

Parr and FFPS Operations Overview

Discussion Points

- How Parr and FFPS are currently used (dispatched)
- Operation after the new nuclear units are online
- Pumping mode of FFPS
- Limitations of each plant (flood and drought)
- Benefits of FFPS

Parr Hydro

- Generation \approx 14.9 MW w/6 units
- 6,000 CFS max through plant
- Modified run-of-river operation
- Parr Reservoir acts as the lower reservoir for Fairfield Pump Storage

Fairfield Pump Storage

- Generation
 - 8 units @ 75 MW each
 - 880 MW's per foot
 - 1 foot out of Monticello = 2 feet into Parr
- Pumping
 - 83 MW load per unit
 - 1280 MW's per foot
 - 2 feet out of Parr = 1 foot into Monticello

Parr / Fairfield PS

- Parr Reservoir
 - 4,400 acres, active storage 29,000 acre-feet
 - Operating range 10 ft. (el. 256.0' – 266.0')
- Monticello Reservoir
 - 6,800 acres, active storage 29,000 acre-feet
 - Operating range 4.5 ft. (el. 420.5' – 425.0')

Plant Limitations

Flood Conditions

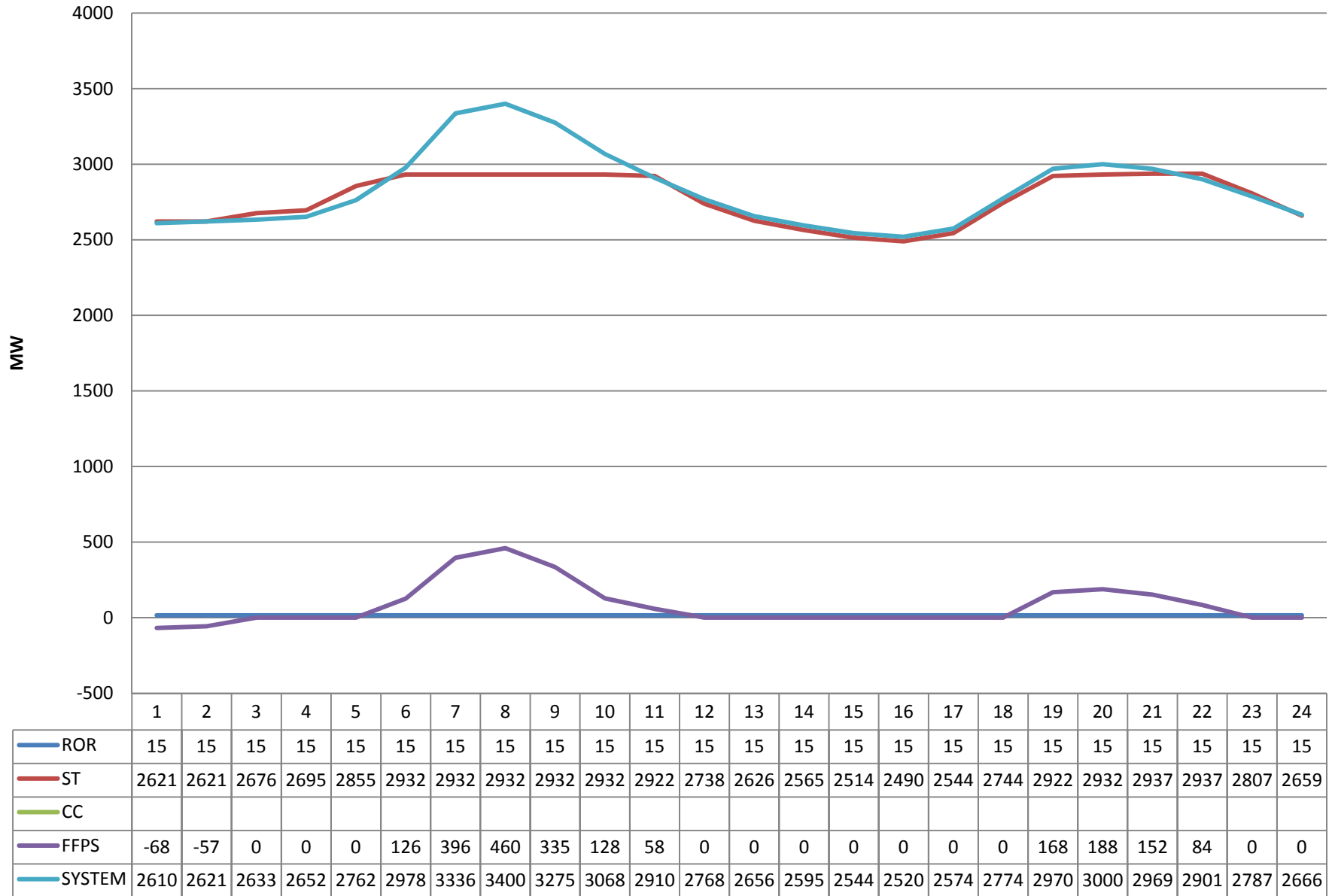
- Discharge at Alston Gauge $> 40,000$ CFS
 - Fairfield must be shutdown
 - Crest Gates Lowered at Parr Dam

Minimum Flow (Parr)

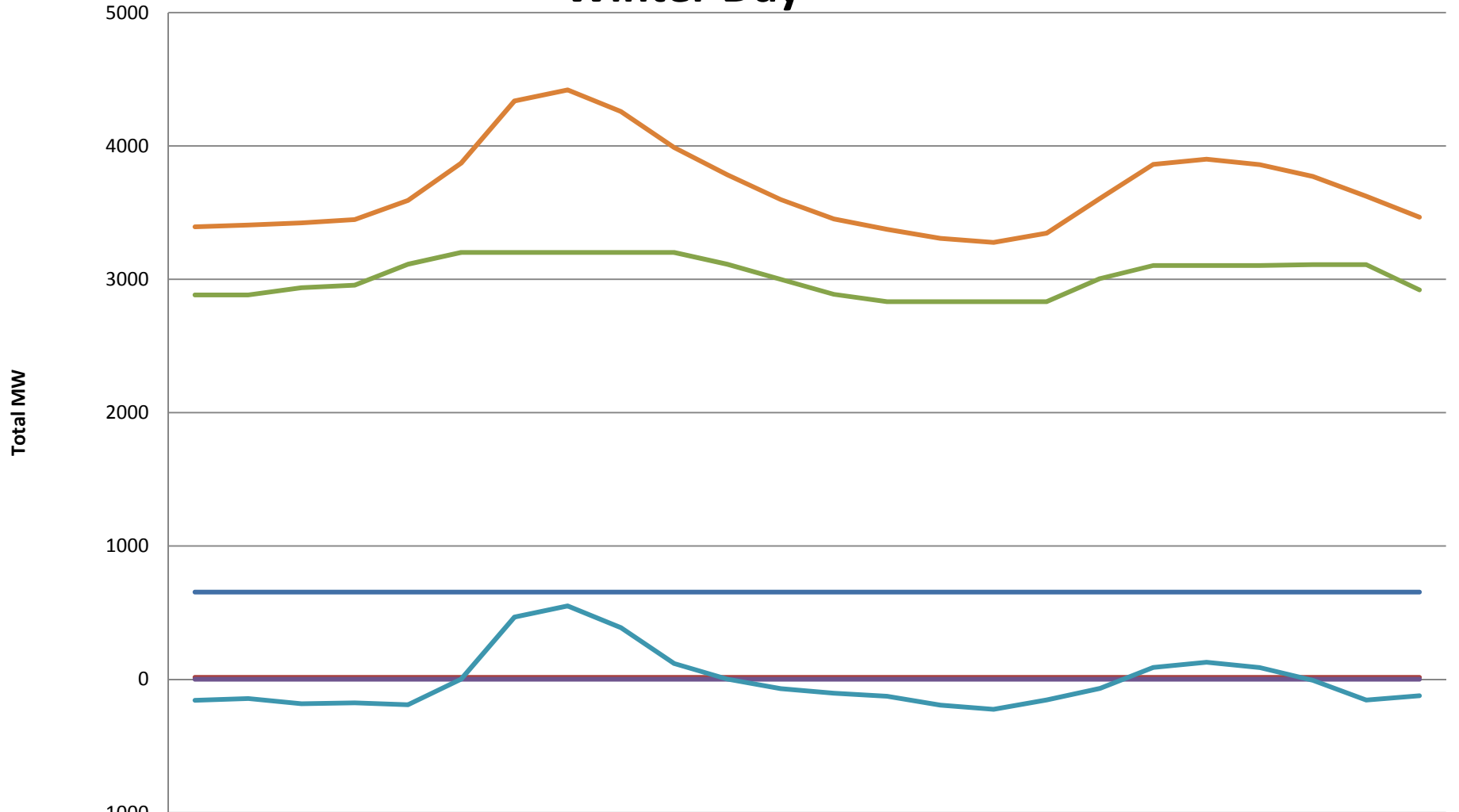
- March-May
 - 1,000 CFS continuous minimum flow or daily average minus evaporation (whichever is less)
- June-February
 - 800 CFS daily average or actual daily average inflow minus evaporation (whichever is less), & 150 CFS continuous minimum flow

FFPS limited to amount of water available at Monticello

Mild Winter Day

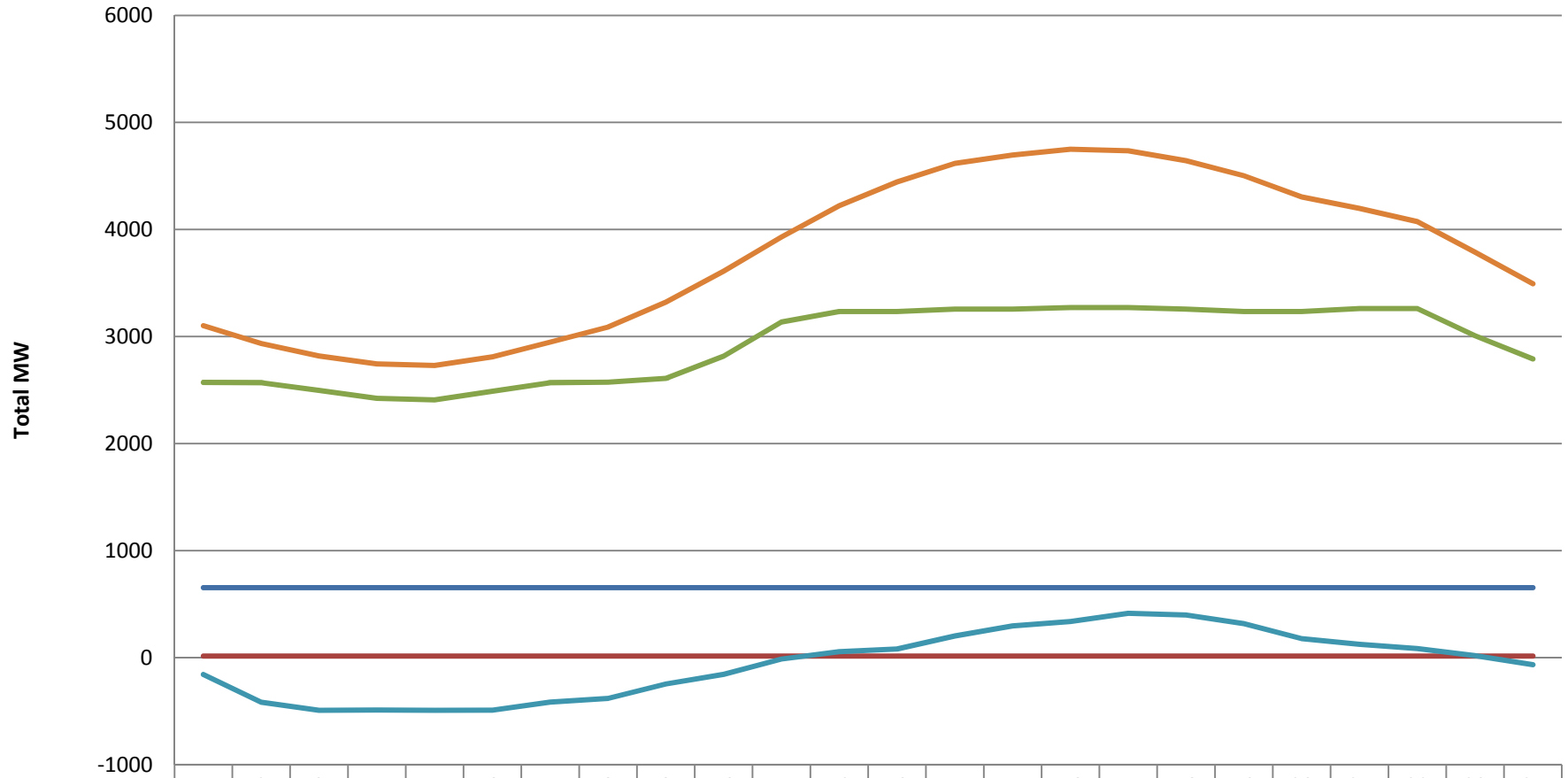


Winter Day



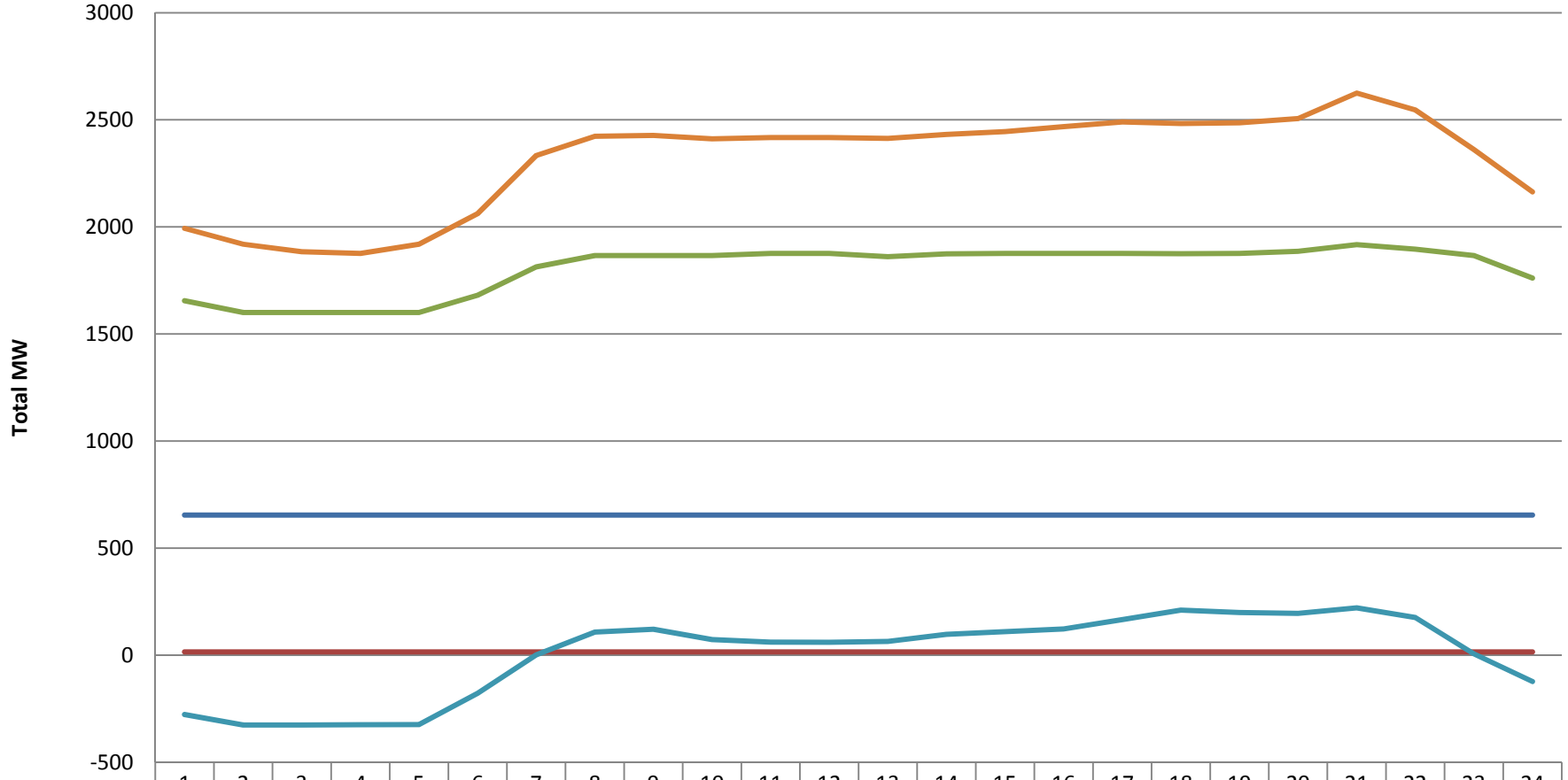
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VCS	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654
ROR	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
ST, CC, CT	2882	2882	2937	2956	3113	3201	3201	3201	3201	3201	3113	2999	2887	2832	2832	2832	2832	3005	3103	3103	3103	3110	3110	2920
FFPS	-158	-144	-183	-177	-191	1	467	550	388	118	1	-70	-104	-127	-194	-225	-155	-68	89	128	88	-8	-156	-123
SYSTEM	3393	3407	3423	3448	3591	3871	4337	4420	4258	3988	3783	3598	3452	3374	3307	3276	3346	3606	3861	3900	3860	3771	3623	3466

Summer Day



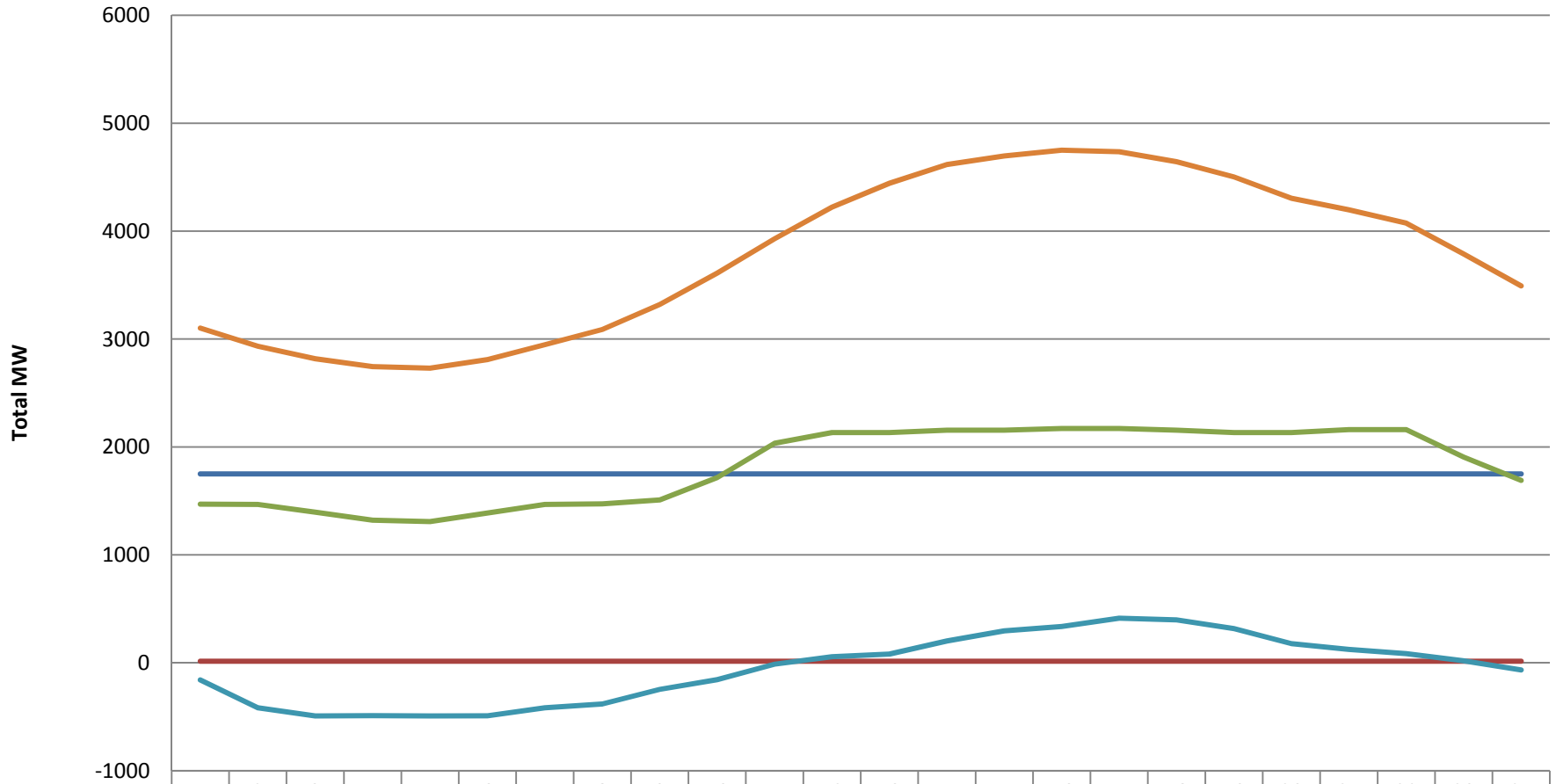
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— VCS	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654
— ROR	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
— ST, CC, CT	2570	2568	2496	2422	2408	2488	2568	2573	2609	2817	3135	3234	3234	3256	3256	3271	3271	3256	3234	3234	3261	3261	3007	2790
— FFPS	-158	-417	-492	-490	-492	-491	-416	-381	-246	-156	-13	56	81	202	296	337	414	398	317	177	124	85	18	-66
— SYSTEM	3101	2934	2818	2744	2730	2810	2948	3088	3321	3611	3929	4222	4444	4617	4696	4750	4735	4643	4502	4304	4197	4074	3788	3493

Typical April Day



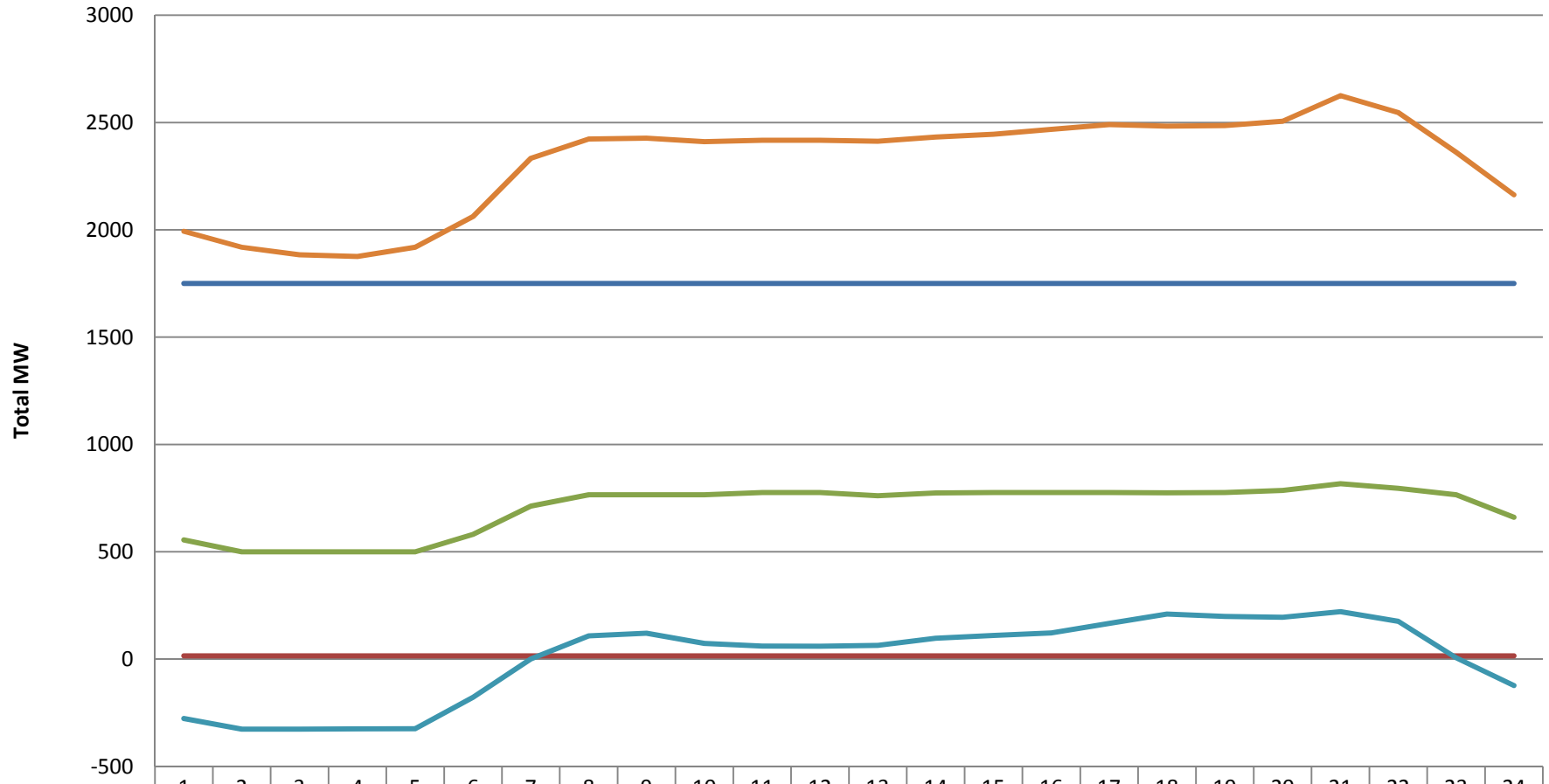
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VCS	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654	654
ROR	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
ST & CC	1655	1600	1600	1600	1600	1681	1813	1866	1866	1866	1876	1876	1861	1874	1876	1876	1876	1875	1876	1886	1917	1896	1866	1761
FFPS	-277	-326	-326	-325	-324	-178	1	108	121	73	61	60	64	97	110	122	166	210	199	195	221	176	6	-123
SYSTEM	1993	1919	1884	1876	1919	2062	2333	2423	2427	2411	2417	2417	2413	2432	2445	2468	2490	2483	2486	2506	2625	2546	2361	2163

Summer Day w/New Nuclear



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
VCS	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
ROR	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
ST, CC, CT	1470	1468	1396	1322	1308	1388	1468	1473	1509	1717	2035	2134	2134	2156	2156	2171	2171	2156	2134	2134	2161	2161	1907	1690	
FFPS	-158	-417	-492	-490	-492	-491	-416	-381	-246	-156	-13	56	81	202	296	337	414	398	317	177	124	85	18	-66	
SYSTEM	3101	2934	2818	2744	2730	2810	2948	3088	3321	3611	3929	4222	4444	4617	4696	4750	4735	4643	4502	4304	4197	4074	3788	3493	

Typical April Day w/New Nuclear



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
— VCS	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
— ROR	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
— ST & CC	555	500	500	500	500	581	713	766	766	766	776	776	761	774	776	776	776	775	776	786	817	796	766	661
— FFPS	-277	-326	-326	-325	-324	-178	1	108	121	73	61	60	64	97	110	122	166	210	199	195	221	176	6	-123
— SYSTEM	1993	1919	1884	1876	1919	2062	2333	2423	2427	2411	2417	2417	2413	2432	2445	2468	2490	2483	2486	2506	2625	2546	2361	2163

Benefits of FFPS

- Flexibility – Pump or Generator
- Quick to Respond in both modes
- Generating Plant trip
 - FFPS called to make up lost generation
 - Maintain reliability of the transmission grid
- Rapid Loss of Load
 - FFPS called to shutdown
 - FFPS called to start pumping until slower units can respond

Questions?

