2018 Avista Natural Gas IRP

Technical Advisory Committee Meeting
January 25, 2018

Agenda

- Introductions & Logistics
- Safety Moment
- Purpose of IRP and Avista's IRP Process
- System Wide Peak Day
- Avista's Demand Overview and 2016 IRP Revisited
- Economic Outlook and Customer Count Forecast
- Demand Forecast Methodology
- Dynamic Demand Forecasting
- Demand Side Management
- Questions/Wrap Up

Safety Moment

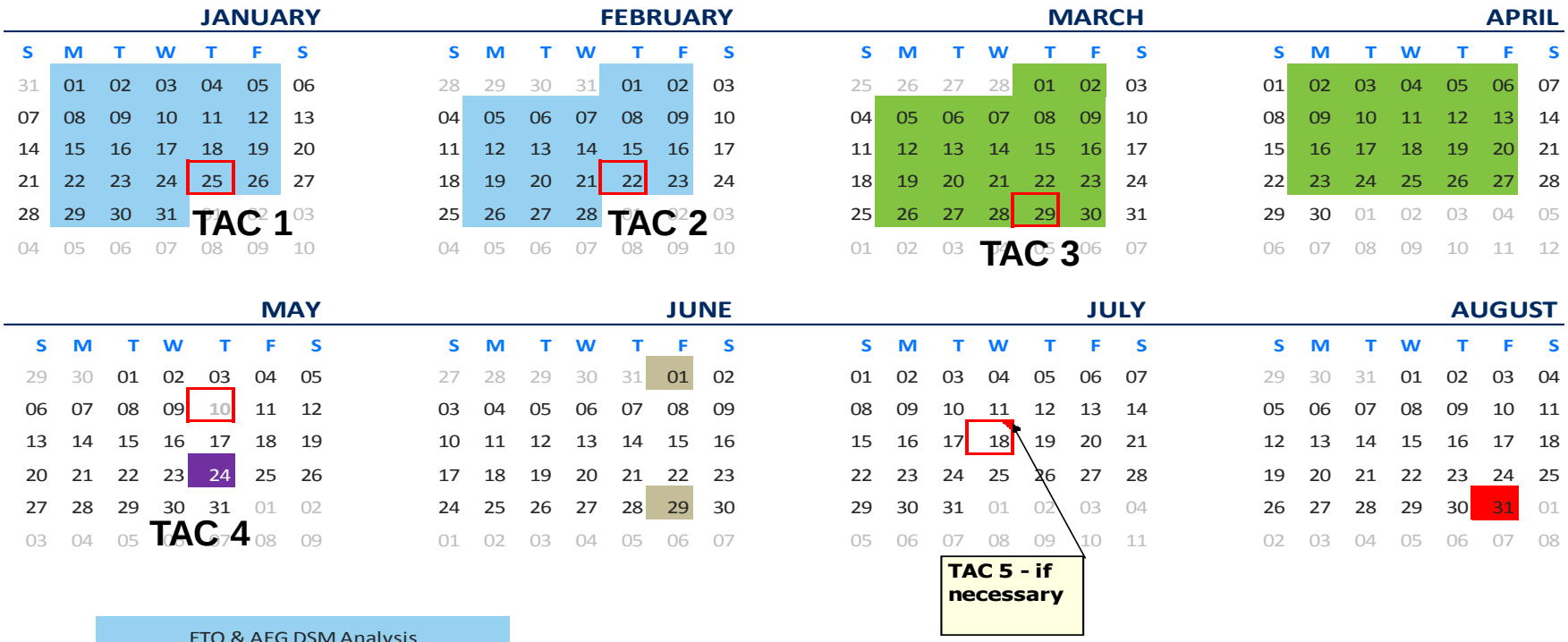
Make it Safe, Make it Personal, Make it Home

2018 IRP Timeline

- **August 31, 2017** – Work Plan filed with WUTC
- **January through May 2018** – Technical Advisory Committee meetings. Meeting topics will include:
  - **TAC 1: Thursday, January 25, 2018:** TAC meeting expectations, review of 2016 IRP acknowledgement letters, customer forecast, and demand-side management (DSM) update.
  - **TAC 2: Thursday, February 22, 2018:** Weather analysis, environmental policies, market dynamics, price forecasts, cost of carbon.
  - **TAC 3: Thursday, March 29, 2018:** Distribution, supply-side resources overview, overview of the major interstate pipelines, RNG overview and future potential resources.
  - **TAC 4: Thursday, May 10, 2018:** DSM results, stochastic modeling and supply-side options, final portfolio results, and 2020 Action Items.
- **June 1, 2018 –** Draft of IRP document to TAC
- **June 29, 2018 –** Comments on draft due back to Avista
- **July 2018 –** TAC final review meeting (if necessary)
- **August 31, 2018 –** File finalized IRP document

IRP Calendar

2018



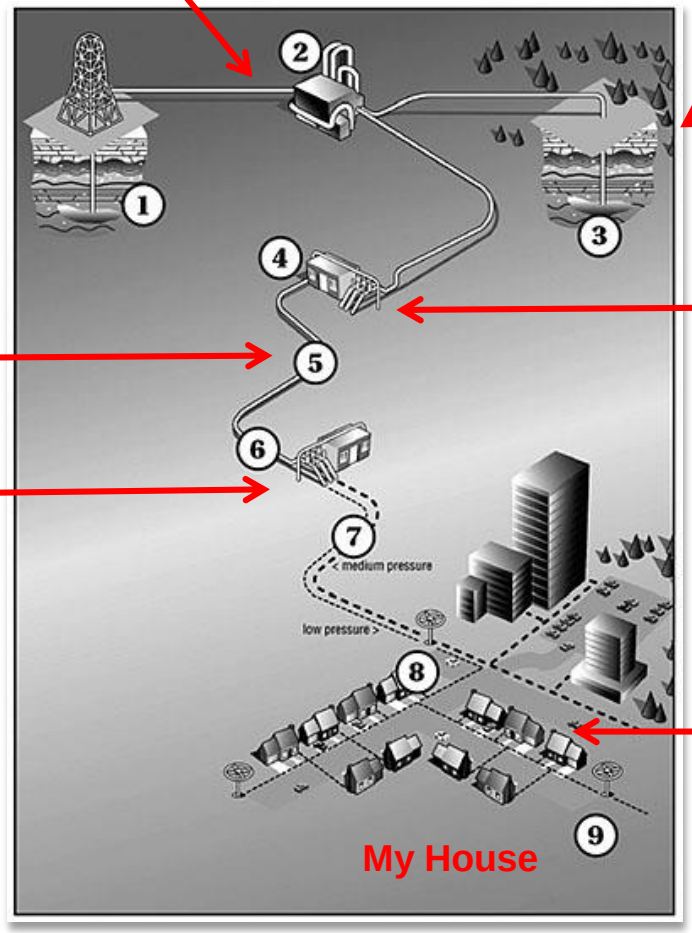
Purpose of Integrated Resource Planning

- Comprehensive long-range resource planning tool
- Fully integrates forecasted demand requirements with potential demand side and supply side resources
- Process determines the least cost, risk adjusted means for meeting demand requirements for our firm residential, commercial and industrial customers
- Responsive to Idaho, Oregon and Washington rules and/or orders

Avista's IRP Process

- Comprehensive analysis bringing demand forecasting and existing and potential supply-side and demand-side resources together into a 20-year, risk adjusted least-cost plan
- Considers:
  - Customer growth and usage
  - Weather planning standard
  - Demand-side management opportunities
  - Existing and potential supply-side resource options
  - Risk
  - Public participation through Technical Advisory Committee meetings (TAC)
  - Distribution upgrades
- 2016 IRP filed in all three jurisdictions on August 31, 2016 and acknowledged

The Natural Gas System



Avista's Demand Overview and 2016 IRP Re-Visited

Tom Pardee
Manager of Natural Gas Planning

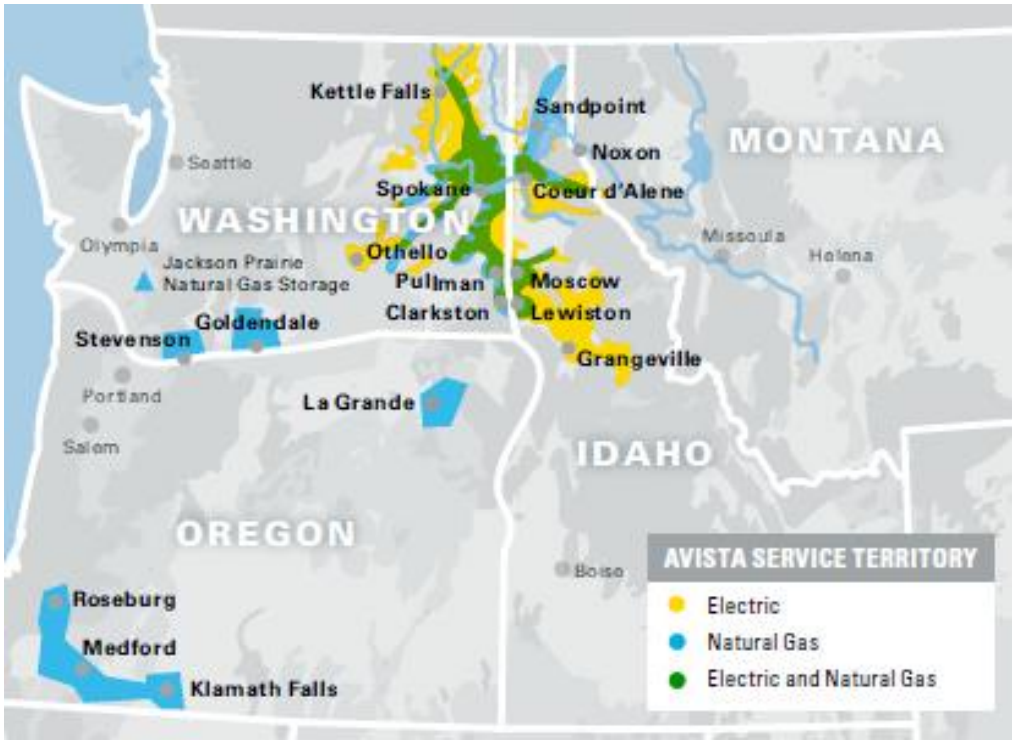
Avista's Demand Overview

Service Territory and Customer Overview

- Serves electric and natural gas customers in eastern Washington and northern Idaho, and natural gas customers in southern and eastern Oregon
  - Population of service area 1.5 million
    - 371,000 electric customers
    - 348,000 natural gas customers

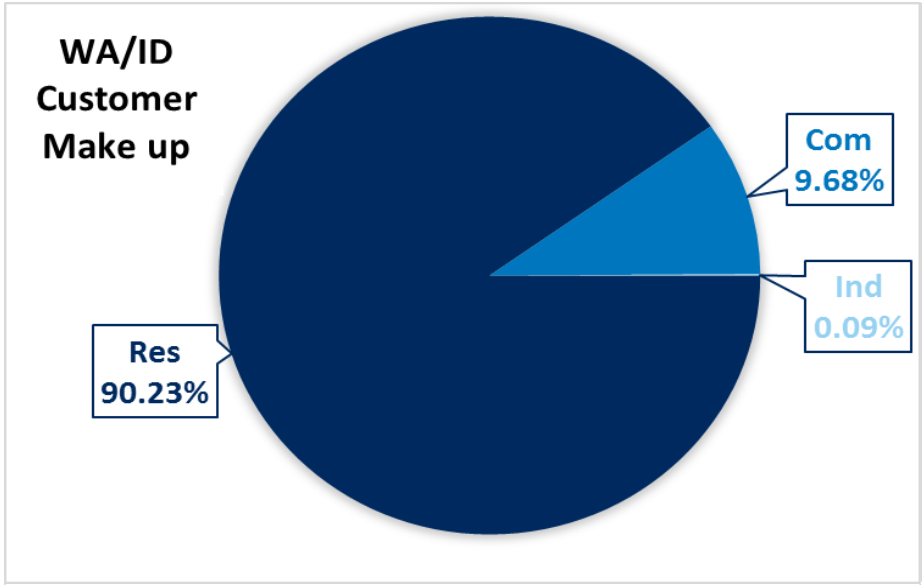
- Has one of the smallest carbon footprints among America's 100 largest investor-owned utilities

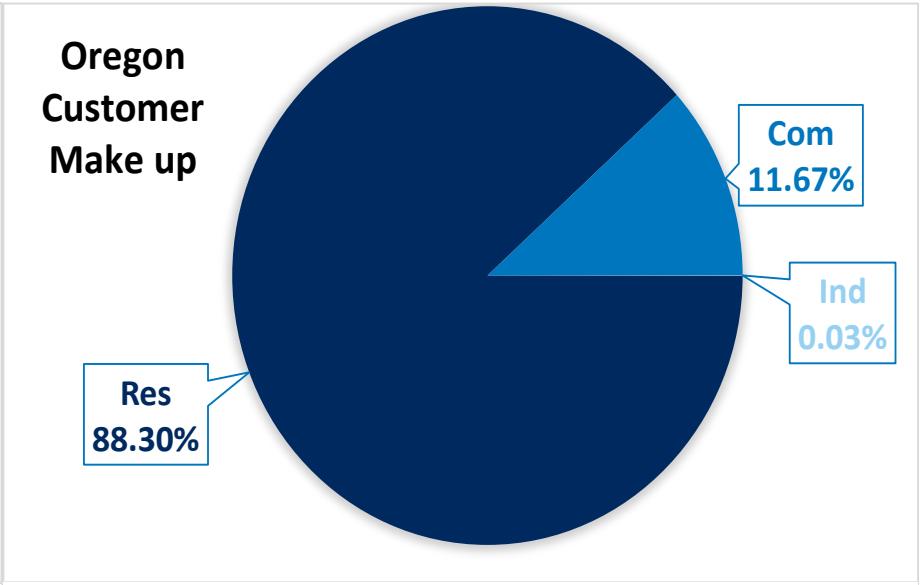
- Committed to environmental stewardship and efficient use of resources

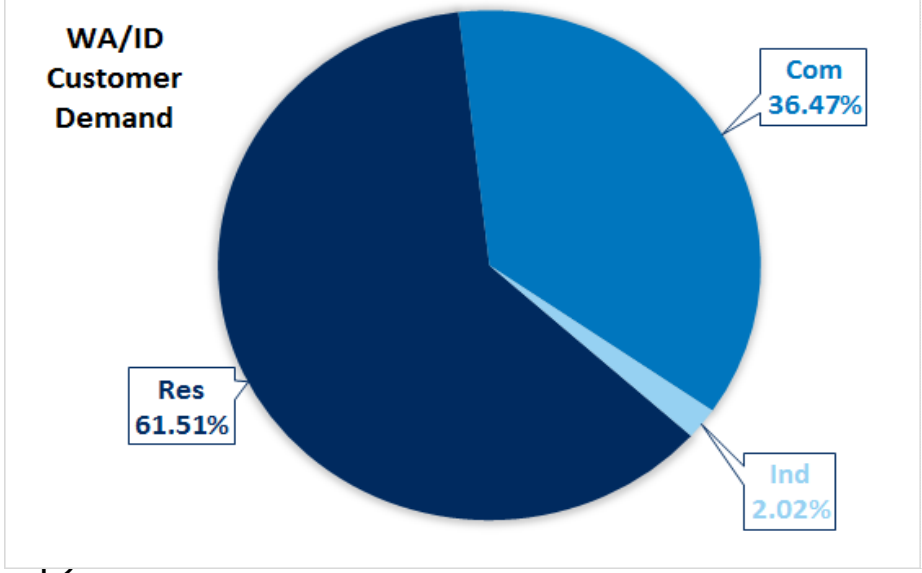


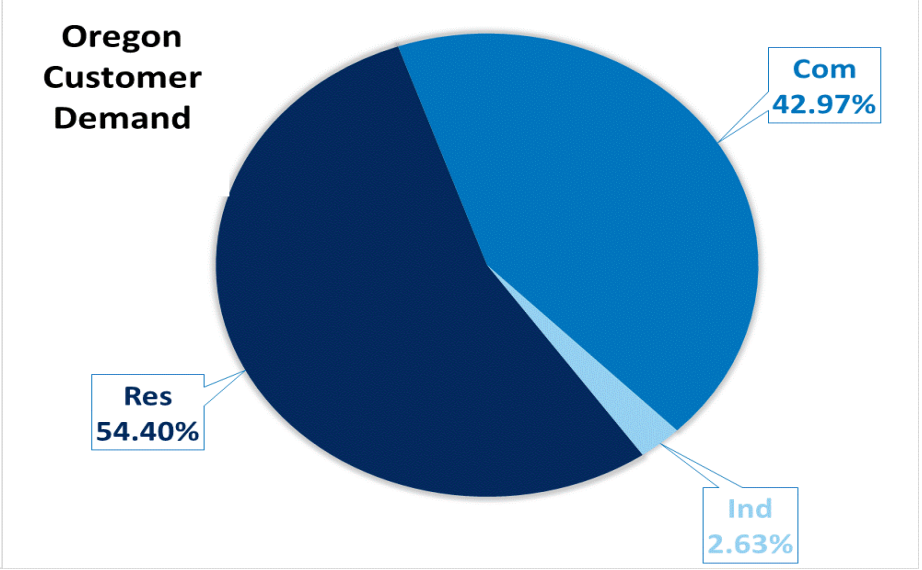
State	Total Customers	% of Total
Washington	163,000	47%
Oregon	102,000	29%
Idaho	83,000	24%
Total	348,000	100%

2017 Customer Make Up and Demand Mix

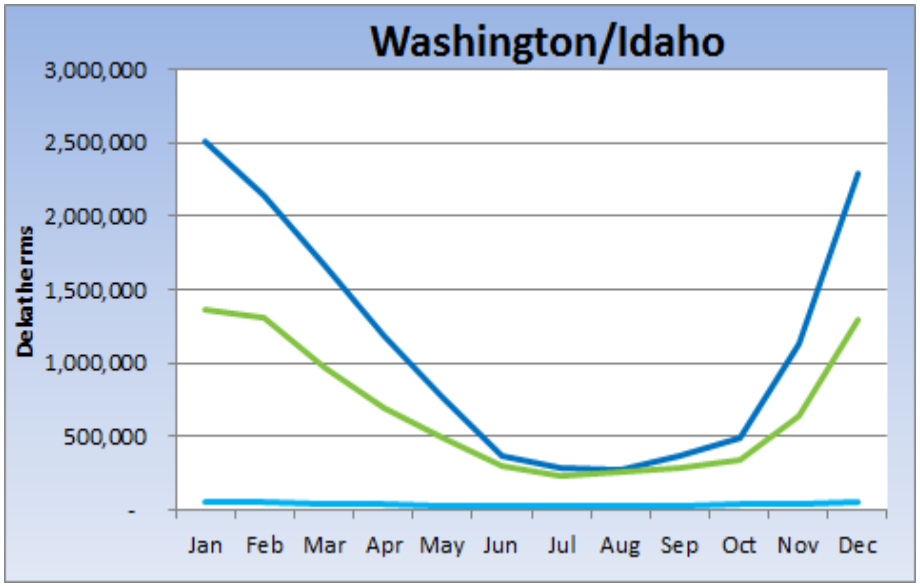


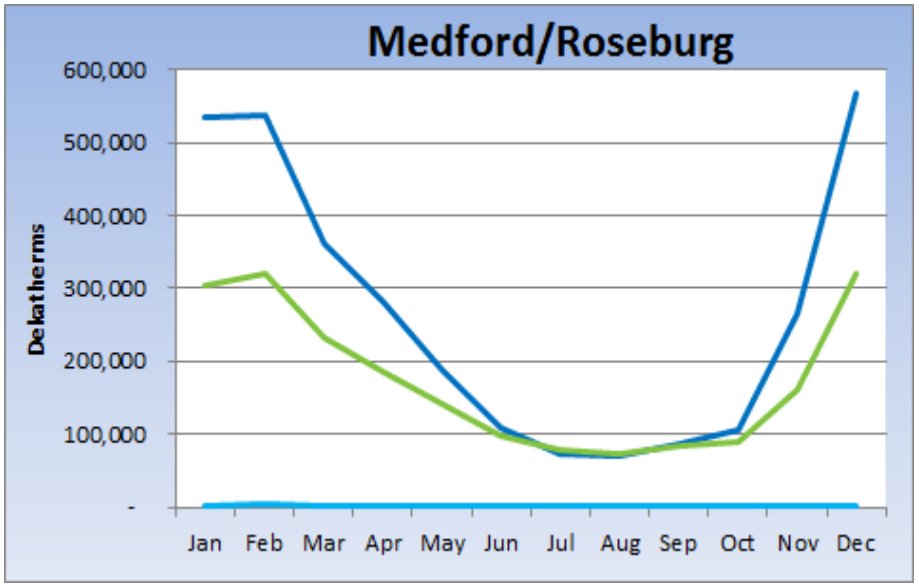


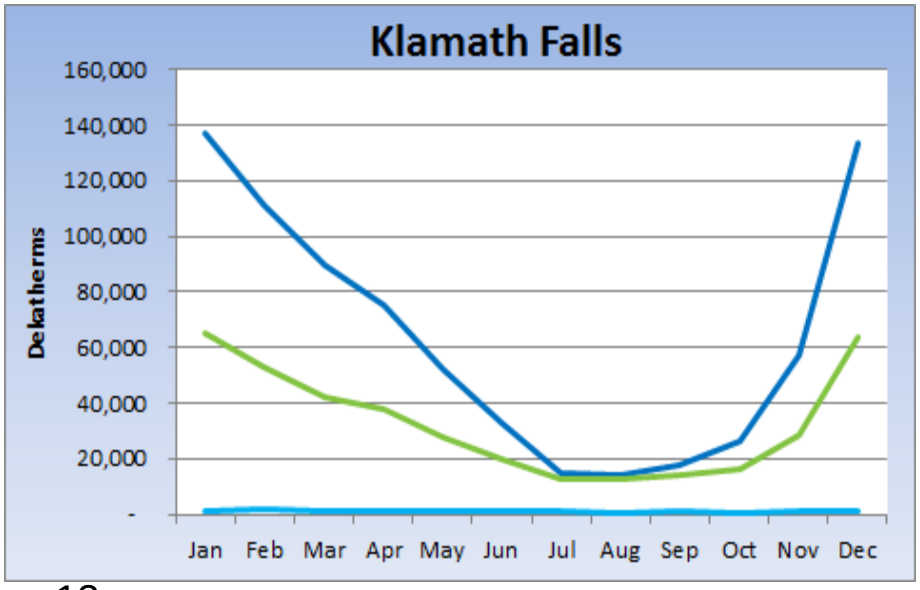


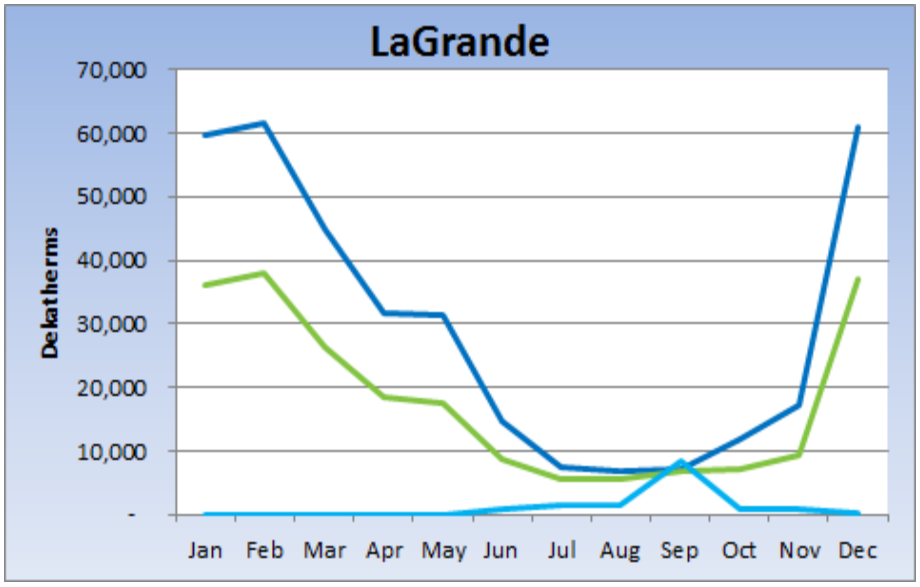


Seasonal Demand Profiles



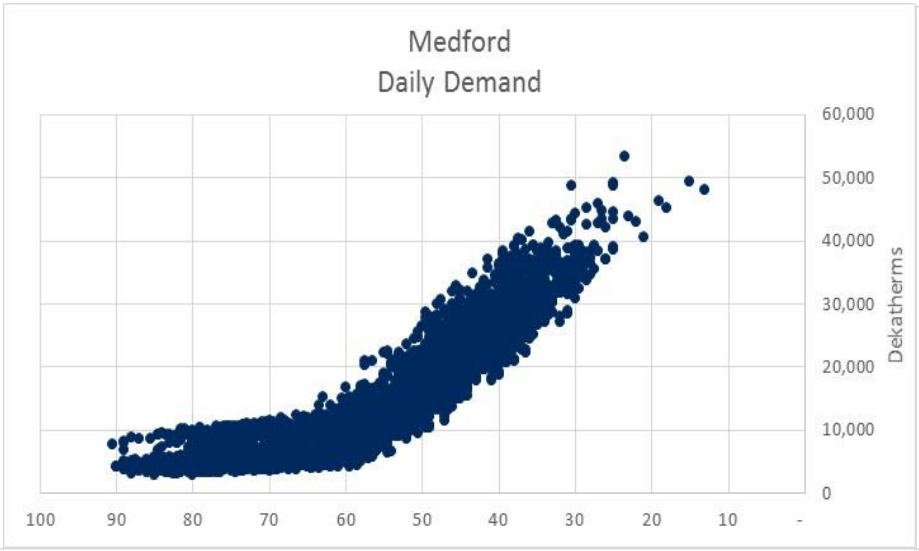


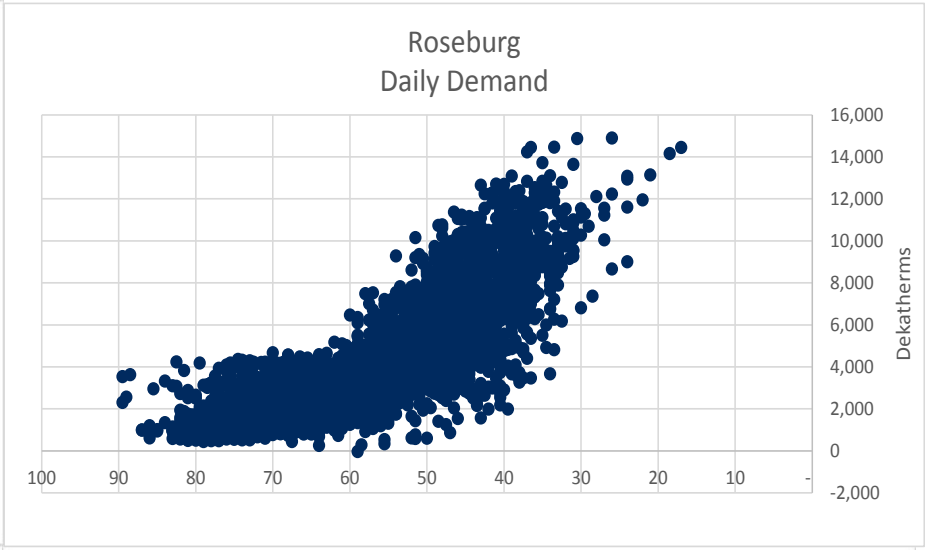


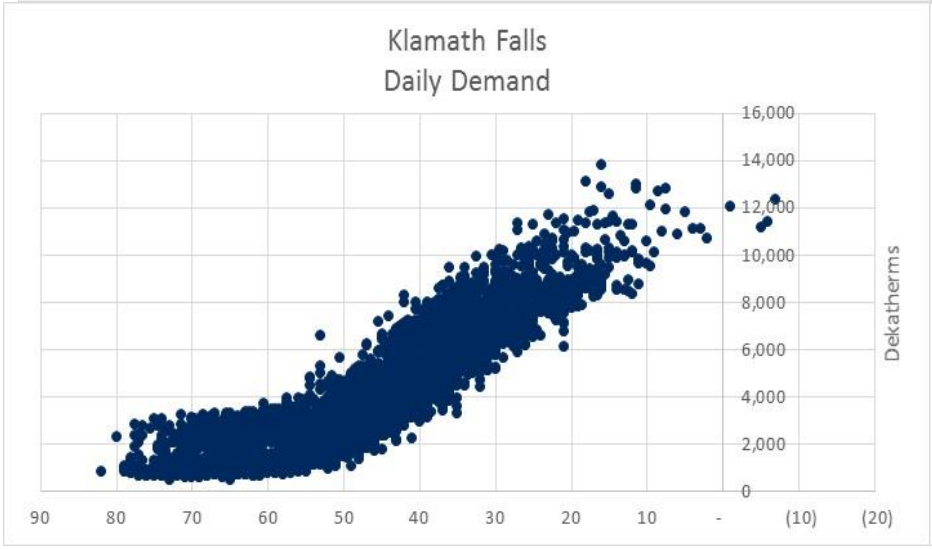


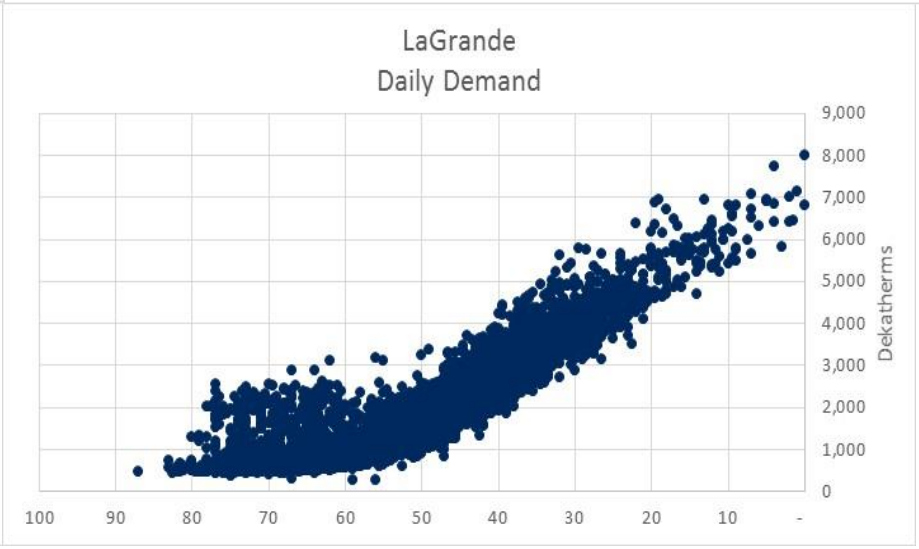
Residential Commercial Industrial

OR Daily Demand Profiles



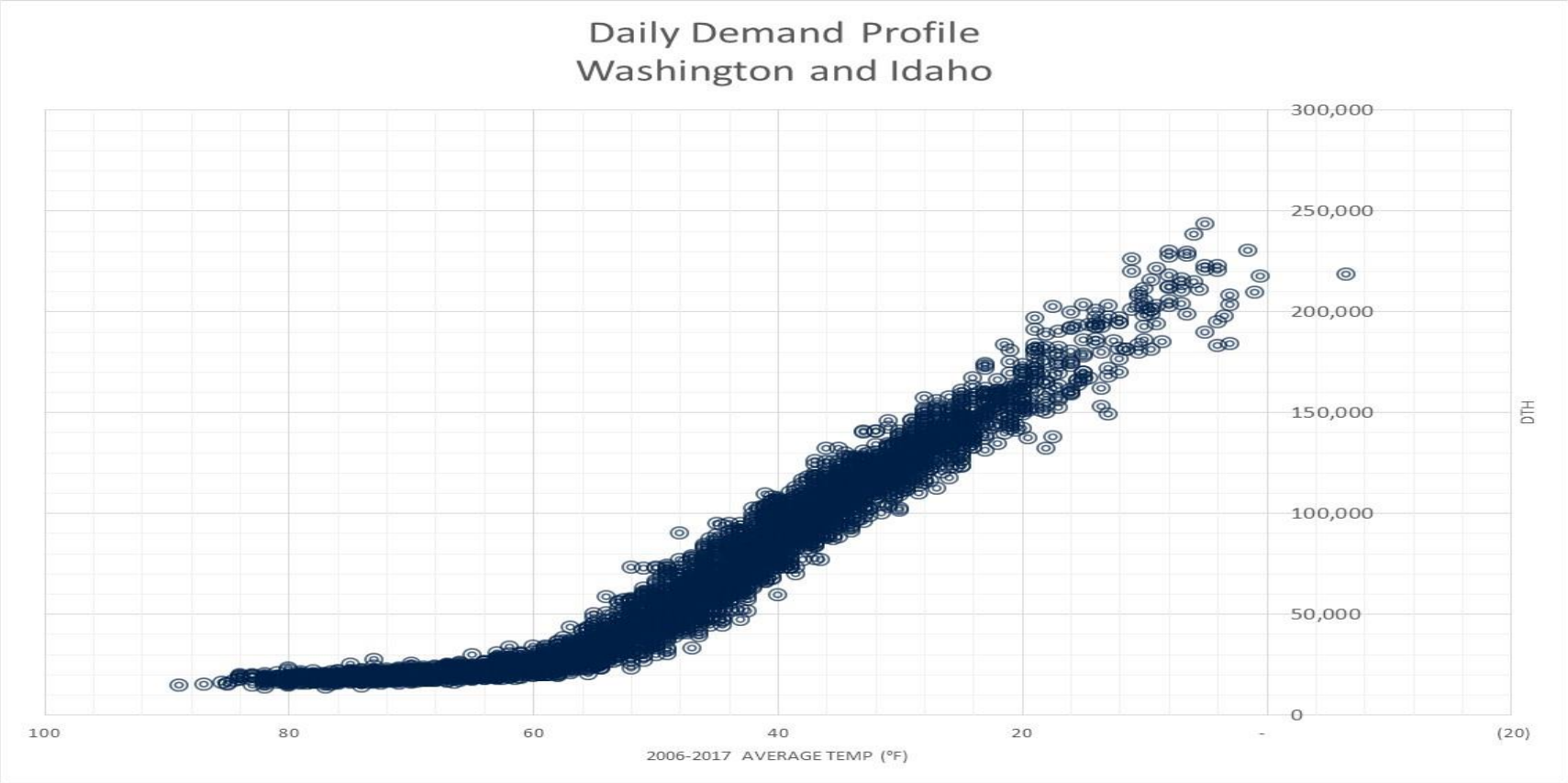






*Data is from 2006-2017

WA-ID Daily Demand Profiles



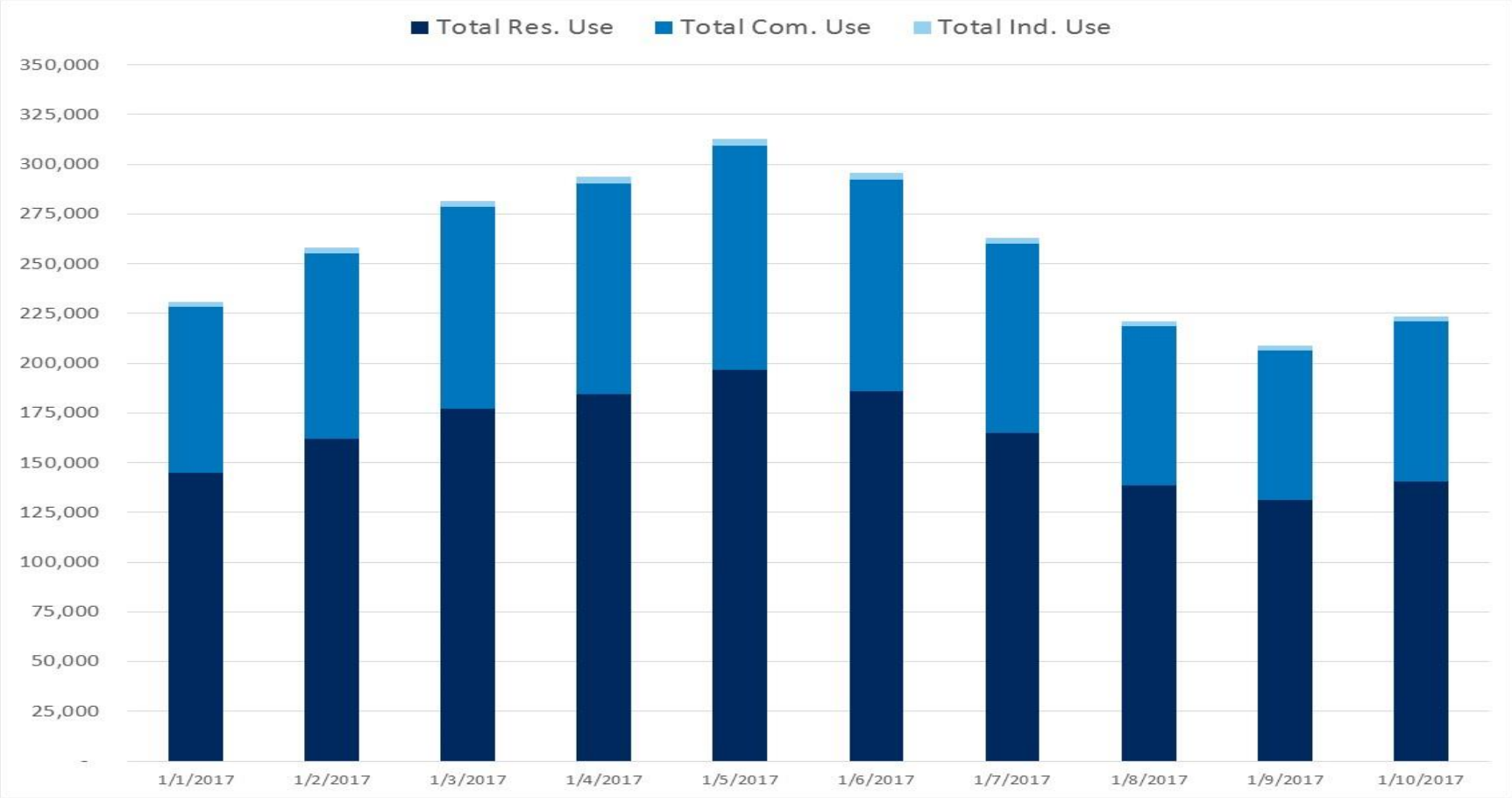
System Wide Peak Day

January 5, 2017

AREA_CODE	Min	Max	Average	HDD
Spokane	-3	14	6	59
La Grande	-9	9	0	65
Klamath Falls	-19	8	-6	71
Medford	14	32	23	42
Roseburg	19	35	27	38

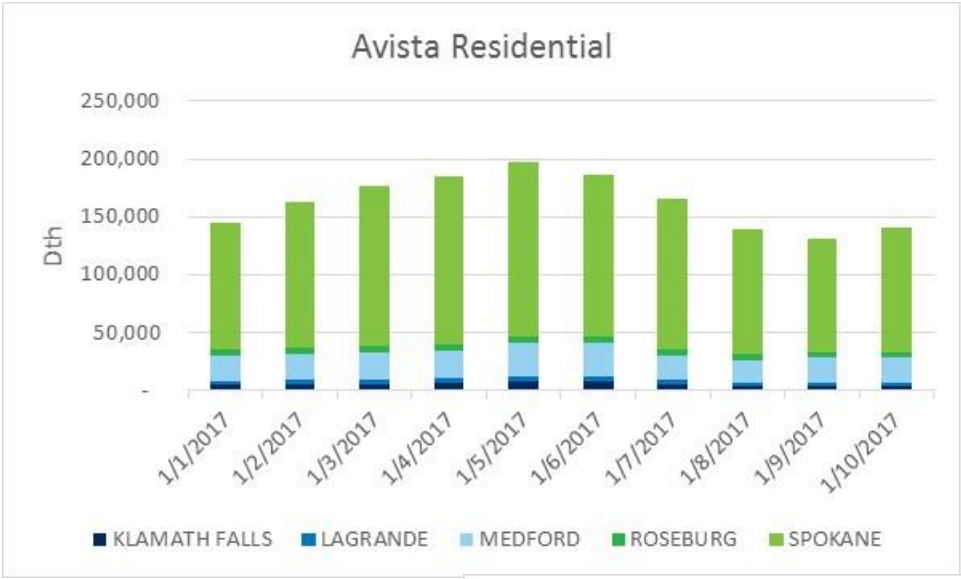
Area	Coldest in 20 Year HDD	Coldest on Record HDD
WA-ID	76	82
Klamath Falls	72	72
La Grande	74	74
Medford	54	61
Roseburg	48	55

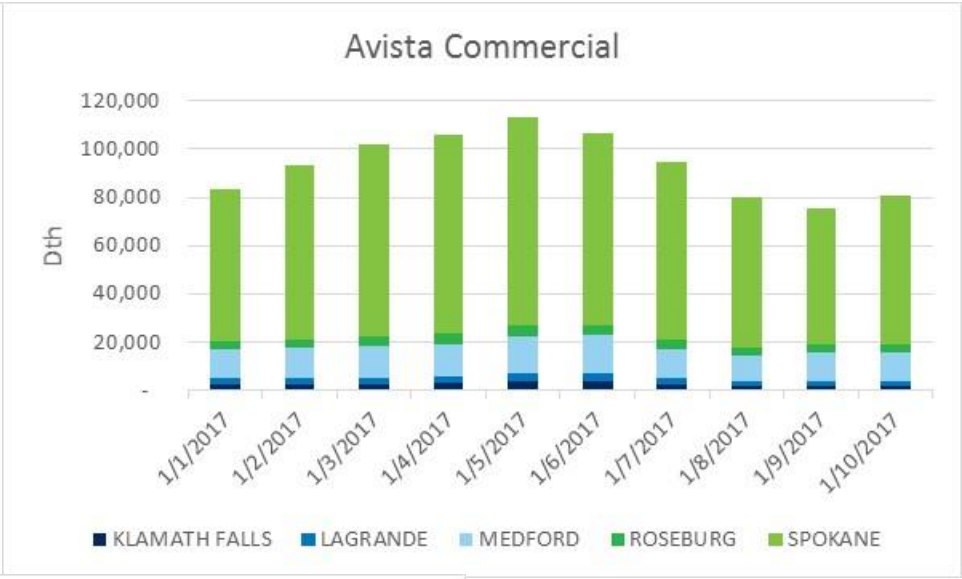
System Wide Peak Day – 1/5/2017

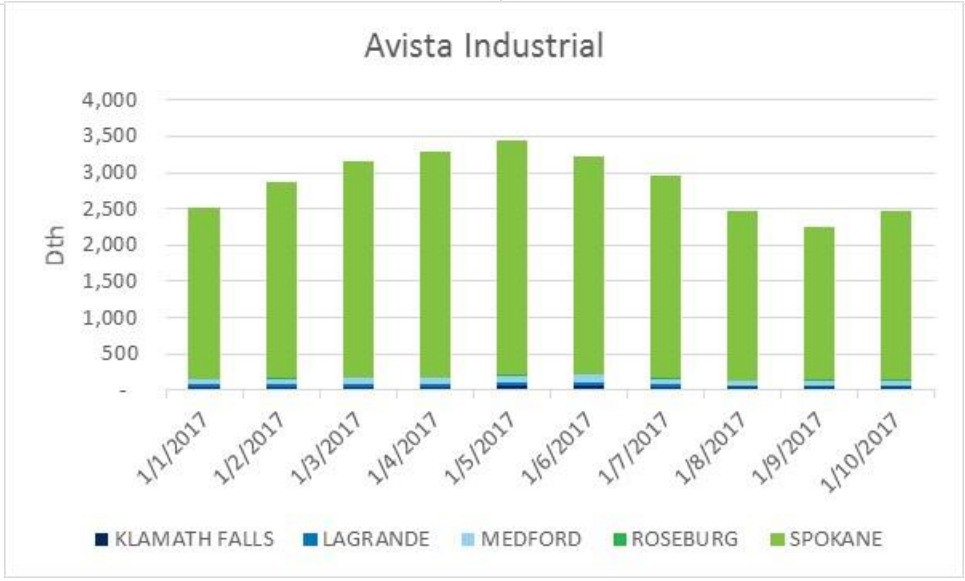


313,000 Dth

System Wide Peak Day – 1/5/2017 by class



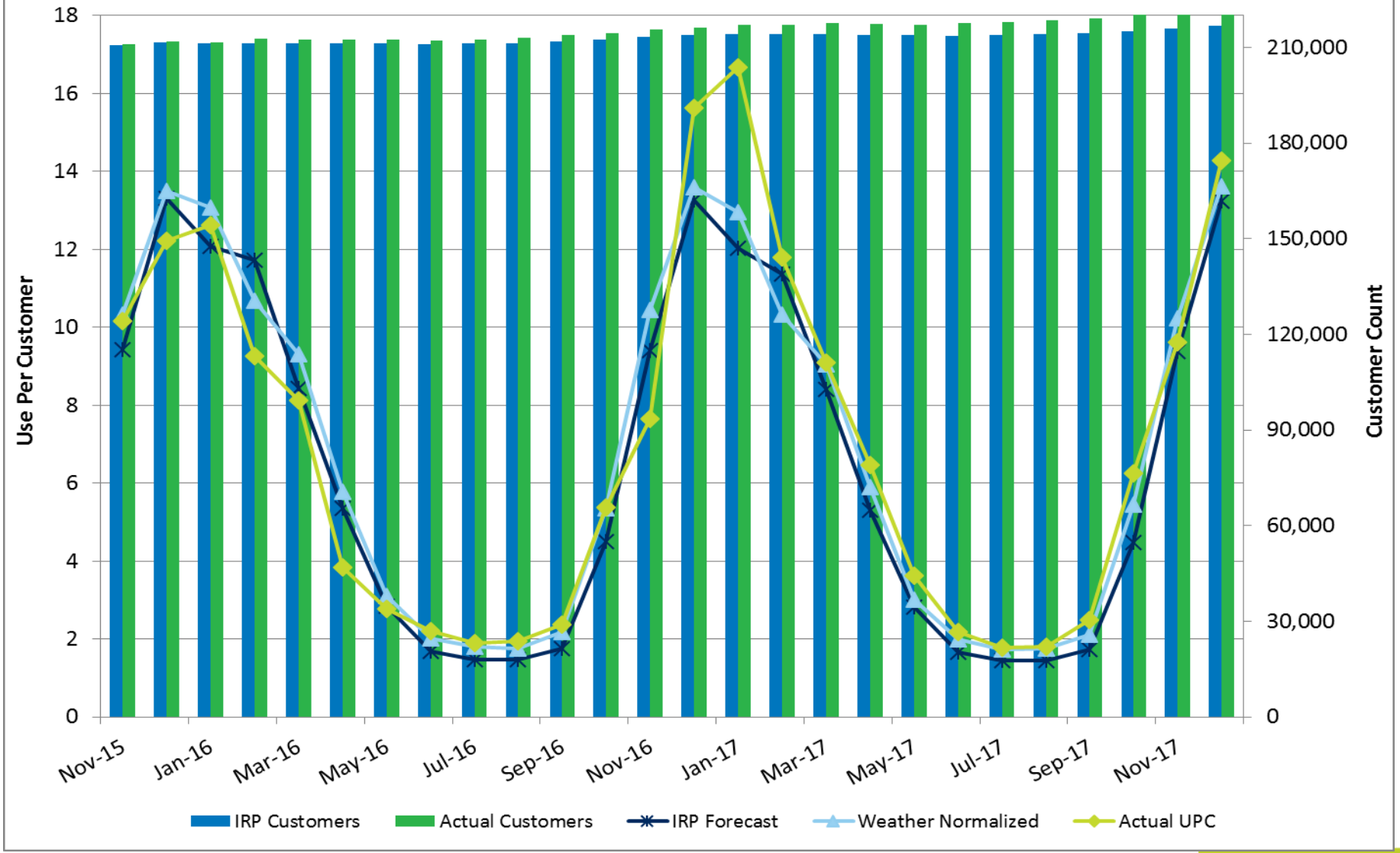




Avista's 2016 Natural Gas IRP Re-Visited

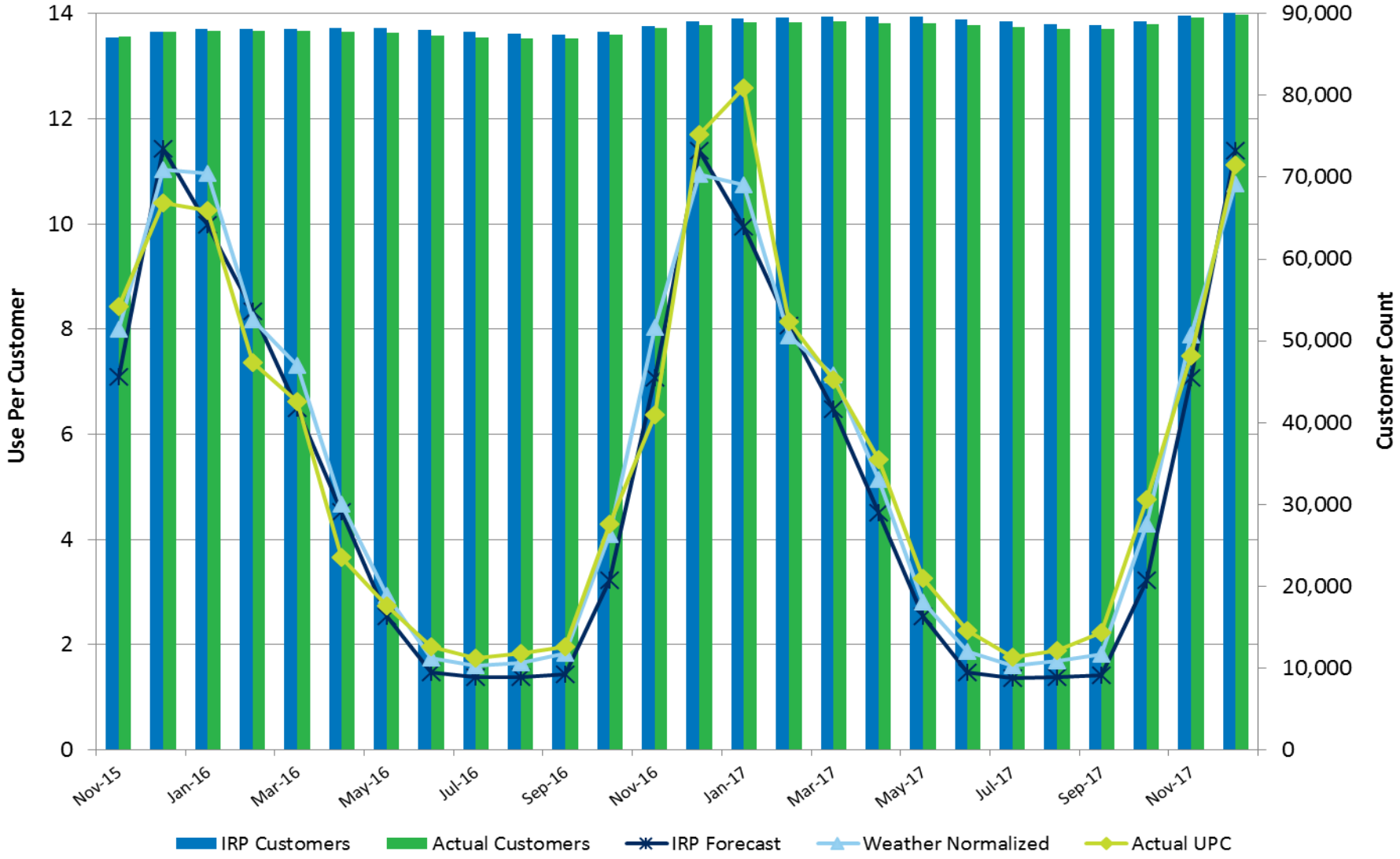
Washington/Idaho IRP Forecast vs. Actual

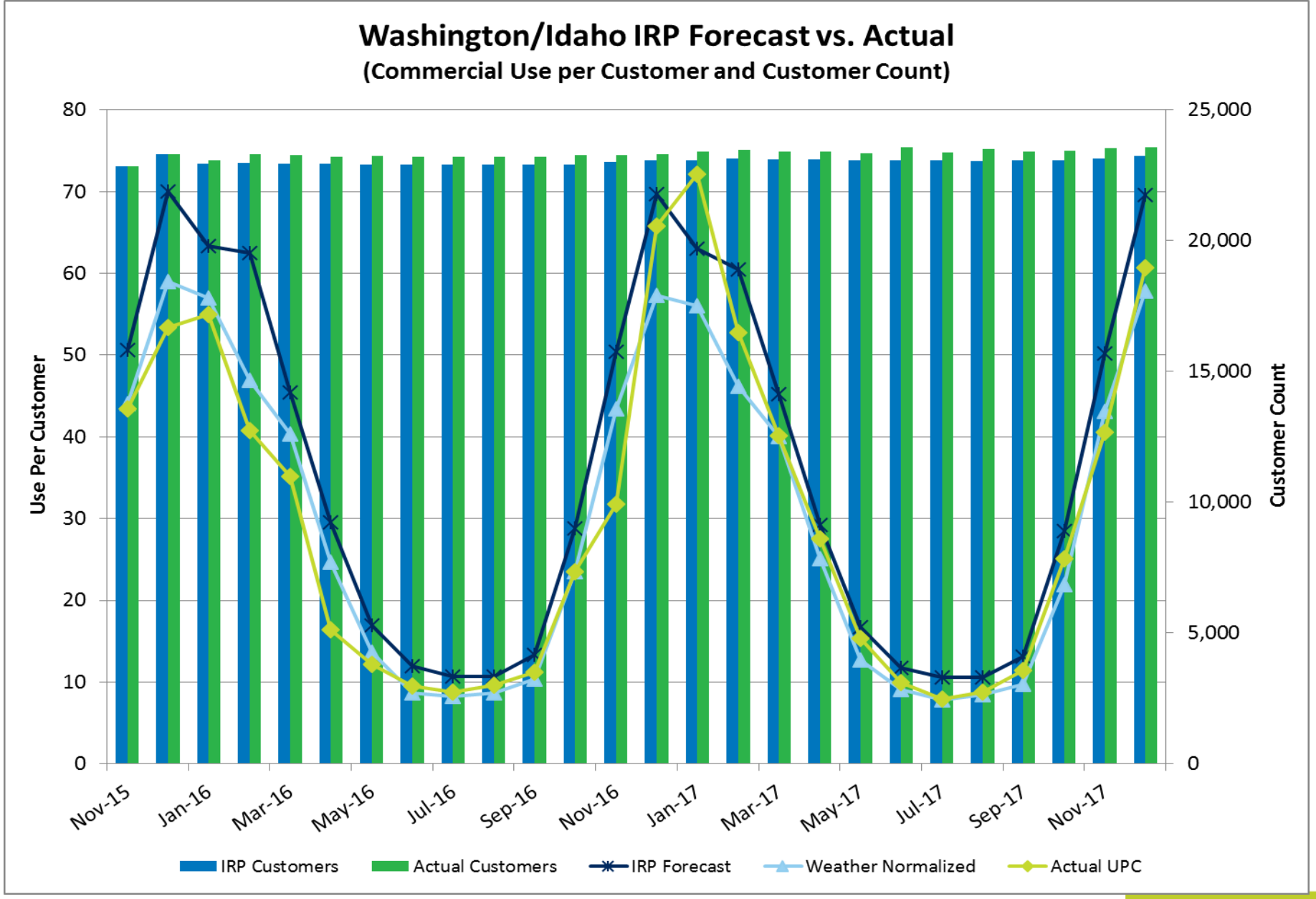
(Residential Use per Customer and Customer Count)

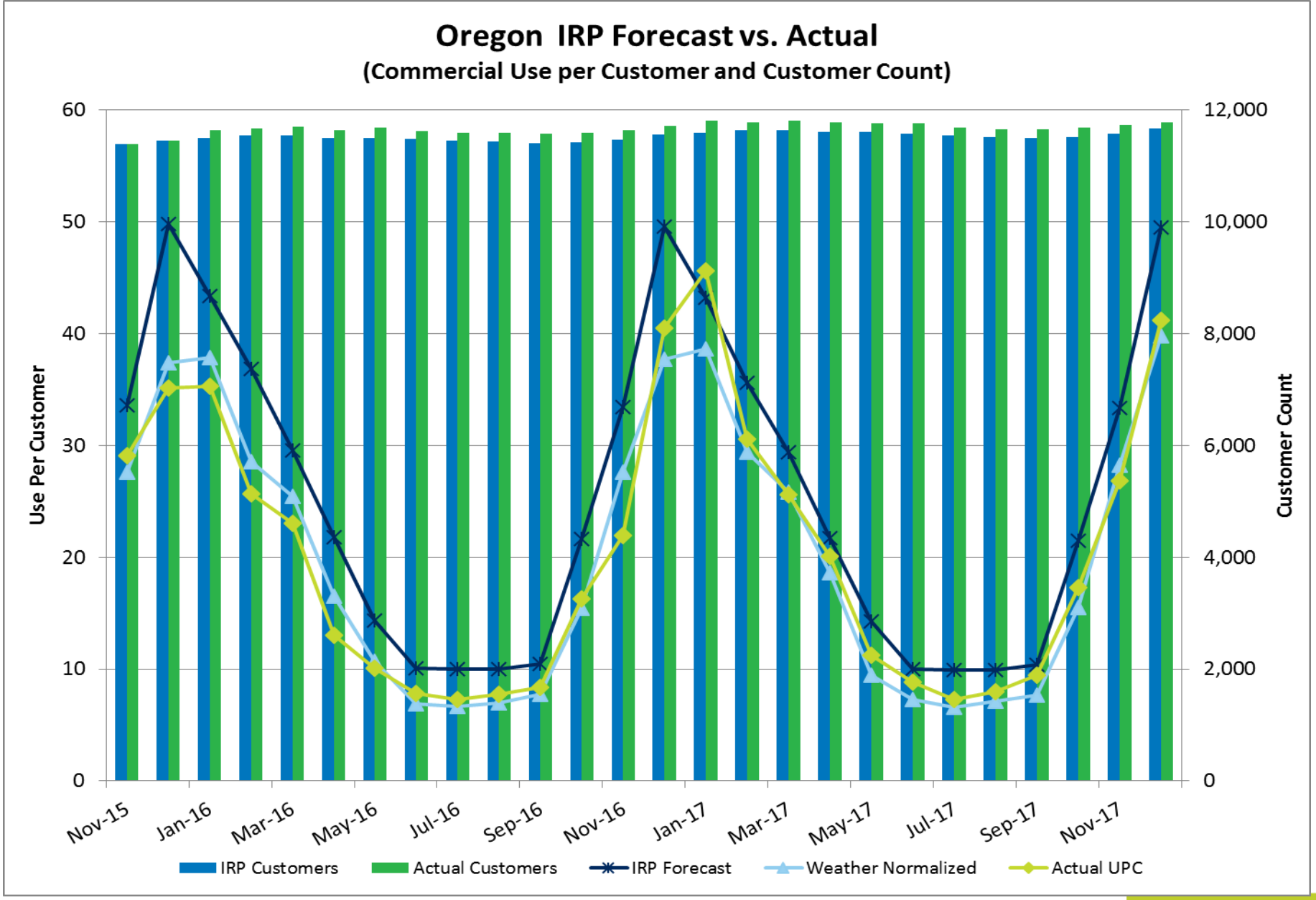


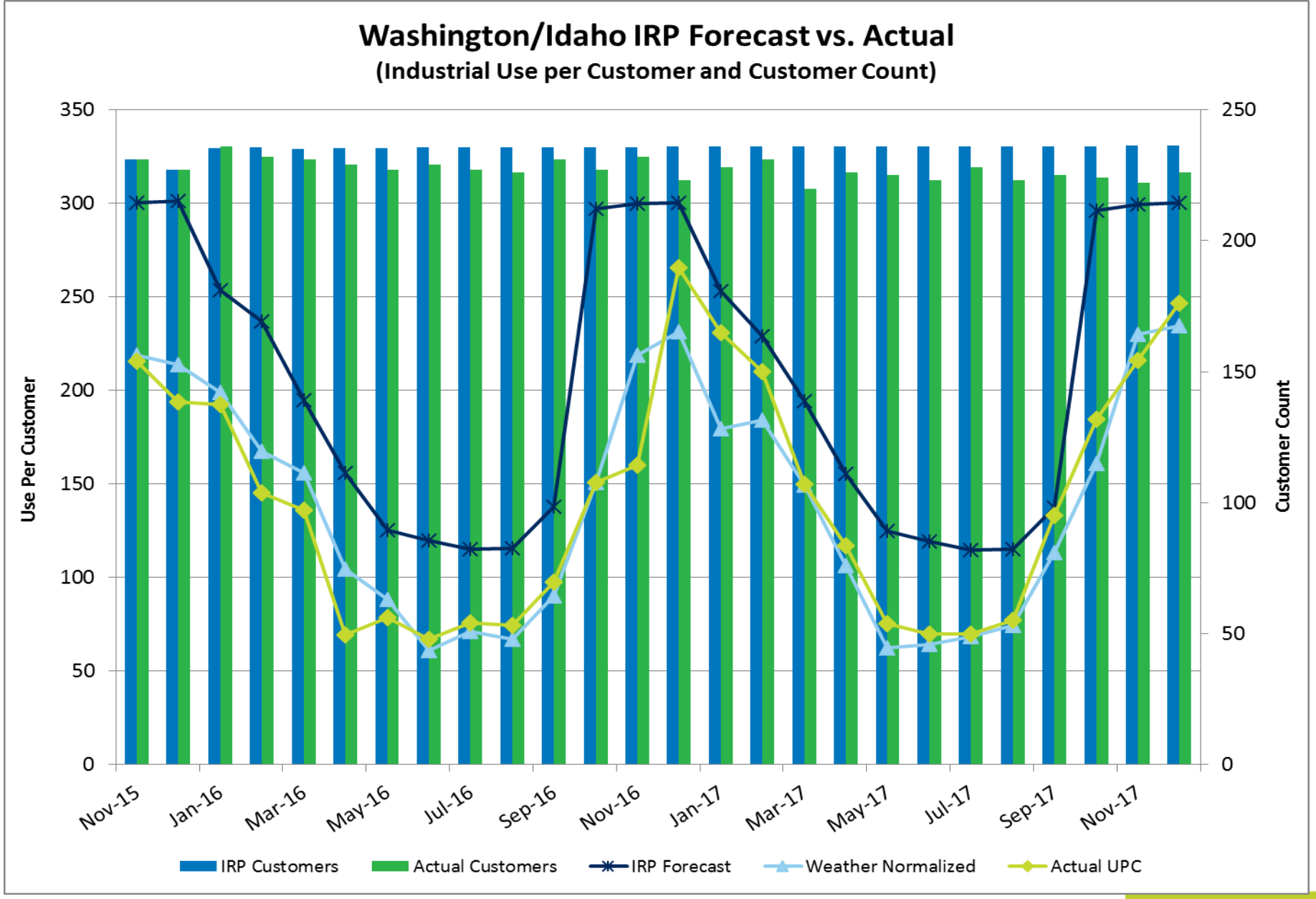
Oregon IRP Forecast vs. Actual

(Residential Use per Customer and Customer Count)



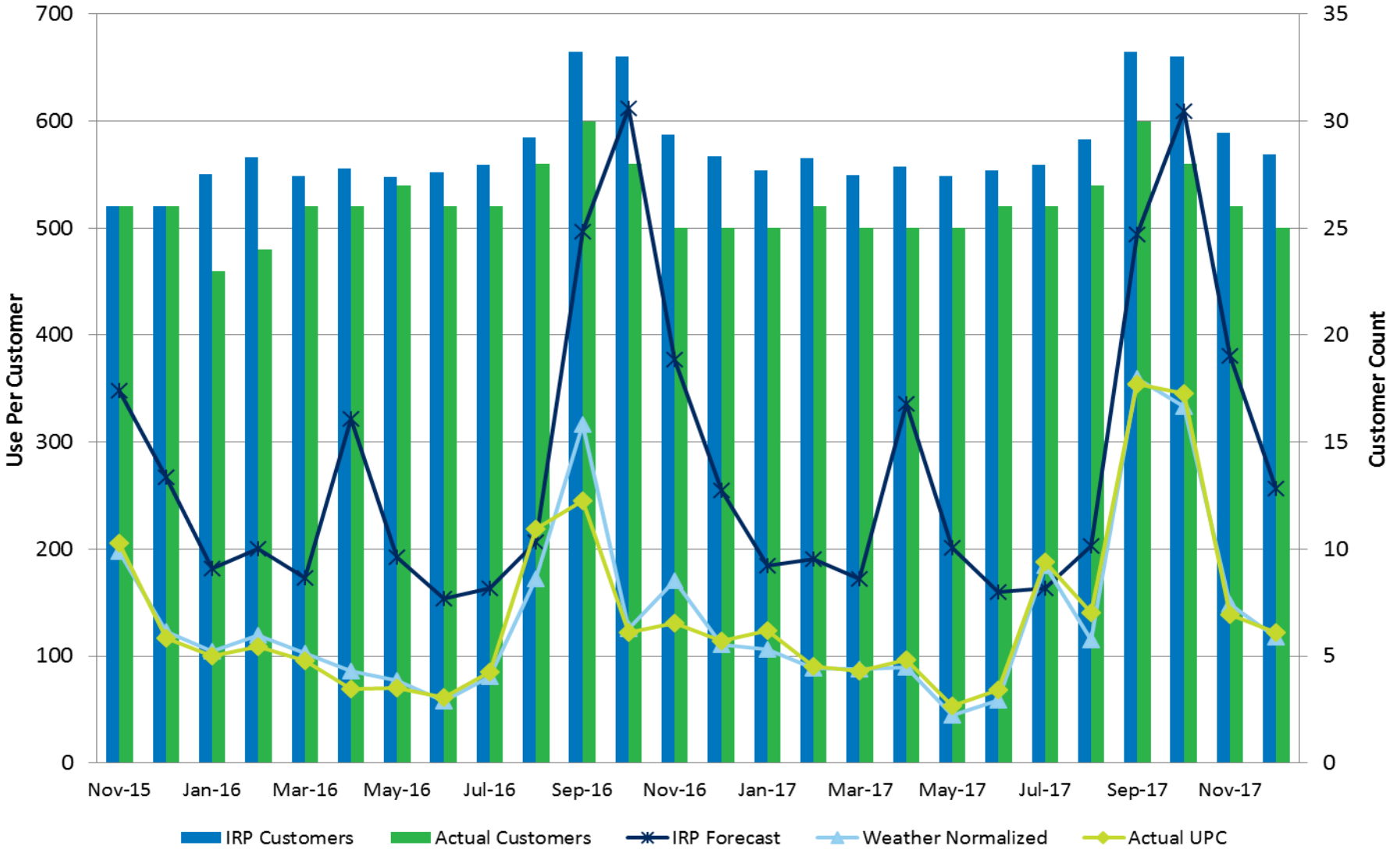

Washington/Idaho IRP Forecast vs. Actual
(Commercial Use per Customer and Customer Count)
Use Per Customer
Customer Count
80
70
60
50
40
30
20
10
0
25,000
20,000
15,000
10,000
5,000
0
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
IRP Customers
Actual Customers
IRP Forecast
Weather Normalized
Actual UPC


Oregon IRP Forecast vs. Actual
(Commercial Use per Customer and Customer Count)
Use Per Customer
Customer Count
60
50
40
30
20
10
0
12,000
10,000
8,000
6,000
4,000
2,000
0
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
IRP Customers
Actual Customers
IRP Forecast
Weather Normalized
Actual UPC

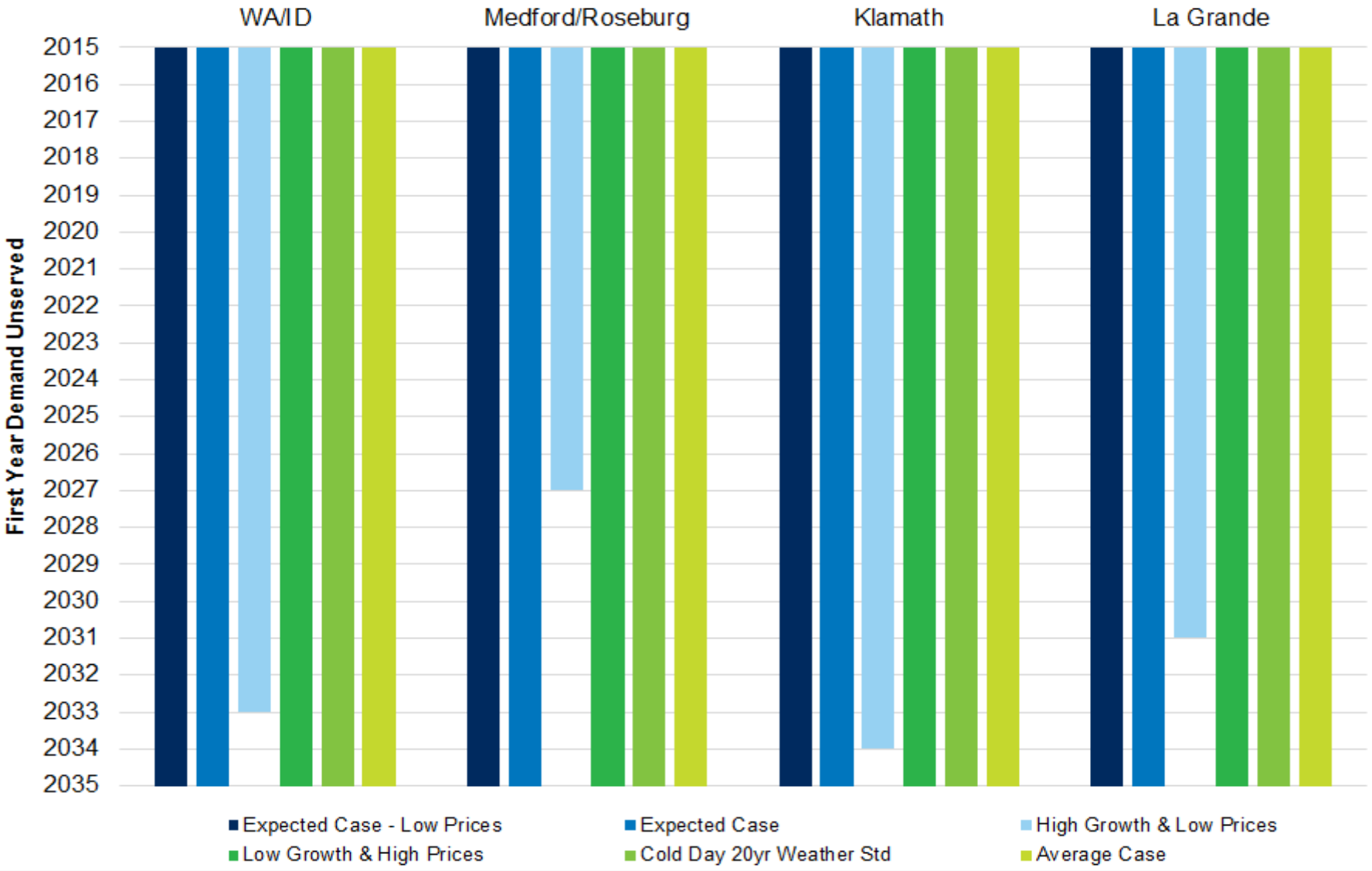

Washington/Idaho IRP Forecast vs. Actual
(Industrial Use per Customer and Customer Count)
Use Per Customer
Customer Count
350
300
250
200
150
100
50
0
250
200
150
100
50
0
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
IRP Customers
Actual Customers
IRP Forecast
Weather Normalized
Actual UPC

Oregon IRP Forecast vs. Actual

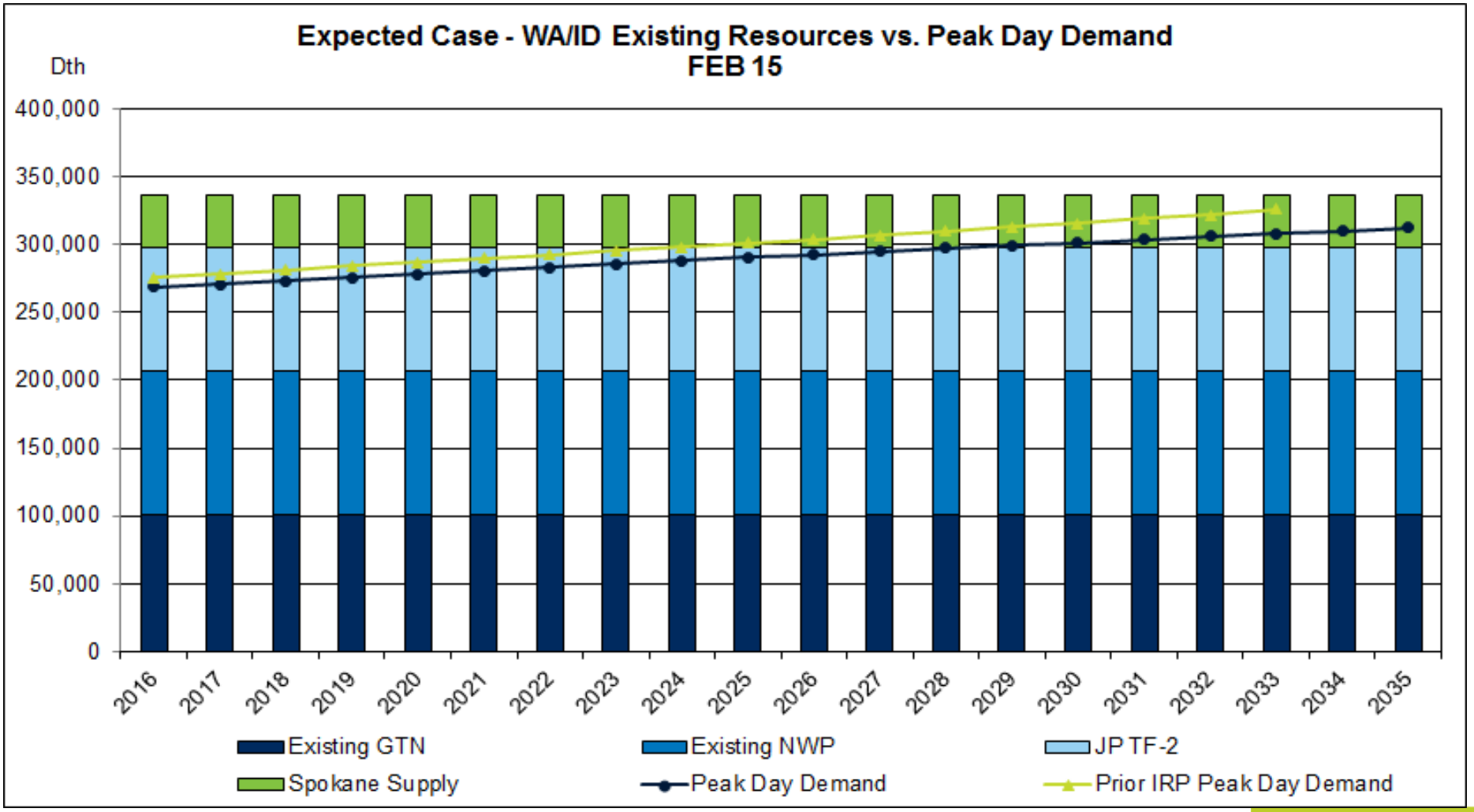
(Industrial Use per Customer and Customer Count)



First Year Peak Demand Not Met with Existing Resources
Scenario Comparisons

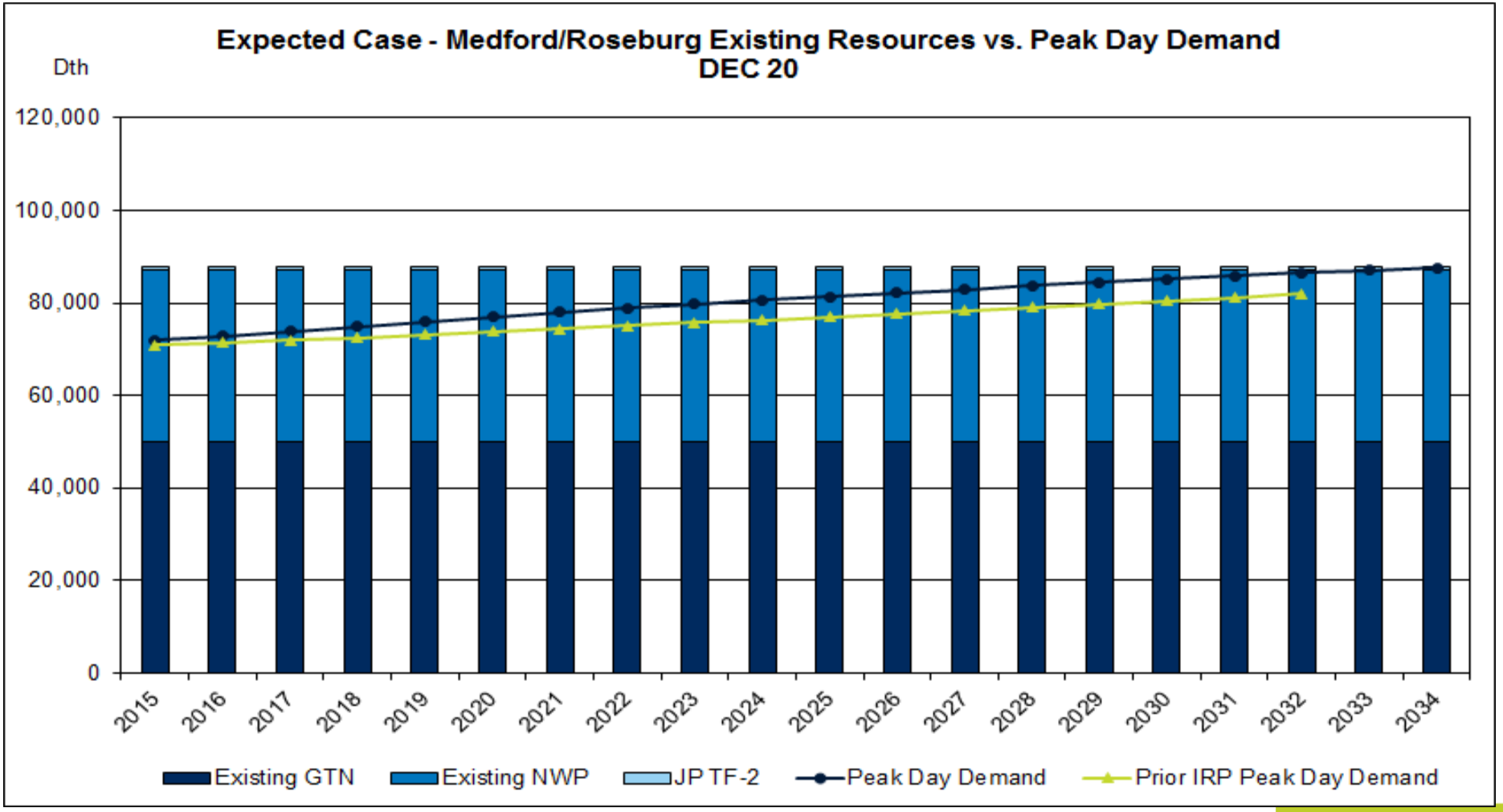


Existing Resources vs. Peak Day Demand



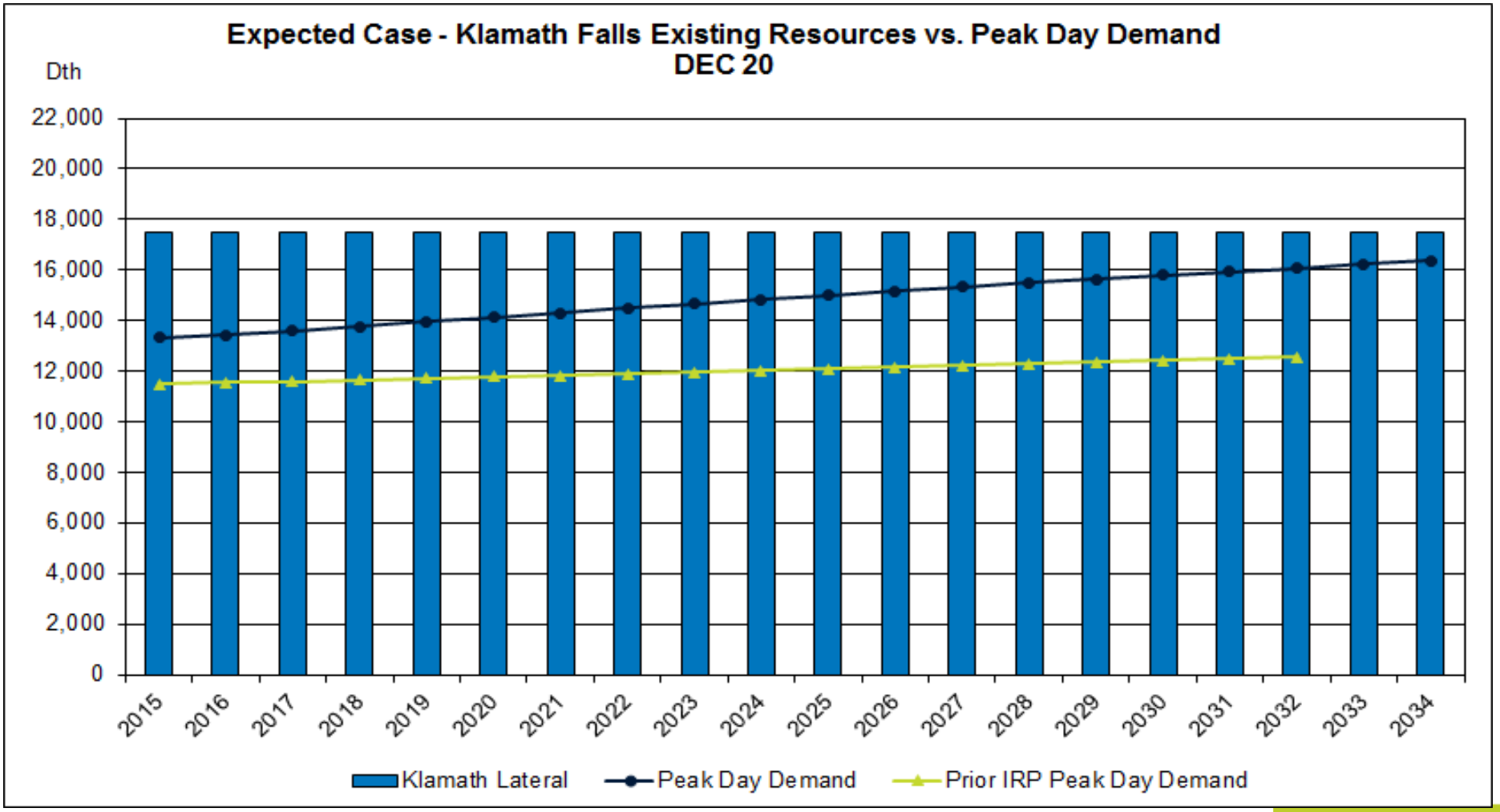
Existing Resources vs. Peak Day Demand

Expected Case – Medford/Roseburg



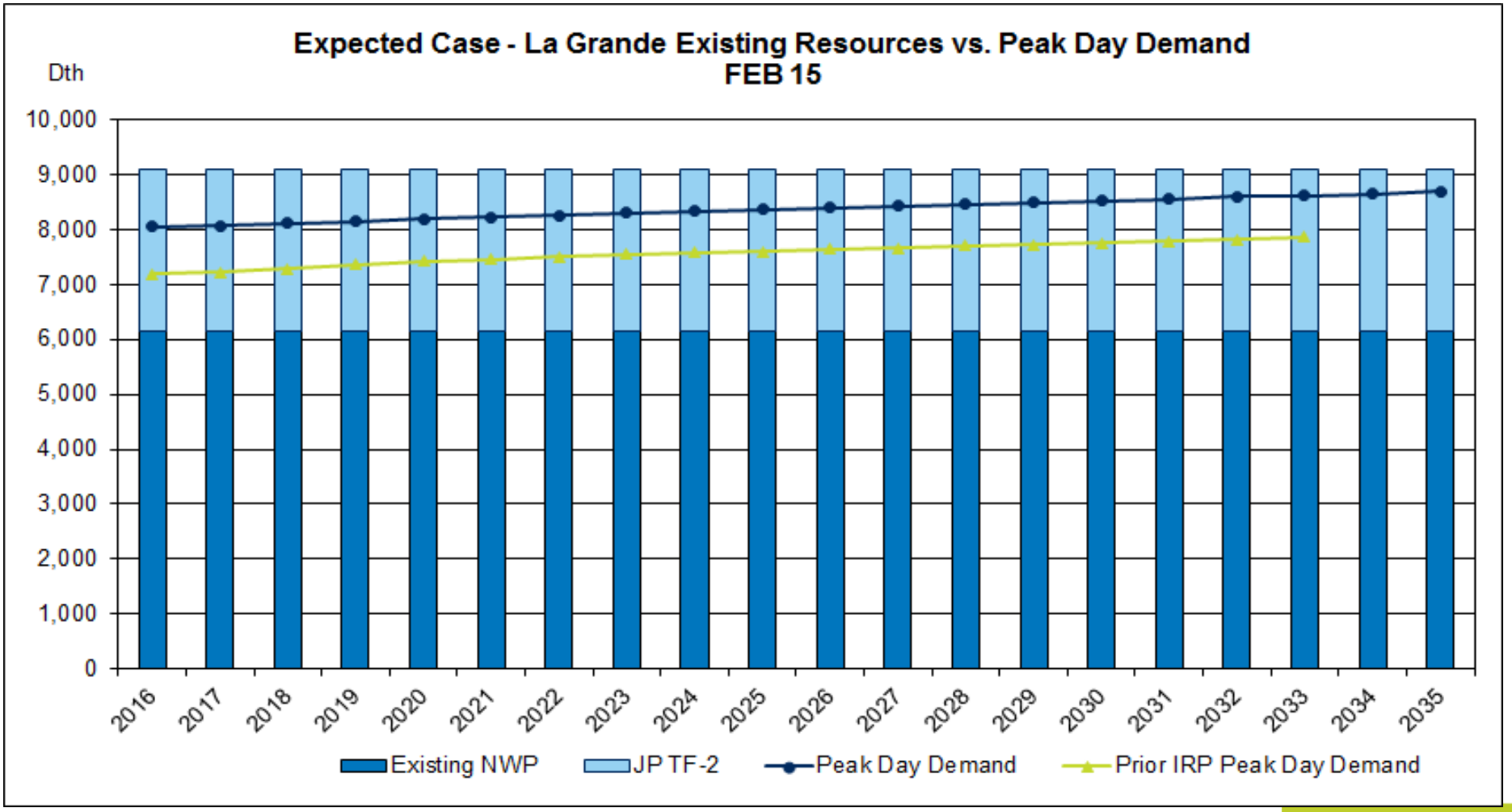
Existing Resources vs. Peak Day Demand

Expected Case – Klamath Falls

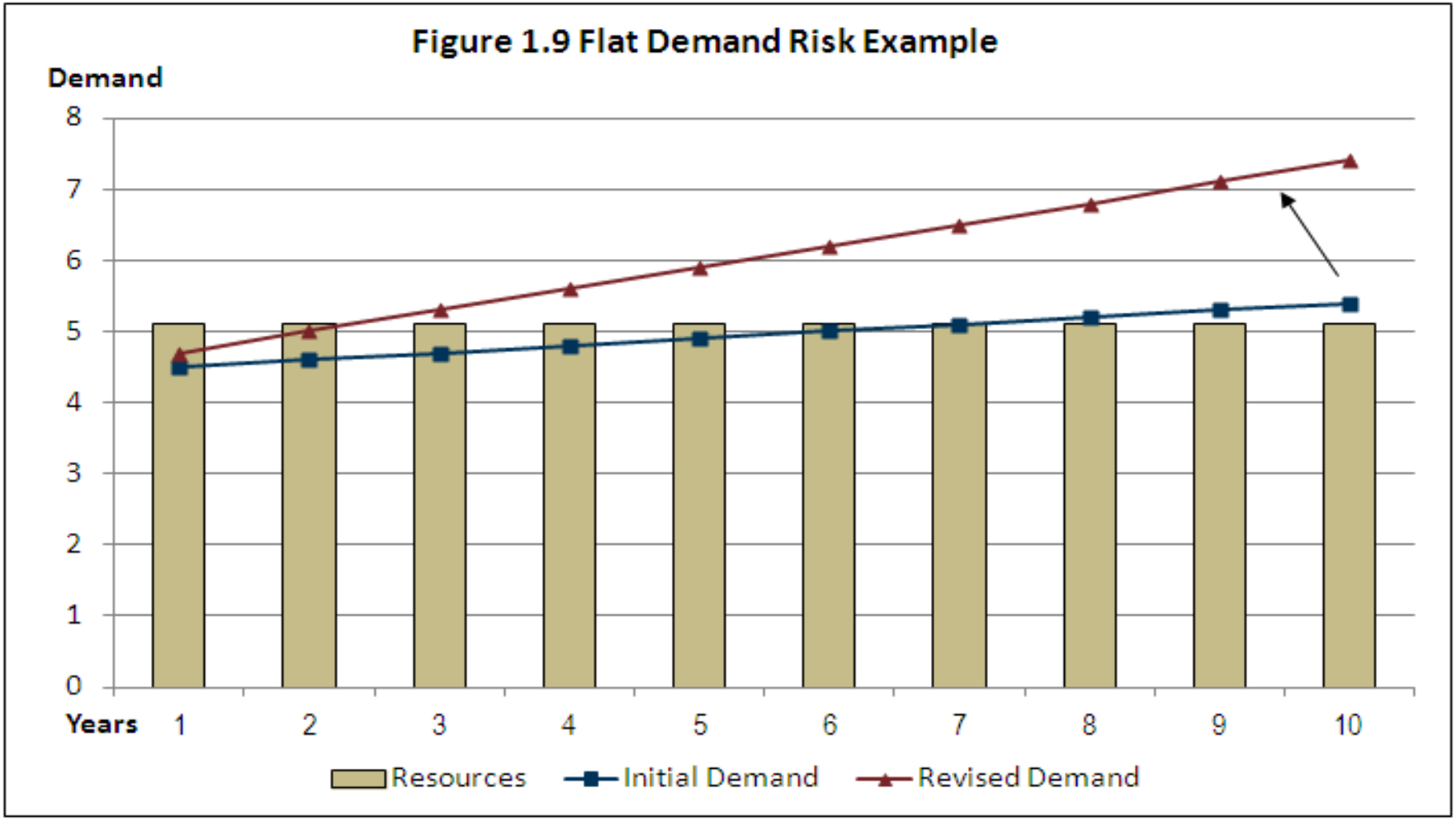


Existing Resources vs. Peak Day Demand

Expected Case – La Grande



Our Biggest Risk Last IRP
"Flat Demand" Risk



2016 IRP Final Action Items

IPUC

- Staff believes public participation could be further enhanced through “bill stuffers, public flyers, local media, individual invitations, and other methods.”
- Result: Avista utilized it’s Regional Business Managers in addition to digital communications and newsletters in all states in order to try and gain more public participation. Previous IRP’s relied on website data and word of mouth.
  - eCommunity newsletter was sent out on January 15, 2018

OPUC

- Staff Recommendation No. 1
  - Staff recommends in Avista's 2018 IRP that Avista pursue an updated methodology, wherein the low/high gas price curves continue to be based on low (high) historic prices in a Monte Carlo setting, but are inflated to match the growth rate (yr/yr) of the expected price curve. The resulting curves wouid be based on historic prices and also produce symmetric .risk profiles throughout the time horizon.
- Staff Recommendation No. 2
  - Staff recommends that Avista forecast its number of customers using at least two different methods and to compare the accuracy of the different methods using actual data as a future task in its next IRP.
  - Result: Avista analyzed the data, but there was nothing material discovered the come up with a meaningful forecast alternative.
- Staff Recommendation No. 3
  - Avista's 2018 IRP will contain a dynamic DSM program structure in its analytics.
    - In, prior IRPs, it was a deterministic method based on Expected Case assumptions, in the 2018 IRP, each portion will have the ability to select conservation to meet unserved customer demand, Avista will explore methods to enable a dynamic analytical process for the evaluation of conservation potential within individual portfolios and will work with Energy Trust of Oregon in the development of this process and in producing any final results for its 2018 IRP for Oregon customers.

OPUC cont.

- Staff Recommendation No. 4
  - Staff recommends that Avista provide Staff and stakeholders with updates regarding its discussions and analysis regarding possible regional pipeline projects that may move forward.
- Staff Recommendation No. 5
  - Staff recommends that in its 2018 IRP process Avista work with Staff and stakeholders to establish and complete stochastic analysis that considers a range of alternative portfolios for comparison and consideration of both cost and risk.
- Staff Recommendation No. 6
  - Environmental Considerations
    - 1. Carbon Policy including federal and state regulations, specifically those surrounding the Washington Clean Air Rule and federal Clean Power Plan;
    - 2. Weather analysis specific to Avista's service territories;
    - 3. Stochastic Modeling and supply resources; and
    - 4. Updated DSM methodology including the integration of ETO

WUTC

- Include a section that discusses impacts of the Clean Air Rule (CAR).
  - In its 2018 IRP expected case, Avista should model specific CAR impacts as well as consider the costs and risk of additional environmental regulations, including a possible carbon tax.
- Provide more detail on the company's natural gas hedging strategy, including information on upper and lower pricing points, transactions with counterparties, and how diversification of the portfolio is achieved.
- Ensure that the entity performing the CPA evaluates and includes the following information:
  - All conservation measures excluded from the CPA, including those excluded prior to technical potential determination
  - The rationale for excluding any measure
  - A description of Unit Energy Savings (UES) for each measure included in the CPA, specifying how it was derived and the source of the data
  - The rationale for any difference in economic and achievable potential savings, including how the Company is working towards an achievable target of 85 percent of economic potential savings.
  - A description of all efforts to create a fully-balanced cost effectiveness metric within the planning horizon based on the TRC.

WUTC cont.

- Discuss with the TAC:
  - The results of Northwest Energy Efficiency Alliance (NEEA) coordination, including non-energy benefits to include in the CPA.
  - The appropriateness of listing and mapping all prospective distribution system enhancement projects planned on the 20 year horizon, and comparing actual projects completed to prospective projects listed in previous IRP's.
- Provide a rationale for any difference in economic and achievable potential savings

2017 – 2018 Avista's Action Plan

- The price of natural gas has dropped significantly since the 2014 IRP. This is primarily due to the amount of economically extractable natural gas in shale formations, more efficient drilling techniques, and warmer than normal weather. Wells have been drilled, but left uncompleted due to the poor market economics. This is depressing natural gas prices and forcing many oil and natural gas companies into bankruptcy. Due to historically low prices Avista will research market opportunities including procuring a derivative based contract, 10-year forward strip, and natural gas reserves.
- Result: After exploring the opportunity of some type of reserves ownership, it was determined the price as compared to risk of ownership was inappropriate to go forward with at this time. As an ongoing aspect of managing the business, Avista will continue to look for opportunities to help stabilize rates and/or reduce risk to our customers.
- Monitor actual demand for accelerated growth to address resource deficiencies arising from exposure to "flat demand" risk. This will include providing Commission Staff with IRP demand forecast-to-actual variance analysis on customer growth and use-per-customer at least bi-annually.
- Result: actual demand was closely tracked and shared with Commissions in semi-annual or quarterly meetings.

Ongoing Activities

- Continue to monitor supply resource trends including the availability and price of natural gas to the region, LNG exports, methanol plants, supply and market dynamics and pipeline and storage infrastructure availability.
- Monitor availability of resource options and assess new resource lead-time requirements relative to resource need to preserve flexibility.
- Meet regularly with Commission Staff to provide information on market activities and significant changes in assumptions and/or status of Avista activities related to the IRP or natural gas procurement practices.
- Appropriate management of existing resources including optimizing underutilized resources to help reduce costs to customers.

Avista Natural Gas Forecasting

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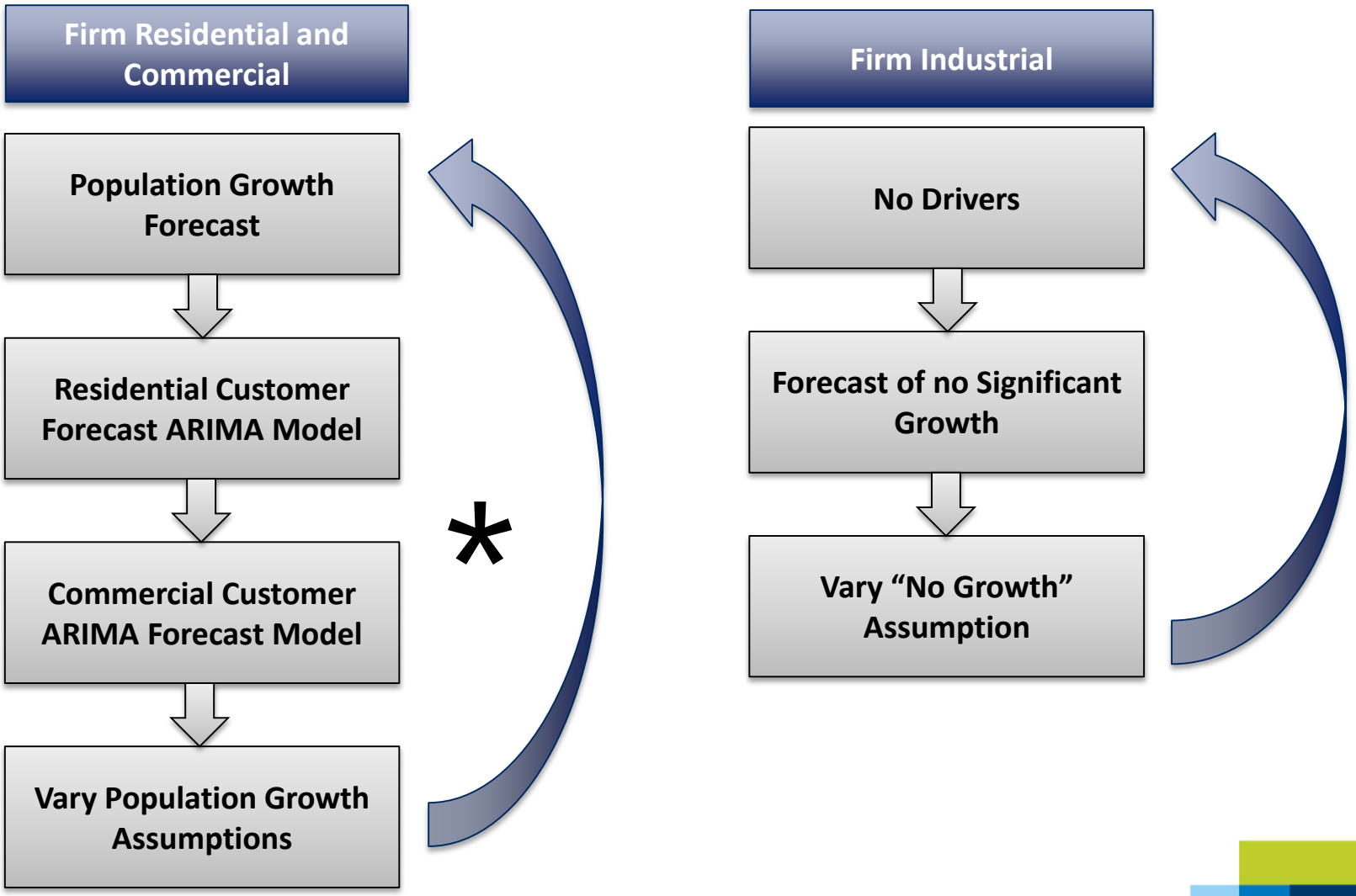
Load Forecasts-Two Step Process

- First, forecast customers (C) by month by schedule (s) by residential (r), commercial (c), industrial (i)—for example, $C_{t,y,s.r}$
- Forecast use per customer (U) by month by schedule by class—for example, $U_{t,y,s.r}$
- Load forecast (L) is the product of the two:

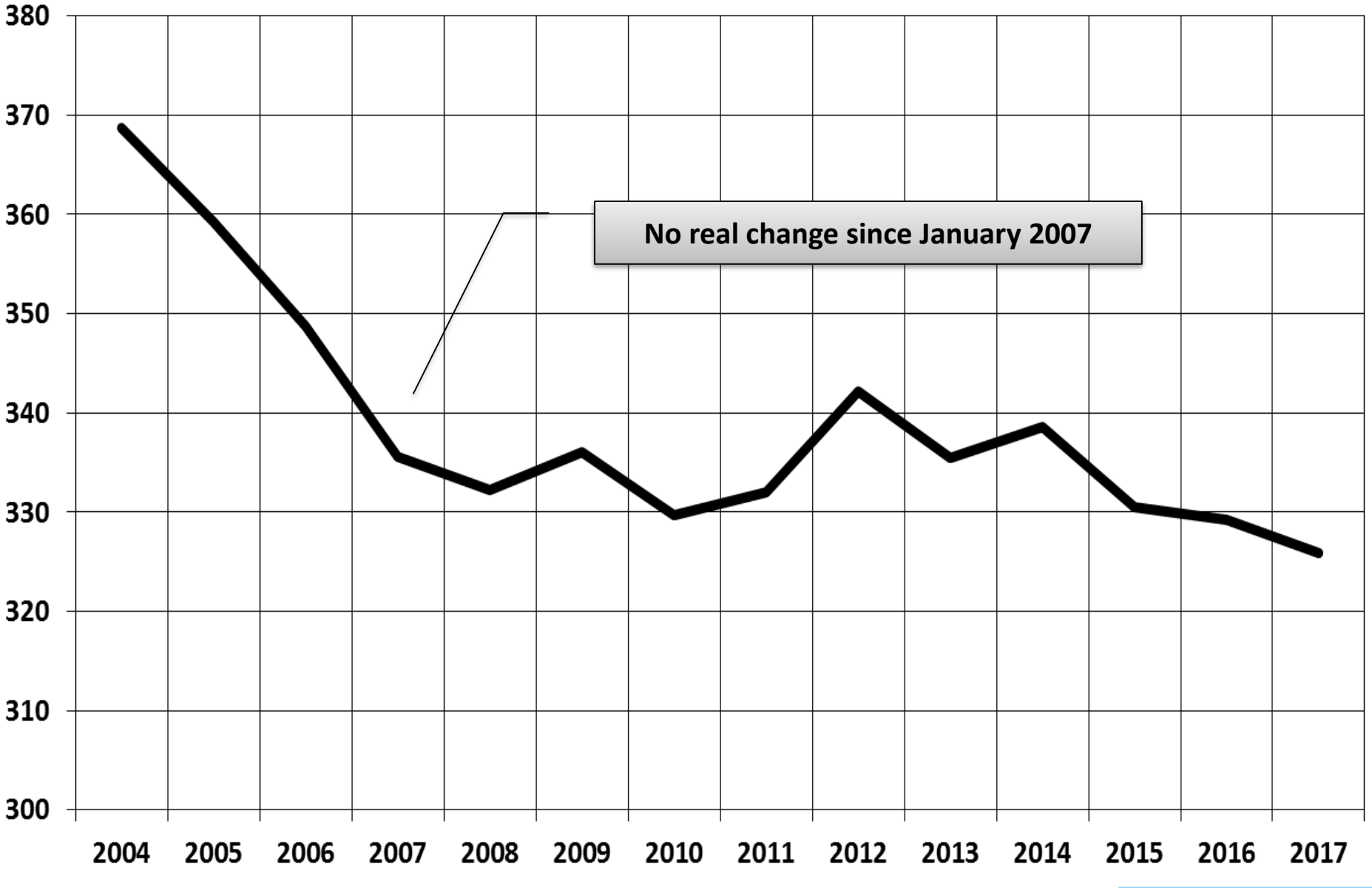
$$L_{t,y,s.r} = C_{t,y,s.r} \times U_{t,y,s.r}$$

For weather sensitive schedules a 20-yr MA defines normal weather.

The Basic Forecast Approach



System Industrial Customers, 2004-2017



Getting to Population as a Driver, 2018-2023 & 2024-2037

2018-2023 For Spokane, WA; Kootenai, ID, and Jackson, OR counties

Average GDP Growth Forecasts:
- **IMF, FOMC, Bloomberg, etc.**
- **Average forecasts out 6-yrs.**

GDP

Non-farm Employment Growth Model:
- **Model links year y, y-1, and y-2 GDP growth to year y regional employment growth.**
- **Forecast out 6-yrs.**
- **Averaged with GI forecasts.**

EMP

Regional Population Growth Models:
- **Model links regional, U.S., and CA year y-1 employment growth to year y county population growth.**
- **Forecast out 6-yrs for Spokane, WA; Kootenai, ID; and Jackson, OR.**
- **Averaged with IHS forecasts.**
- **Growth rates used to generate population forecasts for customer forecasts for residential schedules 101 and 410.**

Kootenai and Jackson: IHS population growth forecasts for 2024-2037

Spokane: OFM population growth forecasts for 2024-2037

OR Union, Klamath, and Douglas counties: IHS population growth forecasts for 2018-2037

Interpolation assumes: $P_N = P_0 e^{rN}$

The Relationship Between Classes

Residential customer growth is approximately equal to population growth in the long-run.

Commercial customer growth is highly correlated with residential growth in the long-run.

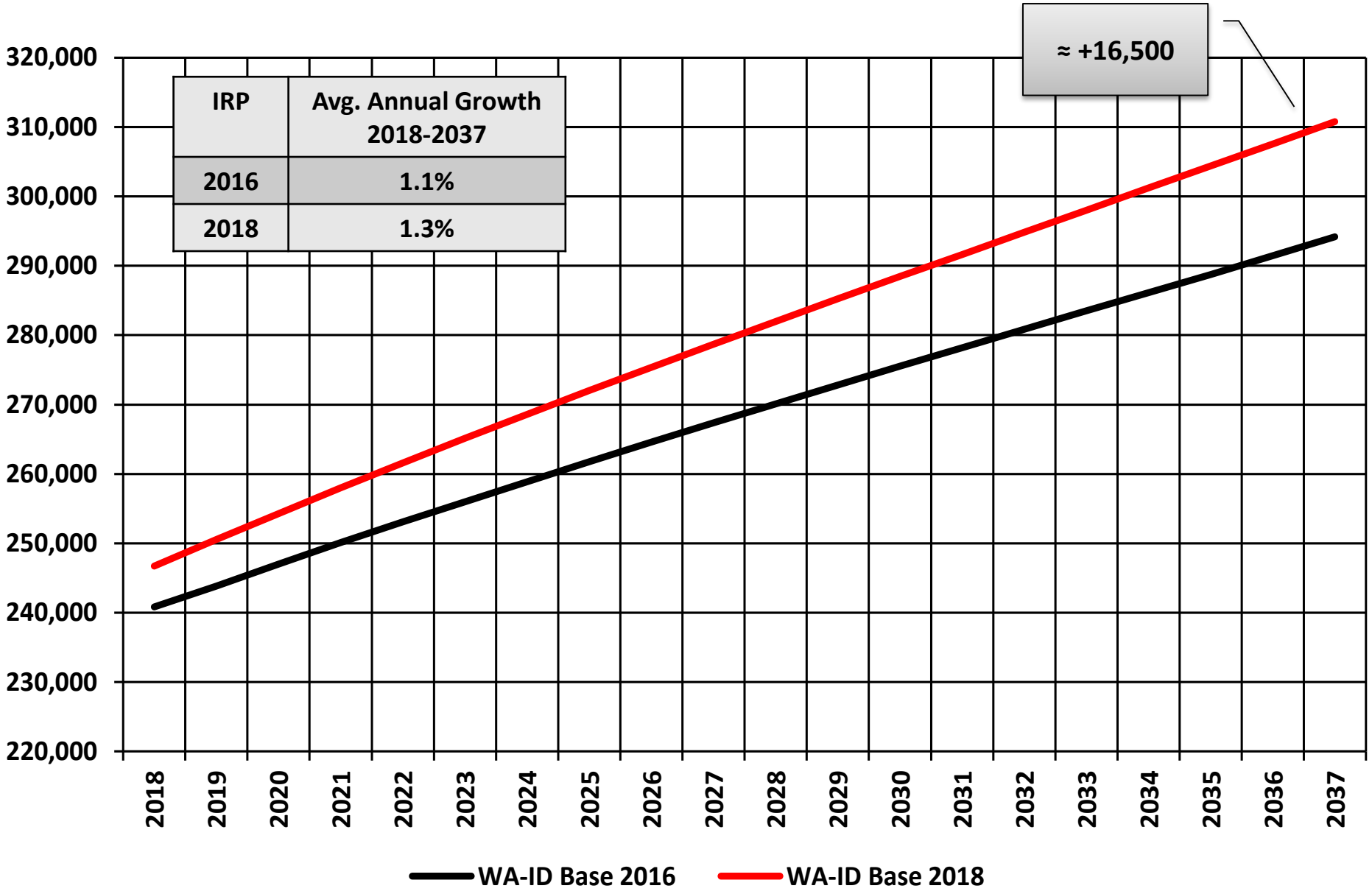
Year-over-year Growth, Gas Correlations by Class, Jan. 2005-Jan 2016

Customers	Residential	Commercial	Industrial
Residential	1.00		
Commercial	0.80	1.00	
Industrial	-0.38	-0.23	1.00

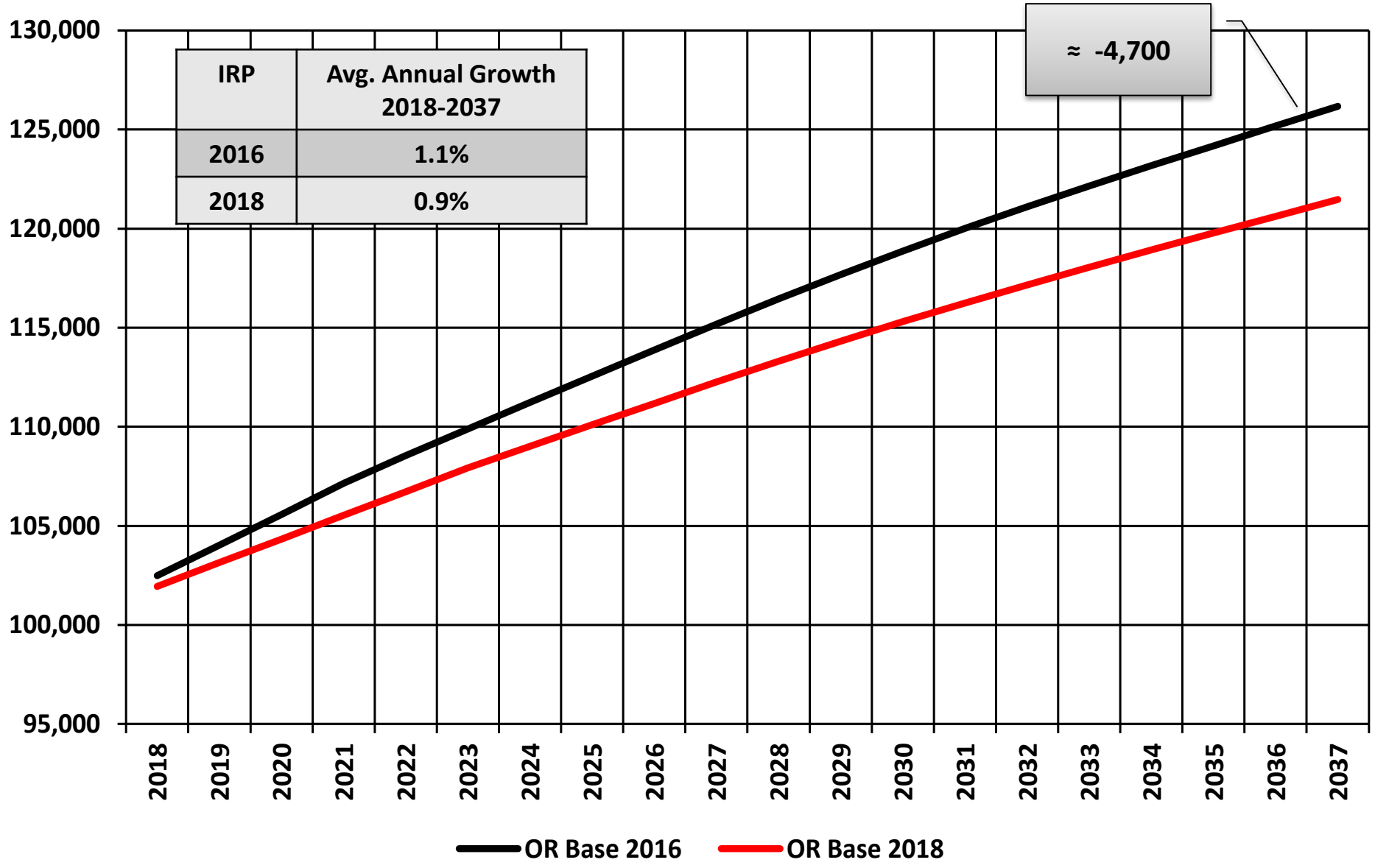
Load	Residential	Commercial	Industrial
Residential	1.00		
Commercial	0.94	1.00	
Industrial	0.21	0.24	1.00

Industrial's correlation to residential is lower and negative. Customer numbers stable or slightly declining.

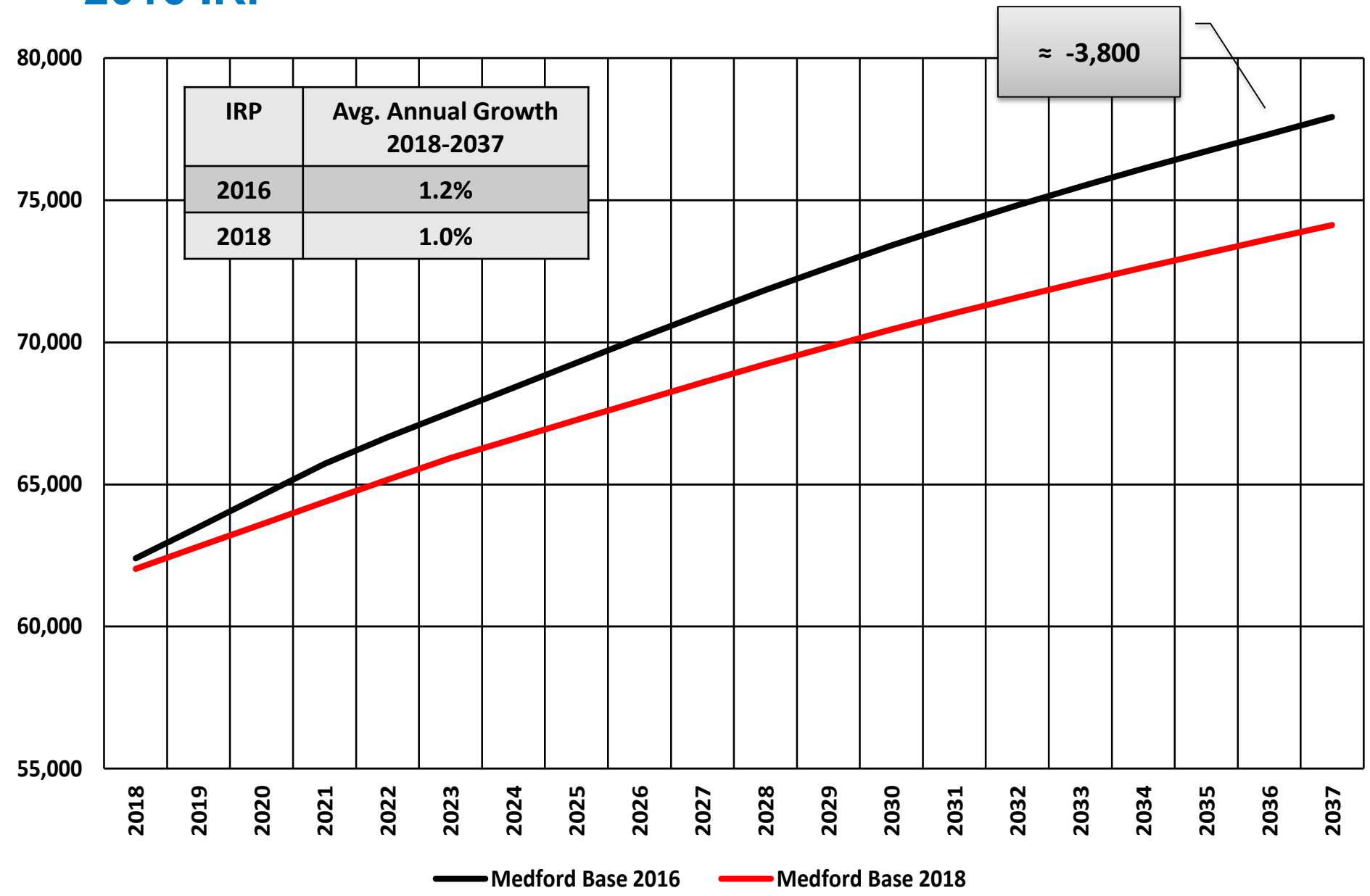
WA-ID Region Firm Customers: 2018 IRP and 2016 IRP



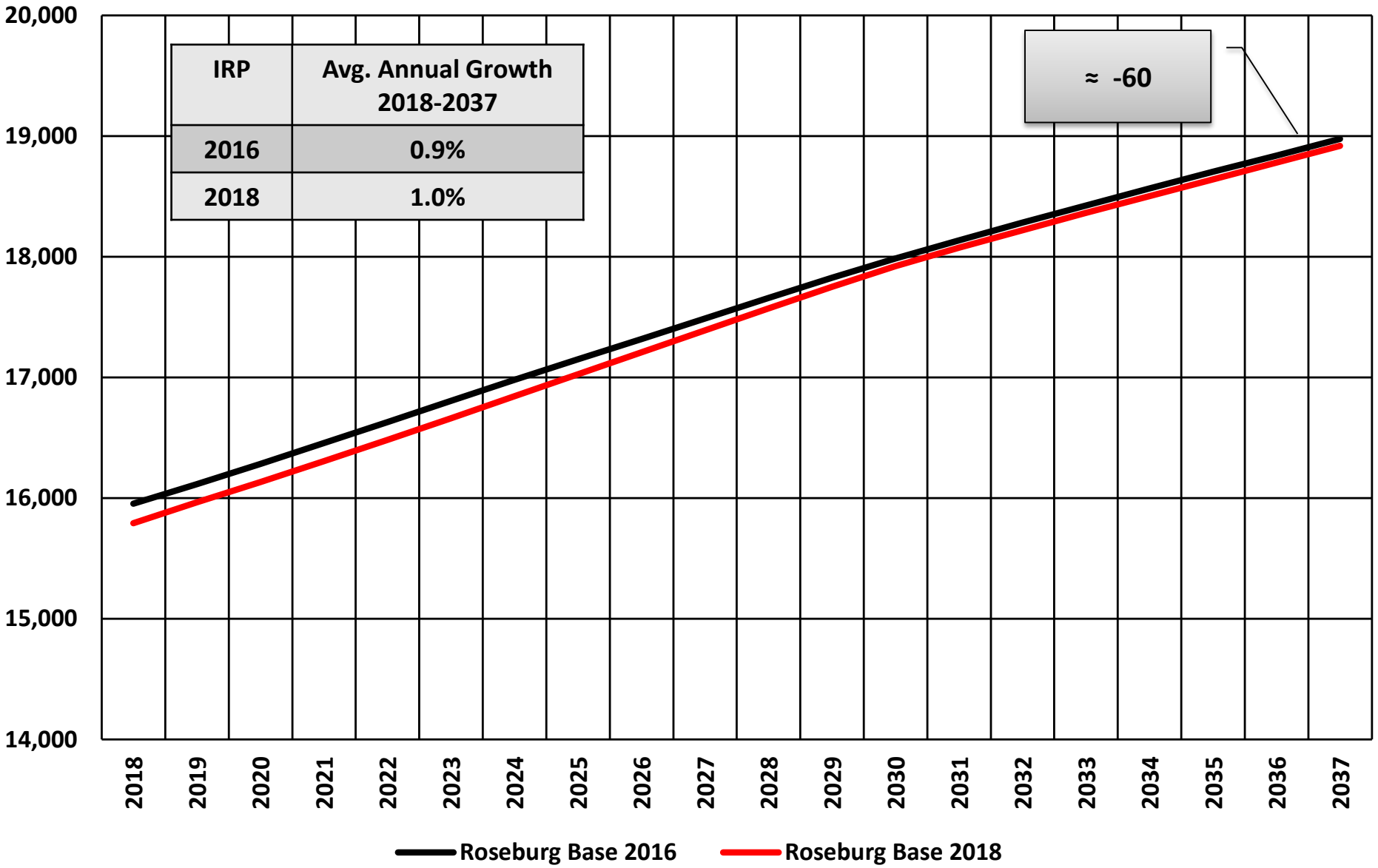
OR Region Firm Customers: 2018 IRP and 2016 IRP



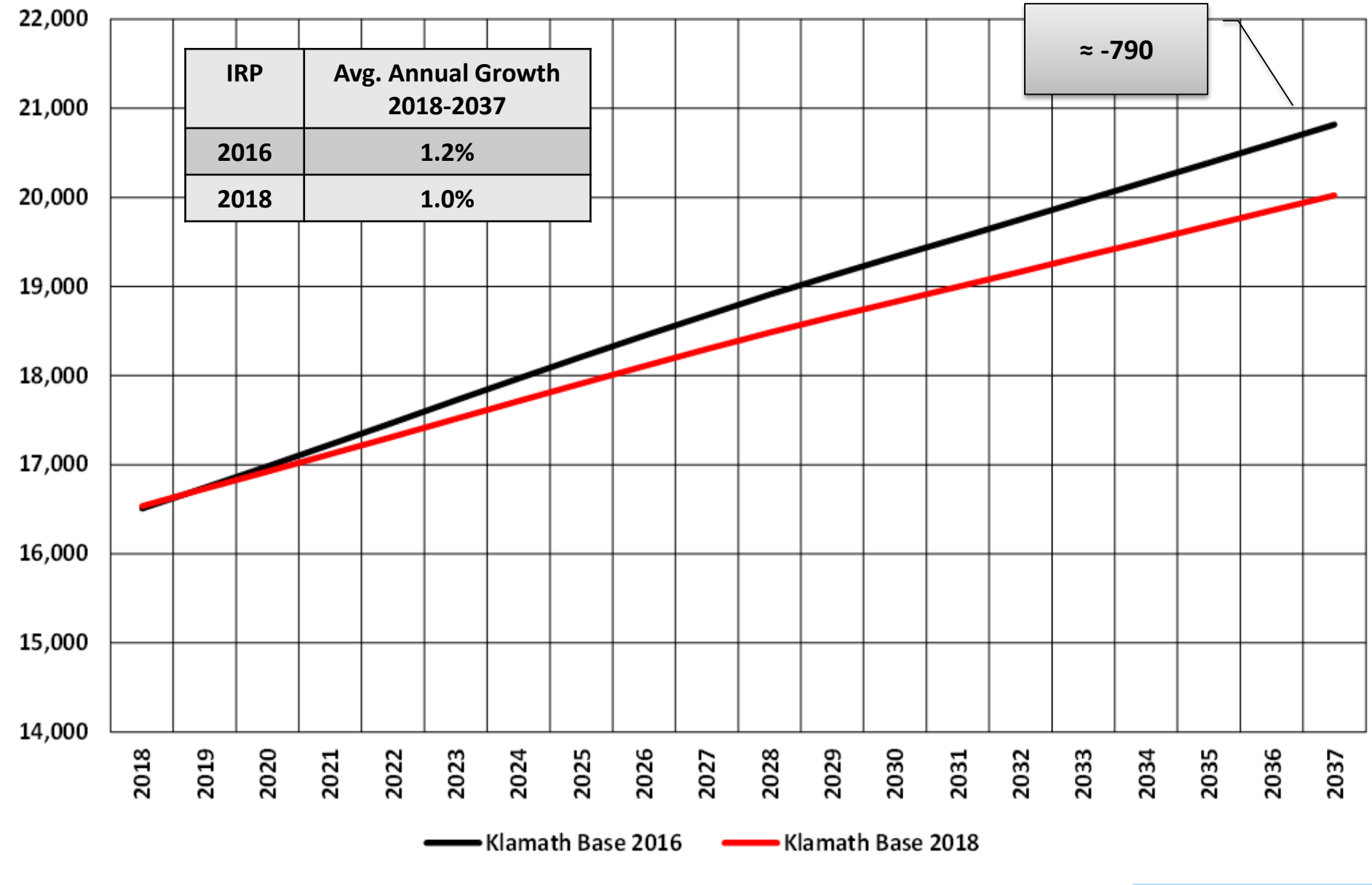
Medford, OR Region Firm Customers: 2018 IRP and 2016 IRP



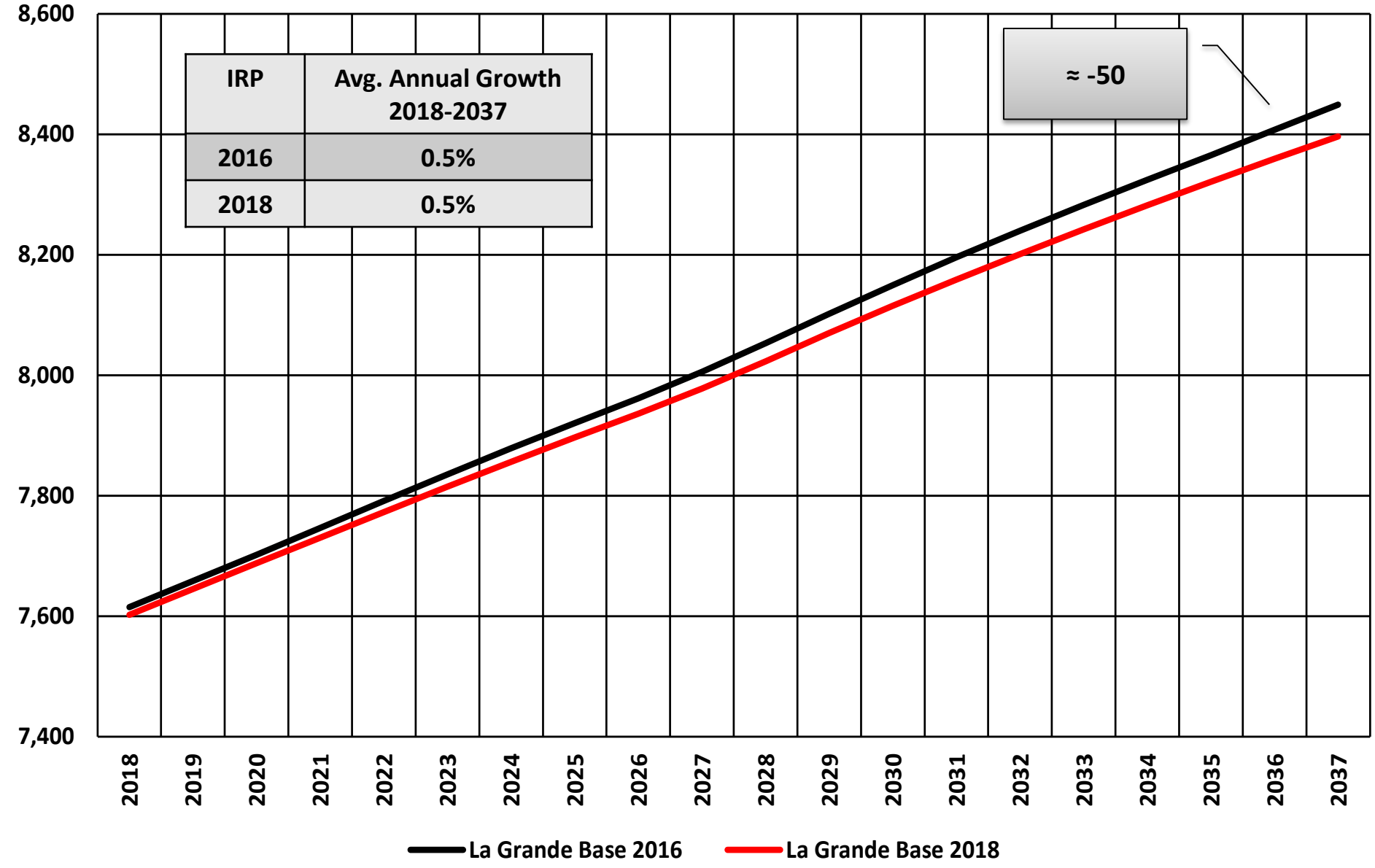
Roseburg, OR Region Firm Customers: 2018 IRP and 2016 IRP



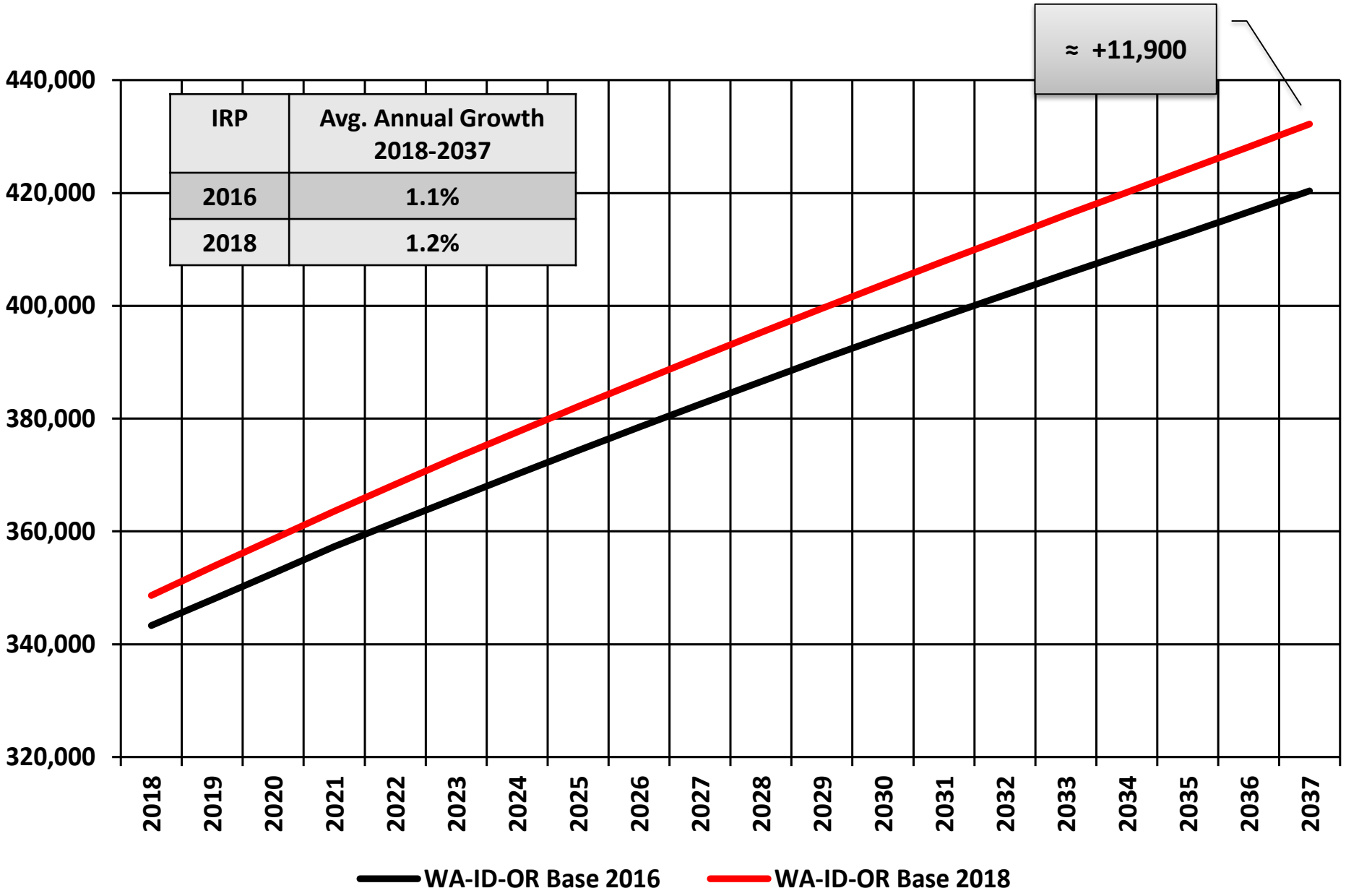
Klamath, OR Region Firm Customers: 2018 IRP and 2016 IRP



La Grande, OR Region Firm Customers: 2018 IRP and 2016 IRP

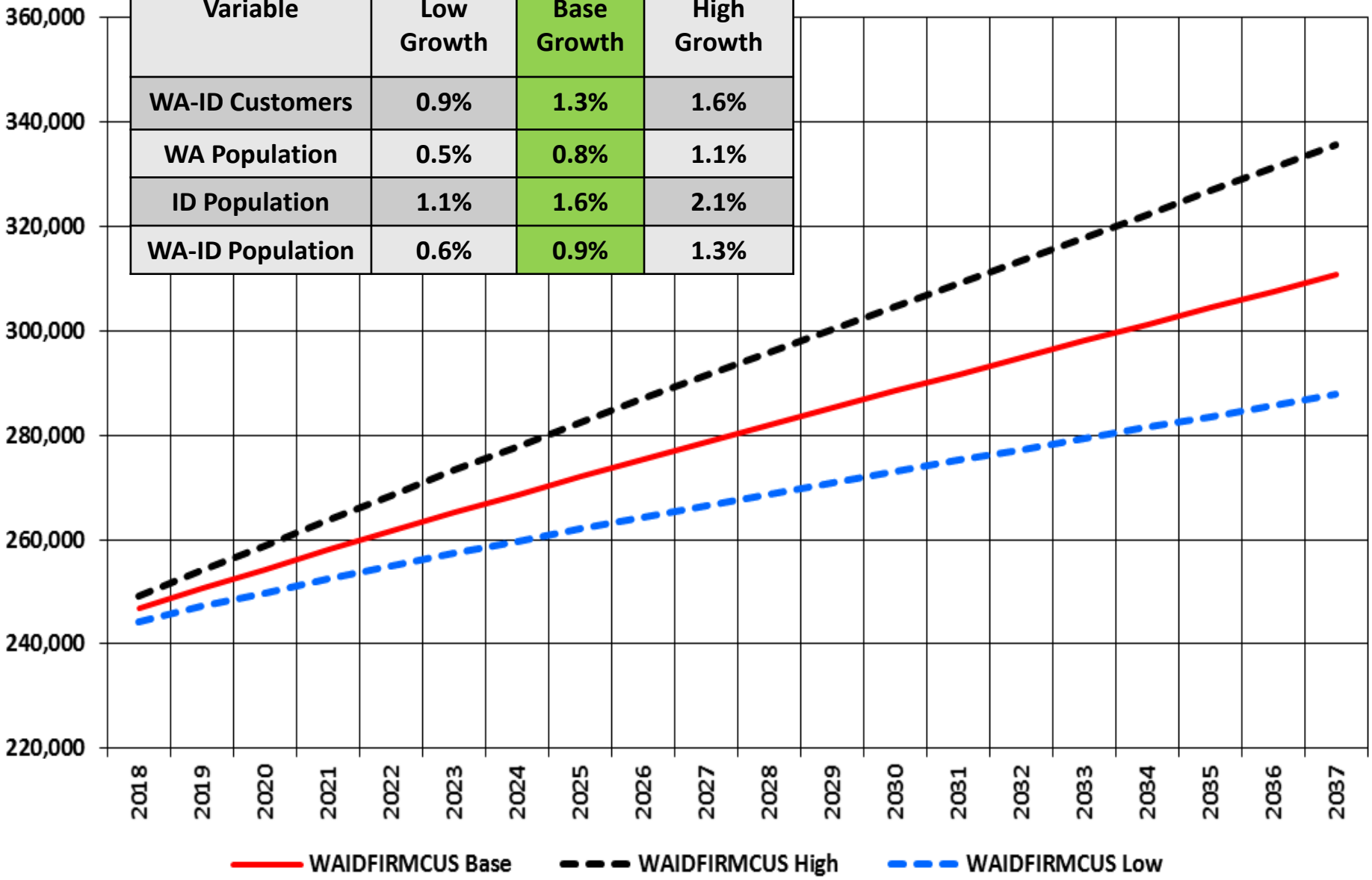


System Firm Customers: 2018 IRP and 2016 IRP



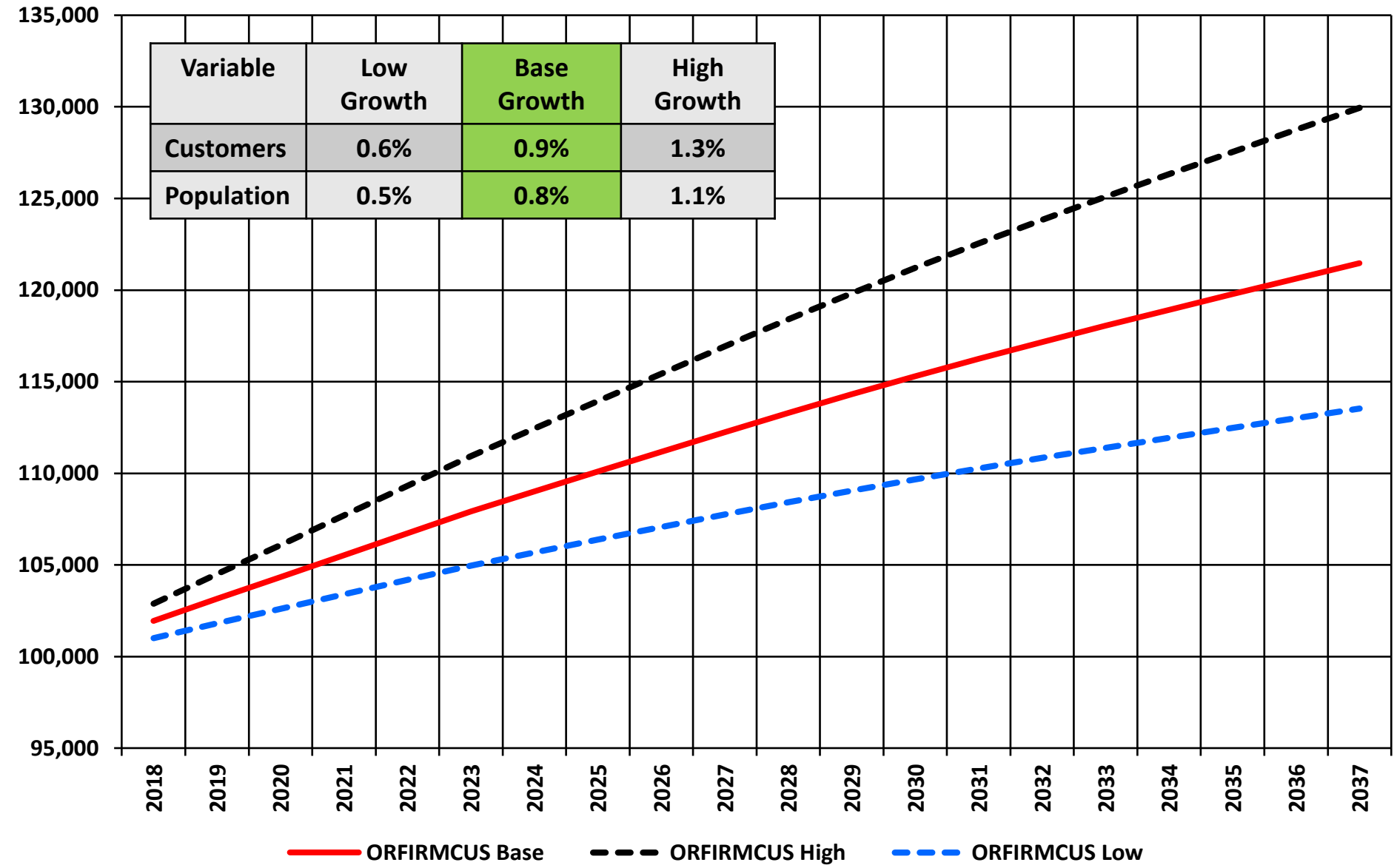
WA-ID Region Firm Customer Range, 2018-2037

Variable	Low Growth	Base Growth	High Growth
WA-ID Customers	0.9%	1.3%	1.6%
WA Population	0.5%	0.8%	1.1%
ID Population	1.1%	1.6%	2.1%
WA-ID Population	0.6%	0.9%	1.3%



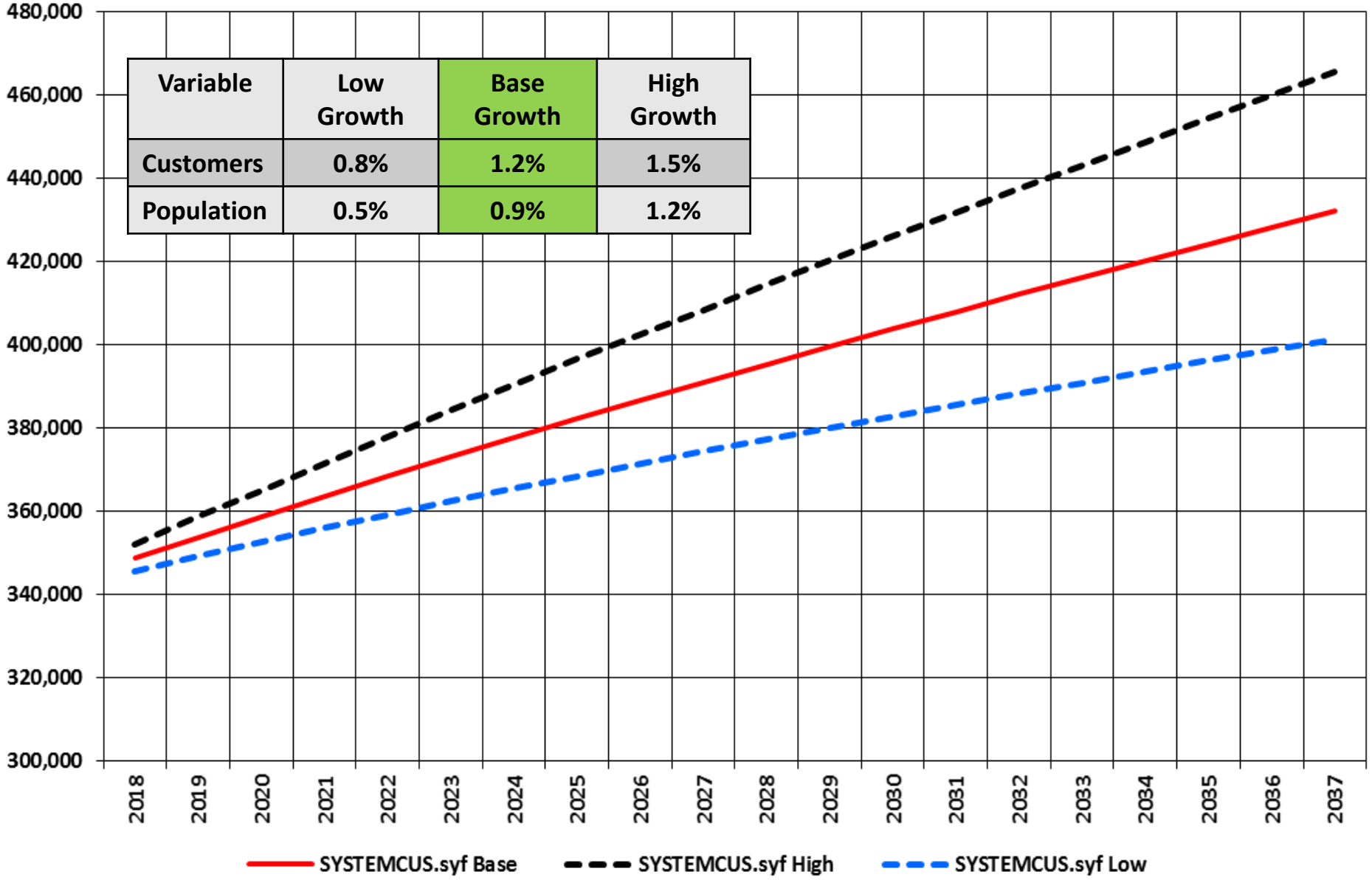
OR Region Firm Customer Range, 2018-2037

Variable	Low Growth	Base Growth	High Growth
Customers	0.6%	0.9%	1.3%
Population	0.5%	0.8%	1.1%



System Firm Customer Range, 2018-2037

Variable	Low Growth	Base Growth	High Growth
Customers	0.8%	1.2%	1.5%
Population	0.5%	0.9%	1.2%



Summary of Growth Rates

System	Base-Case	High	Low
Residential	1.2%	1.6%	0.9%
Commercial	0.7%	1.0%	0.3%
Industrial	-0.3%	2.2%	-3.3%
Total	1.2%	1.5%	0.8%
WA	Base-Case	High	Low
Residential	1.2%	1.5%	0.9%
Commercial	0.7%	1.0%	0.4%
Industrial	-0.8%	1.9%	-3.1%
Total	1.2%	1.5%	0.8%
ID	Base-Case	High	Low
Residential	1.5%	2.0%	1.0%
Commercial	0.6%	1.1%	0.1%
Industrial	0.1%	1.7%	-2.7%
Total	1.4%	1.9%	0.9%
OR	Base-Case	High	Low
Residential	1.0%	1.3%	0.6%
Commercial	0.7%	1.1%	0.4%
Industrial	0.1%	4.7%	-7.8%
Total	0.9%	1.3%	0.6%

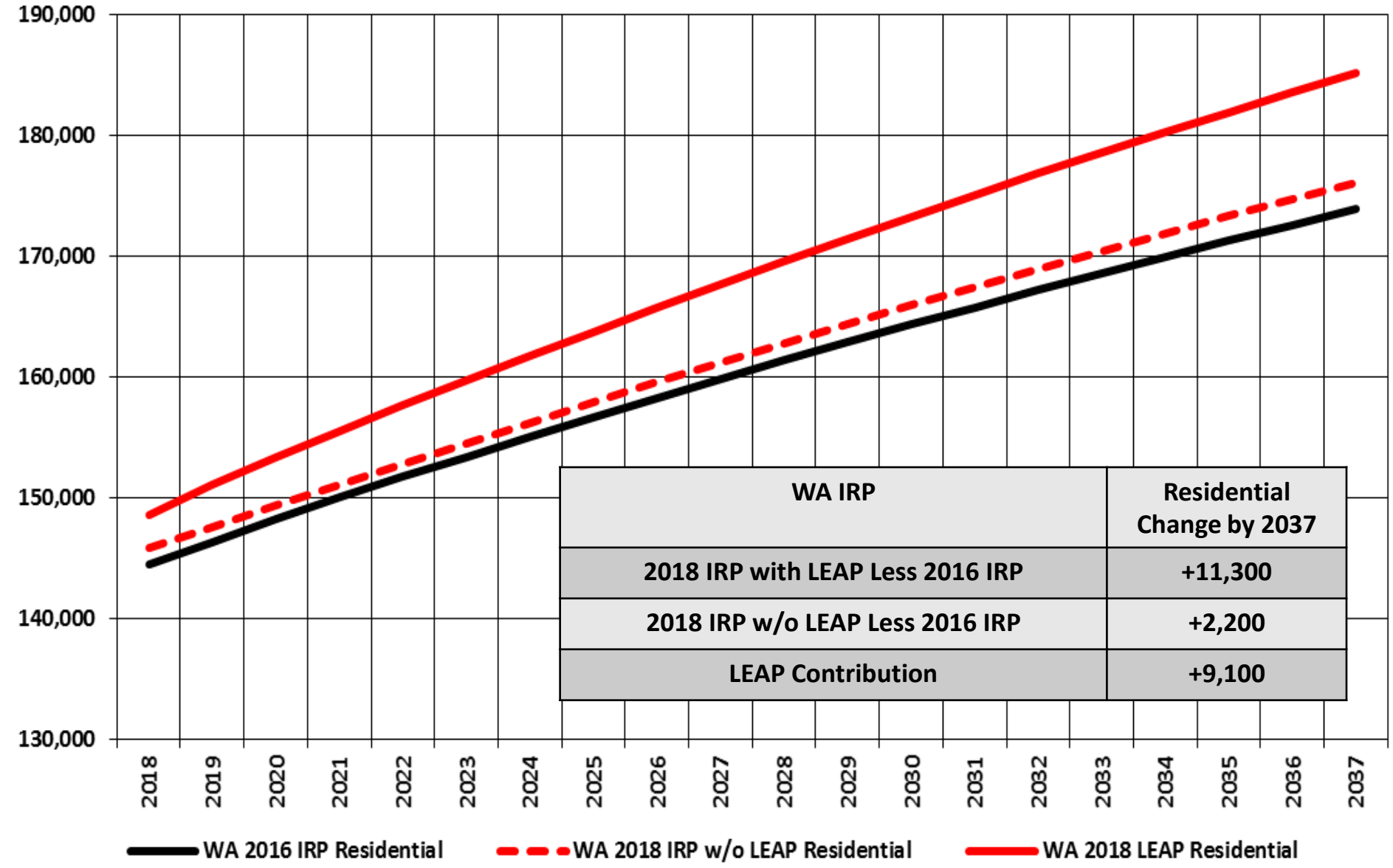
Forecasting with Permits or Housing Starts

- Potential data sources have poor coverage in our service territory or series are not long enough. This is especially a problem for non-MSA areas like Roseburg, Klamath, and La Grande.
- IHS has annual and quarterly housing start data only for MSAs. IHS's MSA housing starts are estimates:

  "We then use the permits-to-starts ratio for the national and regional level from the Census that is released every year to derive the starts. Unfortunately, until recently, the census only has these ratios at the national and regional level. As a consequence, we use this ratio for any county, metro and state within the region to derive our starts from."

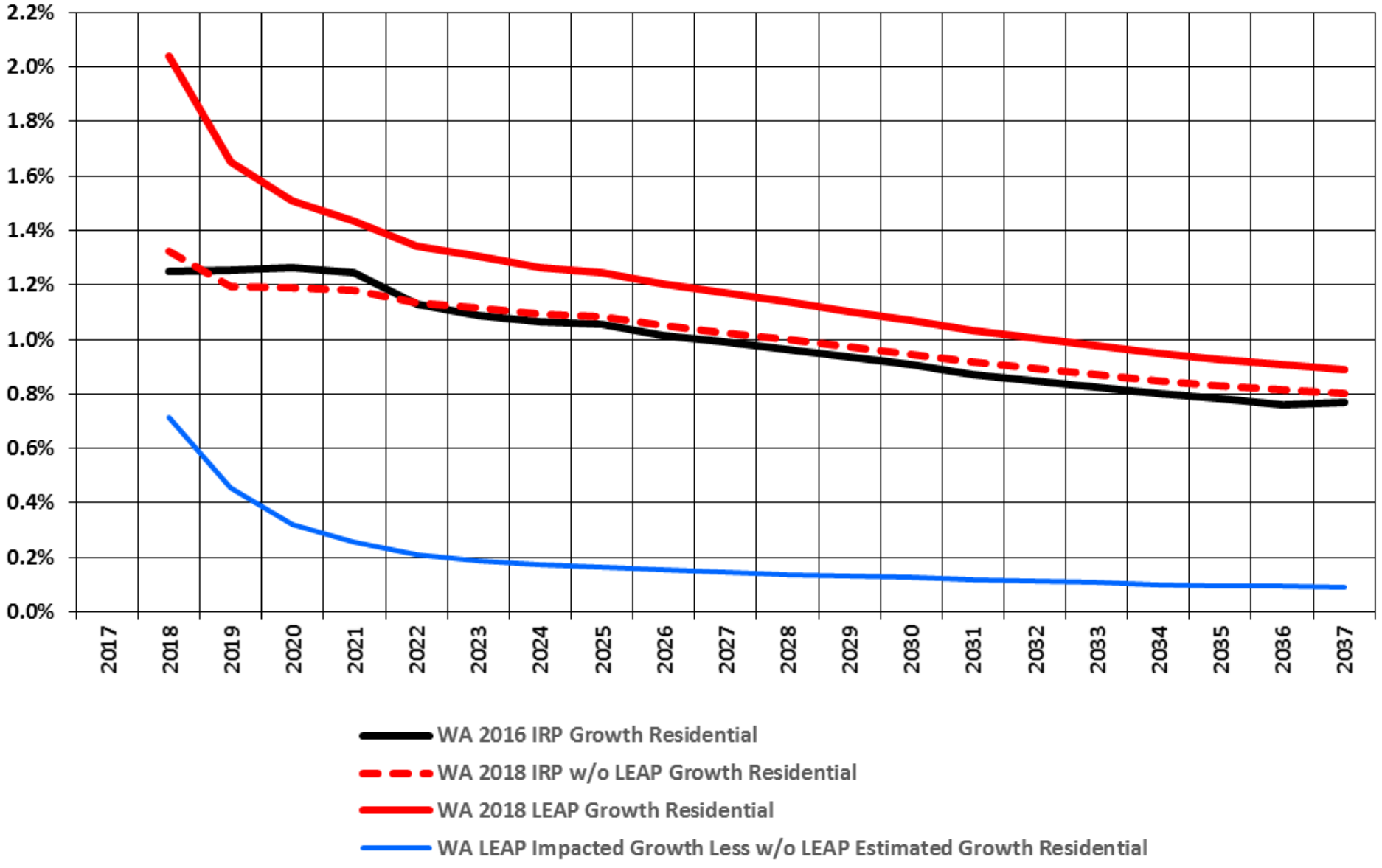
- Prior use of IHS housing start forecasts resulted in significant over forecasting of customers.
- NAHB also produces a housing start series, but their data only covers fairly large MSAs.

Estimating the IMPACT of LEAP in WA: Residential Customers



WA IRP	Residential Change by 2037
2018 IRP with LEAP Less 2016 IRP	+11,300
2018 IRP w/o LEAP Less 2016 IRP	+2,200
LEAP Contribution	+9,100

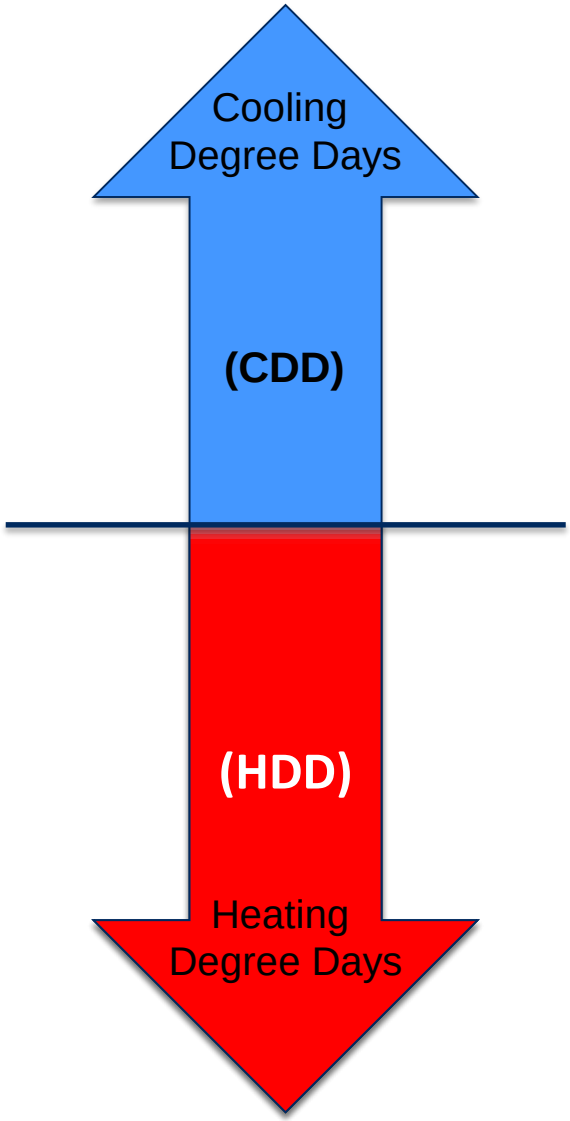
Estimating the IMPACT of LEAP in WA: Residential Growth Rates



Demand Forecast Methodology

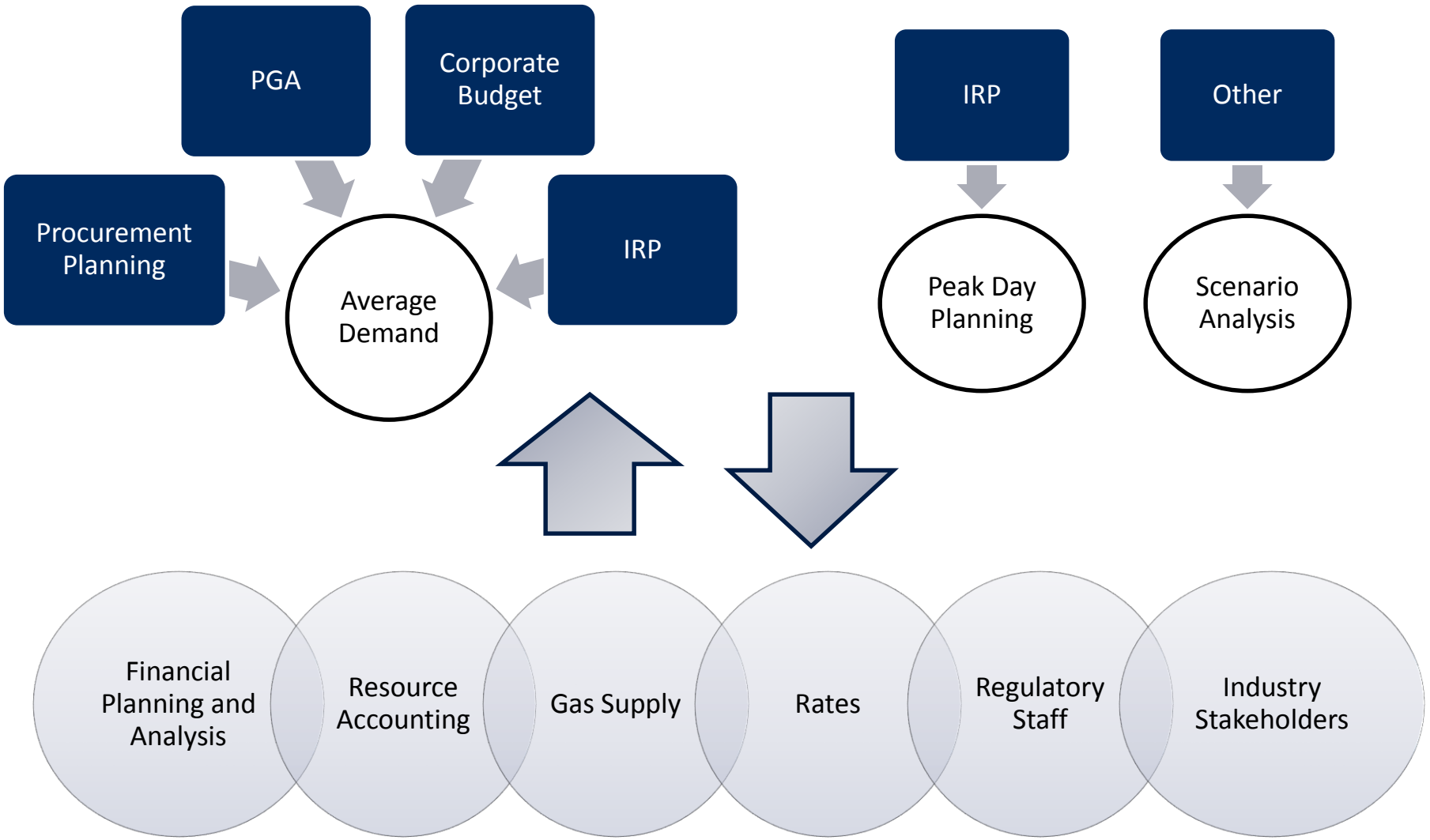
Tom Pardee
Manager of Natural Gas Planning

Temperature & Degree Days



Temp (°F)		Degree Days
100	=	35
90	=	25
80	=	15
70	=	5
65	=	0
60	=	5
50	=	15
40	=	25
30	=	35
20	=	45
10	=	55
0	=	65
-10	=	75
-20	=	85

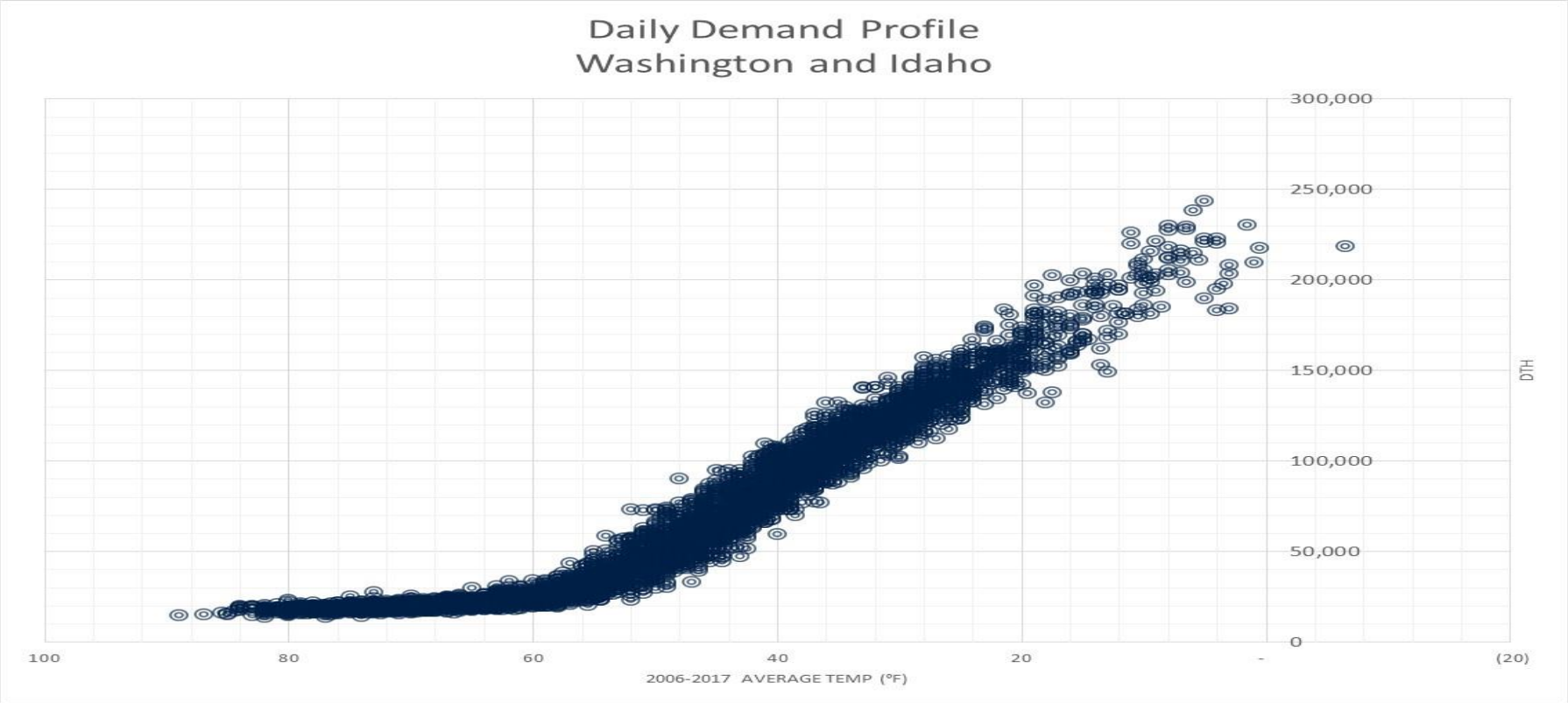
Natural Gas Demand Forecasting



Weather

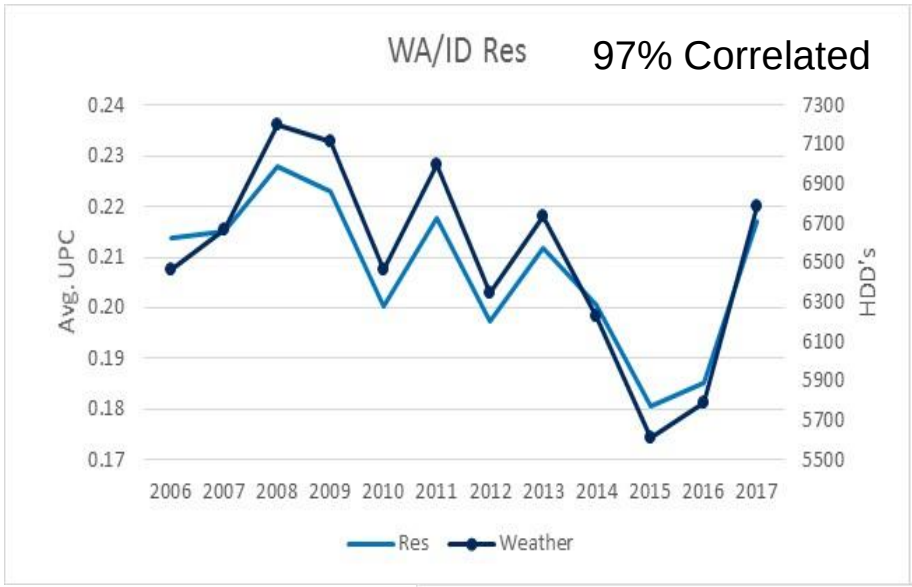
- NOAA 20 year actual average daily HDD's (1998-2017)
- Peak weather includes two winter storms (5 day duration), one in December and one in February
- Planning Standard – coldest day on record
- Sensitivity around planning standard including
  - Normal/Average
  - Coldest in 20 years
  - Monte Carlo simulation

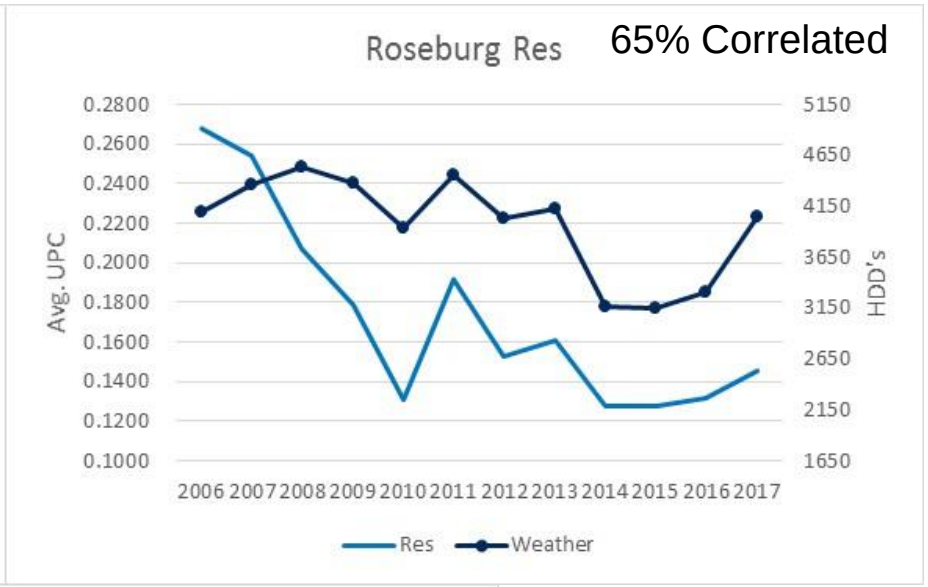
The Use per Customer Forecast cont.

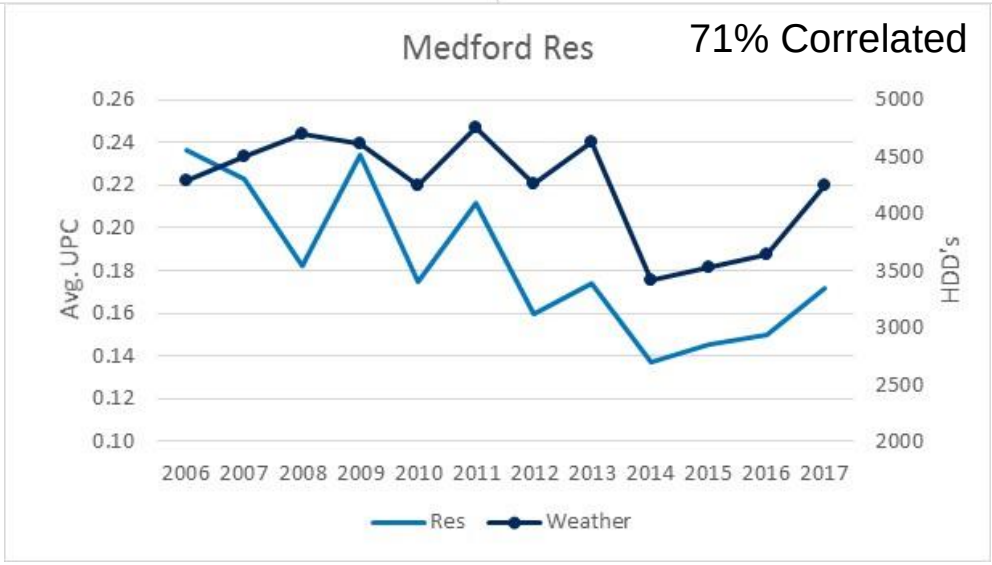


- Historical data is used to determine initial base and heat coefficients.
- Adjustments are made to incorporate DSM and price elastic responses.

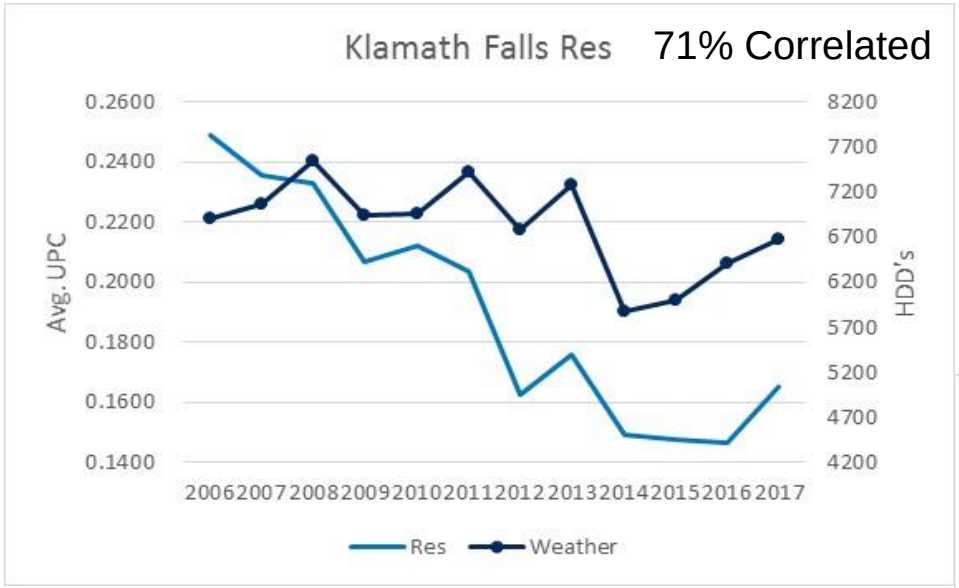
Residential – UPC and Weather

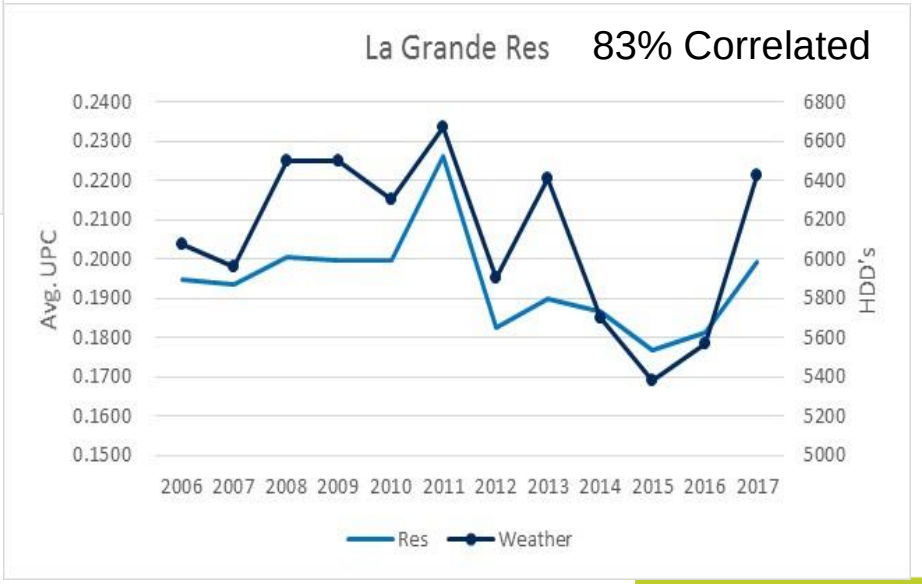




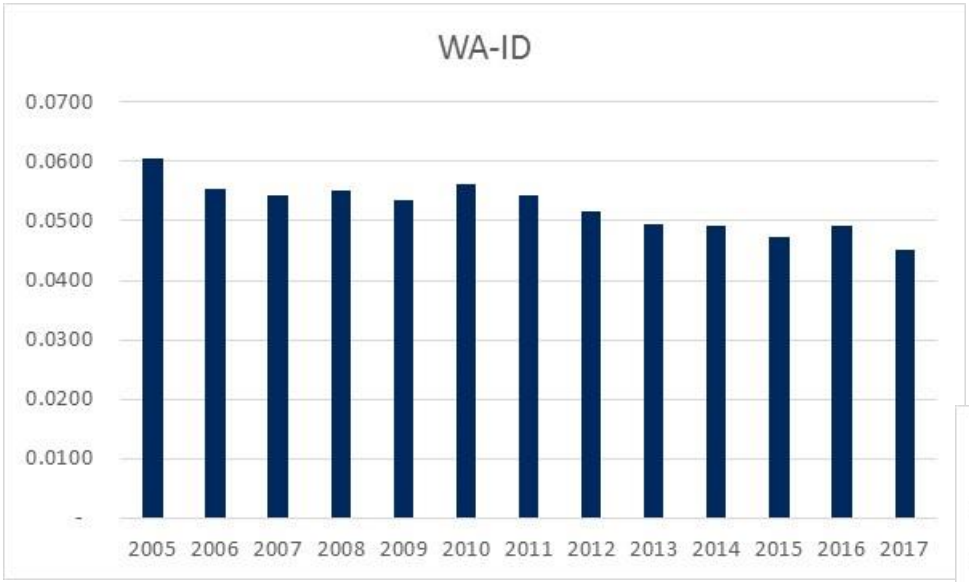


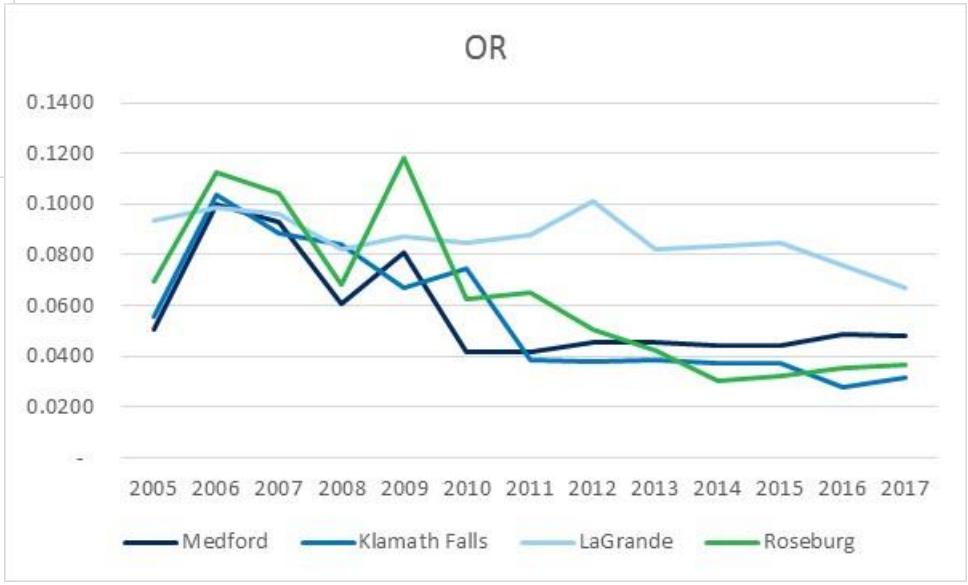
Residential – UPC and Weather





Base Coefficients





July and August Average

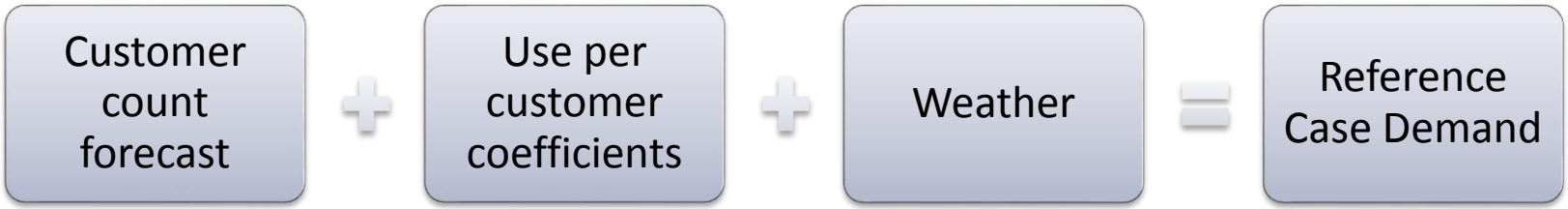
Demand Modeling Equation – a closer look

SENDOUT® requires inputs expressed in the below format to compute daily demand in dekatherms. The **base** and **weather sensitive** usage (degree-day usage) factors are developed outside the model and capture a variety of demand usage assumptions.

Table 3.2 Basic Demand Formula

# of customers **x** Daily **base usage** / customer
Plus
# of customers **x** Daily **weather sensitive** usage / customer

Developing a Reference Case



1. Expected customer count forecast by each of the 5 areas
2. Use per customer coefficients – Flat all classes, 5 year, 3 year or last year average use per HDD per customer
3. Weather planning standard – coldest day on record
   - WA/ID 82; Medford 61; Roseburg 55; Klamath 72; La Grande 74

Dynamic Demand Methodology

Tom Pardee
Manager of Natural Gas Planning

Dynamic Demand Methodology

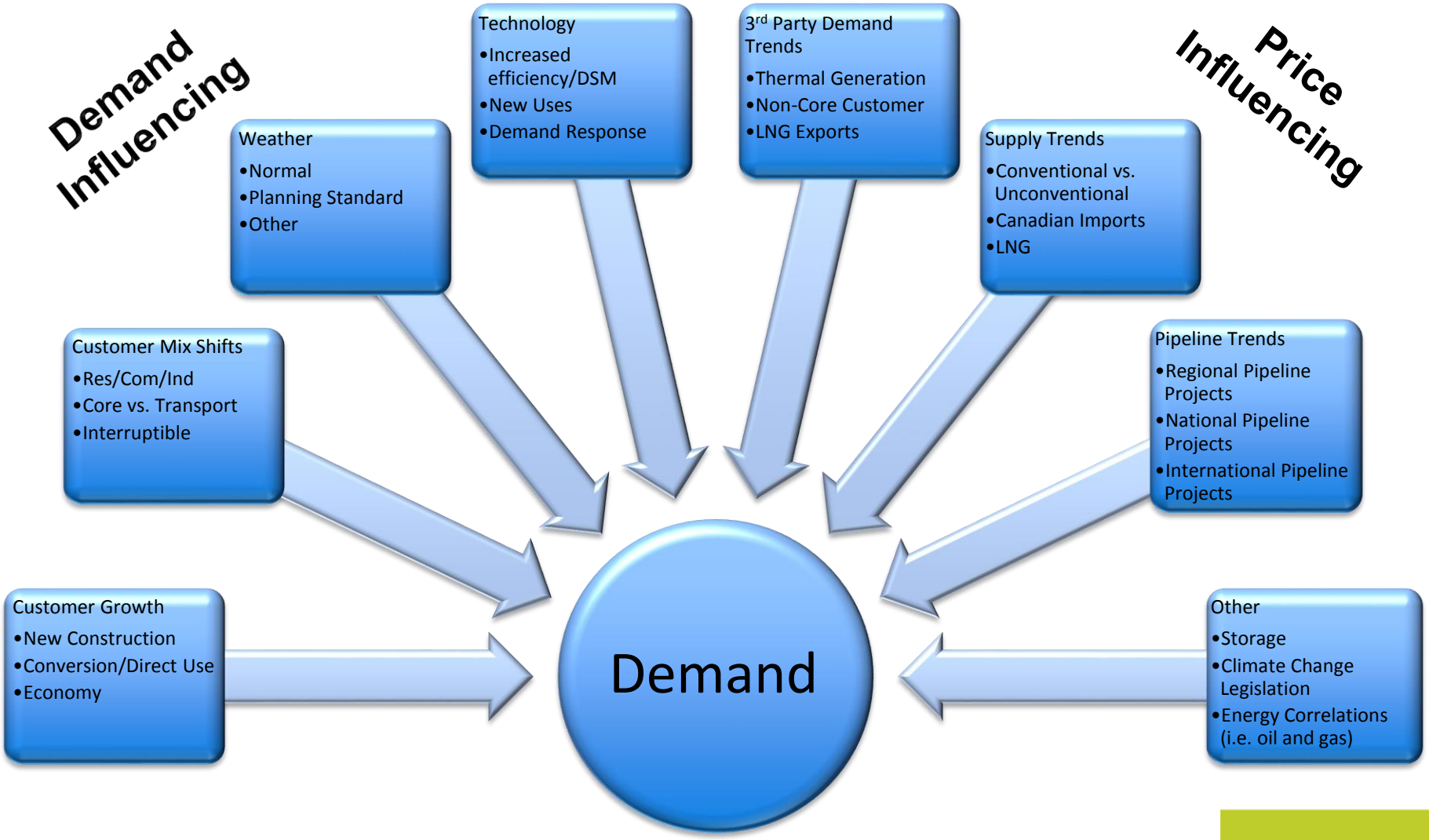
Demand Influencing

- Conditions that **DIRECTLY** affect core customer volume consumed

Price Influencing

- *PRICE SENSITIVE* conditions that, through price elasticity, **INDIRECTLY** affect core customer volume consumed

Demand Drivers



Customer Growth and Mix – Demand Influencing

- Key driver in demand growth
- Can change the timing and/or location of resource needs
- Currently we model expected, high, and low growth scenarios
- New construction vs. conversions
- Residential/Commercial/Industrial vs. Transportation
- New uses – CNG/NGV

Weather Standard – Demand Influencing

- Has the potential to significantly change timing of resource needs
- Significant qualitative considerations
  - No infrastructure response time if standard exceeded
  - Significant safety and property damage risks
- Current Peak HDD Planning Standards
  - WA/ID 82
  - Medford 61
  - Roseburg 55
  - Klamath 72
  - La Grande 74

Technology – Demand Influencing

- Demand side management initiatives will reduce demand **HOWEVER**, it is dependent upon customers willingness/ability to participate.
- Development of new uses for natural gas
  - CNG
  - NGV
  - LNG
  - ???NG
- Demand response (Smart Grid)
- New technologies in Demand Side Management

Price Elasticity Factors Defined

- Price elasticity is usually expressed as a numerical factor that defines the relationship of a consumer's consumption change in response to price change.

- Typically, the factor is a **negative** number as consumers normally **reduce** their consumption in response to **higher** prices or will **increase** their consumption in response to **lower** prices.

- For example, a price elasticity factor of -0.13 means:
  - A 10% price **increase** will prompt a 1.3% consumption **decrease**
  - A 10% price **decrease** will prompt a 1.3% consumption **increase**

Price Elasticity

- Establishes factors for use in other price influencing scenarios
- Very complex relationship – we use historical data however……
  - Historical data has DSM, rate changes (PGA, general rate, etc.), economic conditions, technological changes, etc.
  - History is not necessarily the best predictor of future behavior

Price Elasticity Assumptions From 2018 IRP

Elasticity Assumption	Real Price annual increase within 30%
High	Negative .20
Expected	Negative .10
Low	No response

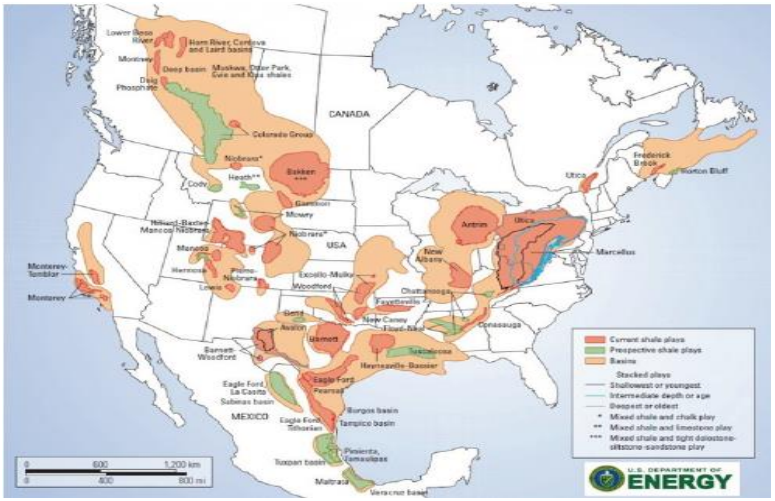
Expected Elasticity is derived from Medford and Roseburg and applied to all areas

3rd Party Demand Trends – Price Influencing

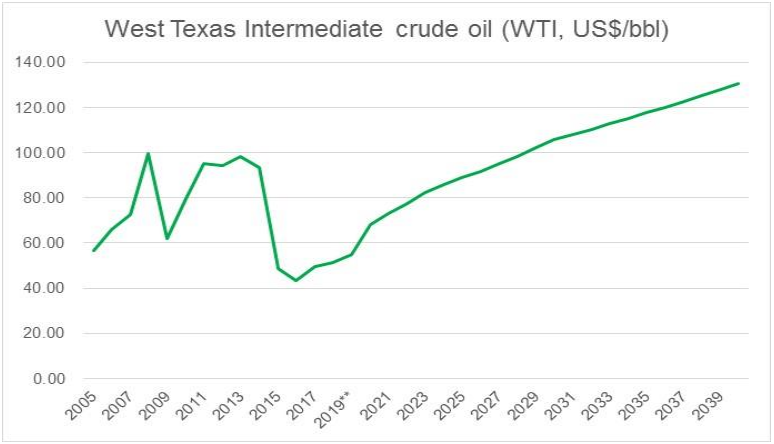
- Gas fired generation
- Coal plant retirements driving gas for power
- CNG/NGV Transportation Fleets
- Export LNG
- Non-firm customer trends
- Mexico Exports

Supply Trends – Price Influencing

- Shale is Everywhere
- LNG Export

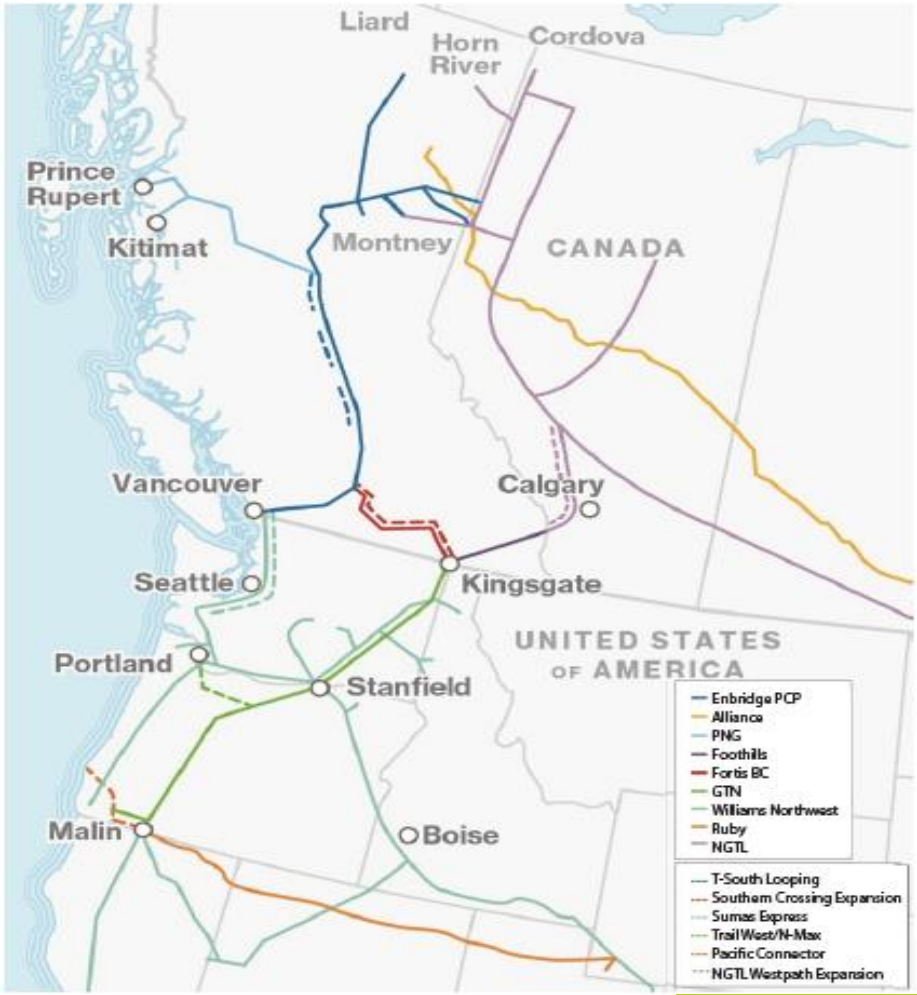


- Associated gas from Oil – 25% of overall US production



Pipeline Trends – Price Influencing

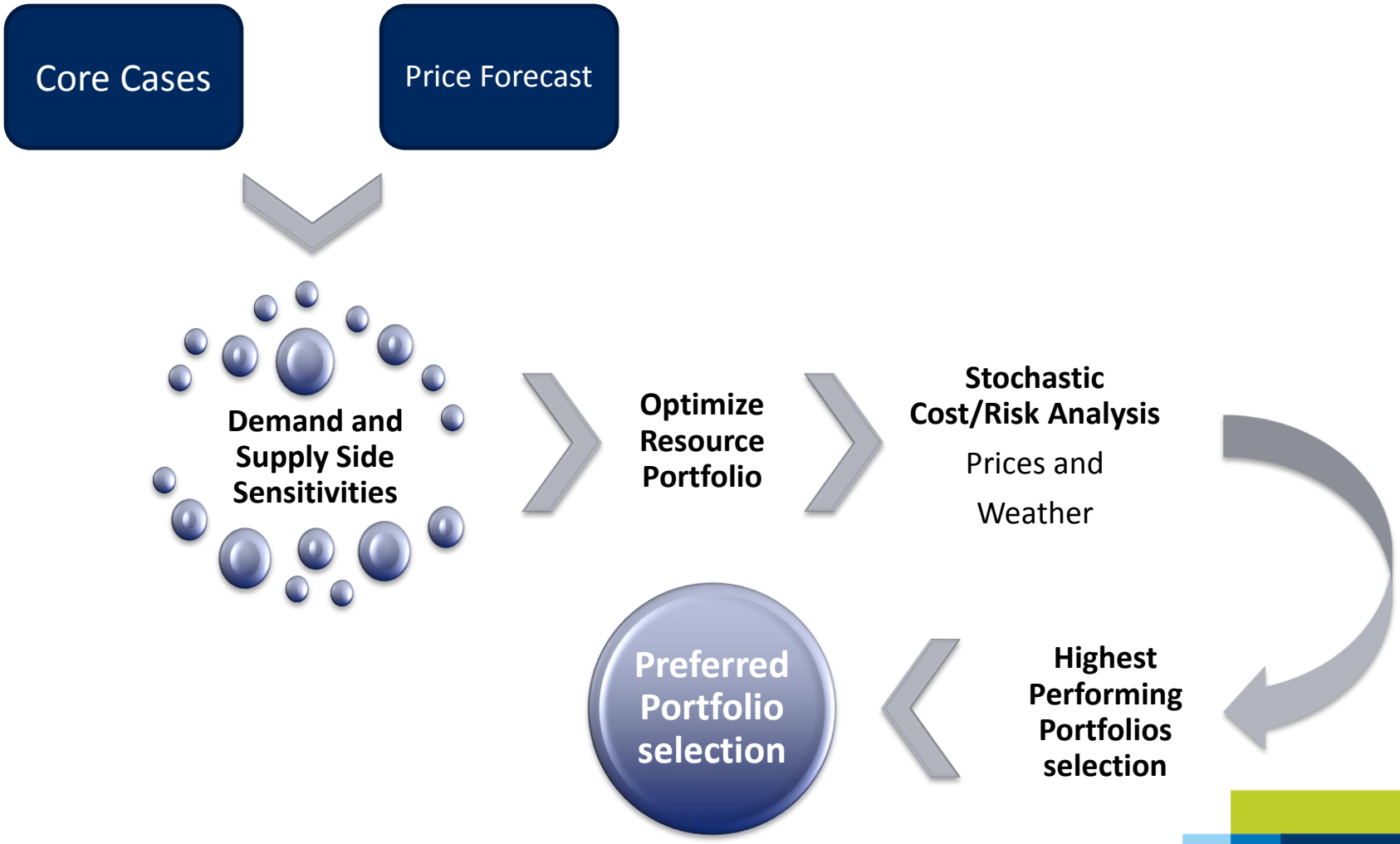
- Regional Pipeline Proposals
  - Sumas Express
  - Pacific Connector – from Jordan Cove LNG
  - Trail West/N-Max (GTN to NWP – Molalla area)
- National Pipeline Proposals
- International Pipeline Proposals
  - T-South Looping
  - NGTL Westpath Expansion
  - Southern Crossing Expansion



Other Supply Issues – Price Influencing

- Storage
- Climate Change and Carbon Legislation
- Energy Correlations
- Extraction cost

Sensitivities, Scenarios, Portfolios



Sensitivities for 2018 IRP

			DEMAND INFLUENCING - DIRECT									PRICE INFLUENCING - INDIRECT			
INPUT ASSUMPTIONS	**Reference Case**	**Reference Plus Peak Case**	**Low Cust Growth**	**High Cust Growth**	**No Conversion to natural gas Growth**	**Alternate Weather Std**	**DSM Case**	**Peak plus DSM Case**	**Demand Desctruction Reference Case**	**Demand Destruction Reference Plus Peak**	**Alternate Historical UPC Case**	**Expected Elasticity**	**Low Prices**	**High Prices**	**Carbon Legislation**
Customer Growth Rate	Reference	Reference Plus	Low Growth	High Growth	Reference minus LEAP	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Use per Customer	3 Year Historical	3 Year Historical	3 Year Historical	3 Year Historical	3 Year Historical	3 Year Historical	3 Year Historical	3 Year Historical	3 Year Historical less demand destruction	3 Year Historical less demand destruction	5 Year Historical	3 Year Historical	3 Year Historical	3 Year Historical	3 Year Historical
Weather Planning Standard	20 Year Normal	Coldest on Record	Coldest on Record	Coldest on Record	Coldest on Record	Coldest in 20yrs	Normal	Coldest on Record	Normal	Coldest on Record	Coldest on Record	Coldest on Record	Coldest on Record	Coldest on Record	Coldest on Record
Demand Side Management Programs Included	No	No	No	No	No	No	Expected	Expected	No	No	No	No	No	No	No
Prices Price curve	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Low	High	High/Medium/Low
Price curve adder ($/Dth)	None	None	None	None	None	None	None	None	None	None	None				High/Medium/Low
Elasticity	None	None	None	None	None	None	None	None	None	None	None	Expected	Expected	Expected	Expected

2018 Natural Gas IRP
DSM - Energy Efficiency

Amber Gifford & Ryan Finesilver
First Technical Advisory Committee Meeting
January 25, 2018

Demand Side Management (DSM)

The process of helping customers use energy more efficiently.

The term DSM is used interchangeably with Energy Efficiency and Conservation.

DSM Programs benefit the IRP by contributing to the deferral of plant assets.

Team Roles

DSM Planning & Analytics Team

Applied Energy Group (AEG)

Gas Supply

ACP — CPA — IRP

Oregon DSM Programs

Who DSM Serves

Three Jurisdictions

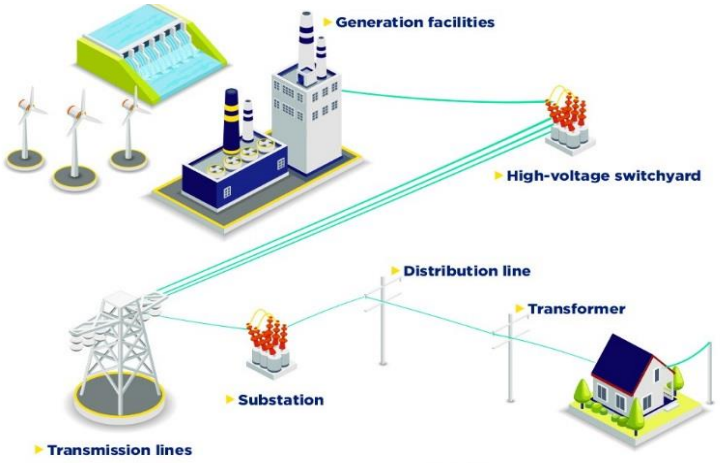
- Washington
- Idaho
- Oregon (ETO except for Low-Income)

Multiple Customer Segments

- Residential
- Industrial/Commercial
- Low-Income Residential

The Company's Infrastructure

- Aids in reducing overall capacity
- Defers capital investments



DSM Funding – Natural Gas

SCHEDULE 191

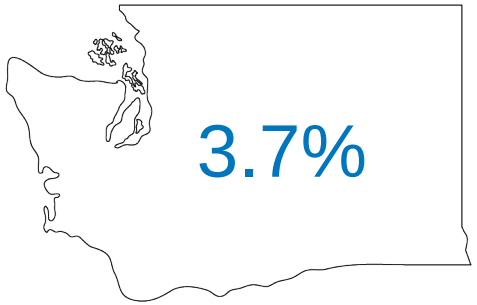
DEMAND SIDE MANAGEMENT RATE ADJUSTMENT - WASHINGTON

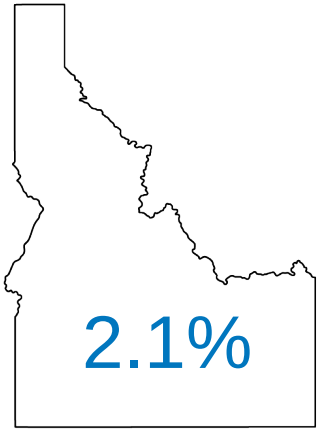
APPLICABLE:
To Customers in the State of Washington where the Company has natural gas service available. This Demand Side Management Rate Adjustment or Rate Adjustment shall be applicable to all retail customers taking service under Schedules 101, 111, 112, 121, 122, 131, and 132. This Rate Adjustment is designed to recover costs incurred by the Company associated with providing Demand Side Management services and programs to customers.

MONTHLY RATE:
The energy charges of the individual rate schedules are to be increased by the following amounts:

Schedule 101	$0.03472 per Therm
Schedule 111 & 112	$0.02475 per Therm

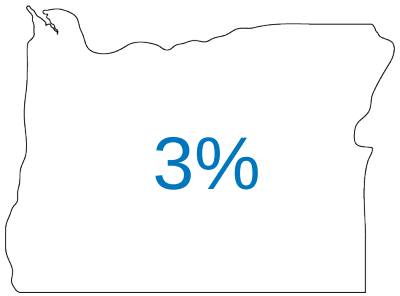
Tariff percentage of customer bill by state:



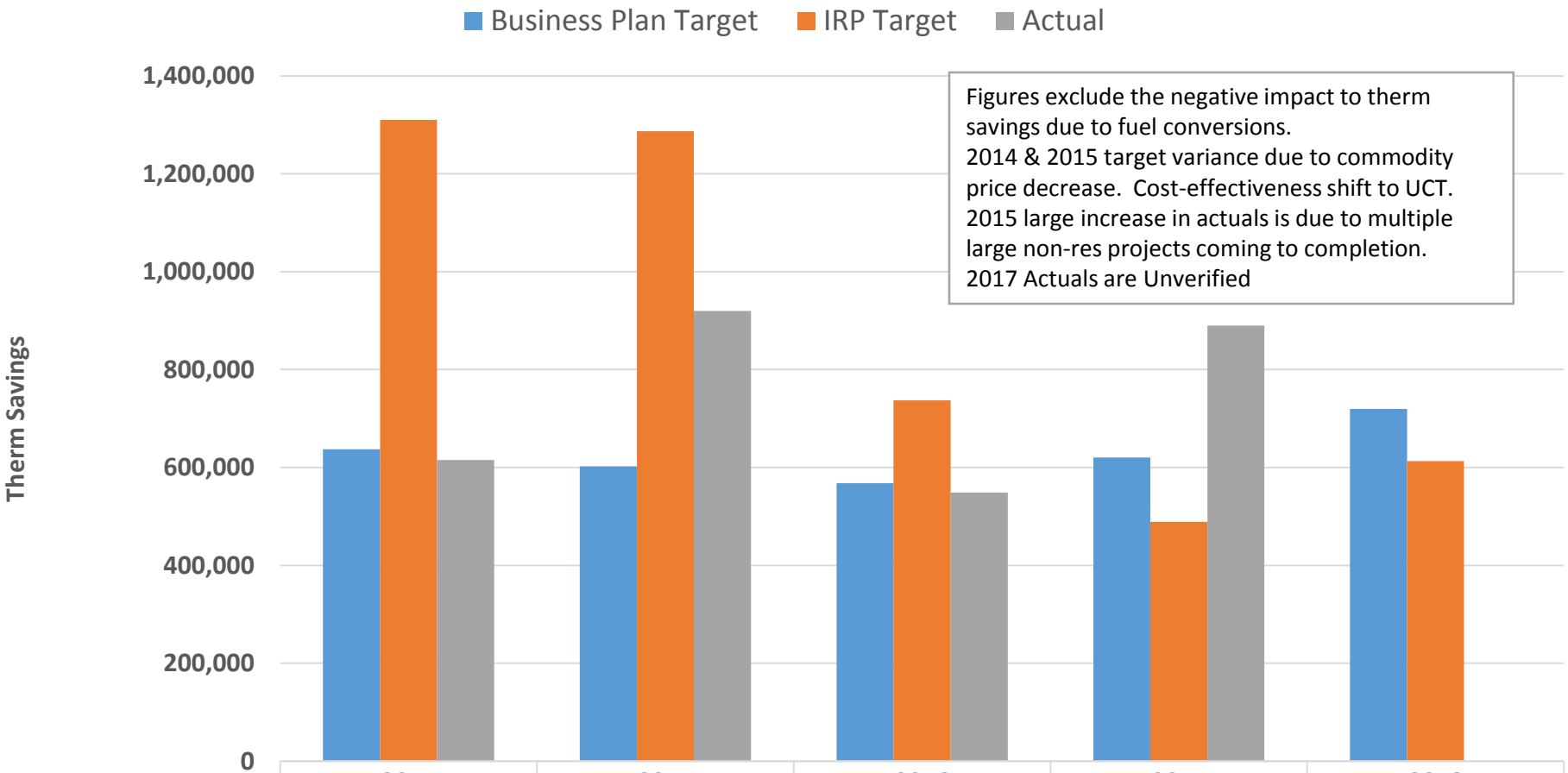


$8.5 Million Annual Funding

(2017)

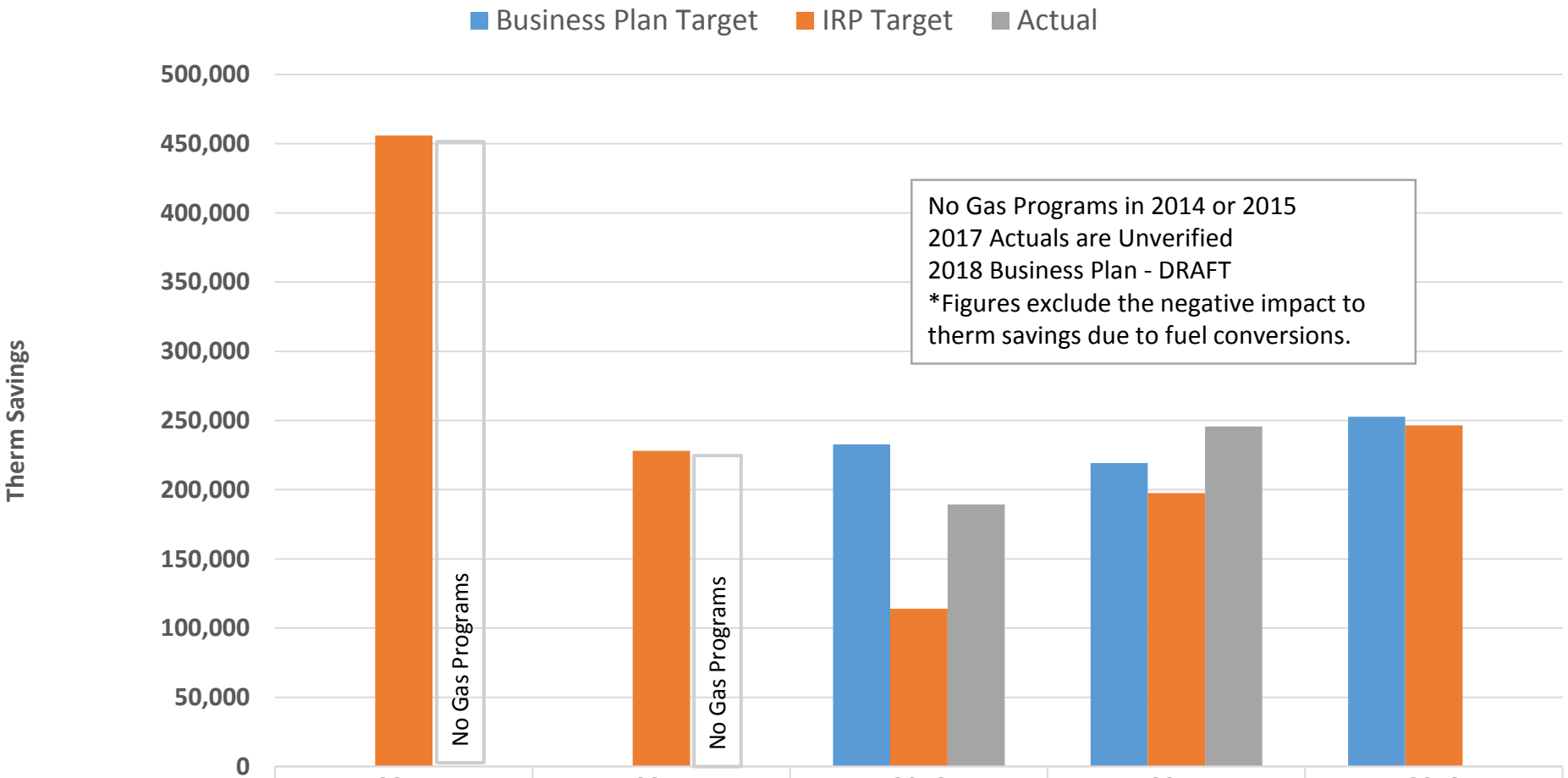


WA Gas Targets to Actual Savings



	2014	2015	2016	2017	2018
Business Plan Target	637,042	602,010	567,653	620,310	719,451
IRP Target	1,310,000	1,287,000	737,000	489,110	612,830
Actual	615,418	919,892	548,756	889,776	

ID Gas Targets to Actual Savings



	2014	2015	2016	2017	2018
Business Plan Target	0	0	232,737	219,272	252,712
IRP Target	456,000	228,000	114,000	197,640	246,440
Actual	0	0	189,295	245,747	

DSM Business Planning

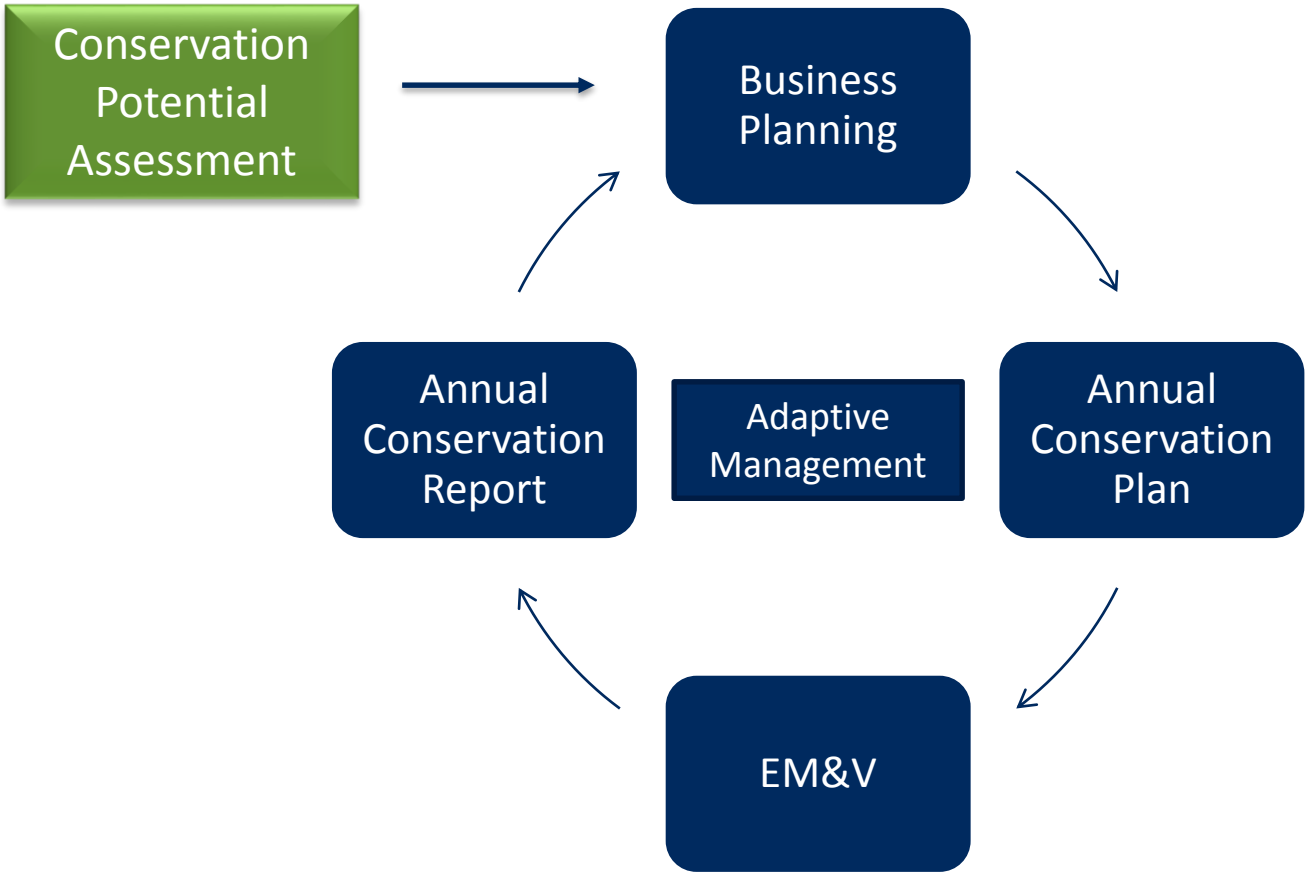
Conservation Potential Assessment (CPA)

- Primary Objectives
  - Meet legislative and regulatory requirements
  - Support integrated resource planning
  - Identify opportunities for savings; key measures in target segments
- Key Deliverables
  - 20-year conservation potential
  - Individual measures
  - IRP target

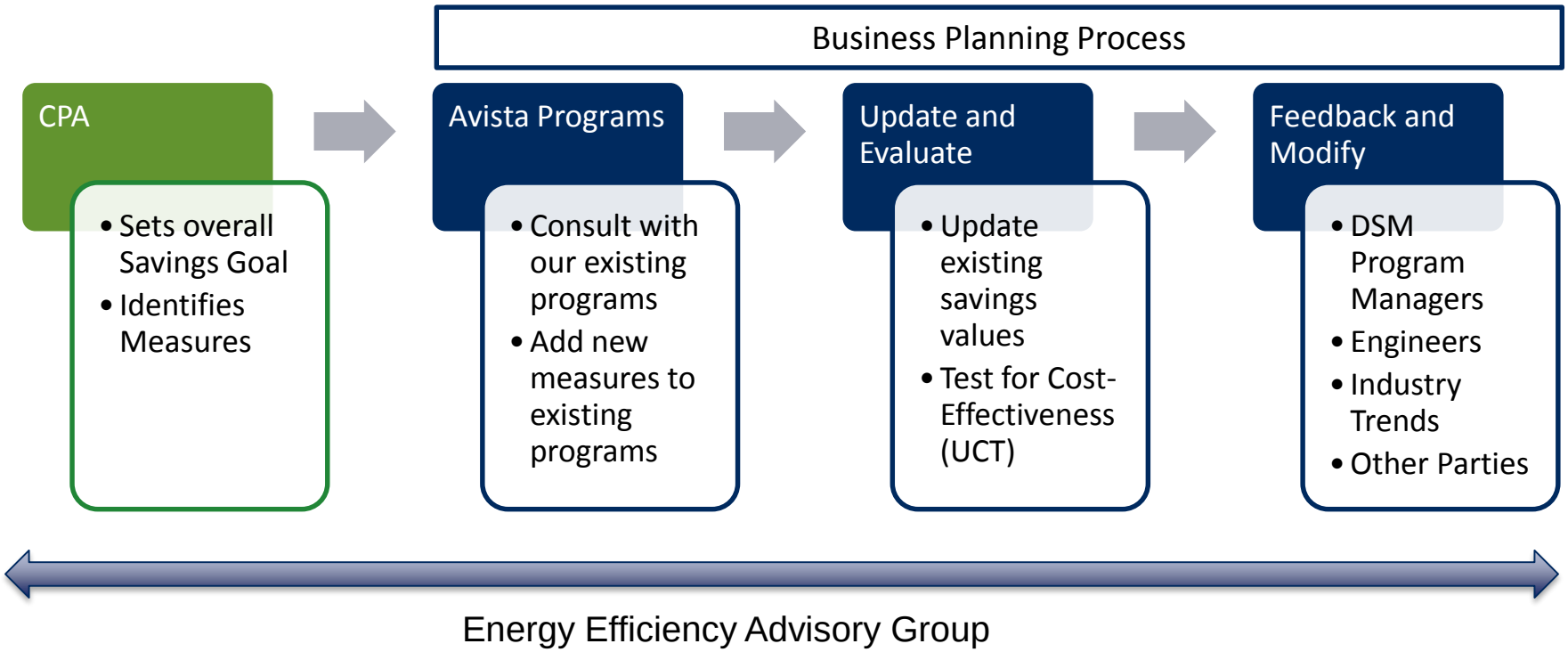
Conservation Potential Assessment

Technical Potential	• Theoretical upper limit of conservation • All efficiency measures are phased in regardless of cost
Achievable Technical Potential	• Realistically achievable, accounting for adoption rates and how quickly programs can be implemented • Does not consider cost-effectiveness of measures
Achievable Potential	• Includes economic screening of measures (cost effectiveness) • Informs our IRP Target

Business Planning Process



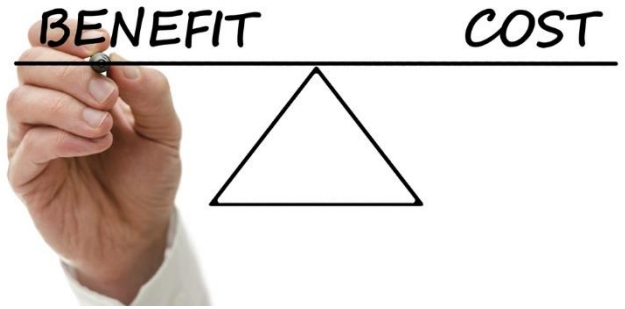
Business Planning Process



Incentive Setting

Cost-Effective Test

Utility Cost Test (UCT)	Must have a UCT of 1.0 or Higher



Decide Incentive Level

$3 per Therm	70% of CIC	UCT Impact	Portfolio Alignment

Significant Costs and Benefits

COSTS

- **Administration**

  (e.g., program design, development, operations, maintenance, overhead, customer service, marketing & outreach, sales, IT infrastructure, customer education, program evaluation, measurement & verification)

- **Measure (Capital) Costs**

  (equipment costs incurred by the utility and participants)

- **Incentives**

- **Revenue Loss**

  (bill reductions)

- **Participant Costs**

  (Other than capital costs – value of service lost & transaction costs)

BENEFITS

- **Avoided Costs**

  (complex)

- **Tax Credits**

  (currently available for DG only)

- **Market/Reliability Benefits**

- **Non-energy benefits**

- **Incentives**

- **Bill reductions**

From Cost-effectiveness training (3/6/15) Powerpoint
http://www.cpuc.ca.gov/General.aspx?id=5267

Questions?

2018 IRP Timeline

- **August 31, 2017** – Work Plan filed with WUTC
- **January through May 2018** – Technical Advisory Committee meetings. Meeting topics will include:
  - **TAC 1: Thursday, January 25, 2018: TAC meeting expectations, review of 2016 IRP acknowledgement letters, customer forecast, and demand-side management (DSM) update.**
  - **TAC 2: Thursday, February 22, 2018: Weather analysis, environmental policies, market dynamics, price forecasts, cost of carbon.**
  - **TAC 3: Thursday, March 29, 2018 :** Distribution, supply-side resources overview, overview of the major interstate pipelines, RNG overview and future potential resources.
  - **TAC 4: Thursday, May 10, 2018:** DSM results, stochastic modeling and supply-side options, final portfolio results, and 2020 Action Items.
- **June 1, 2018 –** Draft of IRP document to TAC
- **June 29, 2018 –** Comments on draft due back to Avista
- **July 2018 –** TAC final review meeting (if necessary)
- **August 31, 2018 –** File finalized IRP document