



PFR Analysis

PFRSTF
10/24/18

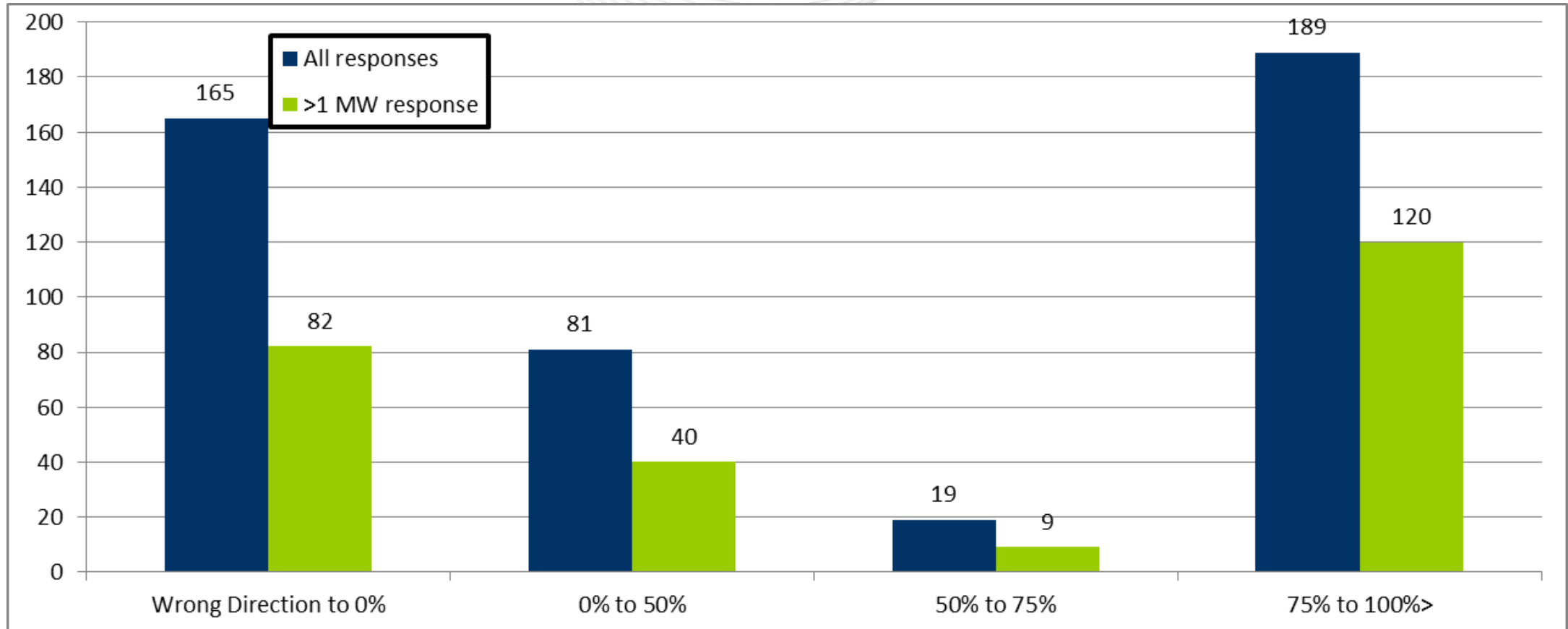
- PFR Analysis
 - Unit Performance
 - Event Performance
 - Examples

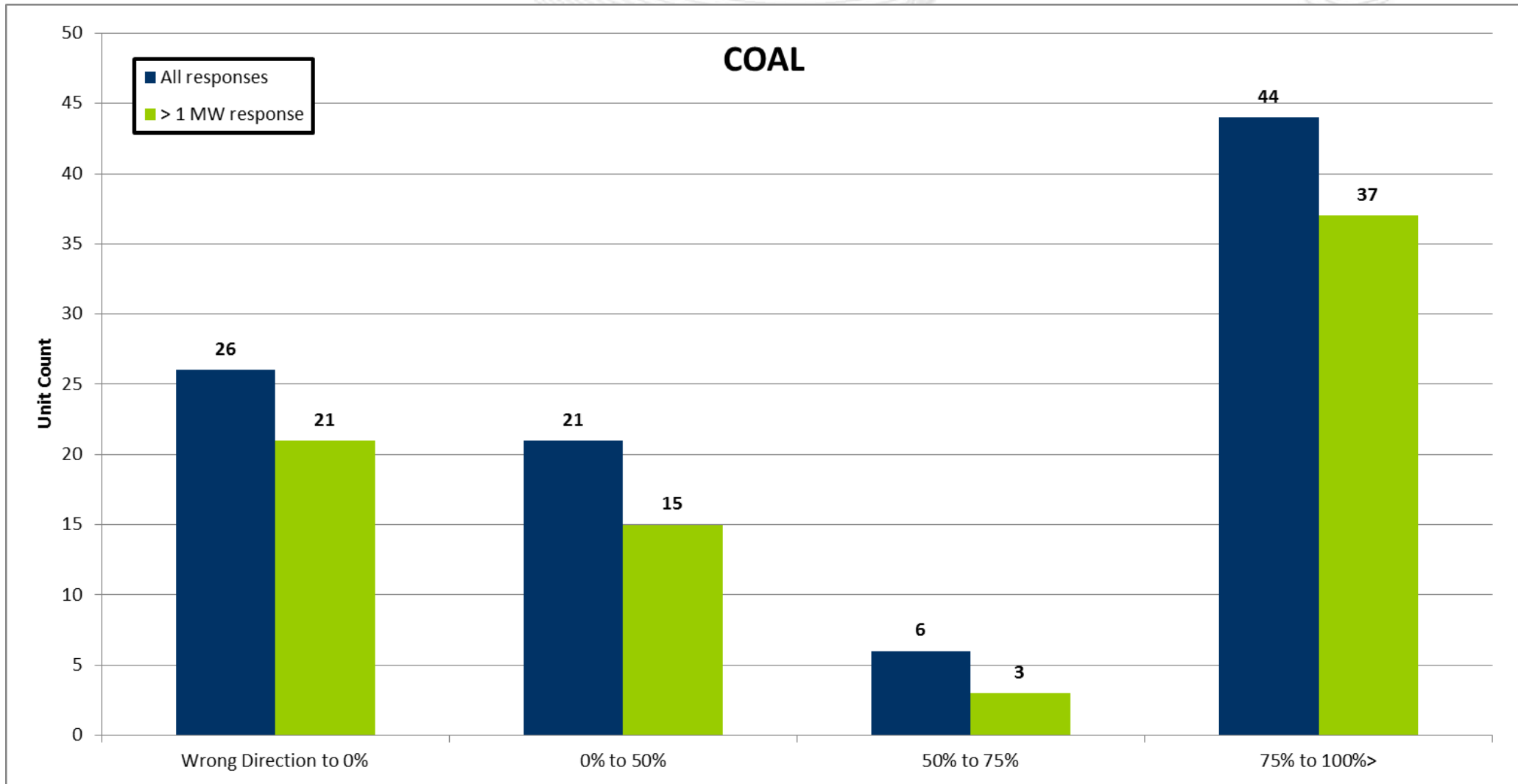
- BAL-003 Selected Events were used for this analysis
 - 13 Events:

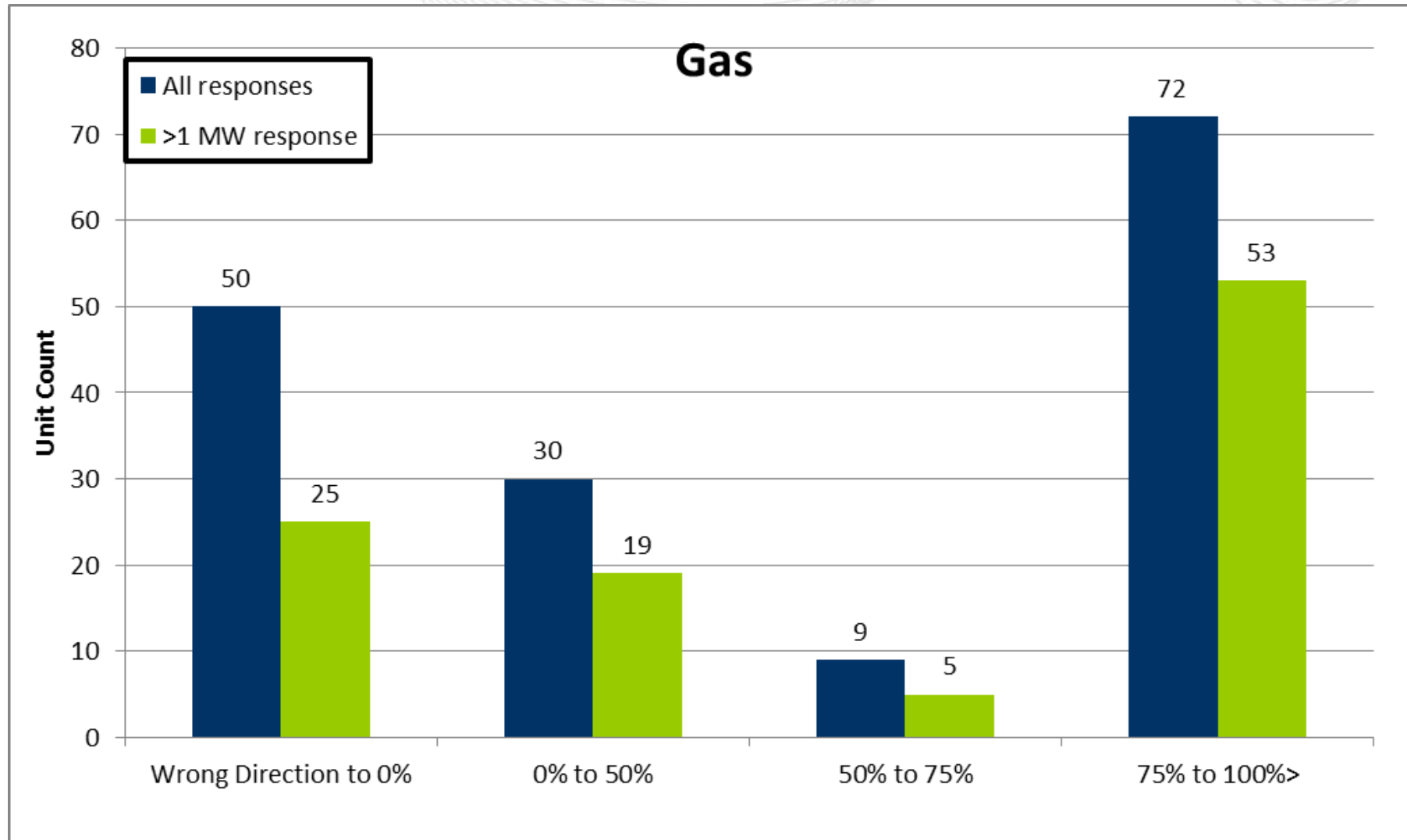
12/5/2017 17:19:02
12/6/2017 18:27:24
12/11/2017 8:58:57
1/3/2018 2:59:48
1/27/2018 16:17:51
2/3/2018 08:35:31
2/16/2018 10:14:29
2/20/2018 19:17:48
3/8/2018 0:16:04
3/14/2018 8:38:22
3/18/2018 12:59:20
4/7/2018 8:36:08
4/12/2018 13:26:23

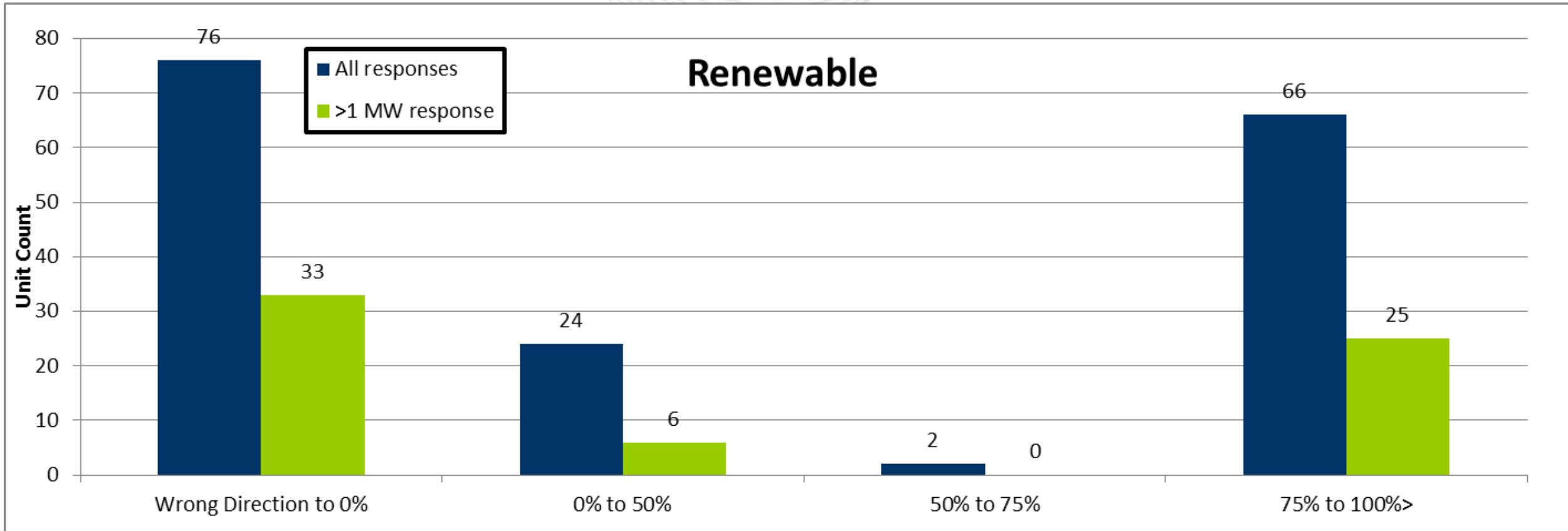
- Unit Performance:
 - Looked at average of MW response for each unit over the 13 events
 - Unit Performance only evaluating responses for events units expected to respond
 - Further filtered data set to expected/actual response >1MW for analysis

- Event Performance:
 - Looked at average MW for each event
 - Units expected to respond and all units
 - Calculated MW/0.1Hz for total RTO measured MW







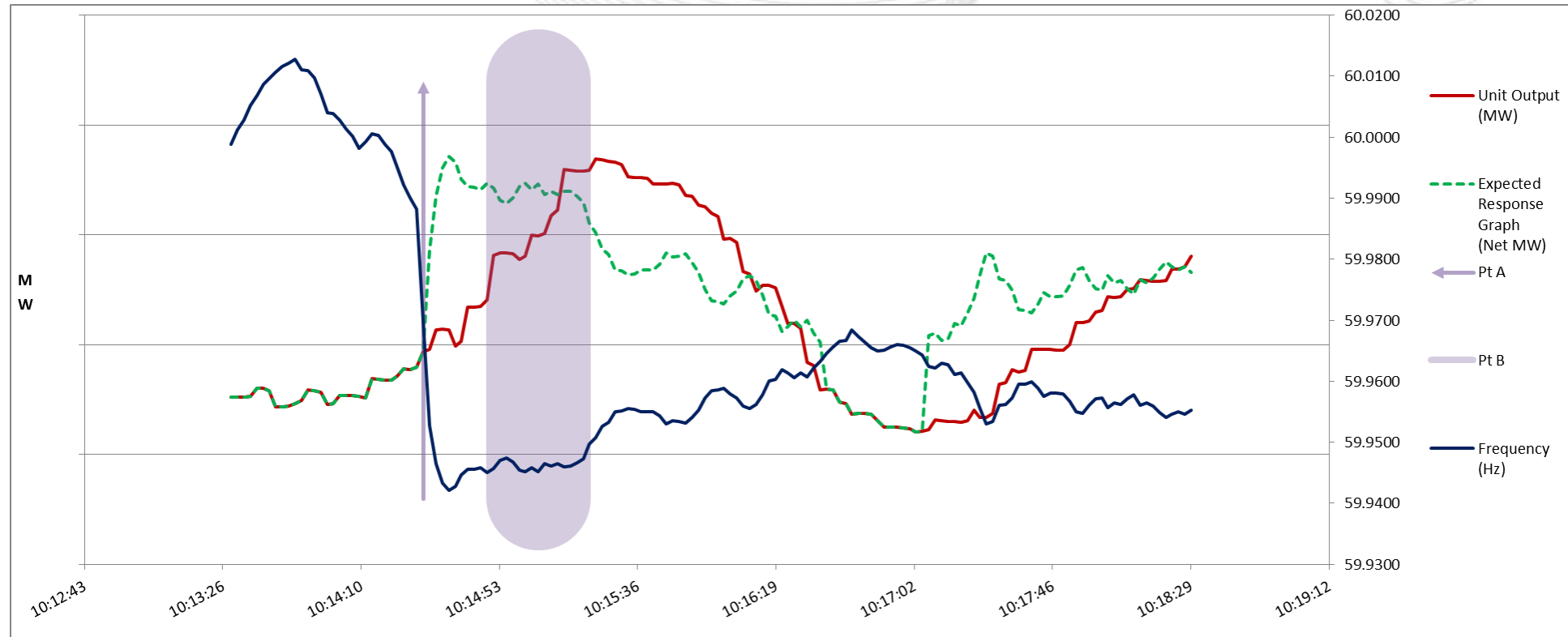


Includes: wind, solar, hydro, landfill

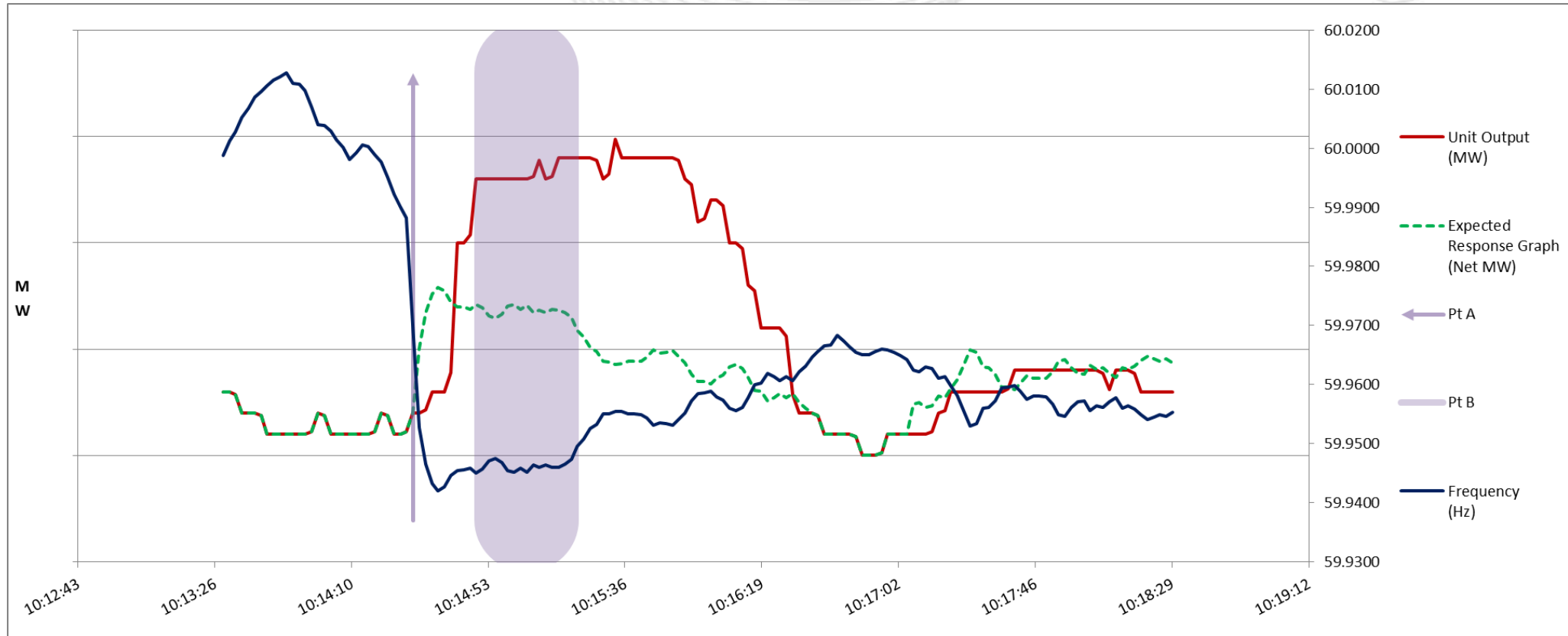


Event Performance

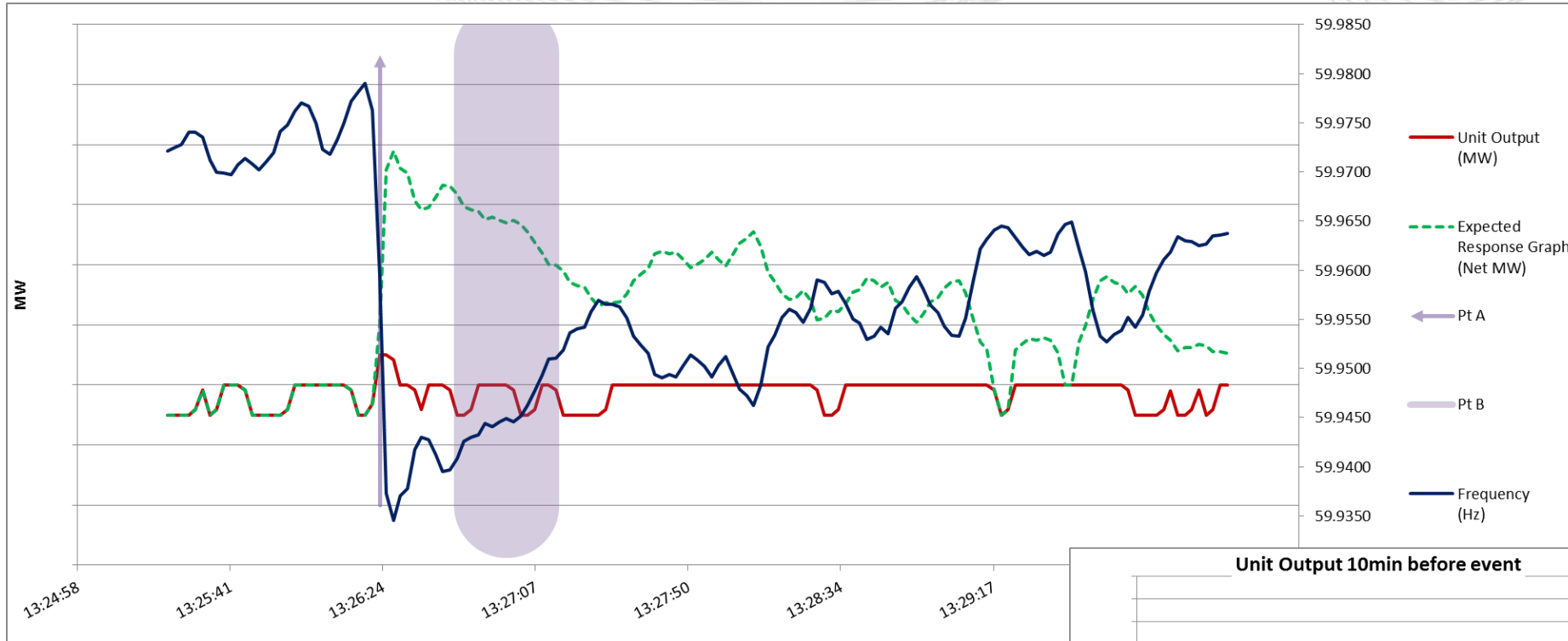
Events	Frequency Delta	Count of Units (with expected response)	Sum of Gen (MW) response	Count of units including Max Capacity & Regulation units	Sum of Gen (MW) response including Max Capacity & Regulation units	MW/0.1 Hz	BAL-003 BA FRO MW/0.1Hz Requirement
12/5/2017 17:19	-0.039	114	92.4373	380	38.8885	-100.2	-258
12/6/2017 18:27	-0.047	138	33.9128	456	37.8589	-80.6	-258
12/11/2017 8:58	-0.053	169	91.8245	481	171.0122	-322.7	-258
1/3/2018 2:59	-0.056	124	93.8815	451	215.0025	-383.9	-258
1/27/2018 16:17	-0.044	148	129.4156	404	215.5001	-489.8	-258
2/3/2018 8:35	-0.051	136	34.5468	500	118.4821	-232.3	-258
2/16/2018 10:14	-0.049	144	60.9423	429	94.6316	-193.1	-258
2/20/2018 19:17	-0.034	143	24.6155	388	53.8662	-158.4	-258
3/8/2018 0:16	-0.058	132	37.6415	379	40.1563	-69.2	-258
3/14/2018 8:38	-0.047	159	32.7475	567	111.4437	-237.1	-258
3/18/2018 12:59	-0.043	127	65.7993	432	90.5855	-210.7	-258
4/7/2018 8:36	-0.056	138	57.1822	406	91.8662	-164.0	-258
4/12/2018 13:26	-0.031	142	33.7516	440	58.189	-187.7	-258



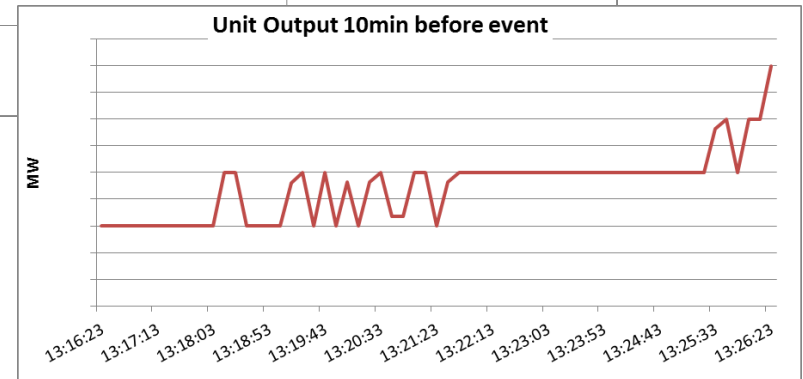
Actual Response =	6.71	MW
Expected Response =	7.07	MW
Performance =	95%	MW



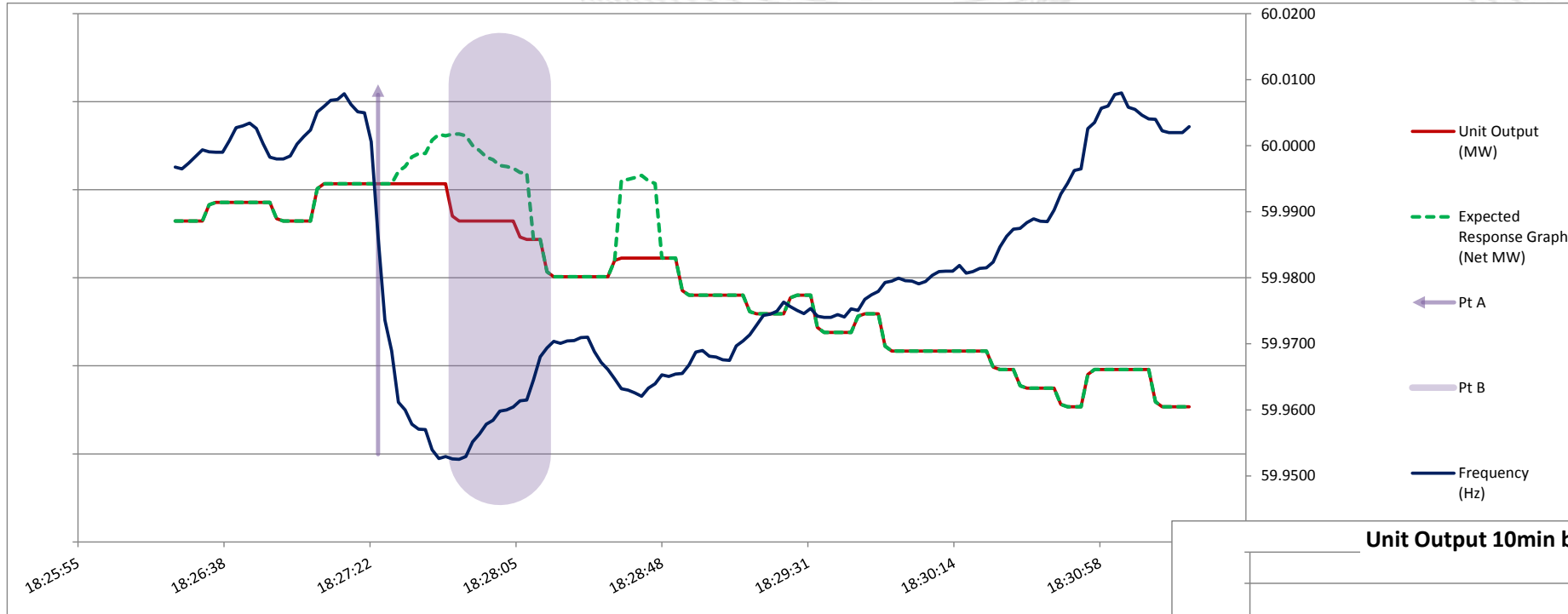
Actual Response =	12.44	MW
Expected Response =	5.28	MW
Performance=	100%	MW



Actual Response =	-1.25	MW
Expected Response =	3.20	MW
Performance =	0%	MW



Example – Response in Wrong Direction



Actual Response =	-3.68	MW
Expected Response =	0.19	MW
Performance=	0%	MW

