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# Winter Assessment 2022-2023 Stochastic Gas Balance Analysis

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Stochastic Gas Balance Purpose

- Hourly load shapes derived independent of utility
- Probabilistic demand scenarios capture uncertainty
- Visibility into Intraday ramping periods
- Isolates curtailment risk to individual hours
- Test against hydraulic and daily gas balance results

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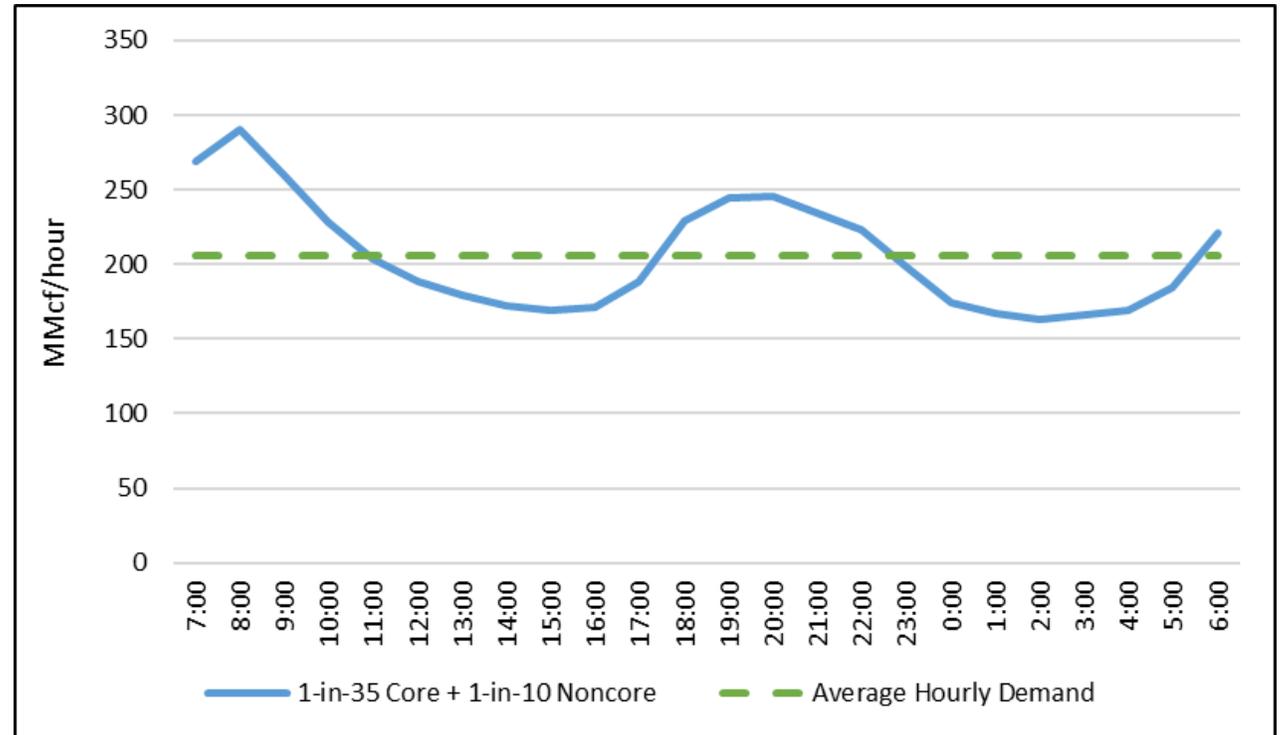
Stochastic Gas Balance Methodology

- Generate cumulative probability distributions
  - Twelve years hourly historical data from SoCalGas
  - Control based on the top 5% of demand days
  - Repeat 24 times for the full gas day
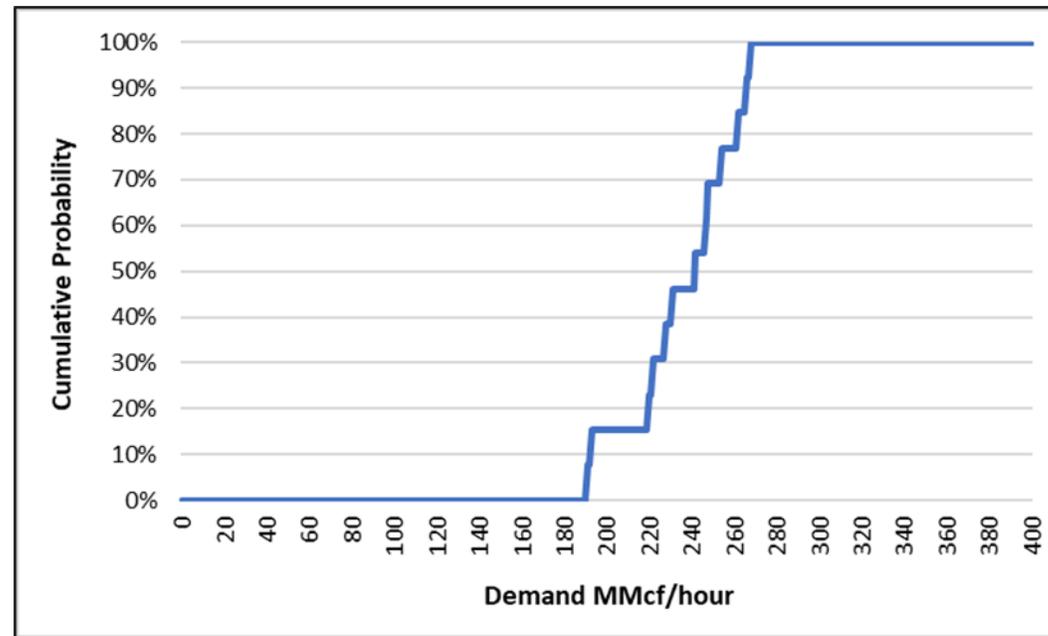
Note: Above example is a cumulative probability distribution for 7 AM

Stochastic Gas Balance Methodology

- Pipeline capacity and withdrawal assumptions are consistent with the deterministic gas balance

- The 24-hour load shape comes from the 1,000 random draws of the probability distribution in each hour to create a full gas day

- Each hour is then scaled *individually* so total demand matches daily demand for the peak and extreme day cases

Note: Blue line is the load shape for the extreme peak day and is used in the hourly gas balance

Stochastic Gas Balance Results

- Run a gas balance for each hour using the stochastic demand
- Shows ability to meet demand (or not) in each hour
- Highlights impact of ramping (peaks occur in the morning and evening hours)
- Results proved consistent with the cold and extreme day gas balances
- Estimates curtailment hours and magnitude

Units in MMcf	Simulated 1-in-35 Core plus 1-in-10- Noncore Winter Peak Day Hourly Gas Balance																								Daily
Hour	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	
Demand	269	290	259	228	204	189	179	173	170	171	188	230	245	246	234	224	198	174	167	163	166	169	185	221	4942
Receipts	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	2815
Expected Feasible Withdrawals	110	115	105	95	86	72	62	55	52	54	71	90	100	100	93	85	81	57	49	46	49	52	67	104	1850
Required withdrawal	152	173	142	111	86	72	62	55	52	54	71	112	127	129	117	106	81	57	49	46	49	52	67	104	2127
Curtailment*	42	58	37	16	0	0	0	0	0	0	0	22	27	29	24	21	0	0	0	0	0	0	0	0	277

Note: These 24 hours represent the extreme day case. The cold day case results in zero estimated curtailment.

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Thank You