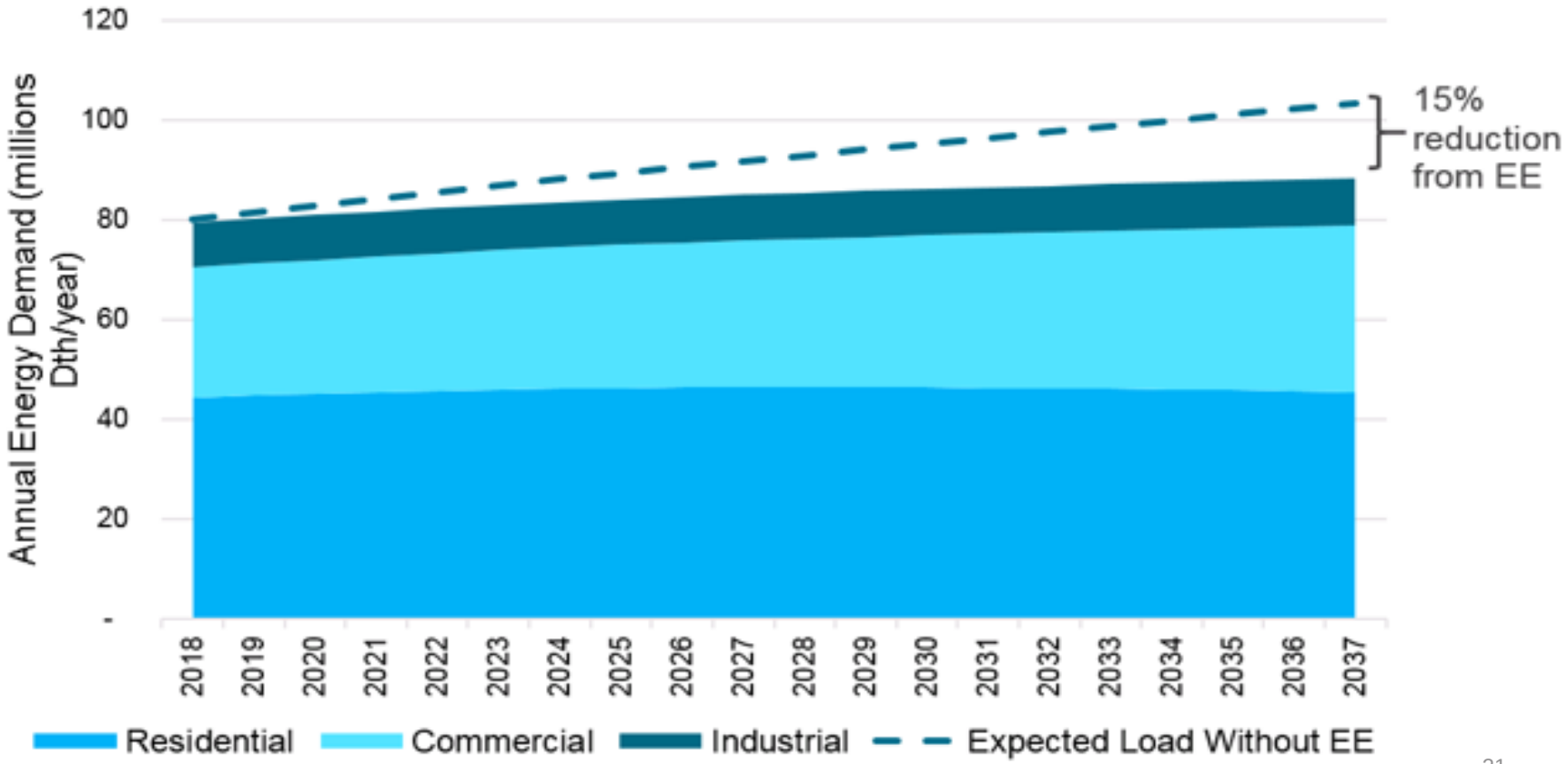
Energy Efficiency Resources



2016 vs. 2018 IRP Cost-Effective Gross Savings Projections and Actuals (Washington)



System-Wide Annual Sales Forecast with and Without Energy Efficiency



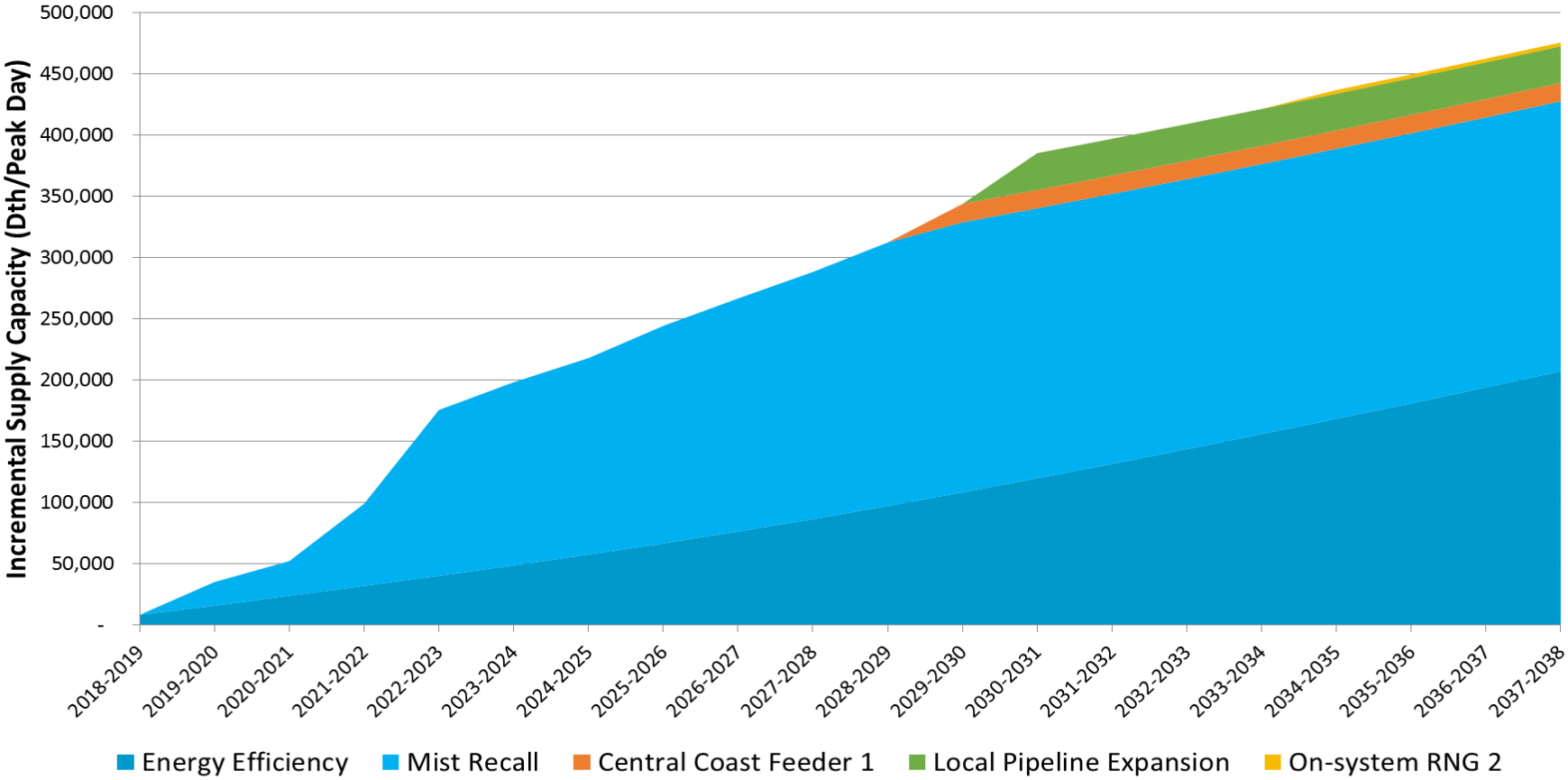
Future Supply Side Options

	Resource	Description
Traditional Resources	Mist Recall	Transferring existing Mist storage capacity from interstate storage customers to utility customers
	North Mist II and III	Completing new storage wells, installing more surface facilities, and building takeaway pipeline capacity to serve utility customers
	Central Coast Feeder Upgrades	Three projects that de-bottleneck the pipeline system to incrementally increase Newport LNG's delivery capacity
	Local Pipeline Expansions	A pipeline expansion specifically for NW Natural needs
	Regional Pipeline Expansions	Regional pipeline expansions for multiple shippers, so economies of scale but timing not likely to be optimal for NW Natural
New Resources	RNG Options	Representative renewable natural gas projects from landfills, waste water treatment plants, or dairy farms
	Power-to-Gas	A power-to-gas facility using renewable energy to produce hydrogen which is blended into natural gas

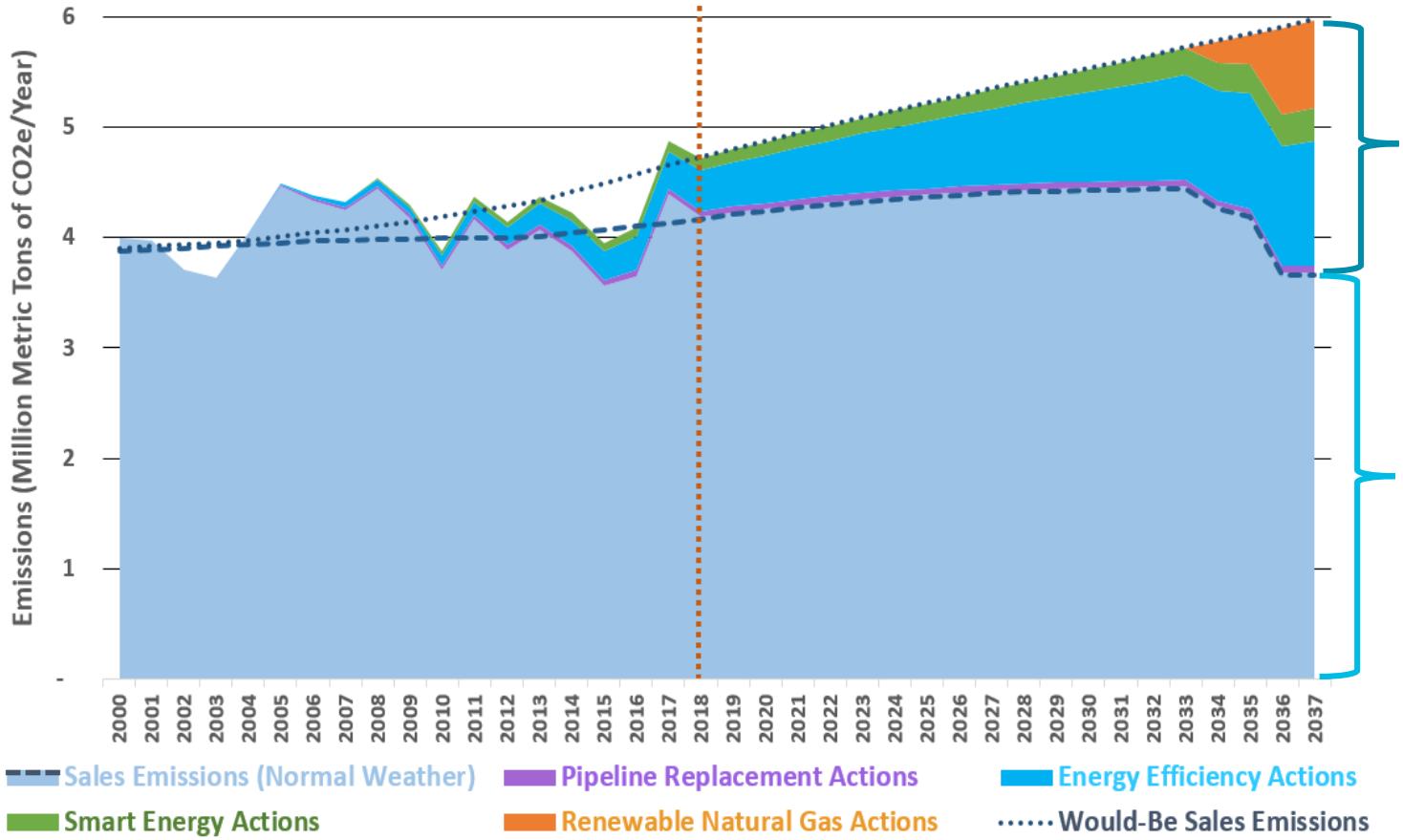
Renewable Natural Gas (RNG)

Prepared for Presentation to the Washington Utilities and Transportation Commission - Not to be used for investment purposes.

Base Case Peak Capacity Additions Without Regional Pipeline Expansion



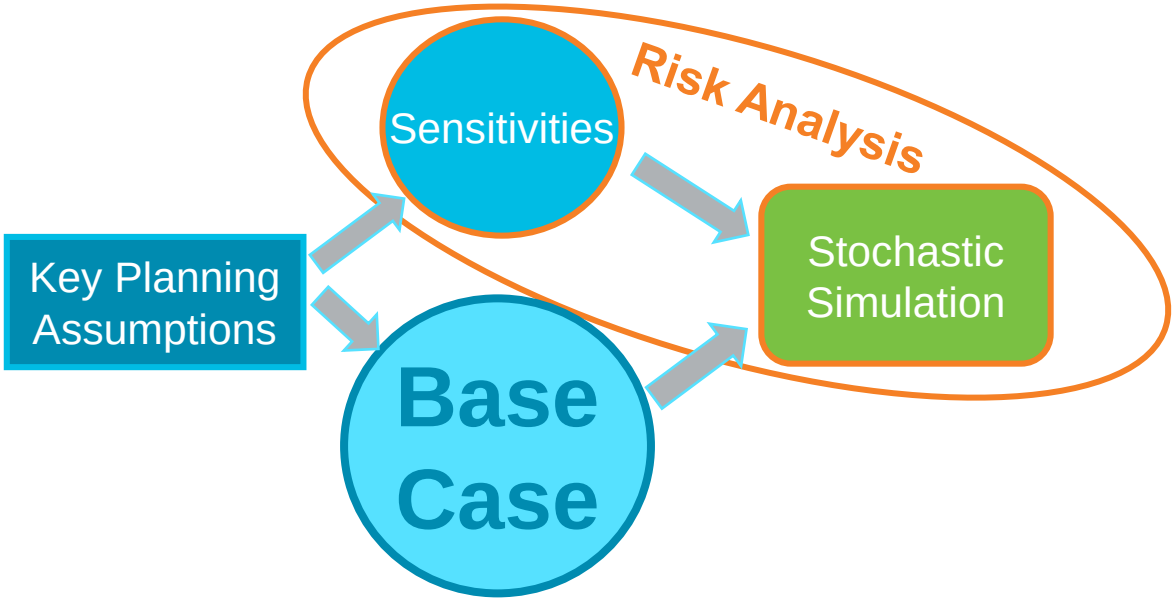
Emission Forecast – Base Case Emissions Forecast



Without emissions reduction actions, expected emissions would be 62% higher in 2037

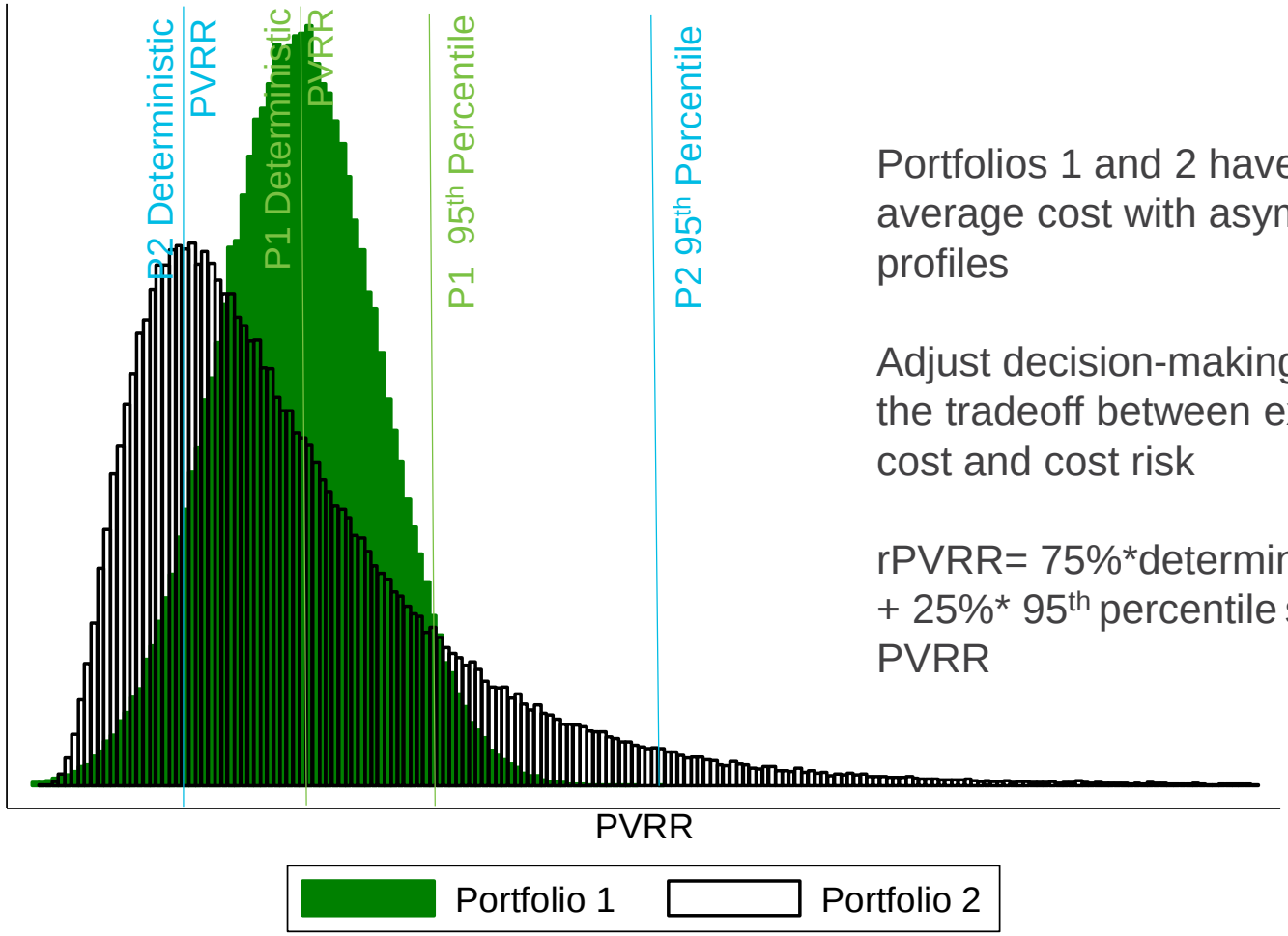
NW Natural's expected 2037 sales emissions represent about 5% of Oregon's total current GHG emissions (and represent well less than 1% of WA's current total emissions)

Risk Analysis



Variables in Risk Analyses
Environmental Policy
Commodity Price
Economic Growth
Supply Infrastructure
Resource Costs
Technological Change
Weather

Risk-Adjusted Portfolio Selection



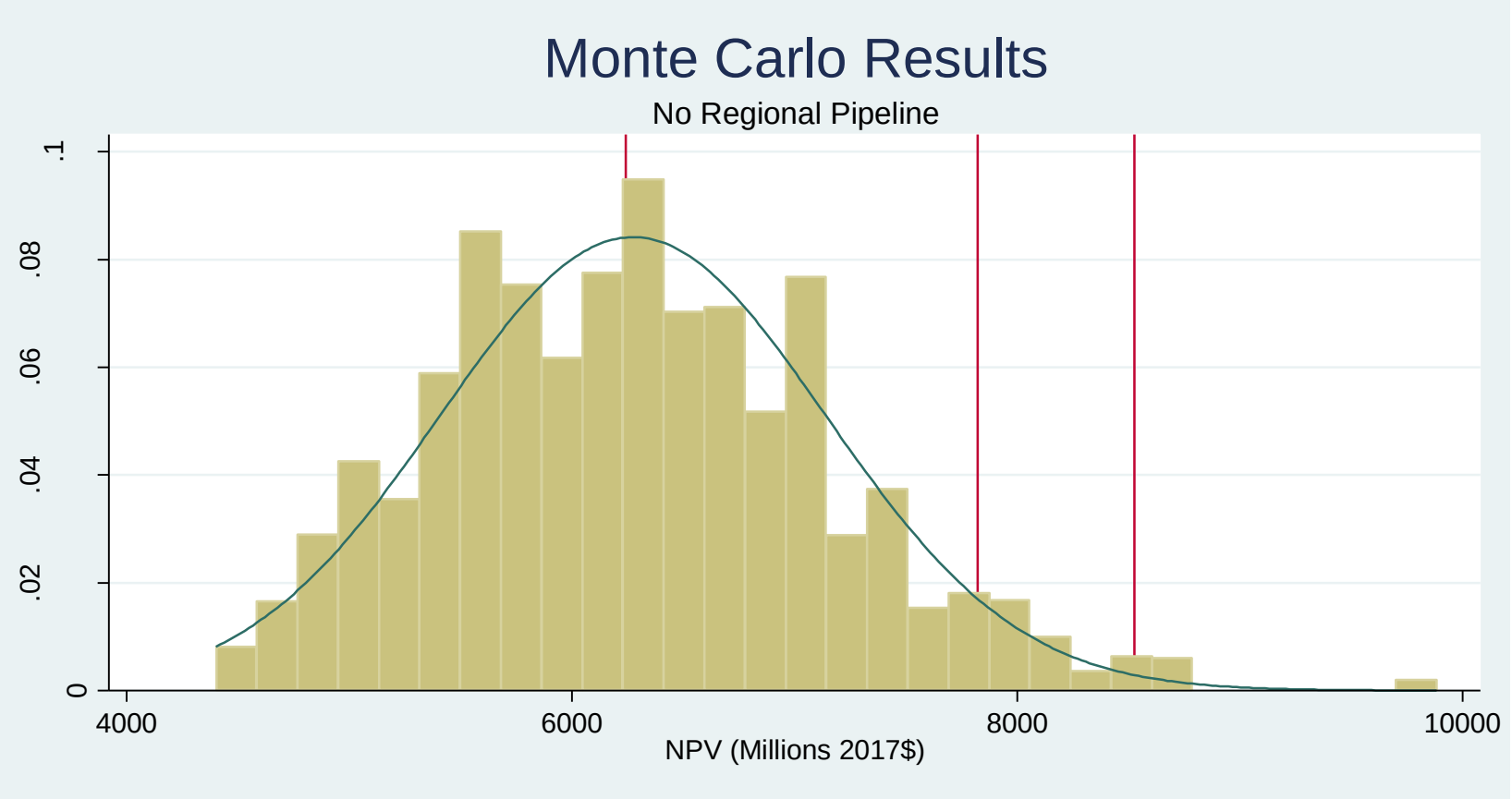
Portfolios 1 and 2 have the same average cost with asymmetric risk profiles

Adjust decision-making to balance the tradeoff between expected cost and cost risk

rPVRR= 75%*deterministic PVRR + 25%* 95th percentile stochastic PVRR

NOTES: Data is simulated to use as an example.

Distribution of Portfolio Results



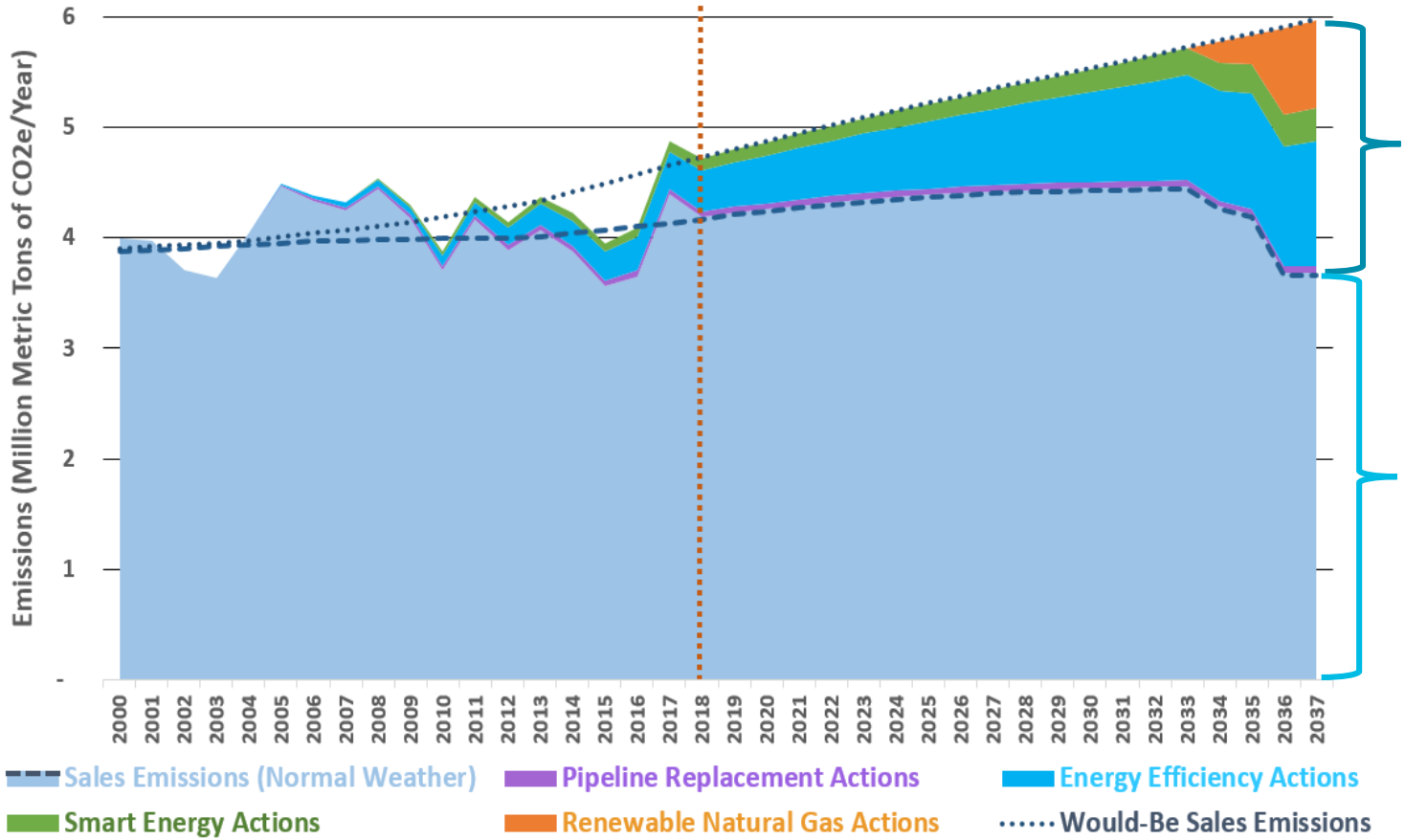
Risk-Adjusted Portfolio Results

Portfolio Cost Distribution NPVRR (millions of dollars)			
	No Regional Pipeline	Regional Pipeline (Fully Subscribed)	Regional Pipeline (Excess Capacity)
Median	6,242	6,233	6,226
95th percentile	7,822	7,815	7,803
rPVRR	**6,637**	**6,629**	**6,620**

Sensitivities in the 2018 IRP

Supply Infrastructure Sensitivities	1. Base Case – No New Regional Pipeline 2. New Regional Pipeline in 2025 – Fully Subscribed 3. New Regional Pipeline in 2025 – Excess Capacity
Economic Growth Sensitivities	4. High Customer Growth 5. Low Customer Growth
Environmental Policy Sensitivities	6. Social Cost of Carbon Used in Resource Planning 7. Natural Gas Deep Decarbonization 8. Compressed Natural Gas in Medium- and Heavy-Duty Transportation 9. New Direct Use Gas Customer Moratorium in 2025

Emission Forecast – Base Case Emissions Forecast



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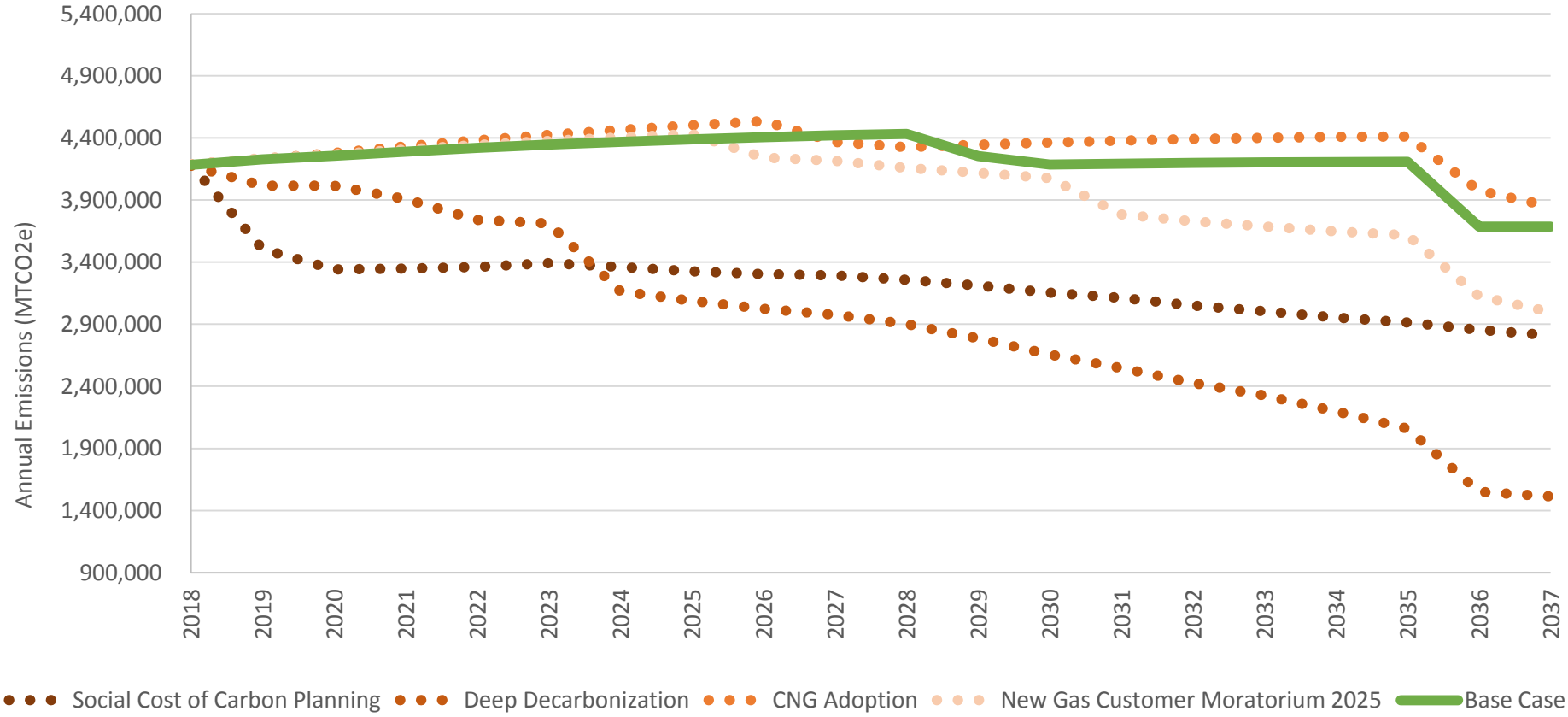
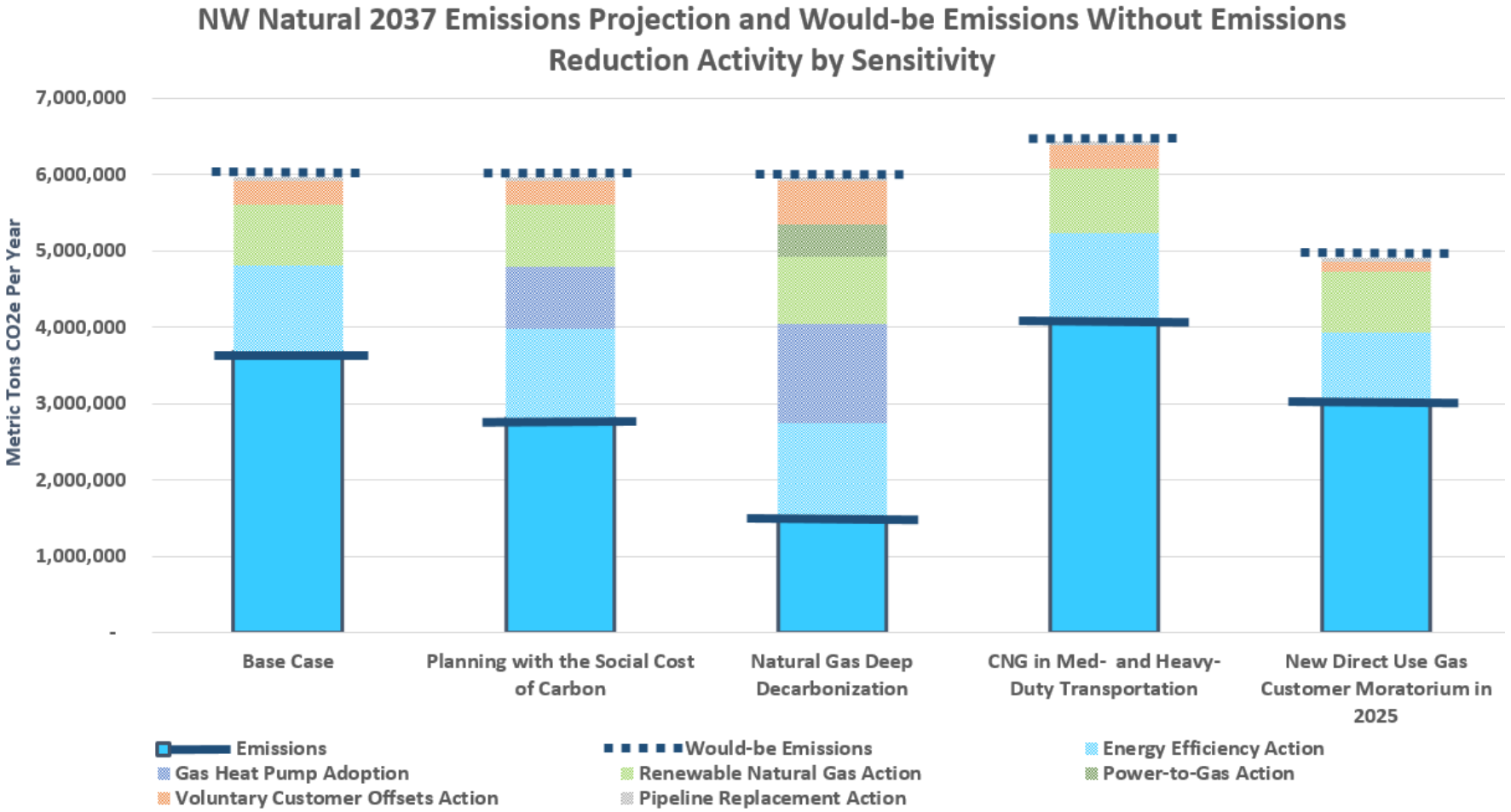
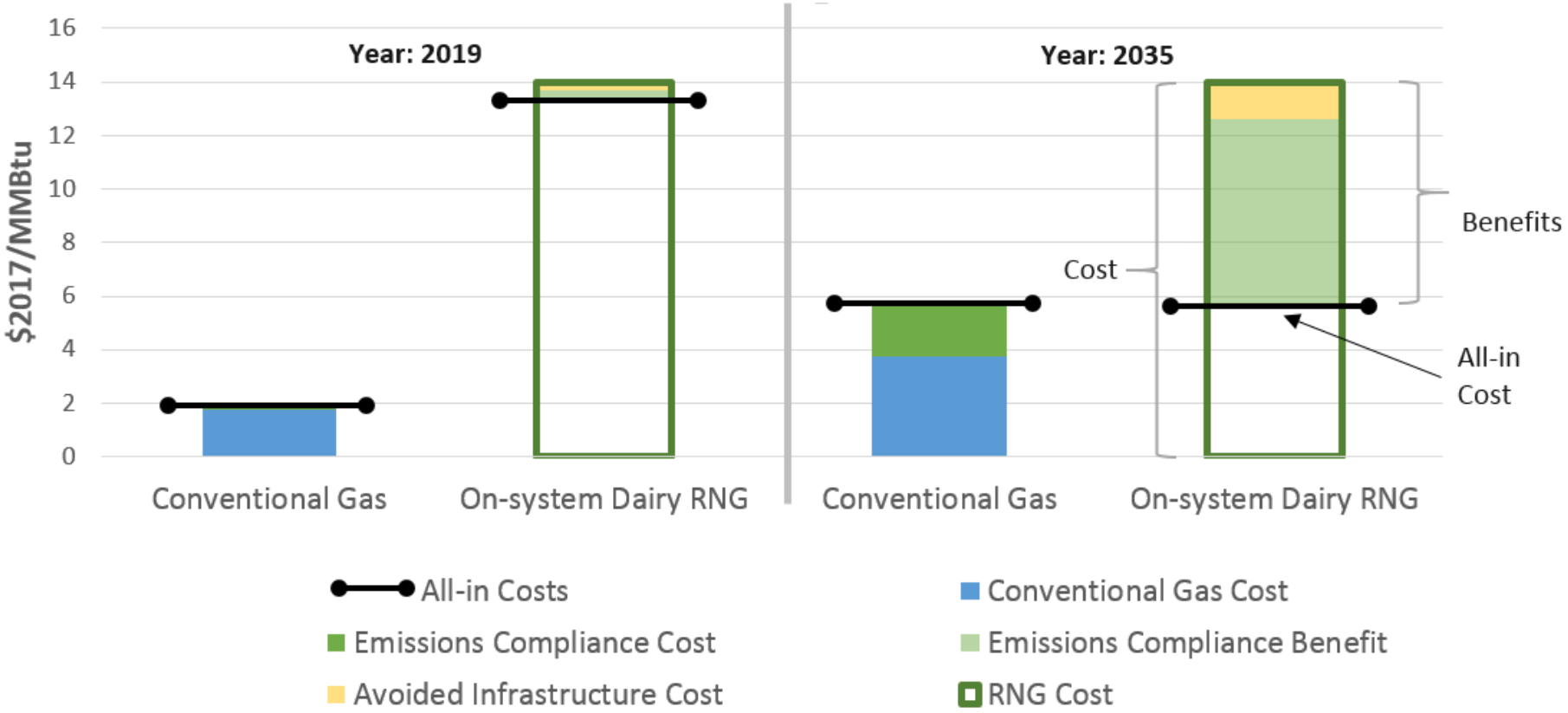
Environmental Policy Sensitivities GHG Emissions Forecasts



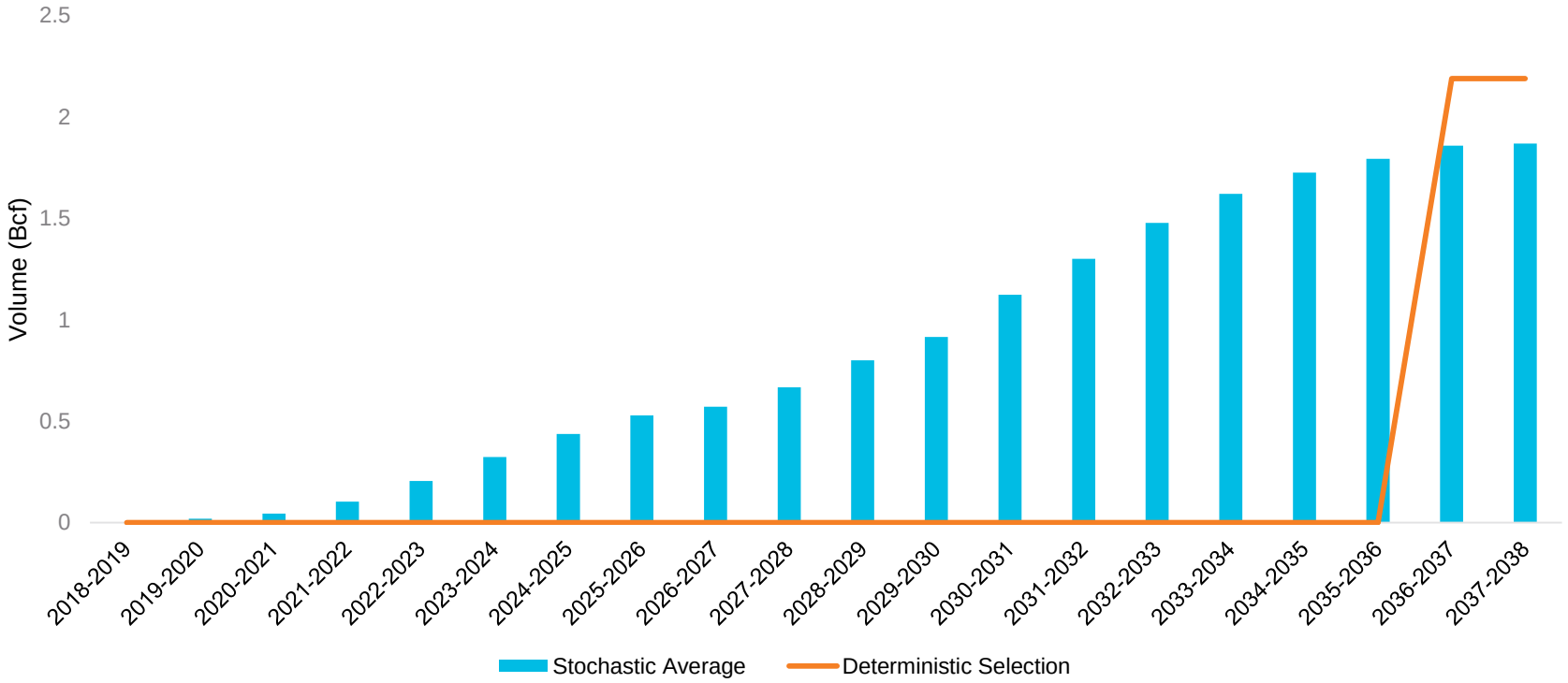
Emissions Forecast by Sensitivity



RNG As a Resource – All-In Costs
Conventional Gas vs. On-system Dairy RNG



Stochastic Analysis
Annual Off-System RNG Volume



Why Include a RNG Evaluation Action Item?

- RNG has multiple stacked values; currently NWN has no way to bundle these stacked values into a clear offer to take to the market to procure RNG
- There are many RNG projects interested in securing long-term offtake agreements at prices far below RINs/LCFS/CFP credit prices
- There are finite RNG resources in Oregon; there are projects being developed today that may be cost-effective resources for our customers. Waiting to bring each project through an IRP process means we may lose access to the most cost-effective RNG resources. In order to provide our customers with the most cost-effective RNG resources NWN needs to be nimble and able to negotiate on price

RNG Evaluation Methodology Mechanics

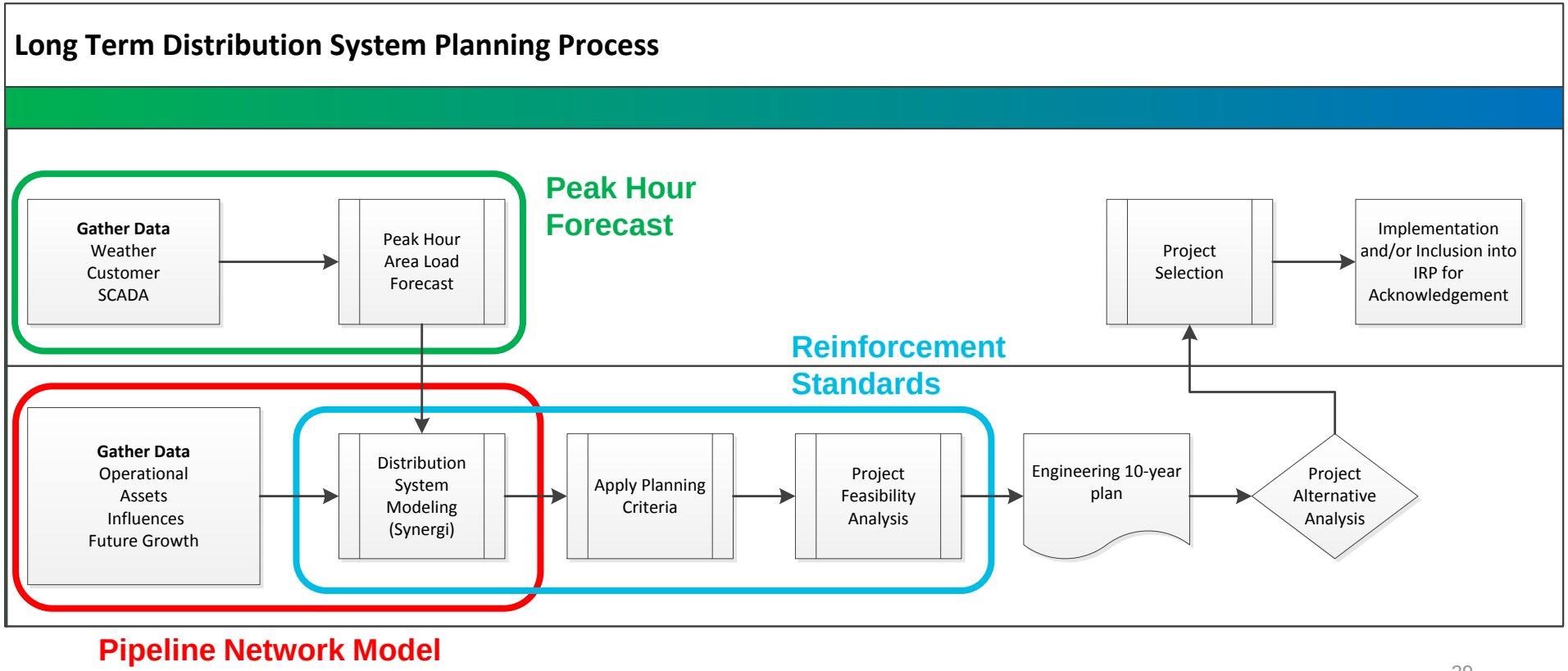
The RNG evaluation methodology takes relative risks into account given uncertainty in natural gas prices, potential compliance costs, weather and capital expenditures:

Step 1:	**Run deterministic and Monte Carlo simulations for 2 portfolios using supply resource planning model (SENDOUT):** **Simulation 1: Portfolio with proposed RNG project.** **Simulation 2: Portfolio without proposed RNG project**
Step 2:	**Compare cost of the two portfolios using Risk-Adjusted Present Value of Revenue Requirement (rPVRR)**
Step 3:	**Calculate the maximum risk-adjusted cost customers would be willing to pay for the RNG resource under consideration based on rPVRR of each portfolio**
Step 4:	**Acquire RNG resource if the RNG resource is cost-effective (i.e., the cost of RNG is less than the maximum risk-adjusted cost from Step 3)**

Key Points about RNG Evaluation Methodology

- RNG projects are being evaluated the same as other supply-side capacity resources based on a least cost and least risk criteria
- What is new is applying stacked benefits to RNG
- These benefits are applied using the same methodology to apply avoided costs value to energy efficiency
- It is beneficial for customers if NW Natural can acquire RNG at or below the maximum risk-adjusted cost

Distribution System Planning Process



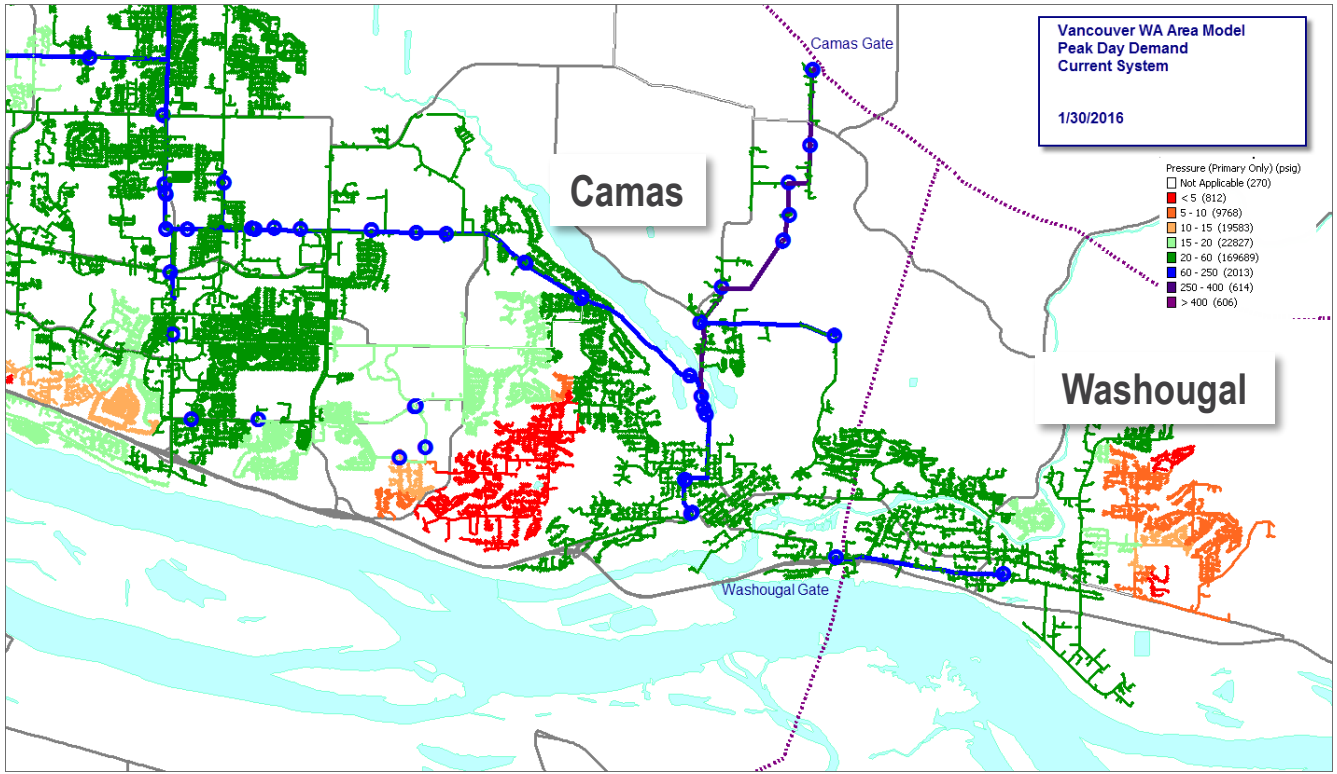
Distribution System Alternatives

Distribution System Alternatives (not all options are possible or applicable in all situations)			Impact Included Directly in to Load Forecast	Option Currently in Use on NW Natural System	Option Currently Considered for Cost-Effectiveness Evaluation
Supply-Side Alternatives	Traditional Pipeline Related Capacity Options	Loop existing pipeline		✓	✓
		Replace existing pipeline		✓	✓
		Install pipeline from different source location into area		✓	✓
		Uprate existing pipeline infrastructure		✓	✓
		Add or upgrade regulator to serve area of weakness		✓	✓
		Gate station upgrades		✓	✓
	Add compression to increase capacity of existing pipelines			✓	✓
	Mobile/fixed geographically targeted CNG storage			✓	✓
	Mobile/fixed geographically targeted LNG storage				✓
	On-system gas supply (e.g. renewable natural gas)				✓
	Geographically targeted underground storage				✓
Demand-Side Alternatives	Demand Response	Interruptible schedules (DR by rate design)	✓	✓	✓
		Geographically targeted interruptibility agreements			✓
		Geographically targeted demand response programs			
		Time of use pricing			
	Energy Efficiency	Peak hour savings from normal statewide EE programs	✓	✓	✓
		Geographically targeted energy efficiency (GeoTEE)			

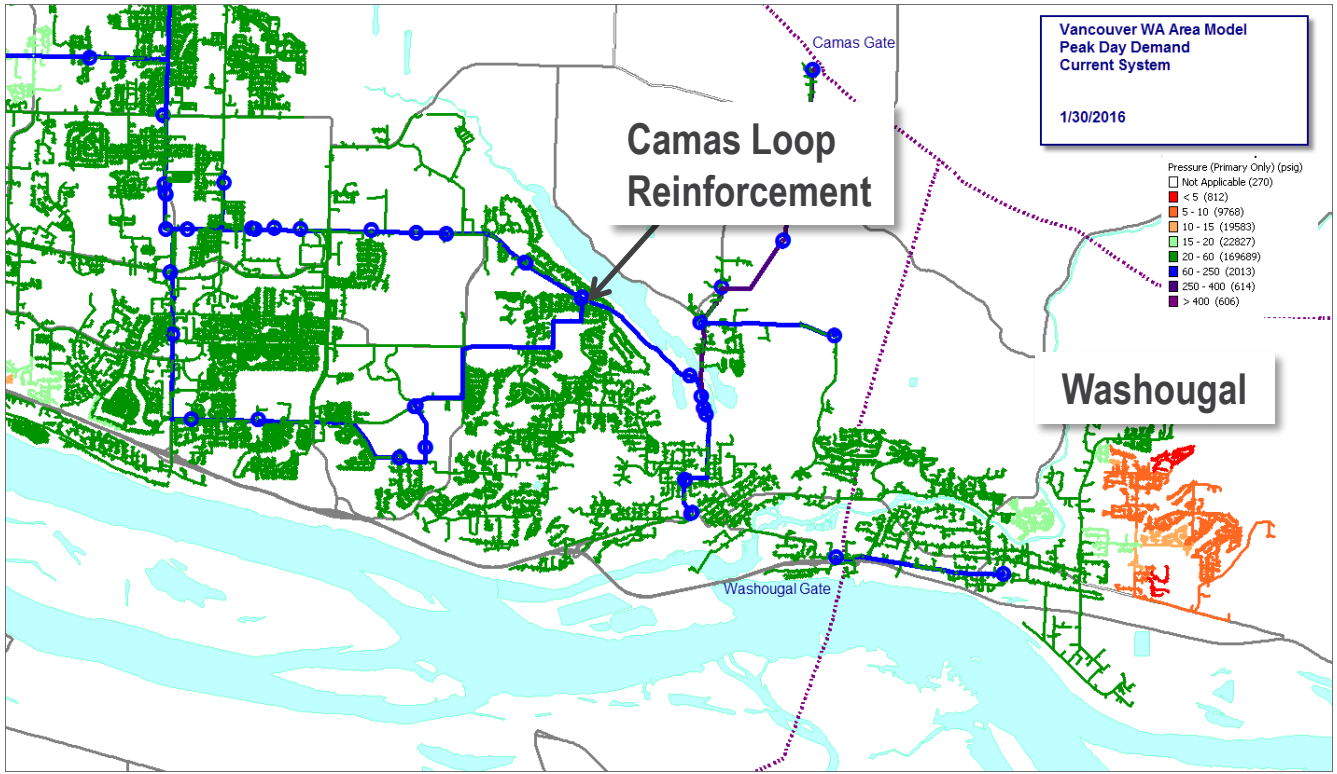
Recent Distribution Projects

	Completed
119th St. Reinforcement	2014
Camas Reinforcement	2016
Vancouver Core Phase 1 (Felida Extension)	2016
119th St. to Salmon Creek Reinforcement	2017
Washougal Extension	2018

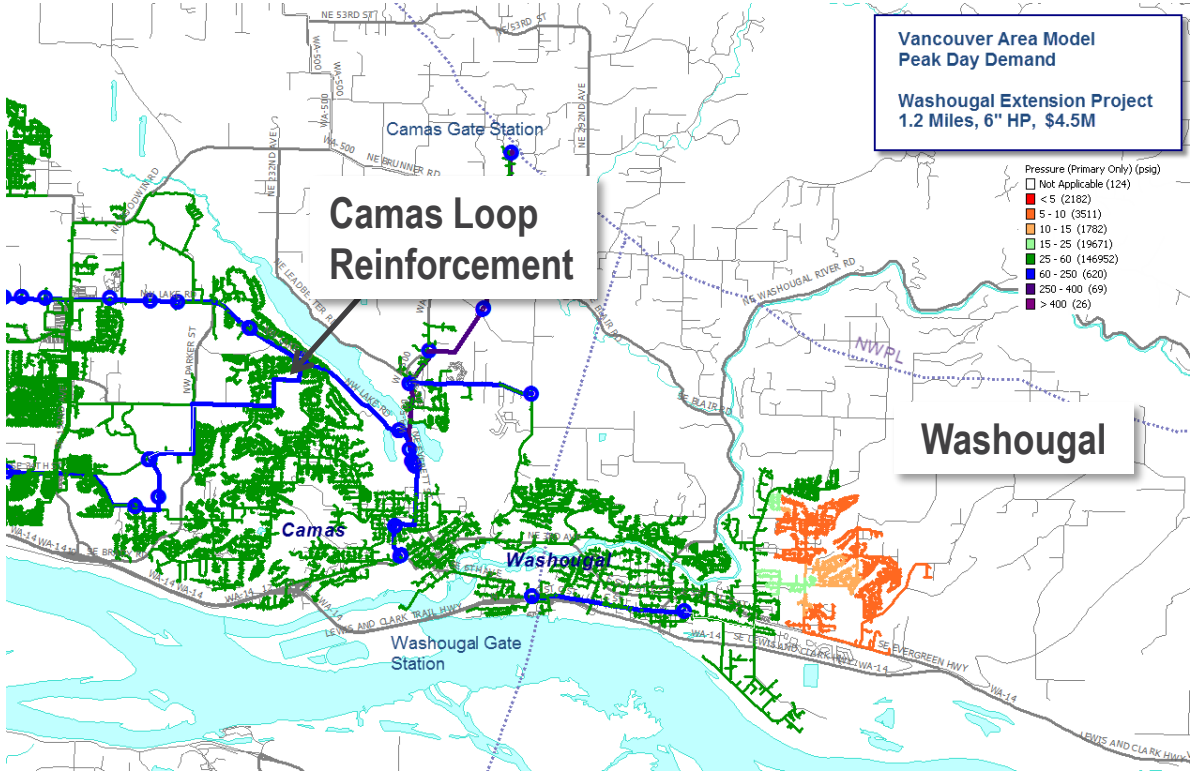
Recent Projects – Camas and Washougal



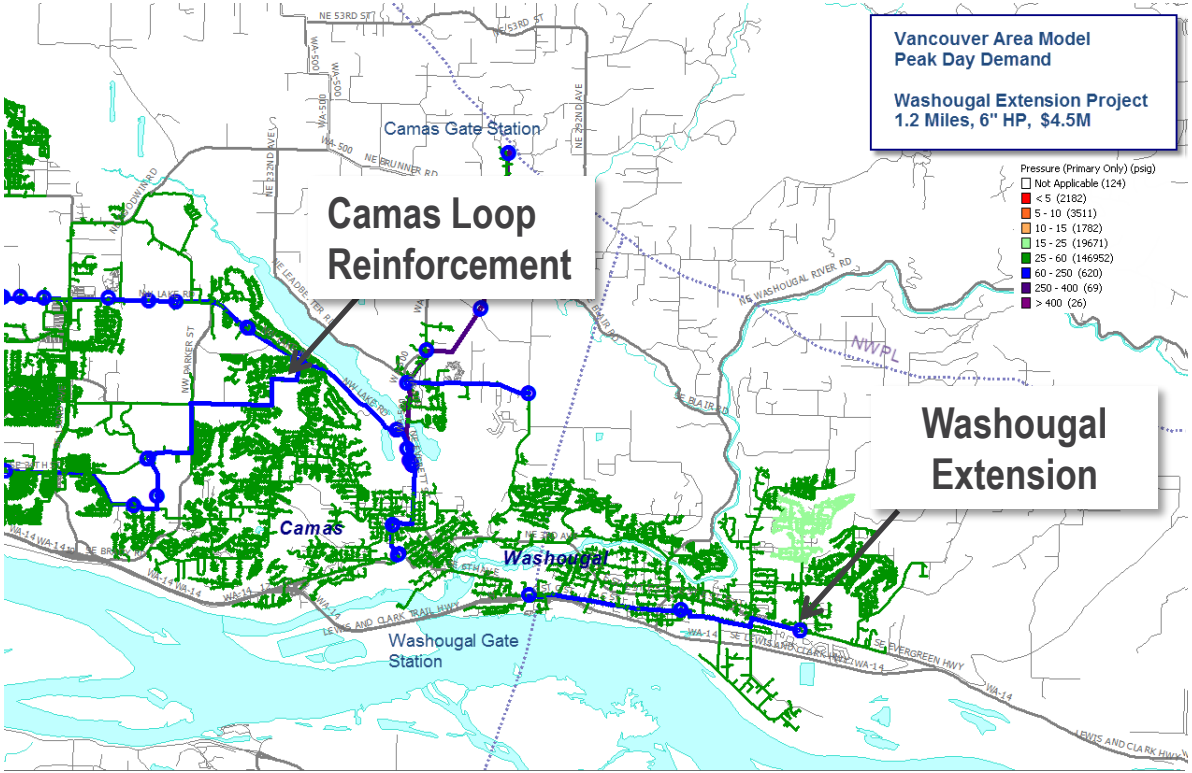
Recent Projects – Camas and Washougal



Recent Projects – Camas and Washougal



Recent Projects – Camas and Washougal



Action Plan Items

Supply Resource Investments

1) Recall 10,000 Dth/day of Mist storage capacity for the 2020-21 gas year. Recall 35,000 Dth/day of Mist storage capacity for the 2021-22 gas year.

2) Use the methodology detailed in Appendix H to evaluate renewable natural gas resources against conventional sources based on all-in costs, where all-in costs are defined as:

*All-in costs = Net Present Value ([cost for delivered gas] + [net GHG emissions intensity*Cost of GHG Emissions Compliance] – [avoided supply capacity costs] – [avoided distribution capacity costs])*

Demand-side Resources - Washington

10) Working through Energy Trust, NW Natural will acquire therm savings of 368,000 therms in 2019 and 375,000 therms in 2020 or the amount identified and approved by Energy Trust board.

Questions?