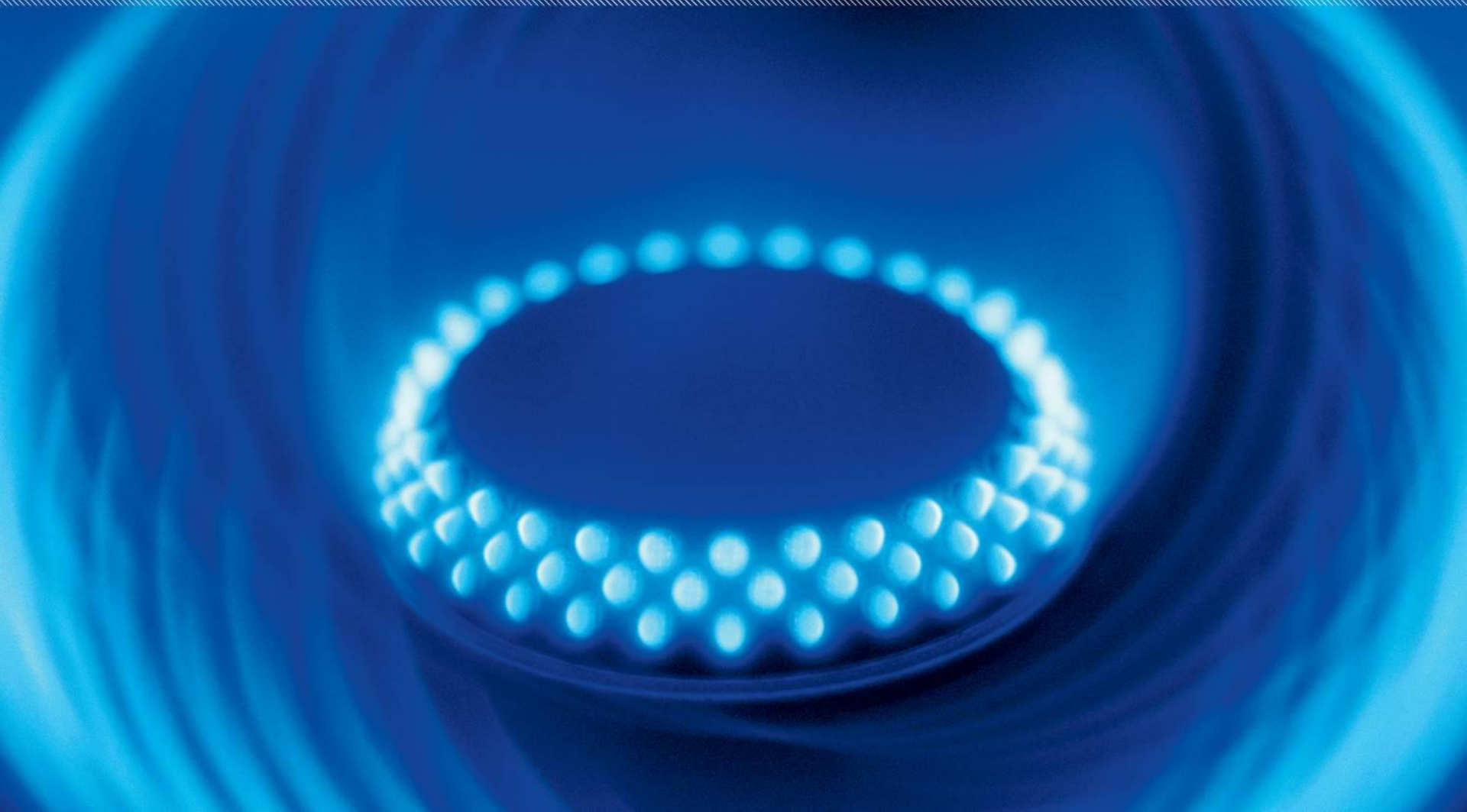
NW Natural®

NW Natural's 2016 IRP

Washington Utilities and Transportation Commission

November 21st, 2016



Forward-looking Statements

- This presentation contains forward-looking statements. Forward-looking statements include statements concerning plans, objectives, goals, strategies, future events, forecasts, and other statements that are other than statements of historical facts. NW Natural's expectations, beliefs, forecasts, and projections are expressed in good faith and are believed to have a reasonable basis. However, each such forward-looking statement involves uncertainties that could cause the actual results to differ materially from those projected in such forward-looking statements.

- All subsequent forward-looking statements, whether written or oral and whether made by or on behalf of NW Natural also are expressly qualified by these cautionary statements. Any forward-looking statement speaks only as of the date on which such statement is made. New factors emerge from time to time and it is not possible for NW Natural to predict all such factors, nor can it assess the impact of each such factor or the extent to which any factor, or combination of factors, may cause results to differ materially from those contained in any forward-looking statements.

- The forecasts and projections included in this presentation have been developed for the purposes of integrated resource planning and should not be used for investment decisions. Disclosure of this information or use of the information for investment purposes could constitute a violation of federal securities laws.

Agenda

1. Current Planning Environment
2. Load Forecast
3. Potential Resource Options
4. Resource Portfolio Selection
5. Action Plan Items

Planning Environment

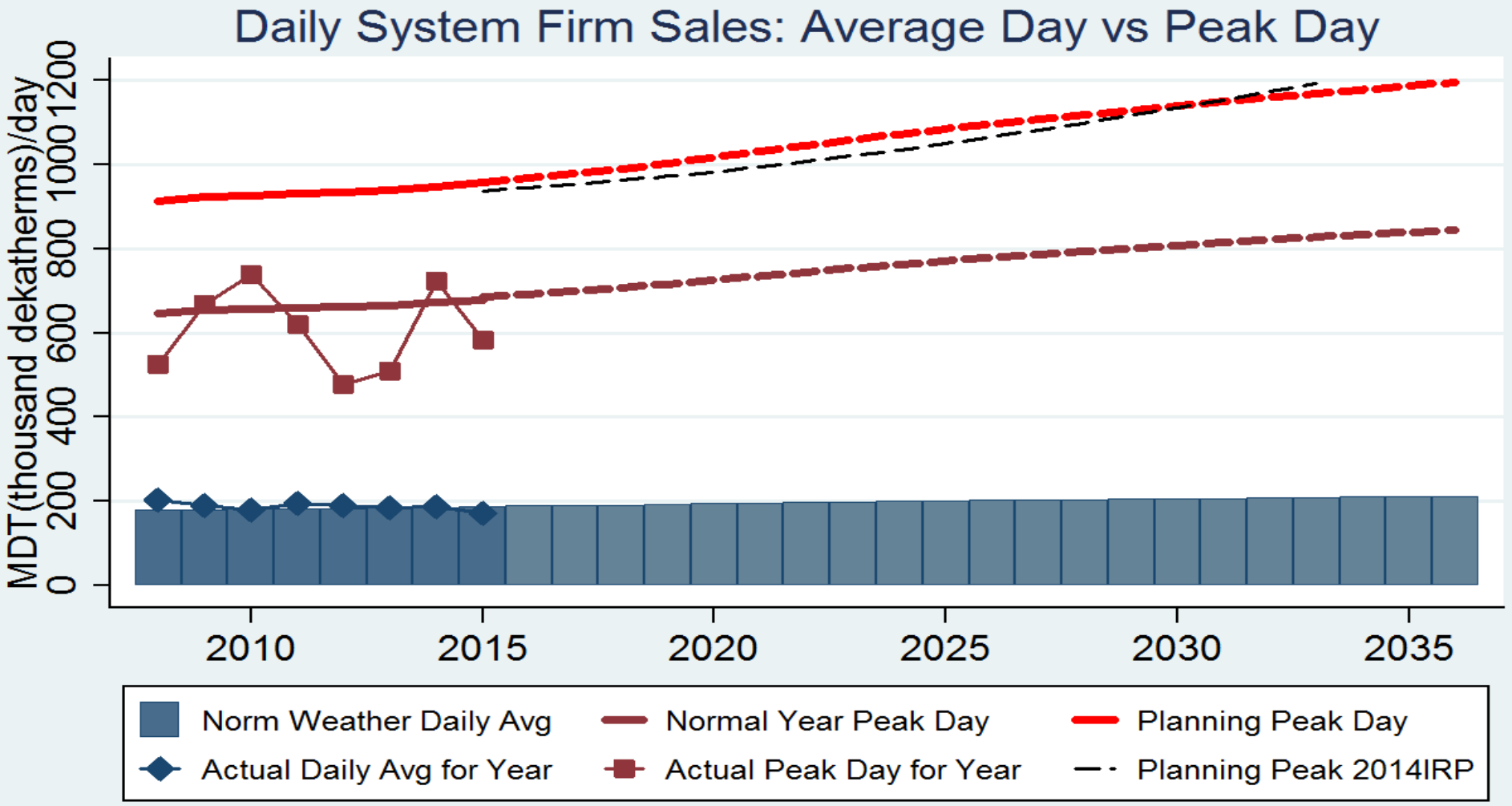
- Regional economies continue expansion
- Gas prices are low and are forecasted to increase modestly over the planning horizon
- New large regional industrial loads and their impact on regional pipeline infrastructure are still unclear
- Implementation of recently adopted and prospective state-level climate policies, while uncertain, may impact NW Natural customers

Customer Growth Rates: 2016–2035 Annual Averages

		Base Case	Low – High Range	2014 IRP (2014 – 2032)
Residential				
	Oregon	1.6%	1.2% - 1.9%	1.5%
	Washington	2.6%	2.0% - 3.4%	3.7%
	System	1.7%	1.3% - 2.1%	1.8%
Commercial				
	Oregon	0.9%	0.2% - 1.5%	1.3%
	Washington	1.8%	0.7% - 2.8%	2.5%
	System	1.0%	0.3% - 1.7%	1.4%
Residential plus Commercial				
	Oregon	1.5%	1.1% - 1.9%	1.5%
	Washington	2.6%	1.9% - 3.3%	3.6%
	System	1.6%	1.2% - 2.1%	1.8%

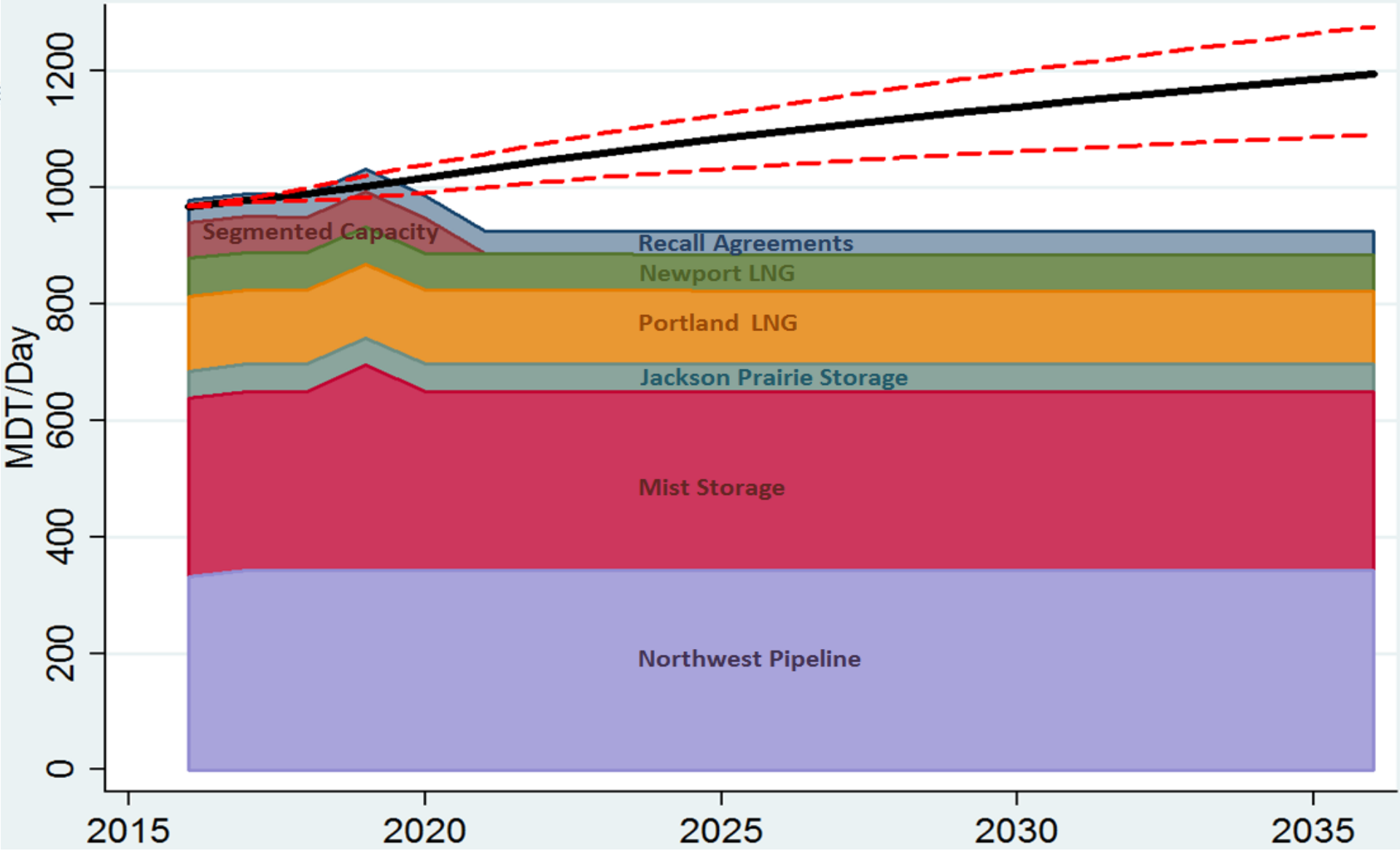
Consistent with Technical Working Group Comments on the 2014 IRP, NW Natural increased the number of historical observations.

Peak Day Forecast: Actuals and 2016 IRP vs. 2014 IRP Forecast



(1) Normal Weather Daily Average = normal weather annual system firm sales/# of days in year
(2) Normal Year Peak Day = 50% probablity highest single day firm sales sendout for the year will be higher or lower
(3) Planning Peak Day = firm sales under design peak weather conditions (most extreme weather in last 30 years)
(4) Actual Daily Average = actual annual total load/# of days in year
(5) Actual Peak Day = highest firm sales load of any day in the gas year

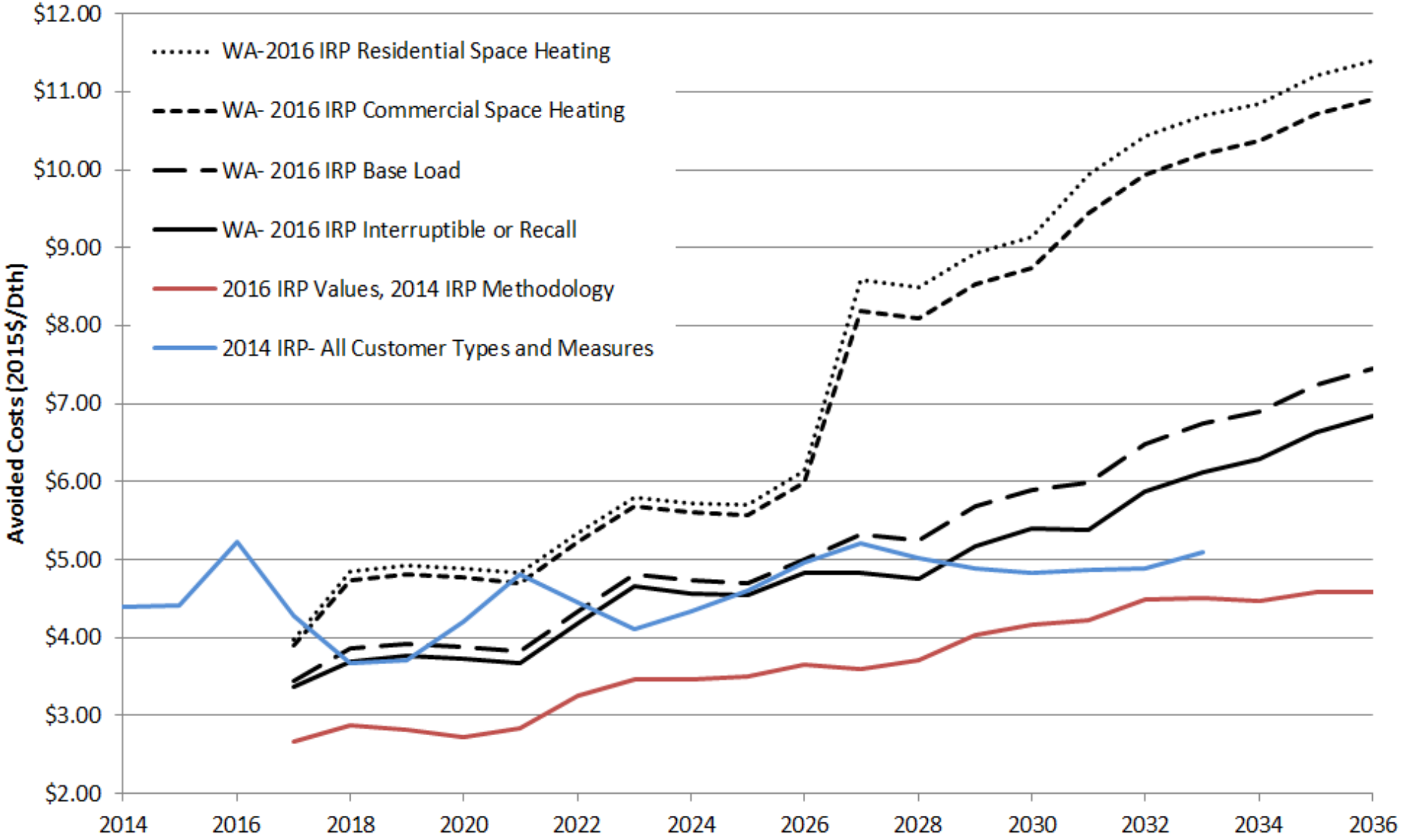
Peak Day Firm Sales Load Resource Balance



Load forecast is net of expected DSM savings; High and low forecast sensitivities shown with red dashed lines

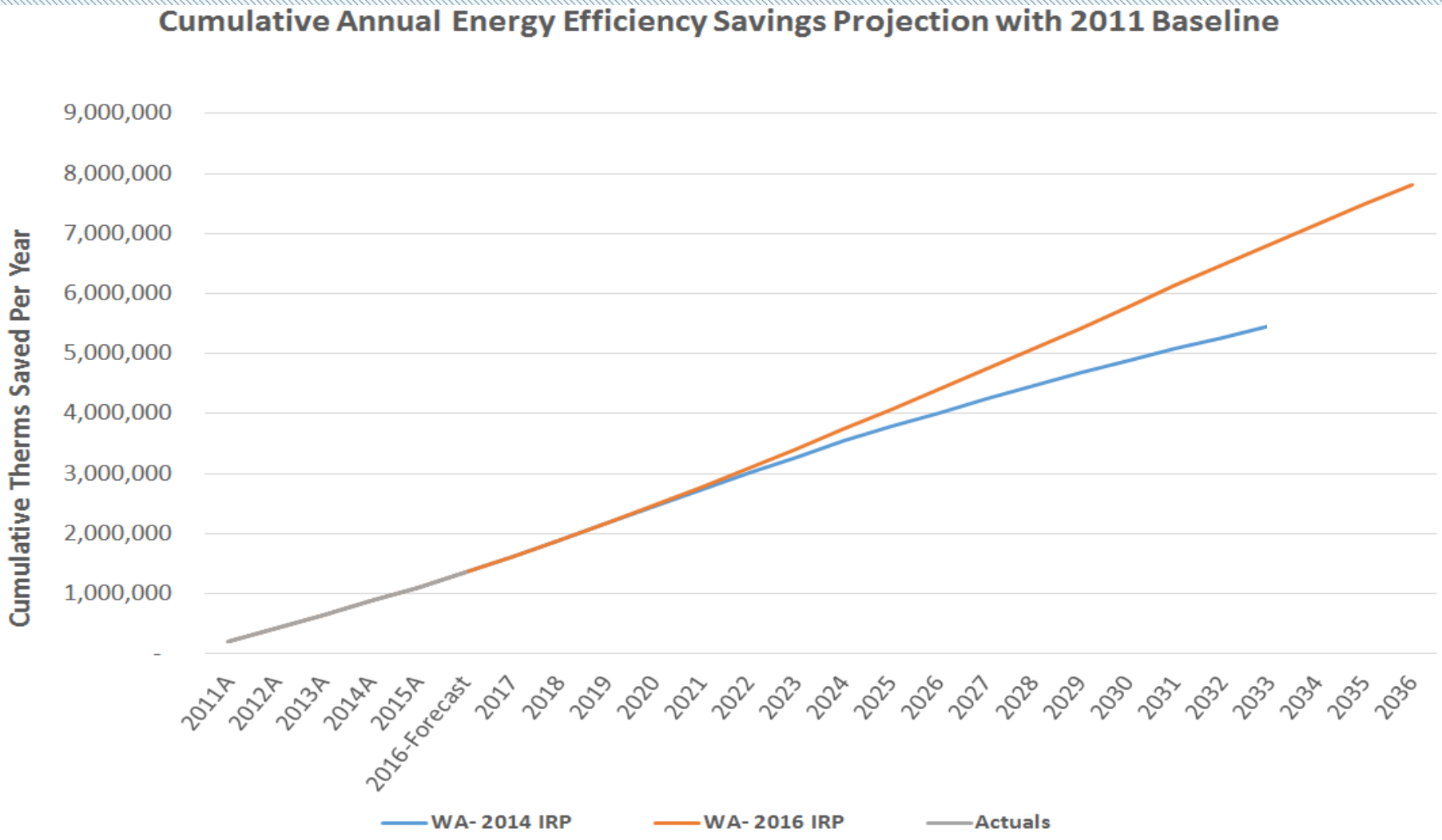
NW Natural®

Washington Avoided Costs by End Use w/ 2014 IRP Comparison



NW Natural®

Demand-side Resources

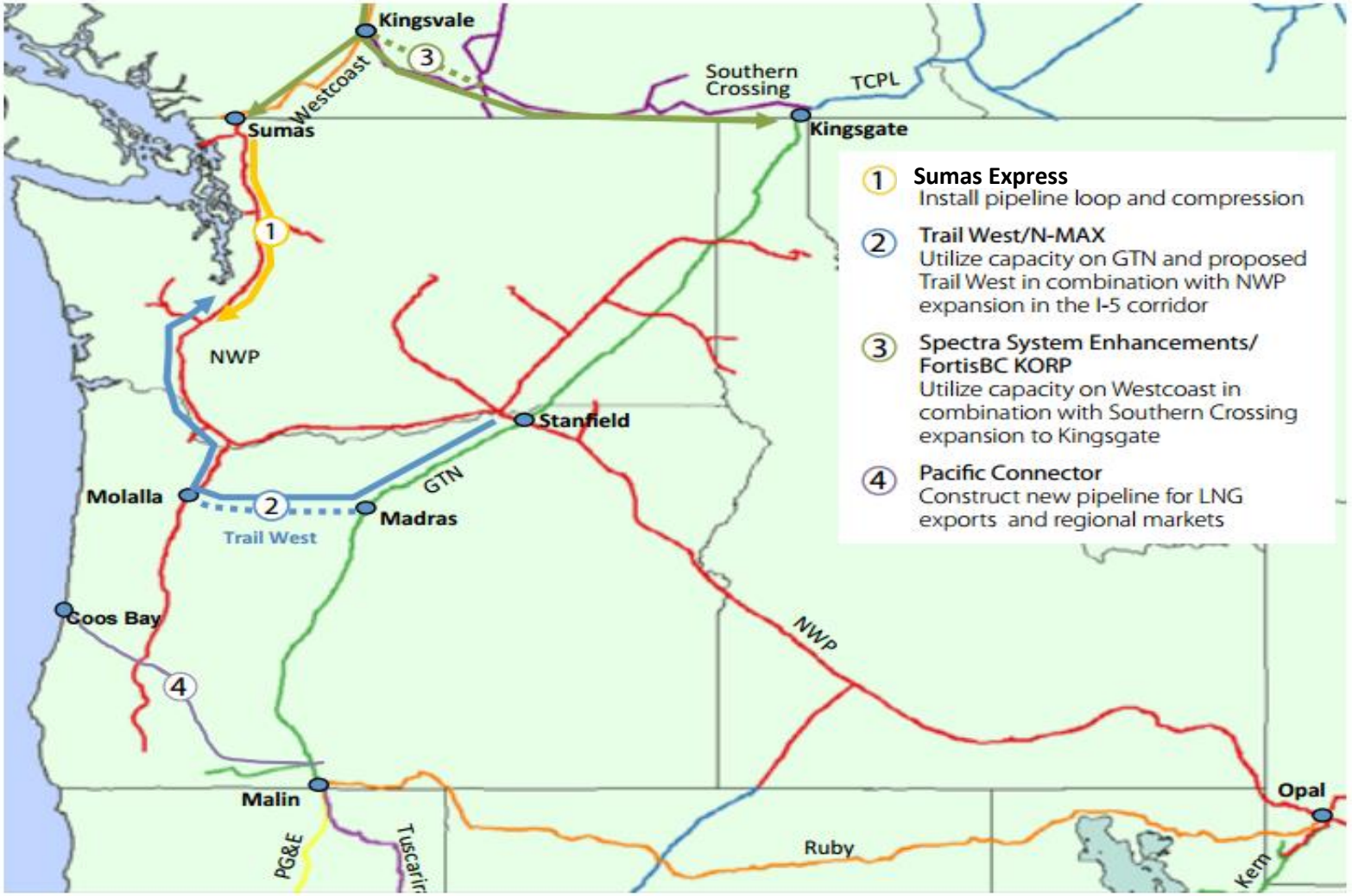


NW Natural®

Future Supply Resources

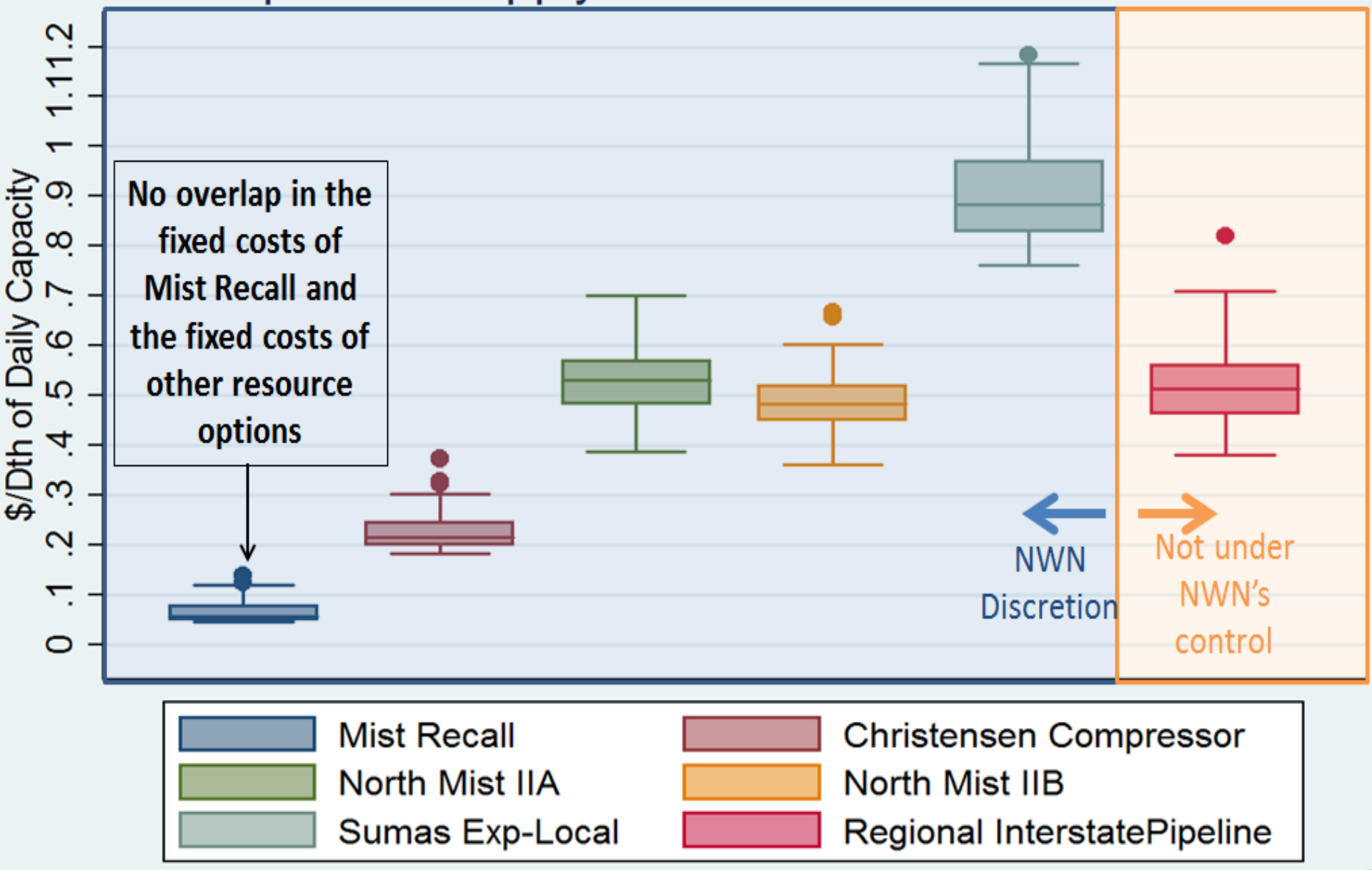
	Resource	Description	Potential Drivers
Beyond NWN Control	Trail West Pathway	Interstate pipeline service from Malin (and/or Stanfield) on GTN and Trail West delivering up Grants Pass Lateral (or directly onto NWN system at Molalla)	Power Generation, Methanol, other Large Industrial Load
	Sumas Expansion Regional (Sumas Express)	Northwest Pipeline service from Sumas to NWN territory sized and timed for regional demands	Power Generation, Methanol, other Large Industrial Load
	Pacific Connector Pathway	Interstate pipeline service from Malin on GTN and Pacific Connector delivering up the Grants Pass Lateral	Jordan Cove LNG
NWN Discretion	Mist Recall	Recall capacity contracted to third parties in the interstate/intrastate storage market to be used for service to the Company's utility customers as contracts expire	NWN demand
	North Mist IIa and IIb	Development of new reservoirs, compression station and pipeline facilities located to the north of the existing Mist storage facilities complex. North Mist IIa would be the first expansion followed by IIb	NWN demand
	Sumas Expansion Local	A local Sumas expansion that is similar to a regional expansion, but is initiated at the request of NW Natural and sized specifically for the Company's needs	NWN demand
	Christensen Compressor	A compressor located between Newport and Salem to increase the takeaway capacity from Newport LNG	NWN demand

Regional Pipeline Infrastructure



Source: Northwest Gas Association, 2015 Gas Outlook

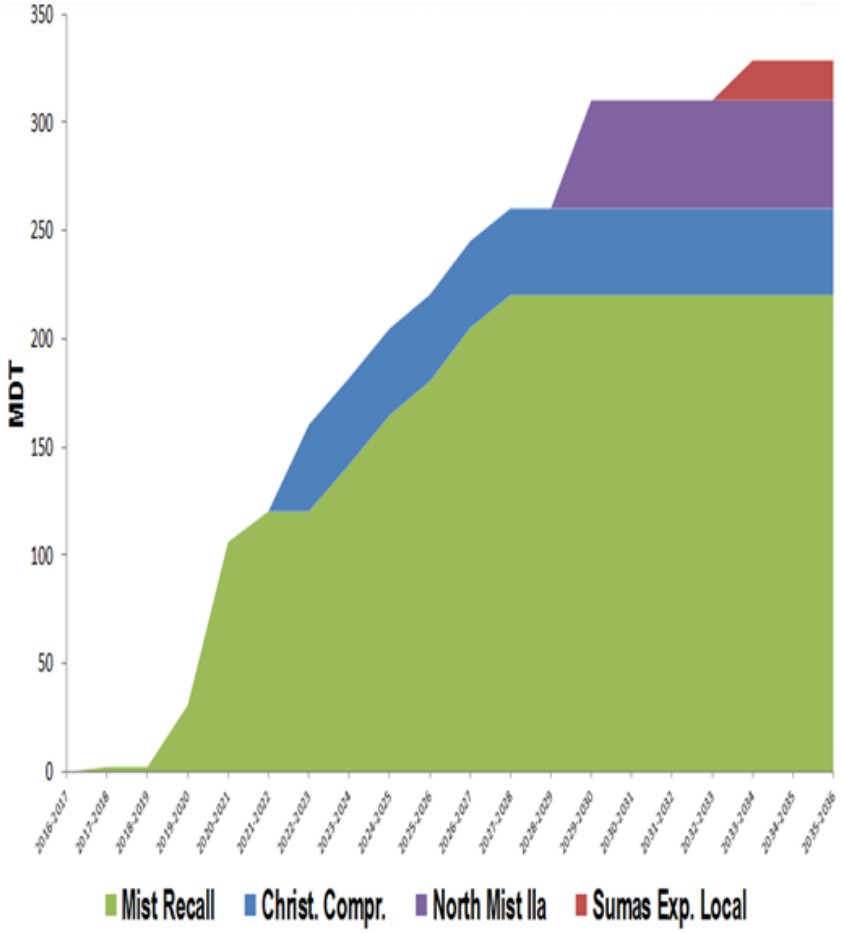
Prospective Supply Resource Fixed Cost Variation



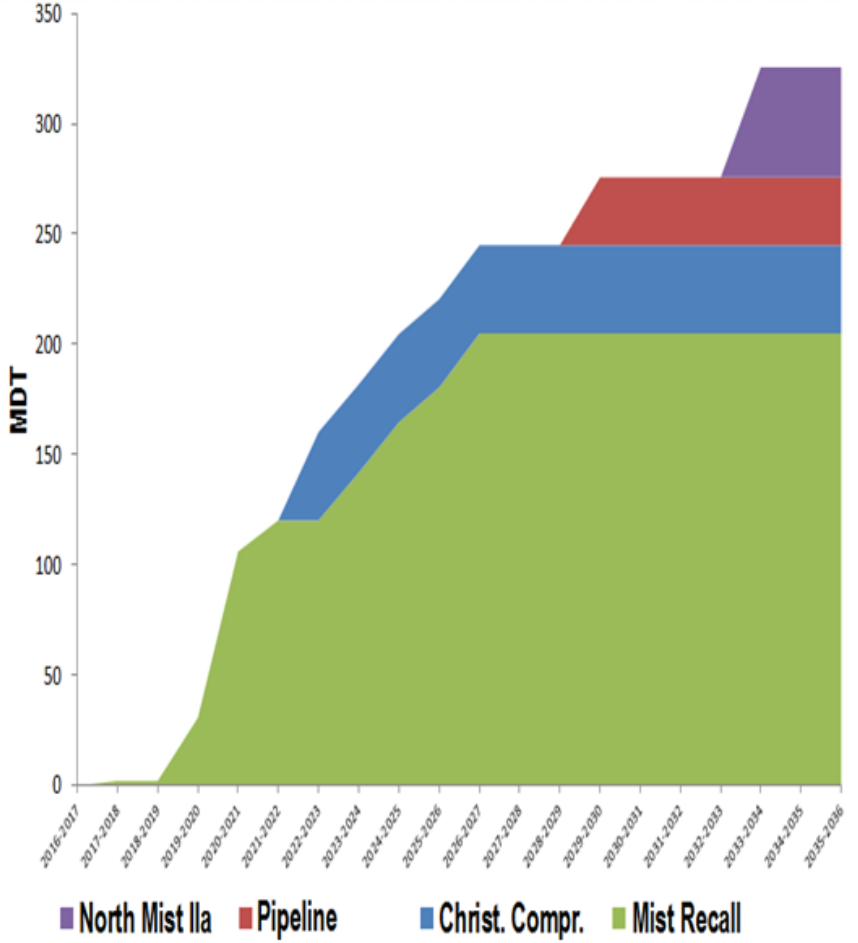
NW Natural®

Resource Selection: With and Without a Regional Pipeline

No New Regional Pipelines



New Regional Pipeline



NW Natural®

Washington-Only Multiyear Action Plan

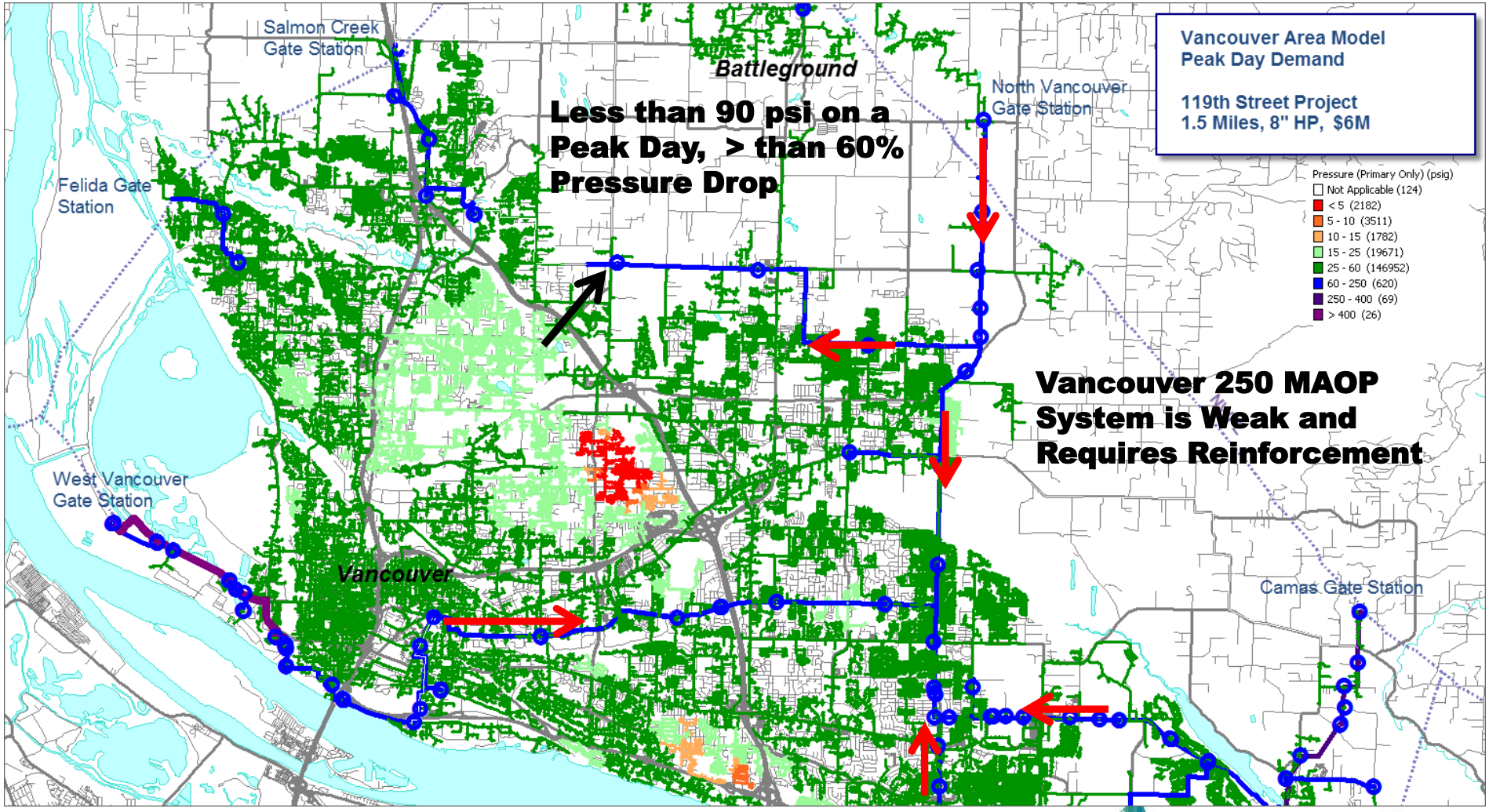
1. Consistent with methodology in chapter 6, NW Natural will ensure Energy Trust has sufficient funding to acquire therm savings of 262,000 therms in 2017 and 270,000 therms in 2018 or the amount agreed to by the Energy Efficiency Advisory Group and approved by the Washington Utilities and Transportation Commission (WUTC).
2. Complete construction of the Clark County distribution projects to address Vancouver load center needs – estimated timing of projects is over the next three years with an estimated cost of $21 million.
3. Comply, as required, with Ecology's final Clear Air rules, which may include the purchasing of allowances and/or investing in carbon reducing projects located in Washington.

Clark County Distribution Projects in the 2016 IRP

Project Name	Location	Description	Purpose	Estimated Cost	Anticipated Construction
119th Street to Salmon Creek	NE 119th St. in Vancouver to Salmon Creek Road	Approximately 2.4 miles of 8-inch wrapped steel Class D High-Pressure Main	Reinforce distribution system in this area north of Vancouver	$6.1 million	2017
Washougal Extension	20th Street to 39th Street in Washougal	Approximately 1.2 miles of 6-inch wrapped steel Class D High-Pressure Main	Reinforce distribution system serving this part of Washougal	$4.5 million	2018
Vancouver Core Replacement Phase 2	Area east of that addressed by Phase 1 project	TBD	Eliminate a reduction in pressure due to pipe size.	TBD	2019

119th Street to Salmon Creek Project 2017 — Need

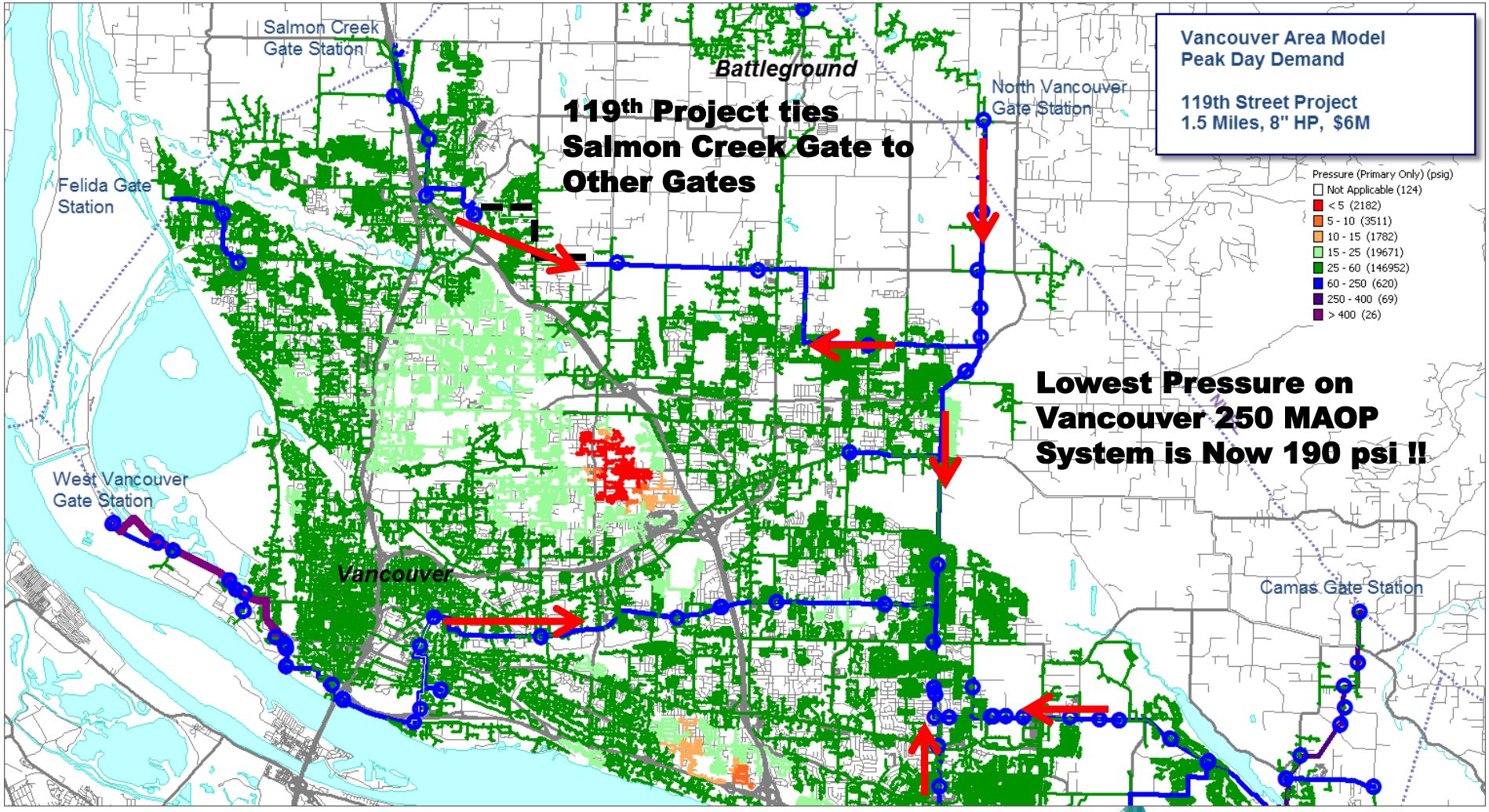
Synergi® Modeling Results—Peak Hour



NW Natural®

119th Street to Salmon Creek Project 2017 — Solution

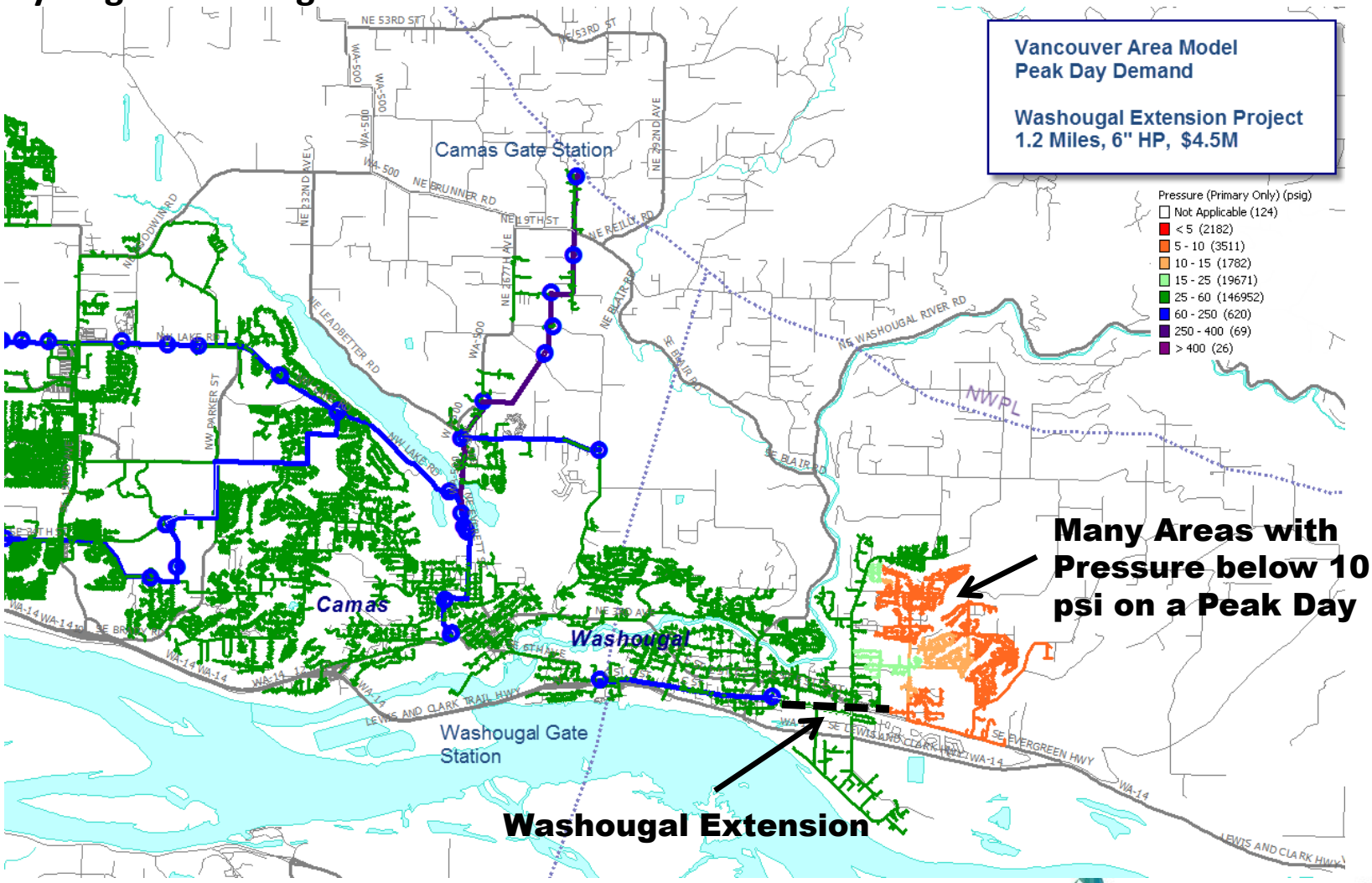
Synergi® Modeling Results—Peak Hour



NW Natural®

Washougal Extension Project 2018 — Need

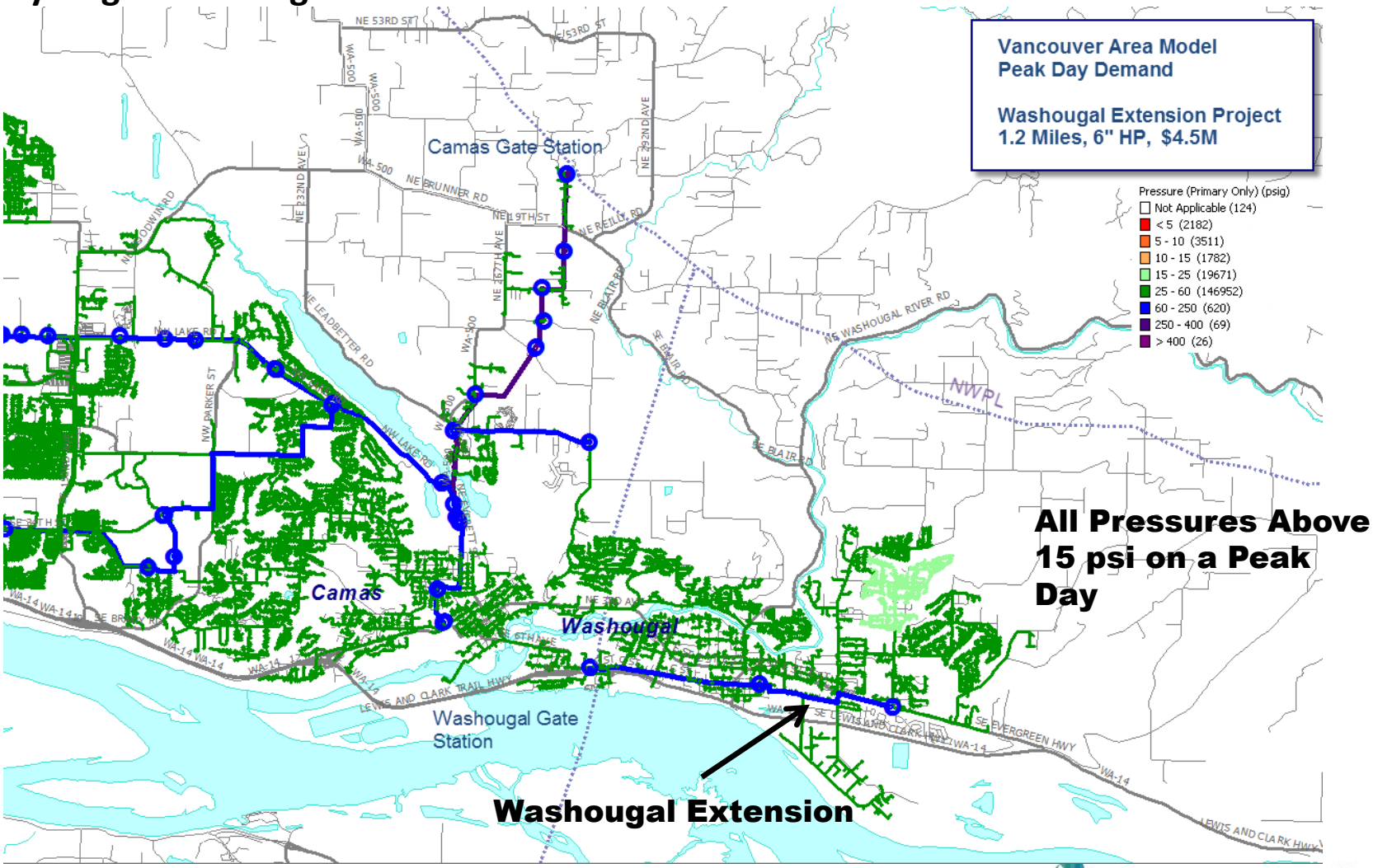
Synergi® Modeling Results—Peak Hour



NW Natural®

Washougal Extension Project 2018 — Solution

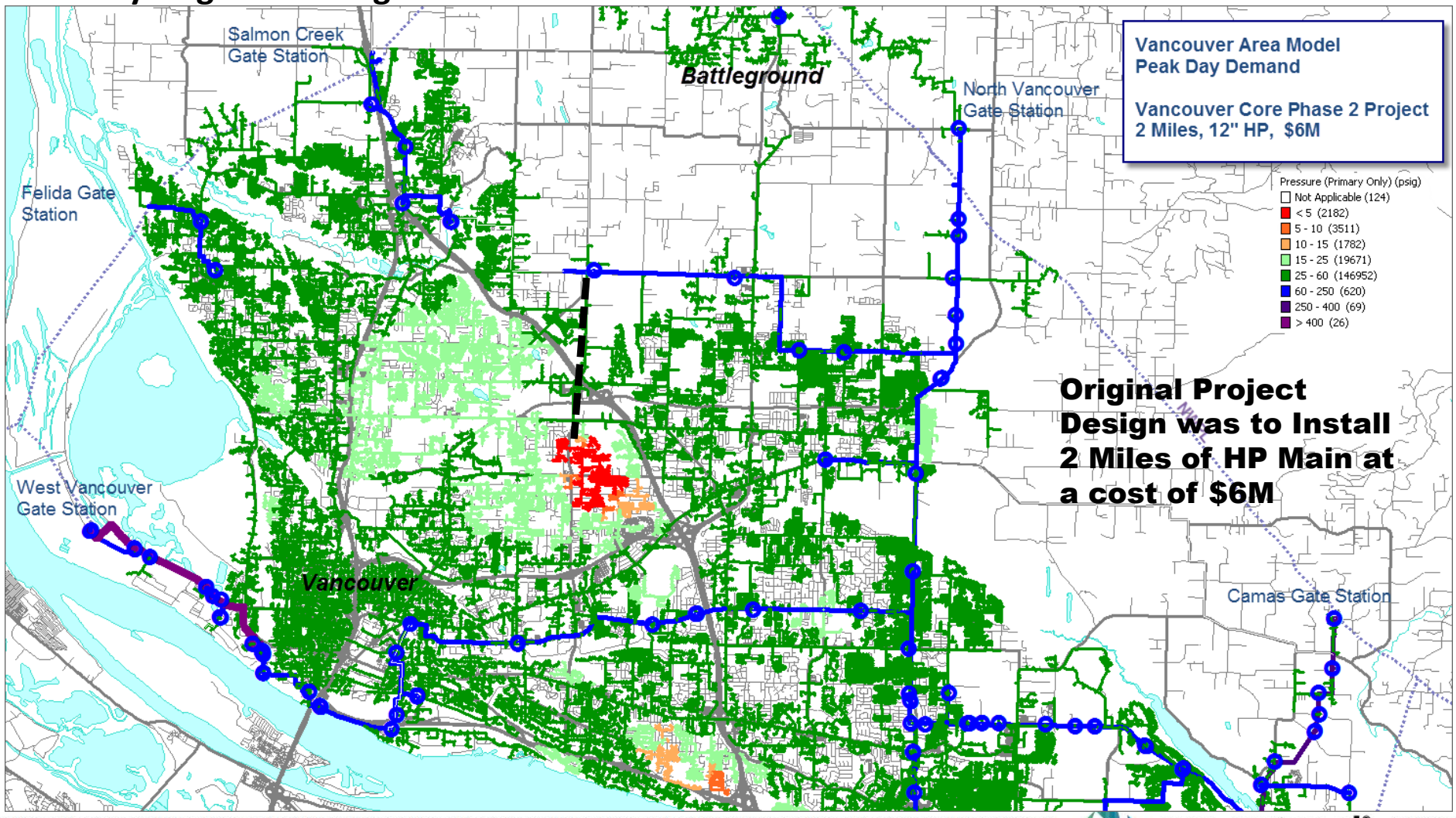
Synergi® Modeling Results—Peak Hour



NW Natural®

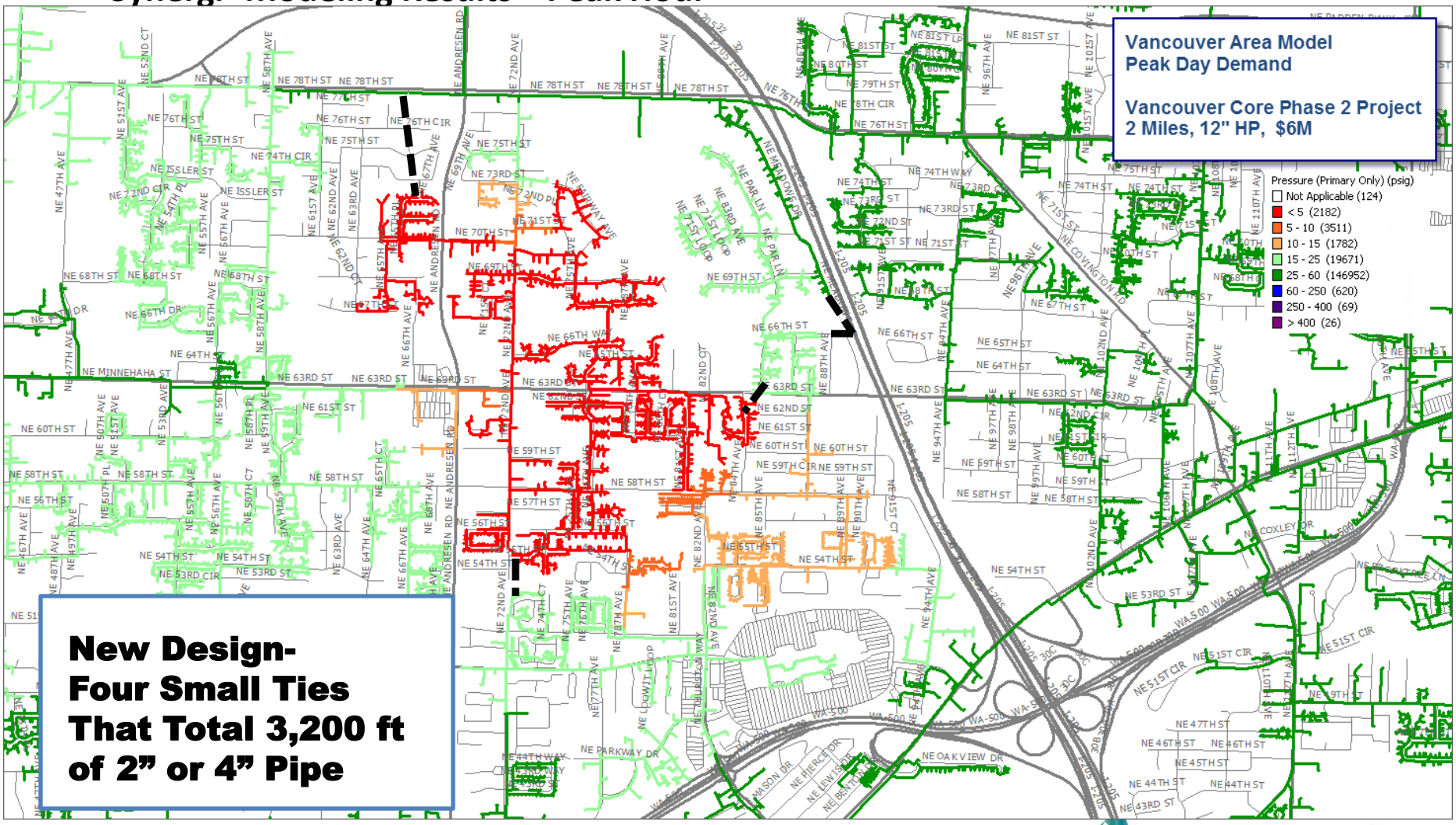
Vancouver Core Phase 2 Project — Need

Synergi® Modeling Results—Peak Hour



Vancouver Core Phase 2 Project — Solution

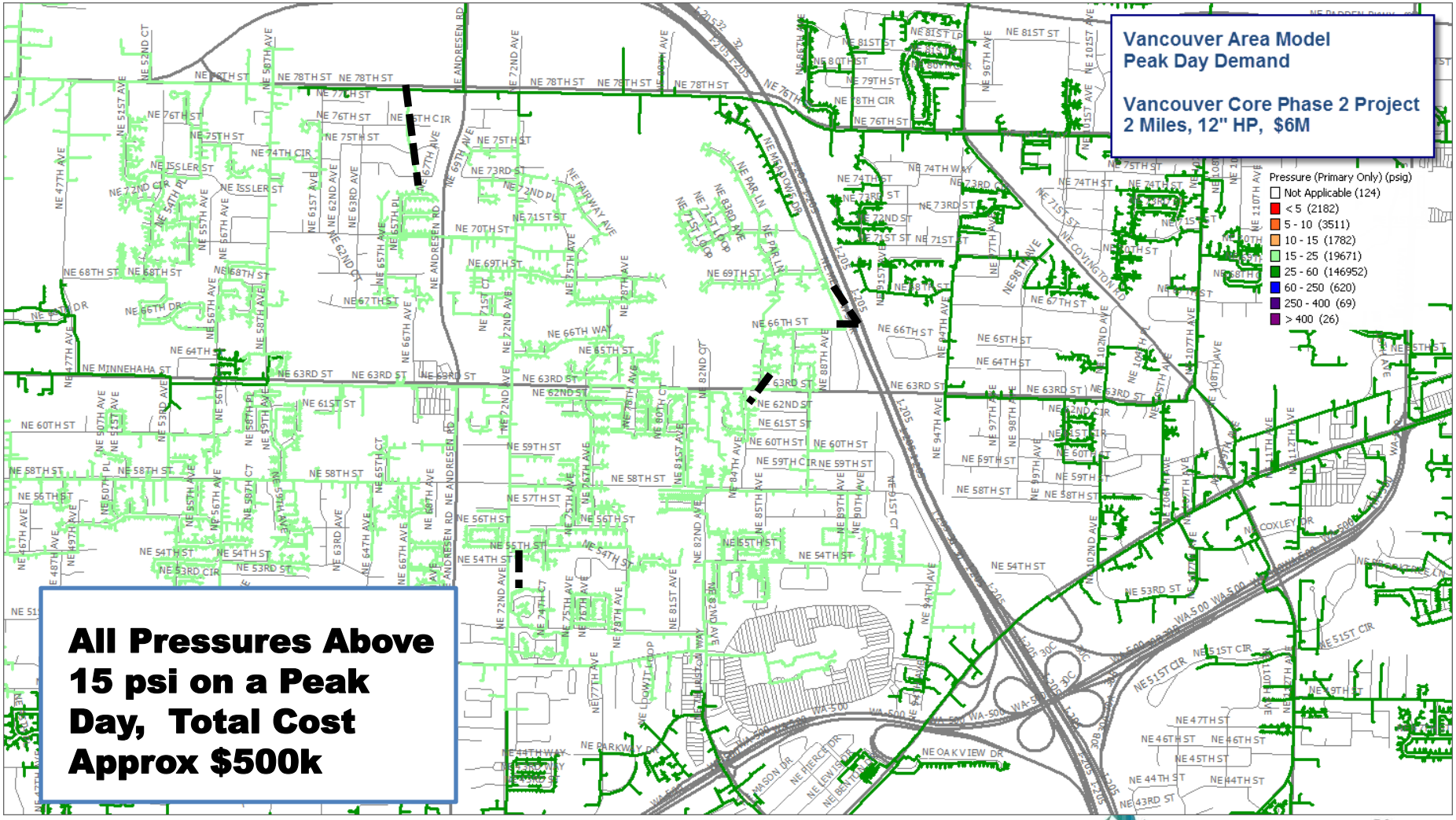
Synergi® Modeling Results—Peak Hour



NW Natural®

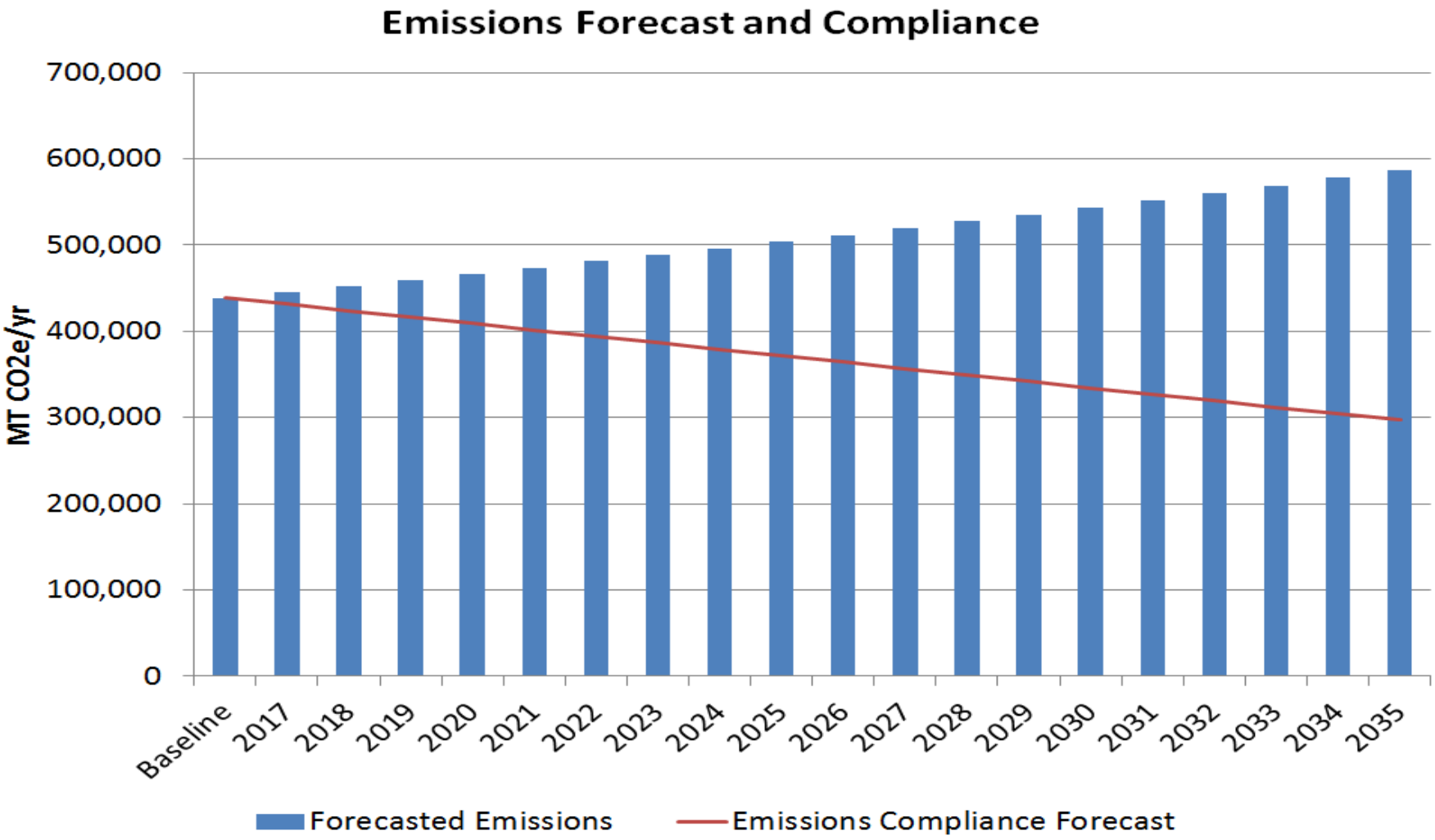
Vancouver Core Phase 2 Project — Solution

Synergi® Modeling Results—Peak Hour



NW Natural®

Compliance with Clean Air Rule



NW Natural®

Rate Impact of CAR

- NW Natural is committed to GHG emissions reductions and we recently adopted a 30% carbon savings goal
- However, we joined litigation with other affected LDCs to challenge the rule because, while good intentioned, we have concerns about authority and feel the details of The Clean Air Rule (CAR) are not in the interest of our customers and do not have the intended climate impacts (among other concerns)
  - CAR will impact customer rates, though it's difficult to know at this time how significantly
  - Emission Reduction Unit (ERU) cost estimates vary significantly, as do availability of the instrument.
  - Some of the options laid out in plan are not yet available, such as the use of allowances created in other markets
  - We can say with certainty that rate impacts will increase over time
  - We have a carbon policy adder in the IRP, but we await the outcome of the case. No immediate action is required while the situation is sorted out

Joint Multiyear Action Items: Supply-side Resource Investments

1. Plan to recall 30,000 Dth/day of Mist storage capacity from the interstate storage account effective May 2019 to serve core customer needs, subject to a review based on an update of the annual load forecast in the summer of 2018.

2. Replace or repair, depending on relative cost-effectiveness, the large dehydrator at Mist's Miller Station. Replacement is currently estimated to cost between $6 million and $7 million based on estimates obtained from a third-party engineering consulting firm engaged by NW Natural. NW Natural will evaluate alternatives associated with the Al's Pool and Miller Station small dehydrator systems at Mist to determine if and when additional actions are warranted.

3. Proceed with the SE Eugene Reinforcement project to be in service for the 2018/2019 heating season and at a preliminary estimated cost of $4 million to $6 million.

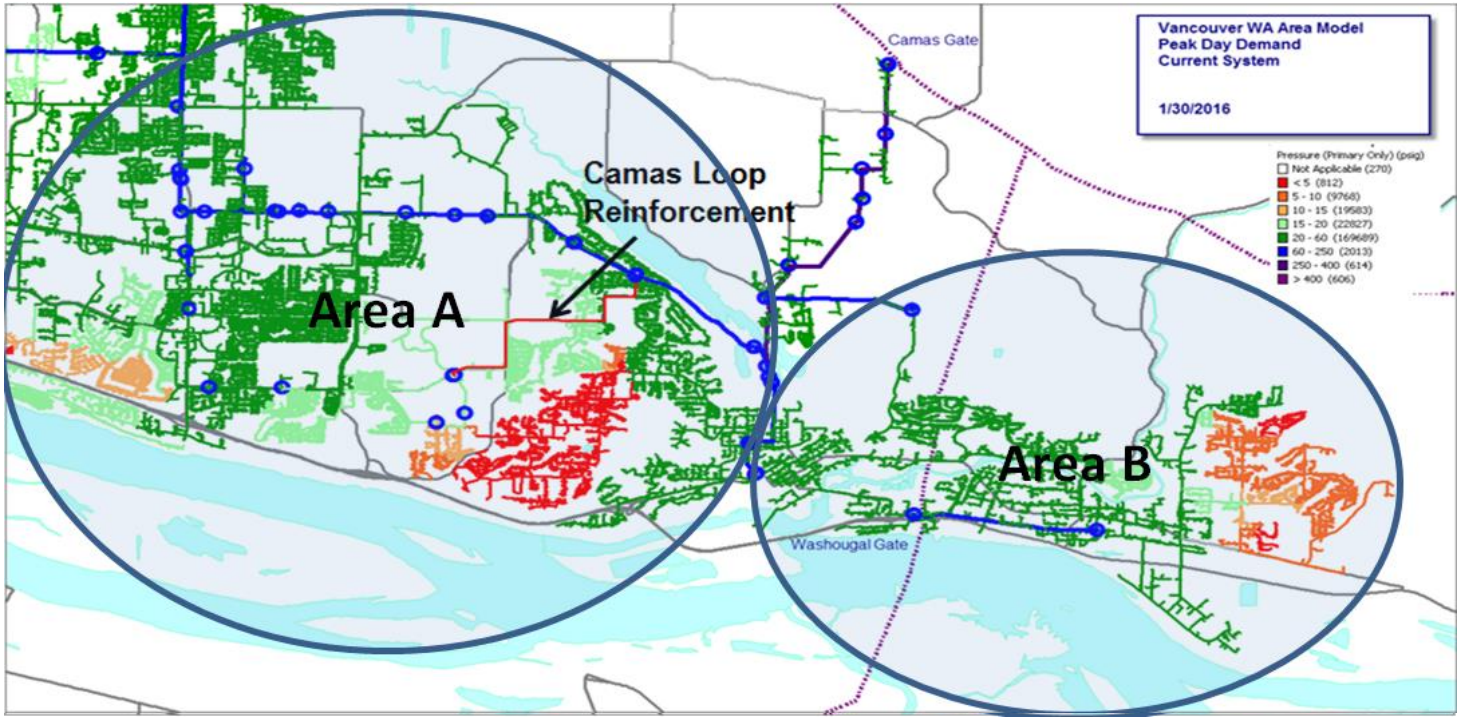
Mist Asset Management

- Mist Storage is a flexible and low cost resource for ratepayers
- Multiple systems at the Mist facility must function in an integrated manner to reliably serve customers
  - Dehydration systems are an example of such systems
- Dehydration systems are used to remove any liquid water carried in gas withdrawn from underground storage
- The large dehydration system at Miller Station shows indirect signs of major internal corrosion, indicating the system is near end of life
- Consultant recommended replacing the large dehydrator within the next 3 years
- NW Natural will conduct a repair versus replace analysis of the large dehydrator system
- Repairs may not be possible or cost effective due its age (installed 1998)
  - Length of time that repair can extend the unit's service life is currently unknown
  - If repaired and not replaced, O&M costs will increase due to inefficiencies

“Targeted” DSM Pilot

What is the potential for DSM to be a viable alternative to supply-side local distribution system projects?

Illustrative Example →



How fast and at what cost can we achieve DSM savings on the peak hour in “Area A”?

NW Natural®

Upstream Methane Pilot

Concept: Drive Adoption of Best Practices in Gas Production as a Gas Purchaser

- Rationale
  - New gas drilling technologies have led to heightened customer concern around gas production practices
  - The production segment accounts for the greatest portion of methane emissions in the natural gas value chain.
  - NW Natural partnered with NRDC to identify 6 best practices to reduce wellhead and production emissions by as much as 85%
- Key Pilot Questions
  - Determine level of producer interest
    - What carbon price is necessary to motivate action?
  - Capture program costs and refine process
  - Identify best verification methodology to balance cost & effectiveness

Action Items: Demand-side Resources and Environmental

1. Consistent with methodology in chapter 6, NW Natural will ensure Energy Trust has sufficient funding to acquire therm savings of 5.1 million therms in 2017 and 5 million therms in 2018 or the amount identified and approved by the Energy Trust board.
2. Work with Energy Trust of Oregon to further scope a geographically targeted DSM pilot via accelerated and/or enhanced offerings ("Targeted DSM" pilot) to measure and quantify the potential of demand-side resources to cost-effectively avoid/delay gas distribution system reinforcement projects in a timely manner and make a Targeted DSM pilot filing with the Oregon Public Utility Commission (OPUC) in late 2017 or early 2018.
3. Work with Energy Trust of Oregon to track peak day savings from DSM programs in addition to the typical Energy Trust metric of total annual savings to better understand if the capacity costs projected to be avoided with peak day savings in the DSM savings projection are being saved.
4. Investigate the viability of developing a pilot project to reduce upstream emissions of methane and, if viable, NW Natural will bring this pilot forward for Commission review and approval. The pilot design would test whether reductions can be achieved at a level consistent with the Base Case carbon values incorporated into the IRP and the range of costs for a larger scale effort. If it is determined that the cost to move the market exceeds the carbon values in the IRP, the Company may alternatively consider advancing the work as a project proposal under SB 844.