

Appendix E

Current & Alternative Resources

Draft 2020 WA IRP

Appendix E - Introduction

The purpose of this document is to transparently describe the transportation and supply inputs that were utilized in the preferred portfolio described in the Resource Integration chapter. Pages 3-5 of this appendix provides annual commodity costs, annual supply amounts, and the annual unit commodity cost at a dollar per dekatherm for supply. Pages 6-12 provides fuel rates, Maximum daily quantity (MDQ), reservation rates, and transportation rates for Cascade's transportation contracts. Also, pages 13-48 show the multiple scenarios Cascade ran as well as cost and served/unserved results for each scenario.

Types of Supply - Summary

- Base – Can be listed as “Base” or “Fixed”; this is an annual supply that we must take if we contract it.
- Winter – This is another supply that we must take but is only available during the winter season (November-March).
- Day Gas – Can be broken down by winter and summer day gas. We only have to take what we need of this type of gas, and because it is more flexible, it is more expensive than Base or Winter gas.
- Peak – Used to serve demand when all other options are exhausted. It is also the most expensive type of gas.

Supply	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
DSM POOL AECO	\$ 8,360	\$ 8,557	\$ 8,148	\$ 8,111	\$ 8,242	\$ 8,486	\$ 8,596	\$ 8,596	\$ 9,270	\$ 9,884	\$ 9,377	\$ 9,377	\$ 9,572	\$ 10,222	\$ 10,222	\$ 10,250	\$ 9,895	\$ 9,228	\$ 5,384	\$ 5,384
Take: Monthly by Supply (MDT)	4,886	4,666	4,443	4,423	4,494	4,627	4,829	4,829	4,960	5,055	5,389	5,113	5,075	5,219	5,219	5,219	5,589	5,589	5,081	5,081
Unit Commodity Cost (\$/000) (\$/dth)	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83	\$ 1.83
DSM POOL AECO	\$ 962	\$ 1,744	\$ 3,530	\$ 6,216	\$ 6,238	\$ 6,071	\$ 6,086	\$ 6,007	\$ 5,847	\$ 5,426	\$ 5,426	\$ 6,140	\$ 6,210	\$ 6,029	\$ 5,712	\$ 5,712	\$ 5,816	\$ 6,271	\$ 7,082	\$ 9,235
Take: Monthly by Supply (MDT)	546	990	2,004	3,550	3,542	3,447	3,456	3,411	3,320	3,321	3,081	3,487	3,526	3,423	3,344	3,266	3,303	3,561	4,037	5,244
Unit Commodity Cost (\$/000) (\$/dth)	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76	\$ 1.76
DSM POOL AECO INDEX	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Take: Monthly by Supply (MDT)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Unit Commodity Cost (\$/000) (\$/dth)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
DSM POOL AECO INDEXX	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Take: Monthly by Supply (MDT)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Unit Commodity Cost (\$/000) (\$/dth)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
DSM POOL BND	\$ 101	\$ 154	\$ 142	\$ 165	\$ 192	\$ 239	\$ 283	\$ 328	\$ 334	\$ 365	\$ 426	\$ 477	\$ 544	\$ 601	\$ 644	\$ 675	\$ 734	\$ 858	\$ 913	\$ 731
Take: Monthly by Supply (MDT)	50	75	66	73	76	90	105	120	119	135	150	167	182	193	200	211	227	236	186	186
Unit Commodity Cost (\$/000) (\$/dth)	\$ 2.01	\$ 2.06	\$ 2.14	\$ 2.25	\$ 2.51	\$ 2.65	\$ 2.70	\$ 2.73	\$ 2.91	\$ 3.06	\$ 3.16	\$ 3.18	\$ 3.25	\$ 3.31	\$ 3.34	\$ 3.38	\$ 3.47	\$ 3.78	\$ 3.86	\$ 3.93
DSM POOL BND	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Take: Monthly by Supply (MDT)	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Unit Commodity Cost (\$/000) (\$/dth)	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
DSM POOL CHM	\$ 201	\$ 206	\$ 214	\$ 225	\$ 251	\$ 265	\$ 270	\$ 273	\$ 291	\$ 306	\$ 316	\$ 317	\$ 325	\$ 329	\$ 333	\$ 339	\$ 348	\$ 377	\$ 386	\$ 392
Take: Monthly by Supply (MDT)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
Unit Commodity Cost (\$/000) (\$/dth)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
DSM POOL CHM	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
Take: Monthly by Supply (MDT)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
Unit Commodity Cost (\$/000) (\$/dth)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
DSM POOL GIL	\$ 201	\$ 206	\$ 214	\$ 225	\$ 251	\$ 265	\$ 270	\$ 273	\$ 291	\$ 307	\$ 316	\$ 317	\$ 325	\$ 330	\$ 333	\$ 339	\$ 348	\$ 378	\$ 386	\$ 394
Take: Monthly by Supply (MDT)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
Unit Commodity Cost (\$/000) (\$/dth)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
DSM POOL GIL	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
Take: Monthly by Supply (MDT)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
Unit Commodity Cost (\$/000) (\$/dth)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
DSM POOL LAP	\$ 201	\$ 206	\$ 214	\$ 225	\$ 251	\$ 265	\$ 270	\$ 273	\$ 291	\$ 306	\$ 316	\$ 317	\$ 325	\$ 329	\$ 333	\$ 339	\$ 348	\$ 377	\$ 386	\$ 392
Take: Monthly by Supply (MDT)	\$ 8	\$ 12	\$ 11	\$ 12	\$ 14	\$ 17	\$ 19	\$ 22	\$ 24	\$ 27	\$ 28	\$ 29	\$ 29	\$ 34	\$ 34	\$ 38	\$ 44	\$ 47	\$ 48	\$ 58
Unit Commodity Cost (\$/000) (\$/dth)	\$ 8	\$ 12	\$ 11	\$ 12	\$ 14	\$ 17	\$ 19	\$ 22	\$ 24	\$ 27	\$ 28	\$ 29	\$ 29	\$ 34	\$ 34	\$ 38	\$ 44	\$ 47	\$ 48	\$ 58
DSM POOL LAP	\$ 4	\$ 6	\$ 5	\$ 5	\$ 5	\$ 6	\$ 7	\$ 8	\$ 8	\$ 8	\$ 9	\$ 9	\$ 11	\$ 10	\$ 11	\$ 10	\$ 11	\$ 14	\$ 13	\$ 15
Take: Monthly by Supply (MDT)	\$ 4	\$ 6	\$ 5	\$ 5	\$ 5	\$ 6	\$ 7	\$ 8	\$ 8	\$ 8	\$ 9	\$ 9	\$ 11	\$ 10	\$ 11	\$ 10	\$ 11	\$ 14	\$ 13	\$ 15
Unit Commodity Cost (\$/000) (\$/dth)	\$ 4	\$ 6	\$ 5	\$ 5	\$ 5	\$ 6	\$ 7	\$ 8	\$ 8	\$ 8	\$ 9	\$ 9	\$ 11	\$ 10	\$ 11	\$ 10	\$ 11	\$ 14	\$ 13	\$ 15
DSM POOL MAD	\$ 201	\$ 206	\$ 214	\$ 225	\$ 251	\$ 265	\$ 270	\$ 273	\$ 291	\$ 306	\$ 316	\$ 317	\$ 325	\$ 329	\$ 333	\$ 339	\$ 348	\$ 377	\$ 386	\$ 392
Take: Monthly by Supply (MDT)	\$ 9	\$ 14	\$ 13	\$ 15	\$ 17	\$ 21	\$ 25	\$ 28	\$ 29	\$ 31	\$ 35	\$ 38	\$ 46	\$ 50	\$ 51	\$ 56	\$ 66	\$ 79	\$ 85	\$ 94
Unit Commodity Cost (\$/000) (\$/dth)	\$ 9	\$ 14	\$ 13	\$ 15	\$ 17	\$ 21	\$ 25	\$ 28	\$ 29	\$ 31	\$ 35	\$ 38	\$ 46	\$ 50	\$ 51	\$ 56	\$ 66	\$ 79	\$ 85	\$ 94
DSM POOL MAD	\$ 5	\$ 7	\$ 6	\$ 6	\$ 7	\$ 8	\$ 9	\$ 10	\$ 10	\$ 11	\$ 12	\$ 14	\$ 15	\$ 15	\$ 15	\$ 16	\$ 19	\$ 17	\$ 20	\$ 14
Take: Monthly by Supply (MDT)	\$ 5	\$ 7	\$ 6	\$ 6	\$ 7	\$ 8	\$ 9	\$ 10	\$ 10	\$ 11	\$ 12	\$ 14	\$ 15	\$ 15	\$ 15	\$ 16	\$ 19	\$ 17	\$ 20	\$ 14
Unit Commodity Cost (\$/000) (\$/dth)	\$ 5	\$ 7	\$ 6	\$ 6	\$ 7	\$ 8	\$ 9	\$ 10	\$ 10	\$ 11	\$ 12	\$ 14	\$ 15	\$ 15	\$ 15	\$ 16	\$ 19	\$ 17	\$ 20	\$ 14
DSM POOL PRV	\$ 201	\$ 206	\$ 214	\$ 225	\$ 251	\$ 265	\$ 270	\$ 273	\$ 291	\$ 306	\$ 316	\$ 317	\$ 325	\$ 330	\$ 333	\$ 339	\$ 348	\$ 378	\$ 386	\$ 392
Take: Monthly by Supply (MDT)	\$ 24	\$ 36	\$ 33	\$ 38	\$ 45	\$ 56	\$ 67	\$ 78	\$ 80	\$ 94	\$ 99	\$ 117	\$ 133	\$ 131	\$ 150	\$ 178	\$ 194	\$ 220	\$ 240	\$ 162
Unit Commodity Cost (\$/000) (\$/dth)	\$ 24	\$ 36	\$ 33	\$ 38	\$ 45	\$ 56	\$ 67	\$ 78	\$ 80	\$ 94	\$ 99	\$ 117	\$ 133	\$ 131	\$ 150	\$ 178	\$ 194	\$ 220	\$ 240	\$ 162
DSM POOL RED	\$ 201	\$ 206	\$ 214	\$ 225	\$ 251	\$ 265	\$ 270	\$ 273	\$ 291	\$ 307	\$ 315	\$ 317	\$ 325	\$ 329	\$ 333	\$ 339	\$ 348	\$ 378	\$ 387	\$ 392
Take: Monthly by Supply (MDT)	\$ 43	\$ 87	\$ 130	\$ 168	\$ 308	\$ 453	\$ 603	\$ 752	\$ 952	\$ 1,082	\$ 1,286	\$ 1,447	\$ 1,520	\$ 1,652	\$ 1,859	\$ 2,019	\$ 2,282	\$ 2,741	\$ 2,841	\$ 1,240
Unit Commodity Cost (\$/000) (\$/dth)	\$ 43	\$ 87	\$ 130	\$ 168	\$ 308	\$ 453	\$ 603	\$ 752	\$ 952	\$ 1,082	\$ 1,286	\$ 1,447	\$ 1,520	\$ 1,652	\$ 1,859	\$ 2,019	\$ 2,282	\$ 2,741	\$ 2,841	\$ 1,240
DSM POOL SWS	\$ 21	\$ 42	\$ 61	\$ 75	\$ 125	\$ 175	\$ 228	\$ 281	\$ 341	\$ 369	\$ 426	\$ 476	\$ 490	\$ 524	\$ 583	\$ 623	\$ 610	\$ 630	\$ 630	\$ 317
Take: Monthly by Supply (MDT)	\$ 21	\$ 42	\$ 61	\$ 75	\$ 125	\$ 175	\$ 228	\$ 281	\$ 341	\$ 369	\$ 426	\$ 476	\$ 490	\$ 524	\$ 583	\$ 623	\$ 610	\$ 630	\$ 630	\$ 317
Unit Commodity Cost (\$/000) (\$/dth)	\$ 21	\$ 42	\$ 61	\$ 75	\$ 125	\$ 175	\$ 228	\$ 281	\$ 341	\$ 369	\$ 426	\$ 476	\$ 490	\$ 524	\$ 583	\$ 623	\$ 610	\$ 630	\$ 630	\$ 317
DSM POOL STN	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1
Take: Monthly by Supply (MDT)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1
Unit Commodity Cost (\$/000) (\$/dth)	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1
DSM POOL STN	\$ 201	\$ 206	\$ 214	\$ 225	\$ 251	\$ 265	\$ 270	\$ 273	\$ 291	\$ 307	\$ 315	\$ 317	\$ 325	\$ 330	\$ 333	\$ 339	\$ 347	\$ 376	\$ 386	\$ 392
Take: Monthly by Supply (MDT)	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Unit Commodity Cost (\$/000) (\$/dth)	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
DSM POOL BND	\$ 201	\$ 206	\$ 214	\$ 225	\$ 251	\$ 265	\$ 270	\$ 273	\$ 291	\$ 306	\$ 316	\$ 317	\$ 325	\$ 330	\$ 333	\$ 339	\$ 348	\$ 378	\$ 387	\$ 392
Take: Monthly by Supply (MDT)	\$ 2	\$ 3	\$ 3	\$ 3	\$ 4	\$ 5	\$ 6	\$ 7	\$ 7	\$ 8	\$ 9	\$ 9	\$ 11	\$ 13	\$ 13	\$ 15	\$ 17	\$ 17	\$ 21	\$ 14
Unit Commodity Cost (\$/000) (\$/dth)	\$ 2	\$ 3	\$ 3	\$ 3	\$ 4	\$ 5	\$ 6	\$ 7	\$											

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
	<p>Medium Load Growth, Stochastic Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. Only GTN Elements Consider. All items in RED mean those elements were not selected in the portfolio</p>						
	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1					
	Current NOVA	JP2					
	Current GTN	JP3					
	Current NWP	JP4					
	Current Foothills	PLY-1					OR101-0
	Current Ruby	PLY-2					OR104-0
		MIST					OR105-0
							OR111-0
							OR170-0
							WA502-0
GTN Only	Incremental NGTL	Spire Storage	4,112,461.39	0.517505	0	7,946,705,894	WA503-0
	Incremental GTN N-S	Gill Ranch Storage					WA504-0
	NWP I-5 Mainline EXP	Wild Goose Storage					WA505-0
	Incremental Ruby	Aeco Hub Storage					WA511-0
	NWP Wen lateral EXP	Magnum Storage					WA512-0
	Incremental Foothills	Clay Basin Storage					WA570-0
	NWP Z20 lateral EXP						WA577-0
	T-South-So Crossing						
	Trails West (Palomar)						
	Bremerton/Shelton						
	NWP East OR Mainline EXP						
	Incremental GTN S-N						
	Incremental Enbridge						
	Pacific Connector						

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
GTN with Storage	Medium Load Growth, Stochastic Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. Incremental GTN and Storage considered. All items in RED mean those elements were not selected in the portfolio						
	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak				
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak				
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak				
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S				
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0
	Current Ruby	PLY-2	OPAL BASE				OR104-0
		MIST	KERN WINTER				OR105-0
			STAT2 BASE				OR111-0
							OR170-0
	Incremental NGTL	Spire Storage	Opal Incrm Supply				WA502-0
	Incremental GTN N-S	Gill Ranch Storage	Renewable Natural Gas	4,107,475.61	0.516878	0	7,946,705,894
	NWP I-5 Mainline EXP	Wild Goose Storage	Resource Mix - 3 Basins				WA504-0
	Incremental Ruby	Aeco Hub Storage	DSM				WA505-0
	NWP Wen lateral EXP	Magnum Storage					WA511-0
	Incremental Foothills	Clay Basin Storage					WA512-0
NWP Z20 lateral EXP						WA570-0	
T-South-So Crossing						WA577-0	
Trails West (Palomar)							
Bremerton/Shelton							
NWP East OR Mainline EXP							
Incremental GTN S-N							
Incremental Enbridge							
Pacific Connector							

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO	KEY ELEMENTS IN SENDOUT SCENARIO	NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
Medium Load Growth, Stochastic Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. Only Incremental NWP capacity and storage considered. All items in RED mean those elements were not selected in the portfolio	KEY ELEMENTS IN SENDOUT SCENARIO							
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak					
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak					
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak					
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S					
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0	
	Current Ruby	PLY-2	OPAL BASE				OR104-0	
		MIST	KERN WINTER				OR105-0	
			STAT2 BASE				OR111-0	
							OR170-0	
	NWP with Storage	Incremental NGTL	Spire Storage		0.515445	0	7,946,705,894	WA502-0
		Incremental GTN N-S	Gill Ranch Storage	Opal Incrm Supply	4,096,087.26			WA503-0
		NWP I-5 Mainline EXP	Wild Goose Storage	Renewable Natural Gas				WA504-0
		Incremental Ruby	Aeco Hub Storage	Resource Mix - 3 Basins				WA505-0
		NWP Wen lateral EXP	Magnum Storage	DSM				WA511-0
Incremental Foothills		Clay Basin Storage					WA512-0	
NWP Z20 lateral EXP							WA570-0	
T-South-So Crossing							WA577-0	
Trails West (Palomar)								
NWP East OR Mainline EXP								
Bremerton Shelton								
Incremental GTN S-N								
Incremental Enbridge Pacific Connector								

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
Storage Only	Medium Load Growth, Stochastic Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. Only incremental storage considered. All items in RED mean those elements were not selected as part of the portfolio						
	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak				
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak				
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak				
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S				
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0
	Current Ruby	PLY-2	OPAL BASE				OR104-0
		MIST	KERN WINTER				OR105-0
			STAT2 BASE				OR111-0
							OR170-0
	Incremental NGTL	Spire Storage	Opal Incrm Supply				WA502-0
	Incremental GTN N-S	Gill Ranch Storage	Renewable Natural Gas	4,096,099.40	0.515446	0	7,946,705,894
	NWP I-5 Mainline EXP	Wild Goose Storage	Resource Mix - 3 Basins				WA503-0
	Incremental Ruby	Aeco Hub Storage	DSM				WA504-0
	NWP Wen lateral EXP	Magnum Storage					WA505-0
	Incremental Foothills	Clay Basin Storage					WA511-0
NWP Z20 lateral EXP						WA512-0	
T-South-So Crossing						WA570-0	
Trails West (Palomar)						WA577-0	
NWP East OR Mainline EXP							
Bremerton Shelton							
Incremental GTN S-N							
Incremental Enbridge Pacific Connector							

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
Medium Load Growth, Stochastic Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All new elements considered. All items in RED mean those elements were not selected as part of the portfolio	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak				
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak				
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak				
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S				
	Current Foothills	PLY-1	KINGSGATE BASE				
	Current Ruby	PLY-2	OPAL BASE				
		MIST	KERN WINTER				
			STAT2 BASE				
	Top Ranking Candidate Portfolio	Incremental NGTL	Spire Storage	Opal Incrm Supply	0.513817	0	7,946,705,894
	Incremental GTN N-S	Gill Ranch Storage	Renewable Natural Gas	4,083,151			OR111-0
	NWP I-5 Mainline EXP	Wild Goose Storage	Resource Mix - 3 Basins				OR170-0
	Incremental Ruby	Aeco Hub Storage	DSM				WA503-0
	NWP Wen lateral EXP	Magnum Storage					WA504-0
	Incremental Foothills	Clay Basin Storage					WA505-0
	NWP Z20 lateral EXP						WA511-0
	T-South-So Crossing						WA570-0
	Bremerton/Shelton						WA577-0
	Trails West (Palomar)						
	NWP East OR Mainline EXP						
	Incremental GTN S-N						
	Incremental Enbridge						
	Pacific Connector						

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
Low Growth	KEY ELEMENTS IN SENDOUT SCENARIO		3,887,895	0.514996	0	7,549,370,601	OR101-0 OR104-0 OR105-0 OR111-0 OR170-0 WA502-0 WA503-0 WA504-0 WA505-0 WA511-0 WA512-0 WA570-0 WA577-0	
	Current Station2	JP1						AECO Base/Fixed, Winter, Day W/S, Peak
	Current NOVA	JP2						SUMAS Base/Fixed, Winter, Day W/S, Peak
	Current GTN	JP3						ROCKIES Base/Fixed, Winter, Day W/S, Peak
	Current NWP	JP4						HUNT Base/Fixed, Winter, Day W/S
	Current Foothills	PLY-1						KINGSGATE BASE
	Current Ruby	PLY-2						OPAL BASE
		MIST						KERN WINTER
								STAT2 BASE
	Incremental NGTL							Opal Incrm Supply
	Incremental GTN N-S	Spire Storage						Renewable Natural Gas
	NWP I-5 Mainline EXP	Gill Ranch Storage						Resource Mix - 3 Basins
	Incremental Ruby	Wild Goose Storage						DSM
	NWP Wen lateral EXP	Aeco Hub Storage						
Incremental Foothills	Magnum Storage							
NWP Z20 lateral EXP	Clay Basin Storage							
T-South-So Crossing								
Bremerton/Shelton								
Trails West (Palomar)								
NWP East OR Mainline EXP								
Incremental GTN S-N								
Incremental Enbridge								
Pacific Connector								

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
30% Environmental Adder	Medium Load Growth, Stochastic Pricing with 30% Environmental Adder, Average Weather w/ Peak Event, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited							
	KEY ELEMENTS IN SENDOUT SCENARIO							
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak					
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak					
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak					
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S					
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0	
	Current Ruby	PLY-2	OPAL BASE				OR104-0	
		MIST	KERN WINTER				OR105-0	
			STAT2 BASE				OR111-0	
							OR170-0	
	Incremental NGTL	Spire Storage	Opal Incrm Supply	3,784,175	0.492211	0	7,688,109,713	WA502-0
	Incremental GTN N-S	Gill Ranch Storage	RenewableNaturalGas					WA503-0
	NWP I-5 Mainline EXP	Wild Goose Storage	Resource Mix - 3 Basins					WA504-0
	Incremental Ruby	Aeco Hub Storage	DSM					WA505-0
	NWP Wen lateral EXP	Magnum Storage						WA511-0
	Incremental Foothills	Clay Basin Storage						WA512-0
NWP Z20 lateral EXP			WA570-0					
T-South-So Crossing			WA577-0					
Bremerton/Shelton								
Trails West (Palomar)								
NWP East OR Mainline EXP								
Incremental GTN S-N								
Incremental Enbridge								
Pacific Connector								

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
No Alberta	Medium Load Growth, Medium Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited						
	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak				
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak				
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak				
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S				
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0
	Current Ruby	PLY-2	OPAL BASE				OR104-275513
		MIST	KERN WINTER				OR105-79928
			STAT2 BASE				OR111-96702
							OR170-132241
	Incremental NGTL	Spire Storage	Opal Incrm Supply				WA502-0
	Incremental GTN N-S	Gill Ranch Storage	Renewable Natural Gas				WA503-0
	NWP I-5 Mainline EXP	Wild Goose Storage	Resource Mix - 3 Basins				WA504-5970
	Incremental Ruby	Aeco Hub Storage	DSM				WA505-1
	NWP Wen lateral EXP	Magnum Storage					WA511-243212
	Incremental Foothills	Clay Basin Storage					WA512-0
NWP Z20 lateral EXP						WA570-126155	
T-South-So Crossing						WA577-0	
Bremerton/Shelton							
Trails West (Palomar)							
NWP East OR Mainline EXP							
Incremental GTN S-N							
Incremental Enbridge							
Pacific Connector							
			4,396,640	0.553431	959,965	7,944,337,791	

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
No BC	Medium Load Growth, Medium Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited						
	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak				
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak				
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak				
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S				
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-58942
	Current Ruby	PLY-2	OPAL BASE				OR104-3168986
		MIST	KERN WINTER				OR105-509654
			STAT2 BASE				OR111-742109
	Incremental NGTL		Opal Incrm Supply				OR170-1104398
	Incremental GTN N-S	Spire Storage	Renewable Natural Gas	3,018,488	0.476692	103,111,415	6,332,157,810
	NWP I-5 Mainline EXP	Gill Ranch Storage	Resource Mix - 3 Basins				WA502-0
	Incremental Ruby	Wild Goose Storage	DSM				WA504-48666605
	NWP Wen lateral EXP	Aeco Hub Storage					WA505-9638759
Incremental Foothills	Magnum Storage					WA511-8986050	
NWP Z20 lateral EXP	Clay Basin Storage					WA512-0	
T-South-So Crossing						WA570-1091289	
Bremerton/Shelton						WA577-0	
Trails West (Palomar)							
NWP East OR Mainline EXP							
Incremental GTN S-N							
Incremental Enbridge							
Pacific Connector							

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
No Rockies	Medium Load Growth, Medium Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited						
	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak				
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak				
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak				
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S				
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0
	Current Ruby	PLY-2	OPAL BASE				OR104-127749
		MIST	KERN WINTER				OR105-440145
			STAT2 BASE				OR111-631131
							OR170-962188
							WA502-0
	Incremental NGTL	Spire Storage	Opal Incrm Supply				WA503-5039
	Incremental GTN N-S	Gill Ranch Storage	Renewable Natural Gas				WA504-5289711
	NWP I-5 Mainline EXP	Wild Goose Storage	Resource Mix - 3 Basins				WA505-6820685
Incremental Ruby	Aeco Hub Storage	DSM				WA511-7079828	
NWP Wen lateral EXP	Magnum Storage					WA512-0	
Incremental Foothills	Clay Basin Storage					WA570-900829	
NWP Z20 lateral EXP						WA577-0	
T-South-So Crossing							
Bremerton/Shelton							
Trails West (Palomar)							
NWP East OR Mainline EXP							
Incremental GTN S-N							
Incremental Enbridge							
Pacific Connector							
			4,919,223	0.628719	22,257,306	7,824,203,601	

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO	KEY ELEMENTS IN SENDOUT SCENARIO	NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
No Canada	Medium Load Growth, Medium Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited							
	KEY ELEMENTS IN SENDOUT SCENARIO							
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak					
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak					
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak					
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S					
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-3725379	
	Current Ruby	PLY-2	OPAL BASE				OR104-22764910	
		MIST	KERN WINTER				OR105-3021583	
			STAT2 BASE				OR111-1559777	
							OR170-1501737	
							WA502-0	
	Incremental NGTL	Spire Storage	Opal Incrm Supply	2,878,065	0.514183	152,367,823	5,597,355,940	WA503-29480160
	Incremental GTN N-S	Gill Ranch Storage	Renewable Natural Gas					WA504-66758882
	NWP I-5 Mainline EXP	Wild Goose Storage	Resource Mix - 3 Basins					WA505-11379261
Incremental Ruby	Aeco Hub Storage	DSM					WA511-10927111	
NWP Wen lateral EXP	Magnum Storage						WA512-0	
Incremental Foothills	Clay Basin Storage						WA570-1249024	
NWP Z20 lateral EXP							WA577-0	
T-South-So Crossing								
Bremerton/Shelton								
Trails West (Palomar)								
NWP East OR Mainline EXP								
Incremental GTN S-N								
Incremental Enbridge								
Pacific Connector								

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
Limit BC	Medium Load Growth, Medium Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited							
	KEY ELEMENTS IN SENDOUT SCENARIO							
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak					
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak					
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak					
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S					
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0	
	Current Ruby	PLY-2	OPAL BASE				OR104-0	
		MIST	KERN WINTER				OR105-0	
			STATZ BASE				OR111-0	
							OR170-0	
							WA502-0	
	Incremental NGTL	Spire Storage	Opal Incrm Supply	4,173,759	0.525219	0	7,946,705,894	WA503-0
	Incremental GTN N-S	Gill Ranch Storage	Renewable Natural Gas					WA504-0
	NWP I-5 Mainline EXP	Wild Goose Storage	Resource Mix - 3 Basins					WA505-0
	Incremental Ruby	Aeco Hub Storage	DSM					WA511-0
	NWP Wen lateral EXP	Magnum Storage						WA512-0
Incremental Foothills	Clay Basin Storage						WA570-0	
NWP Z20 lateral EXP							WA577-0	
T-South-So Crossing								
Bremerton/Shelton								
Trails West (Palomar)								
NWP East OR Mainline EXP								
Incremental GTN S-N								
Incremental Enbridge								
Pacific Connector								

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
No JP	Medium Load Growth, Medium Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited						
	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1 AECO Base/Fixed, Winter, Day W/S, Peak					
	Current NOVA	JP2 SUMAS Base/Fixed, Winter, Day W/S, Peak					
	Current GTN	JP3 ROCKIES Base/Fixed, Winter, Day W/S, Peak					
	Current NWP	JP4 HUNT Base/Fixed, Winter, Day W/S					
	Current Foothills	PLY-1 KINGSGATE BASE					OR101-0
	Current Ruby	PLY-2 OPAL BASE					OR104-0
		MIST KERN WINTER					OR105-0
		STAT2 BASE					OR111-0
							OR170-0
	Incremental NGTL	Spire Storage	Opal Incrm Supply				WA502-0
	Incremental GTN N-S	Gill Ranch Storage	Renewable Natural Gas				WA503-0
	NWP I-5 Mainline EXP	Wild Goose Storage	Resource Mix - 3 Basins	4,168,896	0.524607	0	7,946,705,894
	Incremental Ruby	Aeco Hub Storage	DSM				WA504-0
NWP Wen lateral EXP	Magnum Storage					WA505-0	
Incremental Foothills	Clay Basin Storage					WA511-0	
NWP Z20 lateral EXP						WA512-0	
T-South-So Crossing						WA570-0	
Bremerton/Shelton						WA577-0	
Trails West (Palomar)							
NWP East OR Mainline EXP							
Incremental GTN S-N							
Incremental Enbridge							
Pacific Connector							

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
Medium Load Growth, Medium Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited	KEY ELEMENTS IN SENDOUT SCENARIO							
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak					
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak					
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak					
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S					
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0	
	Current Ruby	PLY-2	OPAL BASE				OR104-0	
		MIST	KERN WINTER				OR105-0	
			STAT2 BASE				OR111-0	
							OR170-0	
							WA502-0	
	No Mist	Incremental NGTL	Spire Storage	4,022,804	0.506223	0	7,946,705,894	WA503-0
		Incremental GTN N-S	Gill Ranch Storage					WA504-0
		NWP I-5 Mainline EXP	Wild Goose Storage					WA505-0
	Incremental Ruby	Aeco Hub Storage					WA511-0	
	NWP Wen lateral EXP	Magnum Storage					WA512-0	
	Incremental Foothills	Clay Basin Storage					WA570-0	
	NWP Z20 lateral EXP						WA577-0	
	T-South-So Crossing							
	Bremerton/Shelton							
	Trails West (Palomar)							
	NWP East OR Mainline EXP							
	Incremental GTN S-N							
	Incremental Enbridge							
	Pacific Connector							

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO	KEY ELEMENTS IN SENDOUT SCENARIO	NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
Medium Load Growth, Medium Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited	KEY ELEMENTS IN SENDOUT SCENARIO							
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak					
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak					
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak					
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S					
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-3725	
	Current Ruby	PLY-2	OPAL BASE				OR104-22765	
		MIST	KERN WINTER				OR105-3022	
			STAT2 BASE				OR111-1560	
							OR170-1502	
							WA502-0	
	No Storage	Incremental NGTL Incremental GTN N-S NWP I-5 Mainline EXP Incremental Ruby NWP Wen lateral EXP Incremental Foothills NWP Z20 lateral EXP T-South-So Crossing Bremerton/Shelton Trails West (Palomar) NWP East OR Mainline EXP Incremental GTN S-N Incremental Enbridge Pacific Connector	Spire Storage Gill Ranch Storage Wild Goose Storage Aeco Hub Storage Magnum Storage Clay Basin Storage	4,281,766	0.539167	152,368	7,941,453,965	WA503-29480 WA504-66759 WA505-11379 WA511-10927 WA512-0 WA570-1249 WA577-0

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO	KEY ELEMENTS IN SENDOUT SCENARIO	NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
Limit JP	Medium Load Growth, Medium Pricing, Stochastic Weather, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited	AECO Base/Fixed, Winter, Day W/S, Peak	4,128,097	0.519473	0	7,946,705,894	OR101-0 OR104-0 OR105-0 OR111-0 OR170-0 WA502-0 WA503-0 WA504-0 WA505-0 WA511-0 WA512-0 WA570-0 WA577-0	
	Current Station2	JP1						
	Current NOVA	JP2						
	Current GTN	JP3						
	Current NWP	JP4						
	Current Foothills	PLY-1						
	Current Ruby	PLY-2						
		MIST						
	Incremental NGTL	Spire Storage						Opal Incrm Supply
	Incremental GTN N-S	Gill Ranch Storage						Renewable Natural Gas
	NWP I-5 Mainline EXP	Wild Goose Storage						Resource Mix - 3 Basins
	Incremental Ruby	Aeco Hub Storage						DSM
	NWP Wen lateral EXP	Magnum Storage						
Incremental Foothills	Clay Basin Storage							
NWP Z20 lateral EXP								
T-South-So Crossing								
Bremerton/Shelton								
Trails West (Palomar)								
NWP East OR Mainline EXP								
Incremental GTN S-N								
Incremental Enbridge								
Pacific Connector								

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
SCC	KEY ELEMENTS IN SENDOUT SCENARIO		3,691,774	0.480193	0	7,688,109,713	OR101-0 OR104-0 OR105-0 OR111-0 OR170-0 WA502-0 WA503-0 WA504-0 WA505-0 WA511-0 WA512-0 WA570-0 WA577-0	
	Medium Load Growth, Stochastic Pricing, Average Weather w/ Peak Event, CEC Cap and Trade Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1						AECO Base/Fixed, Winter, Day W/S, Peak
	Current NOVA	JP2						SUMAS Base/Fixed, Winter, Day W/S, Peak
	Current GTN	JP3						ROCKIES Base/Fixed, Winter, Day W/S, Peak
	Current NWP	JP4						HUNT Base/Fixed, Winter, Day W/S
	Current Foothills	PLY-1						KINGSGATE BASE
	Current Ruby	PLY-2						OPAL BASE
		MIST						KERN WINTER
								STAT2 BASE
	Incremental NGTL							Opal Incrm Supply
	Incremental GTN N-S	Spire Storage						RenewableNaturalGas
	NWP I-5 Mainline EXP	Gill Ranch Storage						Resource Mix - 3 Basins
	Incremental Ruby	Wild Goose Storage						DSM
NWP Wen lateral EXP	Aeco Hub Storage							
Incremental Foothills	Magnum Storage							
NWP Z20 lateral EXP	Clay Basin Storage							
T-South-So Crossing								
Bremerton/Shelton								
Trails West (Palomar)								
NWP East OR Mainline EXP								
Incremental GTN S-N								
Incremental Enbridge								
Pacific Connector								

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)	
Stochastic Carbon	Medium Load Growth, Stochastic Pricing, Average Weather w/ Peak Event, Raise Wages, Cut Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited							
	KEY ELEMENTS IN SENDOUT SCENARIO							
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak					
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak					
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak					
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S					
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0	
	Current Ruby	PLY-2	OPAL BASE				OR104-0	
		MIST	KERN WINTER				OR105-0	
			STAT2 BASE				OR111-0	
							OR170-0	
							WA502-0	
				3,700,168	0.481284	0	7,688,109,713	WA503-0
		Incremental NGTL	Spire Storage					WA504-0
		Incremental GTN N-S	Gill Ranch Storage					WA505-0
	NWP I-5 Mainline EXP	Wild Goose Storage					WA511-0	
	Incremental Ruby	Aeco Hub Storage					WA512-0	
	NWP Wen lateral EXP	Magnum Storage					WA570-0	
	Incremental Foothills	Clay Basin Storage					WA577-0	
	NWP Z20 lateral EXP							
	T-South-So Crossing							
	Bremerton/Shelton							
	Trails West (Palomar)							
	NWP East OR Mainline EXP							
	Incremental GTN S-N							
	Incremental Enbridge							
	Pacific Connector							

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
SCENARIO #1 Medium Load Growth, Medium Pricing, Average Weather w/ Peak Event, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak				
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak				
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak				
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S				
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0
	Current Ruby	PLY-2	OPAL BASE				OR104-0
		MIST	KERN WINTER				OR105-0
			STAT2 BASE				OR111-0
							OR170-0
							WA502-0
							WA503-0
							WA504-0
							WA505-0
							WA511-0
						WA512-0	
						WA570-0	
						WA577-0	
RNG #1	Incremental NGTL Incremental GTN N-S NWP I-5 Mainline EXP Incremental Ruby NWP Wen lateral EXP Incremental Foothills NWP Z20 lateral EXP T-South-So Crossing Bremerton/Shelton Trails West (Palomar) NWP East OR Mainline EXP Incremental GTN S-N Incremental Enbridge Pacific Connector	Spire Storage Gill Ranch Storage Wild Goose Storage Aecco Hub Storage Magnum Storage Clay Basin Storage	Opal Incrm Supply Renewable Natural Gas Resource Mix - 3 Basins DSM	4,016,175	0	7,946,705,894	

SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO		NPV 20 Year Costs in \$000s	Average Cost Per Therm	Max Year Unserved Demand (Therms)	Total Served Demand (Therms)	Class of Unserved Demand (Therms)
RING #2 Medium Load Growth, Medium Pricing, Average Weather w/ Peak Event, SCC w/ 2.5% Discount Rate Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited	KEY ELEMENTS IN SENDOUT SCENARIO						
	Current Station2	JP1	AECO Base/Fixed, Winter, Day W/S, Peak				
	Current NOVA	JP2	SUMAS Base/Fixed, Winter, Day W/S, Peak				
	Current GTN	JP3	ROCKIES Base/Fixed, Winter, Day W/S, Peak				
	Current NWP	JP4	HUNT Base/Fixed, Winter, Day W/S				
	Current Foothills	PLY-1	KINGSGATE BASE				OR101-0
	Current Ruby	PLY-2	OPAL BASE				OR104-0
		MIST	KERN WINTER				OR105-0
			STAT2 BASE				OR111-0
							OR170-0
	Incremental NGTL						WA502-0
	Incremental GTN N-S	Spire Storage	Opal Incrm Supply	4,017,847	0.505599	0	7,946,705,894
	NWP I-5 Mainline EXP	Gill Ranch Storage	Renewable Natural Gas				WA503-0
	Incremental Ruby	Wild Goose Storage	Resource Mix - 3 Basins				WA504-0
	NWP Wen lateral EXP	Aeco Hub Storage	DSM				WA505-0
Incremental Foothills	Magnum Storage					WA511-0	
NWP Z20 lateral EXP	Clay Basin Storage					WA512-0	
T-South-So Crossing						WA570-0	
Bremerton/Shelton						WA577-0	
Trails West (Palomar)							
NWP East OR Mainline EXP							
Incremental GTN S-N							
Incremental Enbridge							
Pacific Connector							



In the Community to Serve®

ANNUAL HEDGE PLAN

(UG-_____)

JULY 17, 2020

Table of Contents

I.	Program Goals	2
II.	Organizational Structure	3
III.	Hedge Program	6
IV.	Material Changes to Hedge Program	10
V.	2020 HEP Meeting and Final Recommendations	11
VI.	Data Driven Hedging.....	12
VII.	Procurement Strategies.....	14
VIII.	Retrospective Report of 2019.....	15
IX.	Market Summary	17
X.	Conclusion	19
XI.	Appendices	
	a. CNGC Monthly Guidance June - 2020	
	b. Mark To Market Calculator - 6-2-2020	
	c. G&A- 2020 Forecast	
	d. 2020 Hedge Plan Process Flow Chart	
	e. Project Team Meeting Minutes - May 2020	
	f. CNGC Book Model	
	g. Var to Life	
	h. GSOC Minutes 2020-04-27	
	i. 2020 HEP Presentation	
	j. Hedge Schedule Chart	
	k. Retrospective Report	
	l. Compliance Matrix	

I. Program Goals

On March 13, 2017, the Washington Utilities and Transportation Commission (WUTC) issued its Policy and Interpretative Statement on Local Distribution Companies' (LDCs) Natural Gas Hedging Practices in Docket UG-132019. This statement provided guidance on how LDCs should develop and implement more robust risk management strategies, analyses, and reporting related to hedging activities.

In Docket UG-132019, the WUTC reviewed hedging practices by utilities in the State of Washington and found that local LDCs experienced costs associated with price risk mitigation techniques upwards of \$1.1 billion over a ten-year period. The WUTC discovered that many of these costs were caused by adherence to programmatic "set-it-and-forget-it" price risk mitigation practices (herein called hedging or hedging strategies) that did not respond well to the downward trending market which prevailed in recent years. The WUTC concluded that, while hedging is necessary to limit upside price risk, an effective program should have the flexibility to mitigate downside hedge losses by adjusting to changing market conditions. To achieve this goal, the Commission identified a need for a risk-responsive hedge plan with a robust analytical framework. Cascade Natural Gas (CNGC or Company) has committed to developing, maintaining and adapting risk responsive hedging policies, processes and applications. Satisfying the Commission's natural gas risk management goal is the purpose of the work associated with this document.

In preparing the Company's hedging document, CNGC has relied on the following points when interpreting the WUTC hedging policy statement:

- WUTC affirmed its preference that natural gas LDCs utilize risk responsive hedging practices.
- Hedging practices should not be speculative in nature. Hedging is an activity designed to reduce price uncertainty and manage foreseen and unforeseen price risk. Hedging is not an attempt to realize profits based on predictions of anticipated market movements.
- The Commission believes that, while there is no right mix of methods that may be applied unilaterally due to utility specific operations, LDCs must reasonably plan for market volatility and appropriately react to balance the benefits of hedging against exposure to hedge losses. This includes recognizing dual protection from upside price risk and downside hedge losses, along with annual validation of acceptable hedging outcomes.
- Based on the WUTC hedging policy statement, the Company is aware that the WUTC views the Gettings White Paper as a resource in helping LDCs develop more robust risk management programs.

In response to Docket UG-132019, CNGC's Gas Supply Oversight Committee (GSOC)¹ took the following actions in order to achieve full compliance the WUTC's goals. First, it formed a project team that would completely redesign the existing Hedge Program. Second, GSOC approved the hiring of an outside consultant, Gelber and Associates (G&A), to assist the project team with the Hedge Program overhaul. Gelber has more than two decades of experience in helping utilities create and manage their hedge programs.

The CNGC Hedging Program was designed to satisfy the WUTC's objectives in a manner that is feasible and economical given CNGC's size, structure, expertise, and customer base. In January of 2019, GSOC approved the Company Hedge Program, while in April of 2020 the newest Hedge Execution Plan (HEP) was approved.

¹ CNGC's Gas Supply Oversight Committee (GSOC) oversees the Company's gas supply purchasing and hedging strategy. Members of GSOC include Company senior management from Gas Supply, Regulatory, Finance and Operations.

Components of both the Hedge Program and the current HEP are discussed in this document, the 2020 Annual Hedge Plan.

On March 17th, 2020, CNGC received acknowledgement on its 2019 Annual Hedging plan. In the acknowledgment letter the WUTC identified that all regional utility hedge plans navigated “a spectrum of market conditions, some unpredictable and extreme, providing opportunity for utilities to evaluate the performance of their overall gas hedging strategies under various circumstances.” This acknowledgment letter also included the Commission’s expectations for hedging plans moving forward, including a clear reconciliation of hedging gains and losses to PGA costs, and a retrospective report detailing the performance and rationale behind hedges executed in the previous PGA year. The Company appreciates this feedback and has included in an appendix to the 2020 Hedge Plan a summary that clearly identifies how this plan incorporates the recommendations given by the Commission.

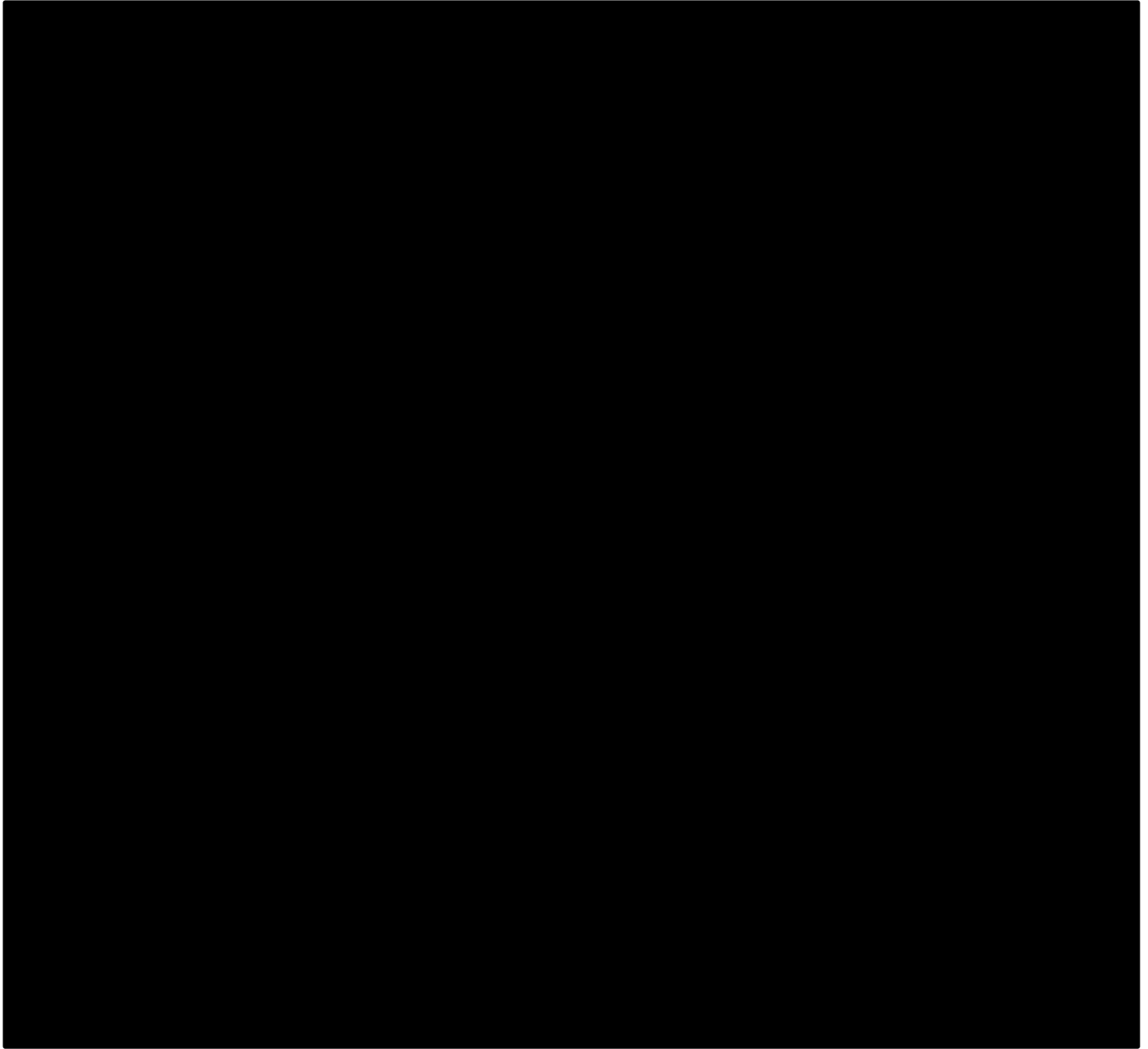
II. Organizational Structure

CNGC’s GSOC has ultimate authority over the Company’s Hedge Plan. This power is granted by the Company’s Policy Management Committee. Key members of CNGC’s Gas Supply department are responsible for executing the strategy set by GSOC, while individuals in the Resource Planning group of the Gas Supply department serve in control and audit roles. Figure 1 outlines the personnel that will be responsible for oversight, execution, and control for the 2020 Hedging Plan. Figure 2 provides a condensed organization chart for the Director of Gas Supply and individuals that report to him who are responsible for executing the Hedge Plan.

Figure 1 - Hedge Plan Roles

ROLE	ASSIGNED TO	TITLE(S)
Corporate Authority to Hedge	Management Policy Committee	President MDUR President MDUG VP, CFO & Treasurer MDUR
Oversight and authorization of CNGC's Hedge Program	Gas Supply Oversight Committee	EVP, Bus Dev & Gas Supply (Chair) EVP, Reg Affrs, Cust Srv, Admn VP, Engineering & Operation Services Controller - Utility Group Dir, Gas Supply Dir, Regulatory Affairs
Final Transaction Approval (upon receipt of signed agreement from counterparty)	Scott Madison	EVP, Business Development & Gas Supply
Final Transaction Approval (upon receipt of signed agreement from counterparty) Backup	Tammy Nygard	Controller - Utility Group
Hedge Execution Director	Kevin Connell	Director, Gas Supply
Delegated Execution Primary	Eric Wood	Supervisor, Gas Supply
Delegated Execution Secondary	Chris Robbins	Manager, Gas Supply & Control
Deal Capture	Carolyn Stone	Gas Supply Analyst III
Confirmation Review Primary	Mark Sellers-Vaughn	Manager, Supply Resource Planning
Confirmation Review Secondary	Brian Robertson	Supervisor, Resource Planning

Figure 2 - Hedge Team Organization Chart



III. Hedge Program

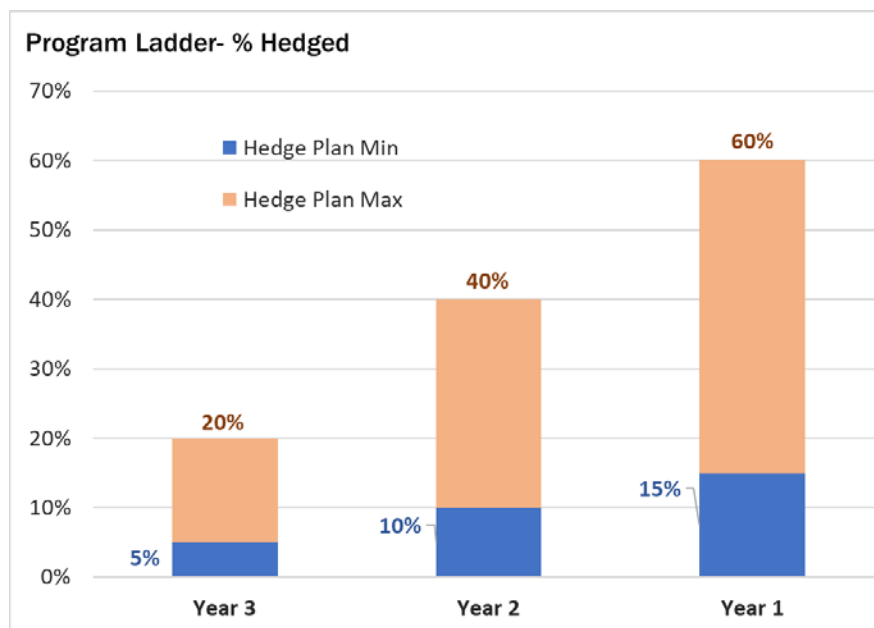
The philosophy behind the Company’s Hedging Program is to accomplish the following goals:

1. Provide essential price protection against adverse price increases which have detrimental impacts for CNGC customers.
2. Make the program “risk-responsive” and capable of adjusting to changing natural gas market conditions in compliance with the Washington Utility and Transportation Commission’s Policy Statement UG-132019.
3. Reduce hedge losses and more proactively respond to low risk or a falling market.
4. Further diversify portfolio by integrating financial hedging instruments.
5. Coordinate design features with appropriate CNGC personnel.

The Hedge Program utilizes a three-year forward-looking ladder with minimum and maximum purchase levels (see Figure 3). The hedge ranges offer flexibility to respond to market conditions and risks should they shift throughout the hedge season.

The 2020 Annual Hedge Plan is structured such that all hedge decisions and rationale for those decisions are recorded and are easily retrievable. Hedges percentages are not “set”, and decisions are not “forgotten”. Decisions are supported by timely data and analysis (see Section VI.). Management are made aware of the downside and upside risk of hedging, as well as the risk associated with not hedging. While the underlying analysis may be complex, the output is intentionally made simple. This facilitates the flow of information and increases transparency throughout the organization.

Figure 3: CNGC Hedge Program ladder



The start of a hedge year is November 1 and the end of the hedge year is October 31 of the next calendar year. However, the hedge ladder rolls over on April 1 to begin buying for the coming years. On this date the Year 2 becomes Year 1, Year 3 becomes Year 2, and a new Year 3 is added. The rolled off Year 1, now “Year 0”, will have several months (April through October) that have not settled and can still be hedged during this time. In terms of hedging the prompt (next) month, any fixed price purchases (hedges) will need to be performed prior to the month’s bid-week in order to be classified as a hedge. A hedge schedule is provided in the Appendix for more clarity.

As part of the Hedging Program, a prospective HEP is created before May each year by CNGC’s Resource Planning group, in collaboration with Gas Supply operations, to lay out a roadmap for the coming year’s hedge season. In preparation for the HEP creation, hedges from the previous year are marked and analyzed, the VaR and Book Model are recalibrated to take into account the latest market inputs, and years one, two, and three rollover to the new buying years. When this is complete, a meeting with the GSOC is convened to seek approval to move forward with the plan and will cover the following items:

1. A review of the prior year’s hedging activities and results.
2. The CNGC Book Model as provided by Resource Planning that shows hedge positions, unhedged positions, and how these positions compare to the current market. The book model looks at the prices in CNGC’s fixed contracts and compares it to the forward prices for the months that a contract is active. The result is displayed as a Mark to Market Calculation, a snapshot of which can be found in Figure 4. The full Book Model is included with this Plan as an appendix.
3. Designation of who will be primary and who will be secondary in the performance of hedge execution and who is responsible for deal capture and confirmation.
4. A preliminary hedging outlook for the upcoming year.
 - a. Major market drivers affecting national and regional gas.
 - b. Potential market opportunities and risks for the coming buying season.
 - c. The volume distribution of purchases through the hedge year to get to the end of season hedge goal.
 - d. Recommended instruments to be used for hedging (fixed-price physicals, swaps, options etc.).
5. An end of year hedge percentage goal for Year 1, Year 2, and Year 3.

The annual HEP process is pictured in Figure 5.

Figure 4- Mark to Market Snapshot

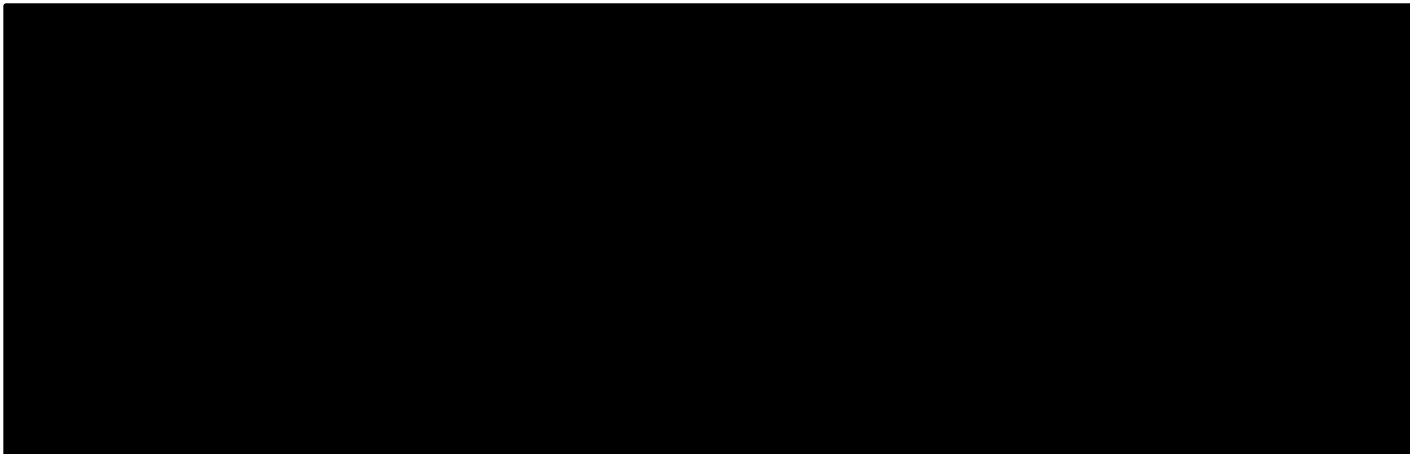
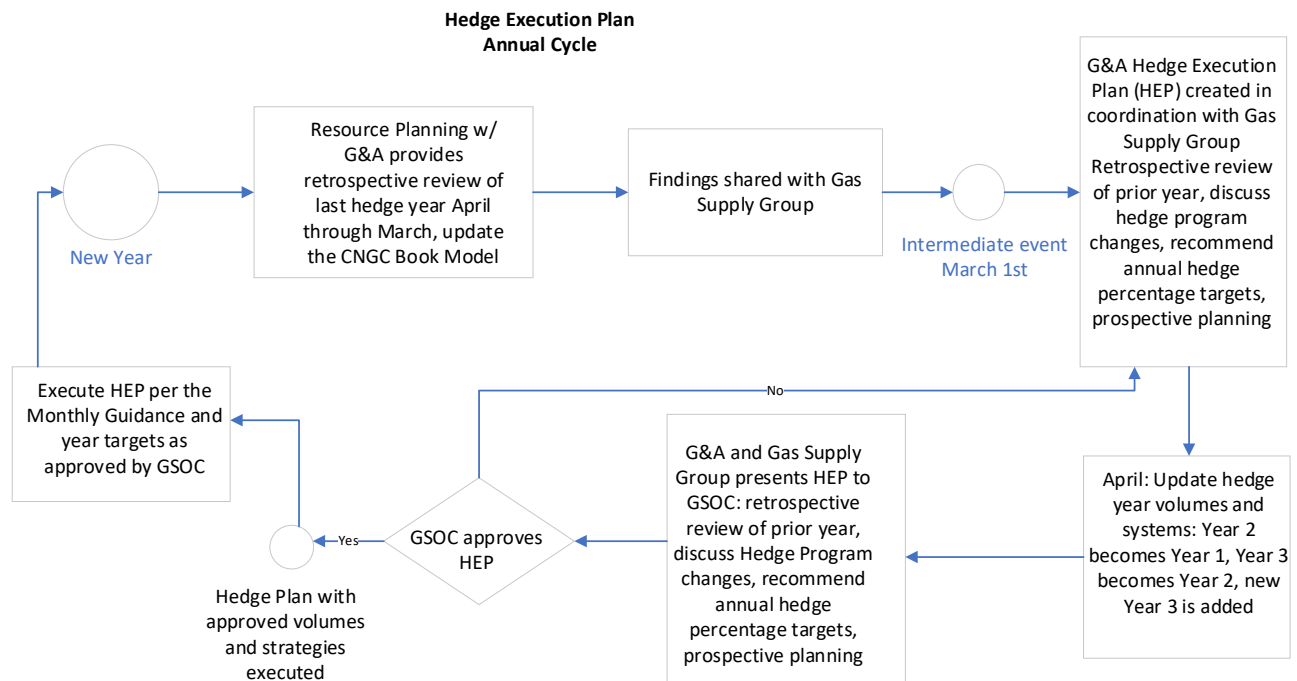


Figure 5 - HEP Annual Cycle Decision Tree



Monthly Guidance and Trade and Execution:

In order to implement the 2020 HEP as approved by GSOC, a Monthly Guidance document is created after updating the CNGC Book Model to include the most recent transactions and analyzing the various risk metrics. The purpose of the Monthly Guidance is to promote dialogue between CNGC’s Resource Planning team, who will be responsible for tracking and updating the CNGC book and various associated risk metrics, and the Gas Supply operations team, who will be negotiating and executing the recommended hedge

transactions. In addition, Monthly Guidance provides documentation and transparency for future internal or external review.

At the beginning, or just prior to the start of each month, the Resource Planning group within the Gas Supply department, with assistance from G&A, will provide the Supervisor of Gas Supply with a Monthly Guidance. The Monthly Guidance gives recommendations on hedge timing, volume, and instrument type. A detailed visualization of the Monthly Guidance is shown as a decision tree in Figure 6, while a copy of a sample Monthly Guidance is included in the appendices of this plan. Regarding instrument type, Figure 7 outlines the decision tree followed in deciding between swaps and call options. In deciding between financial and physical products, cost will be a major consideration. Typically, recommendations are written to give the gas buyer some flexibility to make cost effective decisions. For example, buy dates may be given but the exact time of day for purchasing are not provided. All guidance reports are delivered electronically and made available for review by the Gas Supply team, upper management, and regulatory bodies. Guidance reports are supported by the data-driven analysis by Gas Supply, Resource Planning, and G&A.

Figure 6 – Monthly Guidance Decision Tree

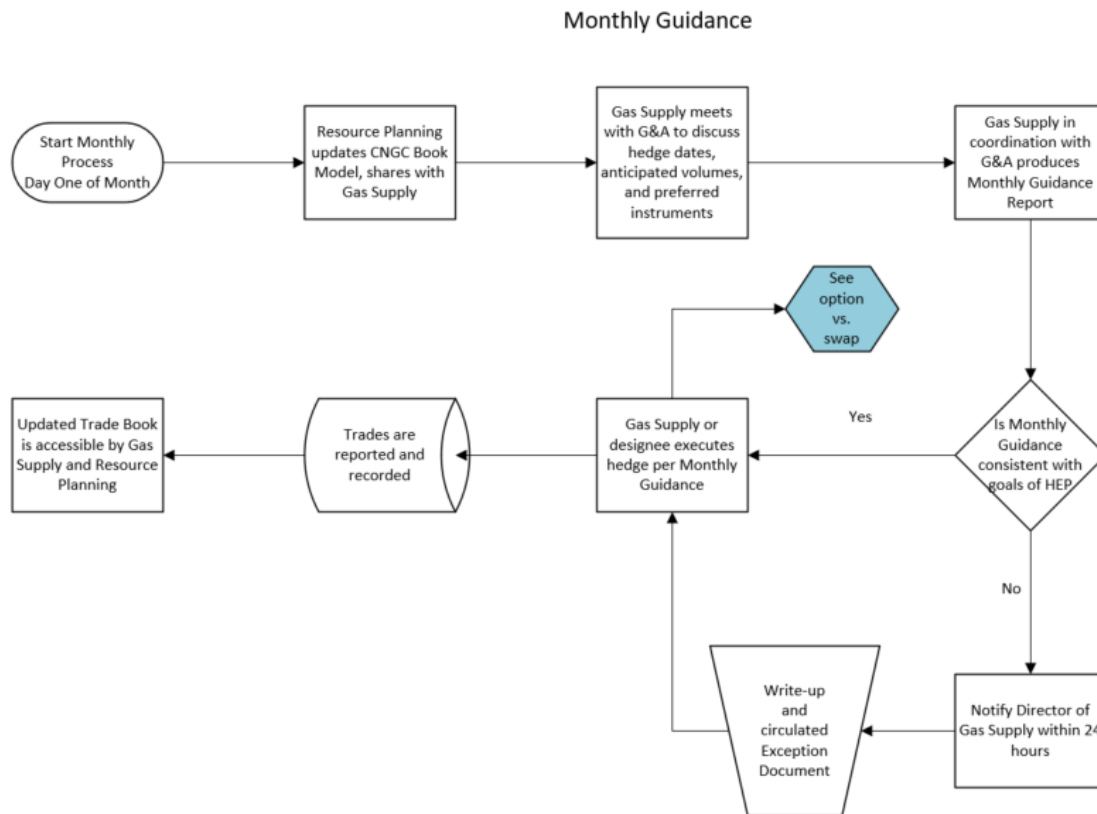
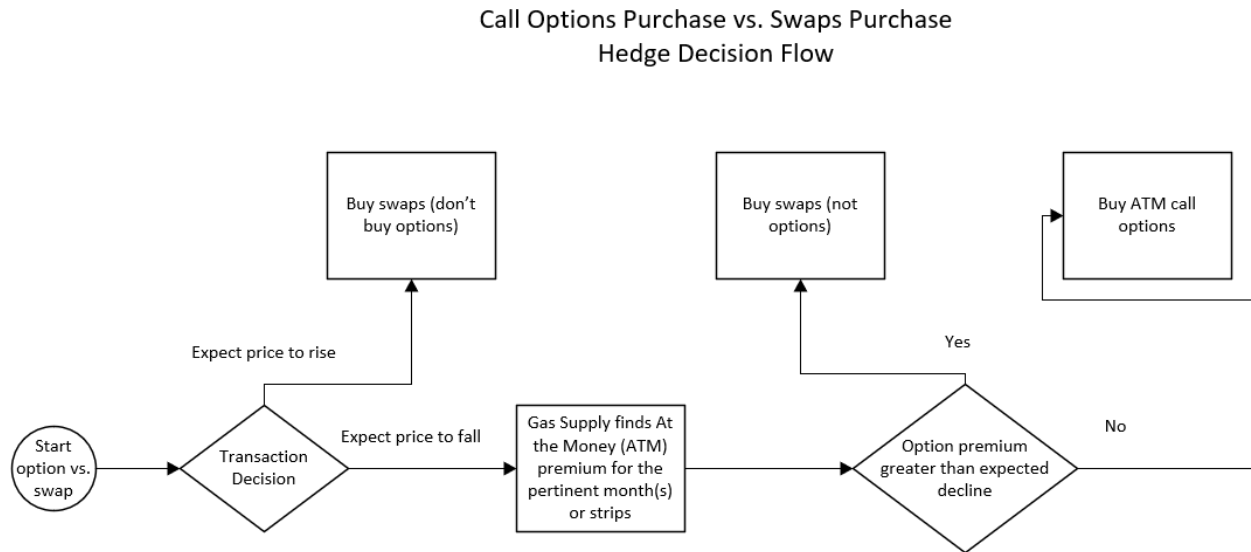


Figure 7 - Call Options vs Swaps Decision Tree



Hedging purchases are expected to occur at a minimum of once a quarter but will more typically occur once a month. Generally, once a quarter hedge purchases are reserved for locations such as -that are less liquid or in low volume summer months where splitting the hedge requirement into monthly increments is not cost effective. Otherwise, hedges will occur monthly per market guidance and a data-driven analytical framework as discussed earlier. However, as part of risk-responsive framework, Monthly Guidance may also recommend delaying or accelerating purchases from one month to another if the market is perceived as over or underpriced as indicated by quantitative metrics.

IV. Material Changes to Hedge Program

The primary purpose of the CNGC Hedge Program is to provide the structural objectives of the Company’s hedging activities. This includes the overall goals of the Annual Hedge Plan, as well as the minimum and maximum allowed hedge percentages. By design, the program itself is fairly static in nature, as these top-level values should not change unless there is a major paradigm shift in the regional markets that the Company procures its gas from. If such a shift were to occur, CNGC would utilize this section to highlight any changes to the Hedge Program, as per WUTC guidelines.

The dynamic portion of the Annual Hedge Plan is the HEP, where hedge targets are reevaluated each year, and risk-responsive strategies are executed on an iterative basis. These changes, including the continued evolution of the Company’s quantitative metrics, are discussed in Sections V and VI.

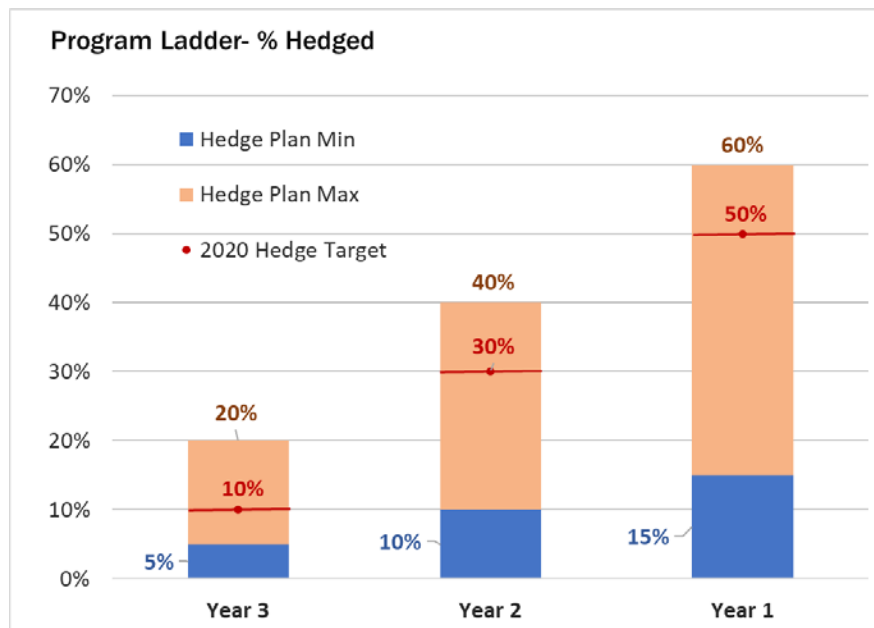
V. 2020 HEP Meeting and Final Recommendations

The 2020 HEP was submitted to GSOC in early spring of 2020. On April 27th, 2020, Gas Supply subsequently convened a HEP review meeting with GSOC and other internal stakeholders via Microsoft Teams. In the ensuing discussion, several key items were addressed and a plan for the coming year was finalized.



Figure 8 shows the final end-of-season hedge volumes (as a percentage of forecasted usage):

Figure 8: CNGC Hedge Program ladder and 2020 Targets



- Year 1 (November 2020 through October 2021) - **50%** (from 40% start)
- Year 2 (November 2021 through October 2022) - **30%** (from 20% start)
- Year 3 (November 2022 through October 2023) - **10%** (from 0% start)

For clarification, the hedge minimum, maximum, and targets are calculated as percentages of forecasted annual usage provided by the Resource Planning team. Hedge percentages are treated as a portion of the larger percentage of base supply (80% in Year 1, 60% in Year 2, and 20% in Year 3) that CNGC contracts based on Portfolio Design targets (see Figure 9).

Figure 9: CNGC 2020 Portfolio and Hedge Targets as a Percentage of Annual Usage Forecast in Dekatherms

Hedge Calculation Table			
	Year 1	Year 2	Year
Contracted Base Supply Target	80%	60%	20%
Hedge Target	50%	30%	10%
Forecast Annual Usage	34,493,326	34,991,857	35,484,895
Needed Base Supply to Contract	27,594,661	20,995,114	7,096,979
Hedge Target	17,246,663	10,497,557	3,548,490
Current Hedged	10,110,000	5,592,000	-
Current Indexed	4,712,000	-	-
Remaining to Hedge	7,136,663	4,905,557	3,548,490
Remaining Indexed Supply Needed	5,635,998	10,497,557	3,548,490

In Q3 2019, CNGC successively implemented its first financial transaction, and, going forward, G&A recommends further increasing the percentage of hedges covered by financial swaps to offer additional transaction flexibility and potential cost savings. Another advancement that was approved for the coming year is the test implementation of call options to limit upside price risk at a set cost (premium). Expanding the offering of available financial instruments will diversify CNGC’s portfolio and show continued evolution towards a more risk-responsive hedging program. Overall, G&A recommended increasing the volume of financial transactions, while still hedging primarily with fixed-price physical transactions during the upcoming Buying Season.

By continuing to hedge this year, CNGC will take advantage of historically low prices in expectation of a broader market recovery, beyond the short- to medium-term impacts of COVID-19 related market conditions. All volume added above the minimum hedging percentage is recognized as a discretionary hedge. However, hedging below the maximum volume percentages is a recognition of the lack of an overriding bullish signal that would cause price spikes in the coming year. Thus, splitting the minimum and maximum hedge percentages mitigates upward price risk while minimizing risk of hedge losses. This approach also acknowledges the high level of uncertainty currently in the market and will offer additional flexibility should market conditions shift quickly.

VI. Data Driven Hedging

Programmatic Hedges:

The programmatic portion of CNGC’s Hedge Program consists of two main components. First, the minimum hedge percentage requires that CNGC cover at least a portion of its expected purchases in Years 3 to 1 (5% after Year 3, 10% after Year 2, and 15% prior to Year 1). The hedge percentage selected above the minimum

is not programmatic. However, the accumulation of hedges is programmatic by purchasing hedges on a calendar schedule in accordance with each Monthly Guidance.²

Discretionary Hedges:

Non-programmatic (discretionary) hedges are data-driven decisions that CNGC makes above the minimum purchase boundary each hedge year. Data driven analysis is essential in developing market views and recommendations. This is an important input into the HEP and the Monthly Guidance when percent hedge levels are chosen. Naturally, if the analysis and forecasting suggest that prices will rise, a higher hedge percentage will be recommended and vice versa if the analysis and forecasting suggest that prices will fall. Key market metrics for forecasting include, but are not limited, US storage levels, weather forecasts, production outlooks, LNG exports, fuel switching for power generators, and a host of fundamental factors. Some of the data will come from outside sources while other data and analysis will be internal, often from proprietary models. In the early years of the Hedge Program, G&A has played an active role in providing and shaping market intelligence. As the hedging program matures, the Resource Planning Group and others within the Gas Supply Department will take over more of these duties. Development of the specific metrics for data driven market analysis is an ongoing process. Market analysis and forecasting is purposely allowed to evolve to stay connected with the ever-changing natural gas market.

VaR and Risk Calculations:

In order to effectively manage and respond to price risk, CNGC must understand and measure the risks in its hedge book. The first step is the creation of the CNGC Book Model. The CNGC Book Model contains all of CNGC's hedges, which include fixed-price physical purchases and financial instruments that may include swaps and call options. The Book Model calculates the volume of gas that is hedged and the volume of gas that is unhedged using forecast data from the most recent IRP load demand models. The hedged and unhedged portfolio is calculated for the next three hedge years for each of CNGC's three supply basins. These figures, along with a hedge schedule, create volume recommendations for the HEP and the Monthly Guidance. Comparing the portfolio to the current market allows for mark-to-market calculation of the hedges performed. The volume of gas that will need to be purchased and is not hedged, presents an upward price risk for CNGC's customers as they will need to pay more if natural gas prices rise. Conversely, the hedged portion of CNGC's portfolio presents a downward loss risk to CNGC hedge book as losses expand as prices decline. To better quantify these risk measures, VaR (Value at Risk) calculations are made. The VaR calculations are made using a proprietary Monte Carlo calculation with formulas and factors derived from historical pricing behaviors. CNGC and G&A, the primary developer of the VaR model, have given special consideration to the independent trading behavior of CNGC's procurement basins. Risk calculations based upon NYMEX Henry Hub pricing have been deemed inadequate based on weak correlations in recent years. As discussed in Section IX, this relationship is improving, and CNGC will continue to monitor the basin correlations and adjust the VaR model if appropriate.

The CNGC Book model and the VaR modeling are updated prior to HEP and Monthly Guidance discussions. This allows for dynamic analysis of current market information. In summary, the VaR results provide GSOC and Gas Supply with potential losses, of a set probability, for both the hedged and unhedged portfolio. The Monthly Guidance also indicates favorable months to hedge based on which months provide the greatest

² This is consistent with the definition of a programmatic hedge from Gettings White Paper page 19 as referenced on page 10 of Docket UG-132019.

net risk reduction. These calculations influence decisions. A goal of the VaR calculation is to balance VaR-down of CNGC's hedged portfolio with the VaR-up of floating volumes and to ensure that the Company is aware of the potential exposure of CNGC's portfolio to extreme price events in either direction. A proper balance provides a safeguard against a hedge position which would be opposed to the natural market position of CNGCs customers. In other words, lower price should be a benefit for gas consumers.

VII. Procurement Strategies

CNGC's GSOC oversees the Company's gas supply purchasing and hedging strategy. The Company's current gas procurement strategy is to have physical gas supplies under contract for 80% of year one's warmer-than-normal core needs. Under this procurement strategy, roughly 10 to 20% of the annual portfolio will be met with spot purchases. Spot purchases consist of either First of the Month deals, executed during bid week for the upcoming month, or day purchases which are utilized to meet incremental daily needs.

CNGC's goal is to have a gas procurement strategy which achieves diversity and flexibility in its gas supply portfolio through a combination of index based physical, fixed price physical structures and financial derivatives such as swaps and options. This goal encompasses not only supply basin origination and capacity limitations, but also includes a combination of pricing options that will assist CNGC in minimizing exposure to price volatility. The buying approach to locking in a significant portion of gas prices maintains a balanced supply portfolio that continues to represent stable pricing as well as secure physical supplies for the Company's core customers.

CNGC employs a number of processes when procuring fixed-price physical and indexed-priced spot physical. There is a separate process for financial derivatives as discussed throughout this annual hedge plan.

Physical Supply

CNGC utilizes TruMarx's COMET transaction bulletin board system to assist in communicating, tracking and awarding most activities involving the Company's physical supply portfolio. In the procurement process for physical natural gas the Company posts an RFP to its 25+ physical supply parties to solicit offers on needed supply. The Company then collect bids from these parties over a period, depending on the number or time requirements of the packages sought, comparing the indicative pricing to each party as well as comparing the information to market intelligence available at the time. Ideally, after monitoring these indicatives and the market, CNGC awards the posted packages. Note that posting on COMET does not obligate CNGC to execute any proposal made by physical suppliers.

Naturally, price is the principle factor; however, CNGC also considers reliability, financial health, past performance, and the party's share of the overall portfolio as to ensure party diversity. It should be noted that there is always the possibility the lowest market price may be during period when the Company is initially gathering the price indicatives; in that situation there is a risk that a sudden price run-up may lead to filling the transaction at the higher end of the bids over time or delay the acquisition to another time. However, the reverse is also true—the initial price indicatives may start high and drop over time,

allowing CNGC to capture the transaction on the downward swing. In the end, timing is always a factor as the market cannot be perfectly predicted.

Occasionally, an operational situation may occur where time is of essence, such as a need to acquire spot gas to meet sudden swings in load demand or in response to an upstream pipeline operational event. In such situations, CNGC may make a short procurement purchase within a narrow time window to procure and schedule the supply. The Company contacts one to three reliable physical parties to meet these short-term supply needs. Again, price is the principle but not the only driver for the awarding of these supply needs. Also, the Company always encourages physical suppliers to propose other transactions or packages that they feel may be of interest in helping CNGC secure cost effective and operationally flexible transactions to meet CNGC's needs. In addition to analysis using Excel, CNGC also uses the SENDOUT® resource optimization model, which is a useful tool for examining logical, operationally and financially feasible physical packages that best utilizes CNGC's various transportation, storage and operational capabilities.

Financial Derivatives

For financial derivatives, CNGC contacts Company-approved financial counterparties ("counterparties") to request bids consistent with the GSOC approved HEP. Naturally, this process requires additional analysis regarding financial reasonableness, timing, hedging strategy, and volumes. The Monthly Guidance and CNGC Book Model are the primary tools used to identify and analyze potential financial derivatives possibilities. Price comparisons may also become more complicated since pricing could be tiered; part of a structure deal may be tied to an index or contains floors, caps, etc. Bids are received from the counterparties and, similar to the physical portfolio, the Company then collect bids from these parties over a period, depending on the number or time requirements of the packages sought, comparing the indicative pricing to each party as well as applying the information from market intelligence available at the time. Furthermore, G&A uses Marketview and CNGC has access to ICE. Both deliver real-time market pricing information for hedging transactions. Ideally, after monitoring these indicatives and the market, CNGC will award the specific packages to individual parties. Again, CNGC is not obligated to execute any offer received.

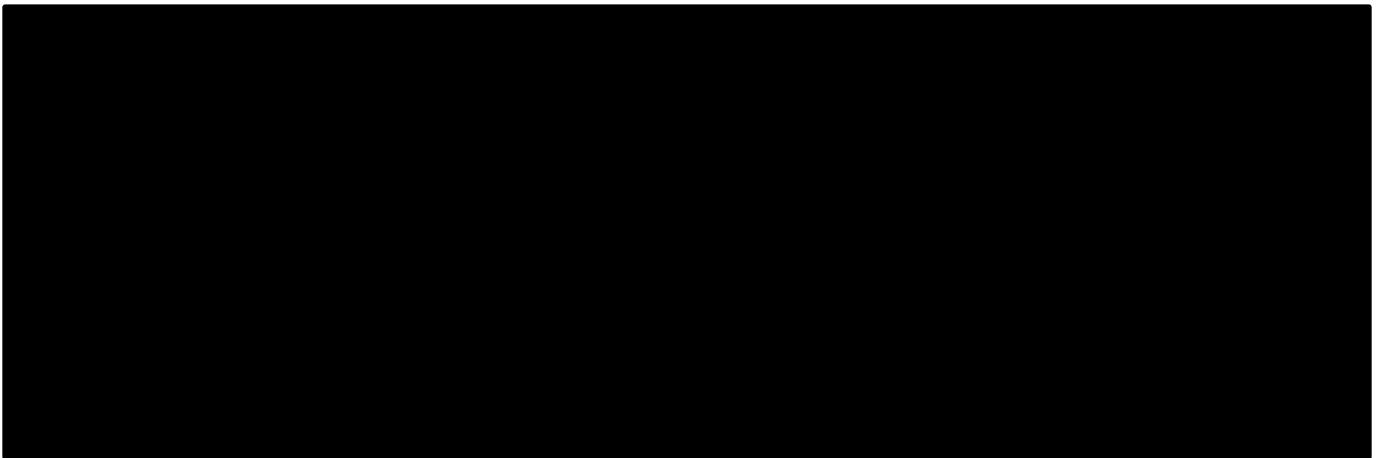
VIII. Retrospective Report of 2019

As per WUTC guidelines, all LDC Hedge Plans must include a retrospective review of the last year's hedging results. The period of June 2019 through March 2020 comprises the first full hedge year since the new CNGC Hedging Program was implemented in 2018. During CNGC's last HEP cycle, GSOC recommended that CNGC hedge at the maximum percentage volume allowed by the new Hedge Program (60% in Year 1, 40% in Year 2, 20% in Year 3). This decision was made based on market risk factors identified by G&A. It was also informed by the risk of continued disruptions on Enbridge following its rupture in the fall of 2018. Figure 10 displays monthly hedge volumes that were recorded as part of 2019-2020 plan, compared to estimated volumes.

Figure 10 - Hedged vs Plan



Figure 11 - Hedge Plan Results



³ Savings estimates based on hedge costs compared to monthly index prices at each supply basin.

Last winter's dramatic price increase was an example of a low probability event that directly impacted natural gas prices at CNGC's supply basins and has cemented the Company's awareness of the need for metrics to quantify various inherent operating risks. Updates to CNGC's VaR model for the 2020 Hedge Year consider last year's price fluctuations and the resulting volatility and standard deviation measures when assessing how to properly insulate the Company and its customers from price shocks. Thus, the VaR model's current appraisal of a 2% probability event considers past circumstances with a similarly low probability. In addition to these updates, CNGC has improved internal communication regarding the prevailing quantitative metrics and the current position of CNGC's Book Model each month.

As discussed previously, CNGC was able to mitigate some of the impact of the winter 2019-20 price escalation through the purchase of fixed-price physicals. Nevertheless, CNGC recognizes that elevated prices at Sumas due to the return of Enbridge constraints resulted in a notable increase in overall gas costs to be recovered from customers. While there is always the potential for another winter price spike, there are no specific indicators signaling such a movement is likely, as there were in 2018-19 and 2019-20 hedge seasons. With these risks in mind, G&A recommended to modify next year's strategy to include a lower volume of hedges in Year 1, as allowed in the new Hedging Program design (see Section V).

IX. Market Summary

The following sections contain forward-looking statements based on current market opinions of its authors. However, these views are subject to change and are used for informational purposes only. In G&A's annual Natural Gas Price Forecast,⁴ several primary drivers of the natural gas market are identified. For 2020, there are many expected and previously unexpected pricing factors at play:

- Declining domestic US gas production.
- Potential demand growth, particularly in exports of LNG and pipeline gas to Mexico.
- The biggest unknown for the coming year is the current outbreak of COVID-19 globally and within the US, which threatens to derail economic growth and provides downside risk to demand throughout the coming spring and summer.

Broad US Market Overview:

US natural gas production is has fallen ~8 Bcf/D since hitting record levels in late 2019. This is a sign that production has reversed its growth path from recent years and is anticipated to maintain a declining trajectory going into 2021. There was a precipitous fall in oil prices early this year after a supply glut formed from reduced demand related to the COVID-19 outbreak and a brief crude oil price war between Saudi Arabia and Russia. Approximately 15% of natural gas is produced as "associated gas"- gas which is a direct result of crude oil production. Fewer crude oil wells being drilled creates less associated natural gas, lower production volumes, and eventually higher prices.

On the demand side, there are several notable growth sources for demand that will eventually provide balance to the market. LNG exports, Mexican exports, and power generation are key areas of demand growth. Coal-to-gas fuel switching for power generation is the most price-responsive form of demand in the short term and has taken natural gas generation to record levels this year, thanks to declining prices

⁴ See appendix.

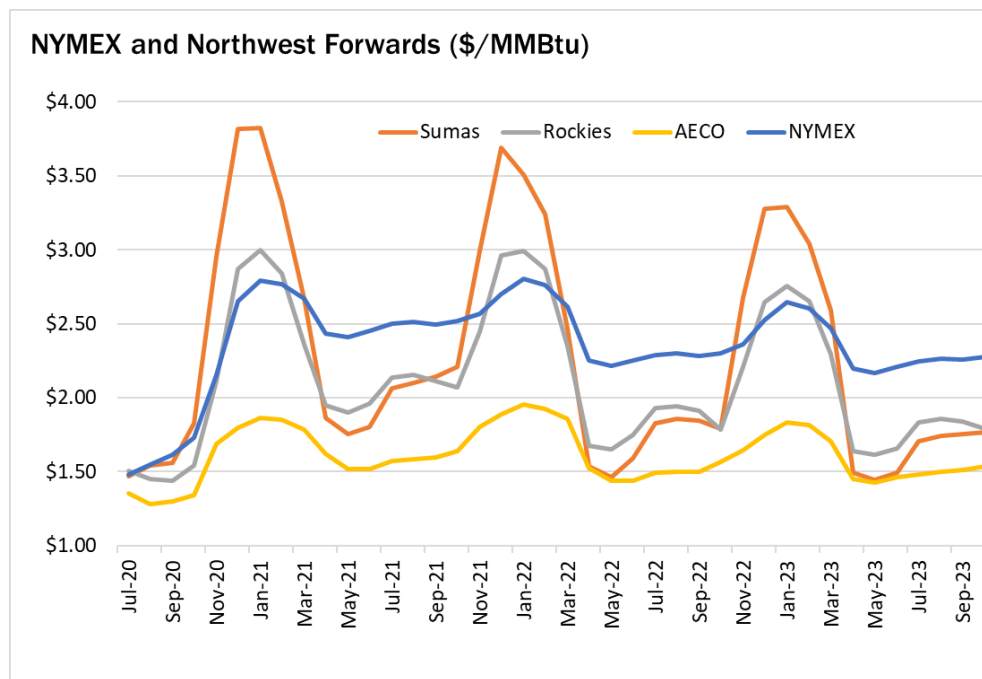
nationwide. Nonetheless, natural gas storage inventories ended the 2019-20 winter at a substantial surplus to previous years and could end the current injection season at over 4 Tcf nationally. However, even with near-record supply in storage, the deliverability of gas supplies on peak days remains a concern that can cause price spikes nationally or regionally in places such as the Pacific Northwest.

The far-reaching impacts related to the spread of COVID-19 within the US are continuously evolving and provide a variety of risks to the natural gas market. Reduced travel, event cancellations, and shuttered business operations significantly reduced commercial and industrial activity this past spring and are suppressing international demand for US LNG exports during the 2020 summer. While these risks impact near-term natural gas demand, the crude oil price shock (mentioned above) has caused a dramatic shift in long-term expectations for natural gas supply. CNGC and G&A continue to monitor and discuss the potential consequences of the coronavirus pandemic and second-order economic effects on CNGC’s hedge portfolio.

Northwest Region Pricing Discussion:

The natural gas forward curve (see Figure 12) is discounted due to current short-term risks, but long-term prices have begun responding to expectations of a supply reduction that would result in a market recovery by late 2020 into 2021.

Figure 12 – NYMEX and Northwest Basin Forwards as of June 26th, 2020



Basis correlations between NYMEX and Northwest pricing hubs have been unreliable in recent years due to repeated price dislocations. Correlations began to break down in 2017 with AECO’s price collapse and were further broken by the Enbridge pipeline explosion in October of 2018. However, there are signs that this correlation will return within the hedge years in question. Forward curve pricing between Northwest locations and NYMEX is highly correlated within the coming three-year hedge window. This includes 96% correlation at AECO, which, despite plentiful Western Canadian gas supplies that keep it at a substantial

discount, mirrors NYMEX trading closely. Even the least correlated of CNGC's hedging locations, Sumas, holds an 80% correlation with NYMEX, and recent news indicates that normalcy will begin to return this year. In a March 2020 report by the Transportation Safety Board of Canada, it was stated, "As of January 2020, based on the results of the assessments, the National Energy Board (NEB)⁵ had lifted operating pressure restrictions on all 12 segments of the NPS 36 L2 pipeline..." which ruptured and caused price dislocations at Sumas.⁶ This signals that the 2018 rupture will not be an issue in the coming hedge year, and prices can be expected to more closely track the broader US natural gas market, with a lingering winter premium.

This, and other market intelligence, has informed CNGC deliberations with GSOC and its hedging goals for the coming year. However, a risk-responsive hedging plan must be dynamic enough to continuously react to new developments and inputs. Through its use of the Book Model and Monthly Guidance, discussed earlier, the Company is able to analyze how market developments impact the risk of its hedge targets, and how to adjust to these developments accordingly throughout the year.

X. Conclusion

The 2020 Hedge Plan was designed by the Utility Hedging Project team under the advisory of Gelber & Associates. The Hedging Program implements processes and analytics that comply with the Washington Utility and Transportation Commission UG-132019 policy statement while simultaneously complying with Oregon Public Utility Commission PGA UM-1286 integrated hedging guidelines. The Hedging Program design establishes a framework that provides flexibility to respond to price risk and market changes. Additionally, the Hedging Program establishes analytics and quantitative metrics that will be frequently updated to maintain a risk-responsive view of current market conditions.

The CNGC Hedging Program hedges using a three-year forward-looking ladder while establishing maximum and minimum percentage boundaries that allow hedge volumes to adjust to market conditions more flexibly. In addition, the 2020 Hedge Plan recommends the inclusion of financial transactions such as swaps and call options to improve diversity of hedges and reduce the cost of hedging. The Hedging Program requires aHEP each spring which determines a strategy for the coming buying season after reviewing the prior year's performance. Accordingly, in April of 2020, GSOC reviewed the proposed HEP and approved the aforementioned changes. To manage hedge purchasing for the 2020 HEP, CNGC will continue referencing the Monthly Guidance document produced by G&A in collaboration with the Resource Planning group. This monthly process includes an update of CNGC's Book Model and the associated mark-to-market and VaR calculations. The report then facilitates information circulation within the Company regarding these metrics and resulting recommendations for the coming month. Furthermore, Guidance documents provide a new level of transparency for decision-making, as can be seen in the included appendix.

⁵ On August 28, 2019, the NEB became the Canadian Energy Regulator (CER).

⁶ Pipeline Transportation Safety Investigation Report P18H0088 released on March 4, 2020.

While the Company was pleased with its 2019 Hedge Plan and the acknowledgment it received from the WUTC, CNGC will look to continually improve its hedge program in a risk-responsive manner, thereby fulfilling the objectives of UG-132019 and providing essential price protection to customers.