PJM Load Model Selection for 2022 Reserve Requirement Study (RRS)

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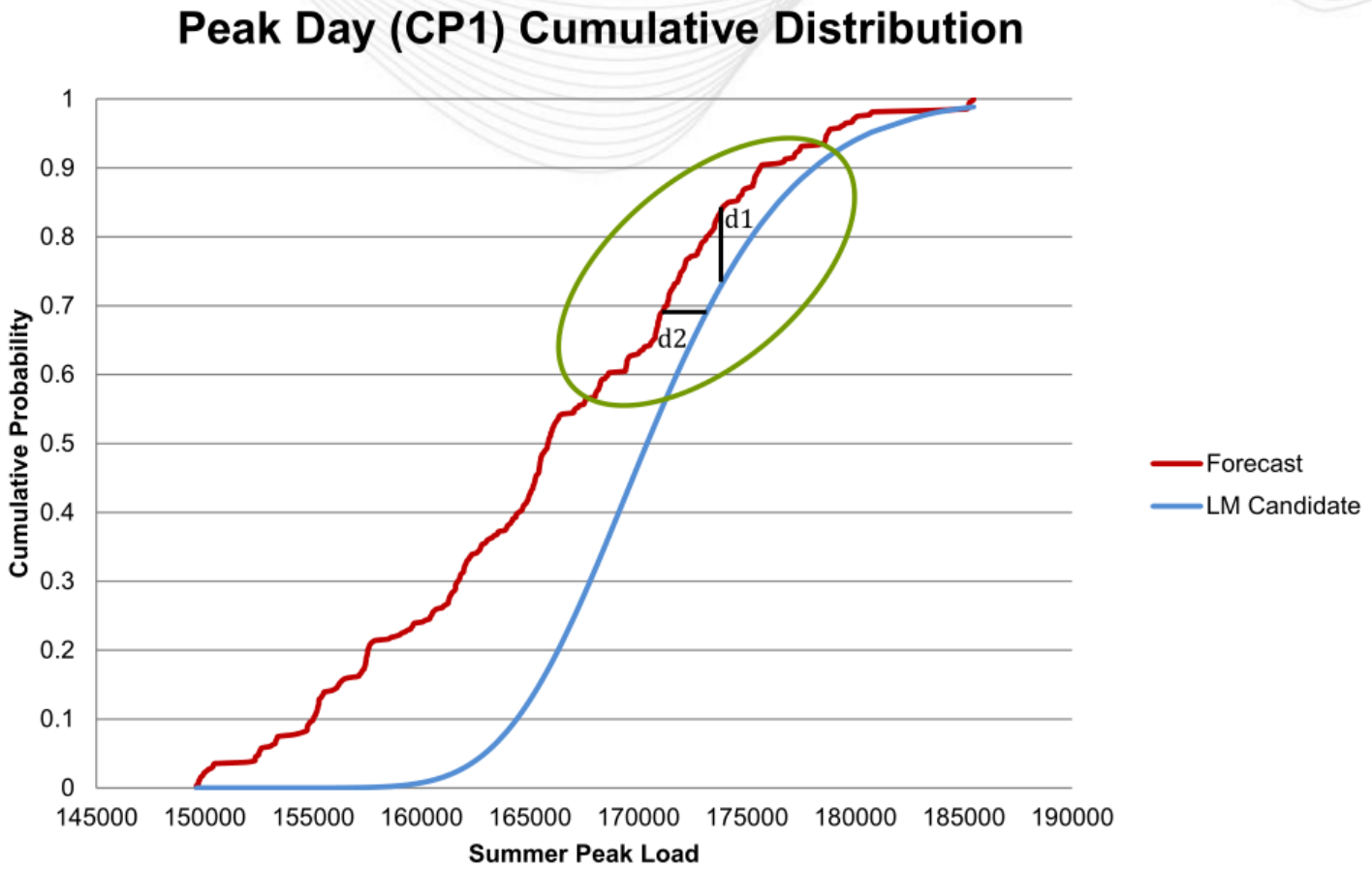
Background

- The Load Model Selection analysis is performed due to the fact that the Coincident Peak distributions from the PJM Load Forecast cannot be used directly in PRISM
- The analysis is based on method approved at June 9, 2016 PC meeting (Appendix V in 2016 RRS Assumptions Letter)
  - Selected Load Model should be a good match of CP1 distribution from PJM load Forecast
  - Consideration of historical PJM / World load diversity
- This year the analysis is based on the 2022 Load Forecast Report. Focus is on 2026/27 Delivery Year.

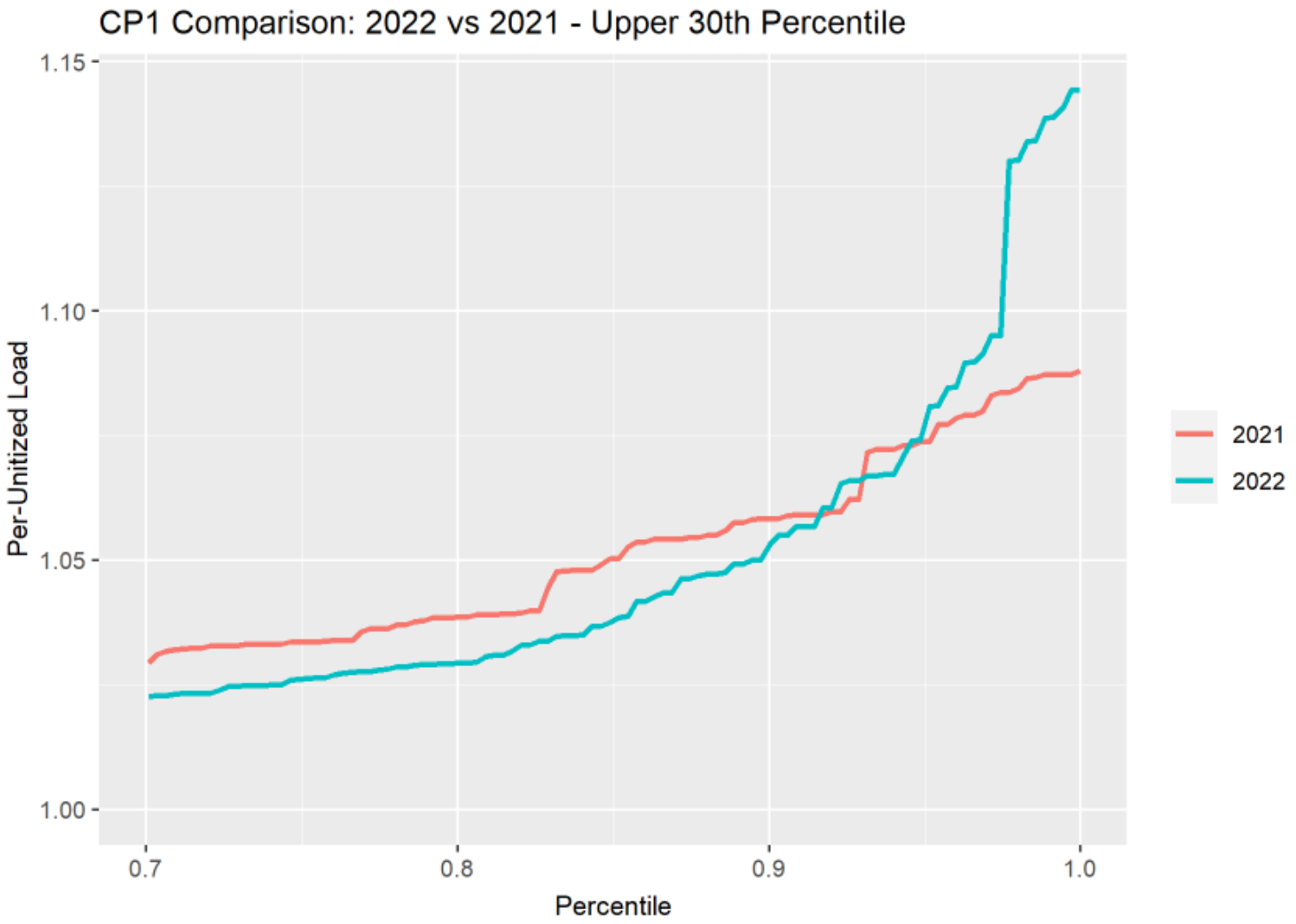
Load Model Candidate vs CP1 from Load Forecast



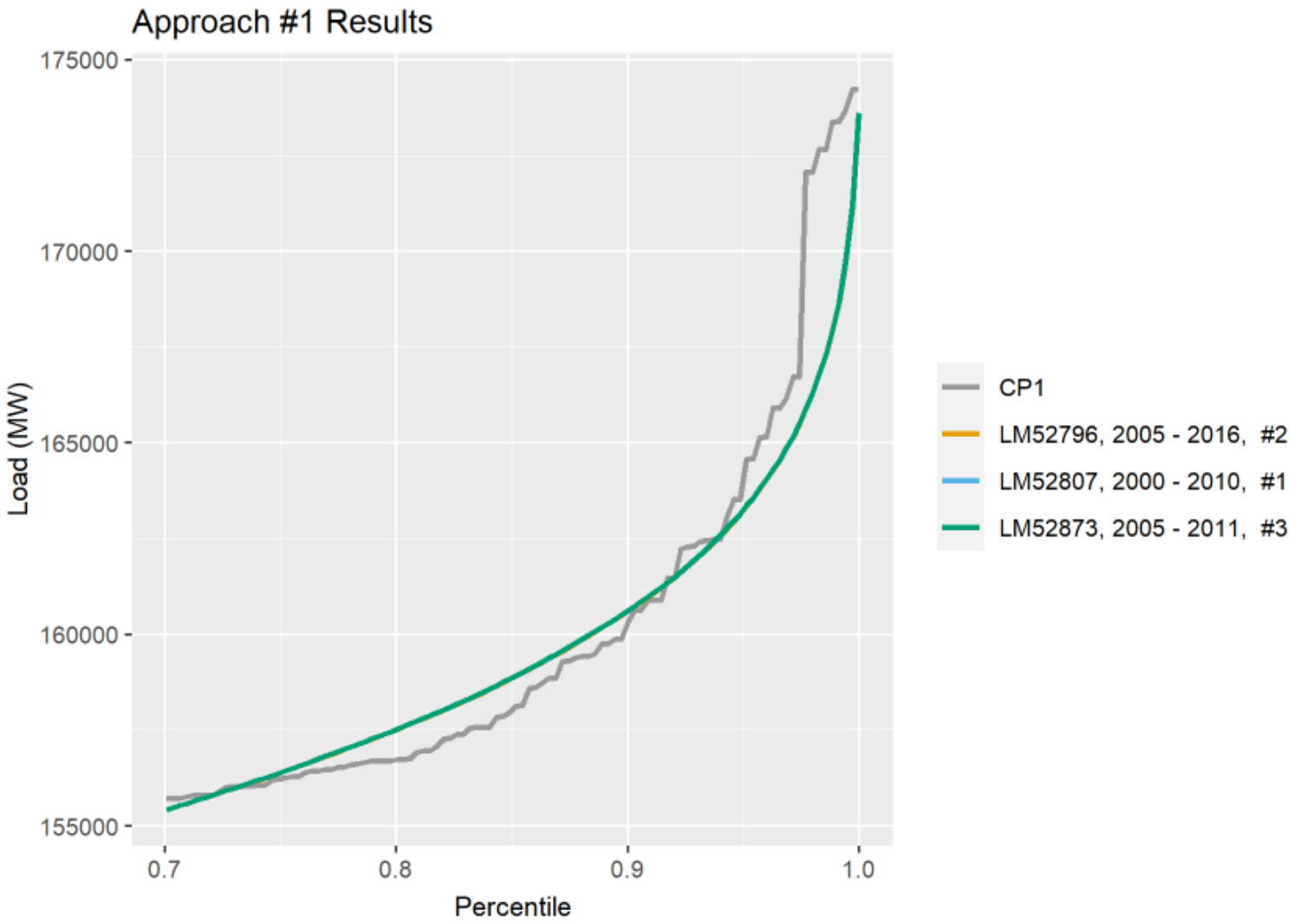
PJM Load Model Combinations to Assess

- A total of 136 Load Models are examined
  - Ranging from a 22-year Load Model (i.e. calculated using data from a 22 year period) to several 7-year Load Models
  - Load Models built with less than 7 years of data are not considered

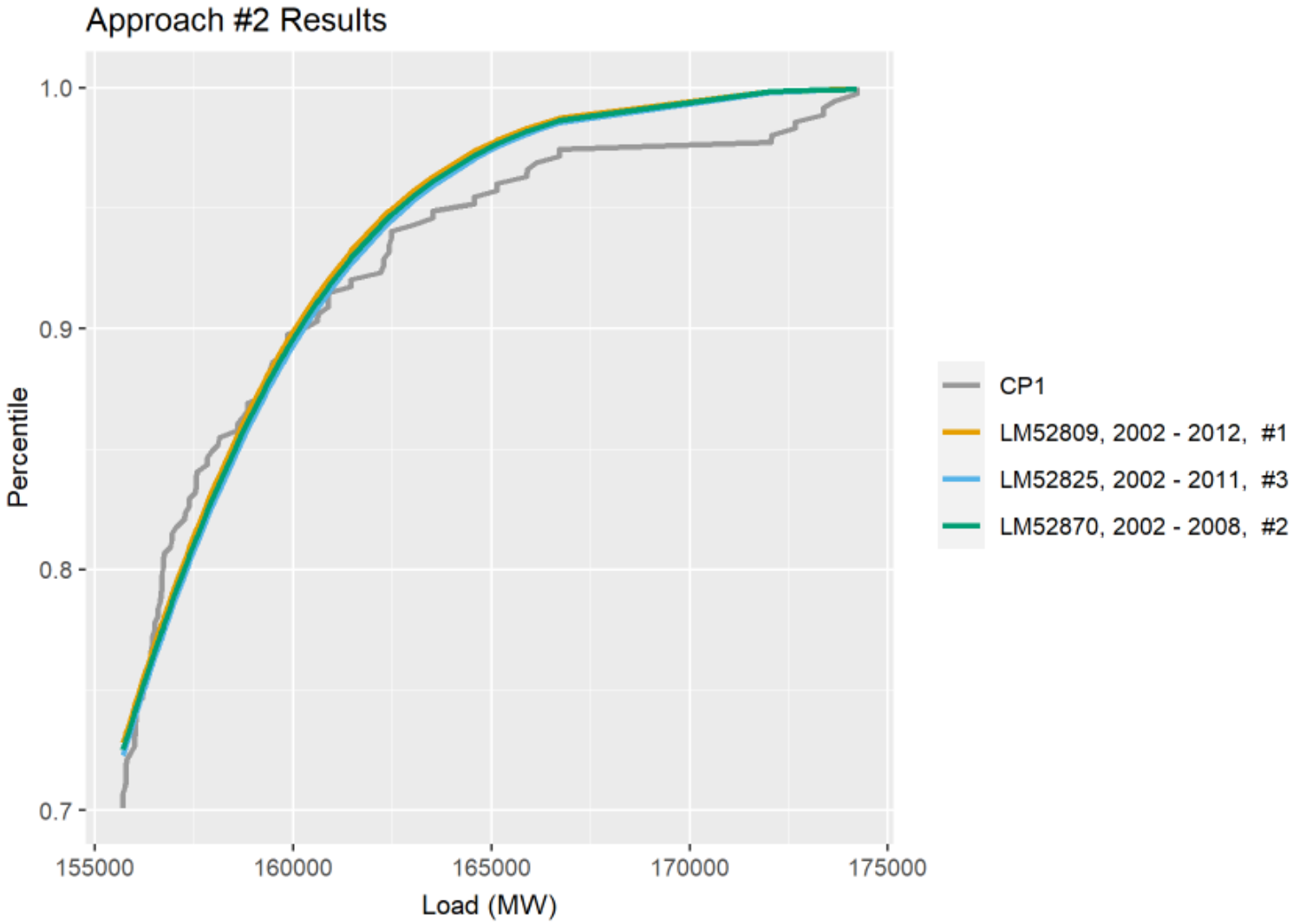
Load Forecast Model CP1 Distribution - 2022 vs 2021



Approach 1 – 70th percentile and above



Approach 2 – 70th percentile and above



Results from Approaches #1 and #2

- The top ranked models from Approaches 1 and 2 do not match
- Approach #1. Top ranked
  - 52807: 2000-2010
  - 52796: 2005-2016
  - 52873: 2005-2011
- Approach #2. Top Ranked
  - 52809: 2002-2012
  - 52870: 2002-2008
  - 52825: 2002-2011

Comments about Approaches #1 and #2

- In prior years, the results from Approach #2 have taken precedence due to the fact that Approach #2 is based on an analytical method (whereas Approach #1 is based on sampling)
- Also, the above decision has been supported by analysis showing that there is **convergence** in the results between Approaches #1 and #2 when Approach #1 is restricted to analyzing between the **70th and 95th** percentiles of the distribution
- This year such **convergence does not exist**

PJM Selected Load Models

- Load Model Choices
  - 52807: 2000-2010
  - 52809: 2002-2012
- The above selected load models are the top performers in Approaches #1 and #2, respectively.
- To decide between them, PJM analyzed the overall performance of the load models under **both** approaches
- As a side note, last year's selected load model (2001-2013) is not one of the choices above

PJM Selected Load Models

- Load Model #52807: 2000-2010
  - Ranked 1st under Approach #1
  - Ranked 15th under Approach #2

- Load Model #52809: 2002-2012
  - Ranked 1st under Approach #2
  - Ranked 79th under Approach #1

- Load Model #52807: 2000-2010 has a better overall performance under both approaches

World Load Models

- To analyze PJM/World peak load diversity, World Load Models were created using the PLOTS program, observing the same historical time periods
  - Uses historical coincident peak pattern
  - World defined as MISO, NY, TVA, and VACAR.

LM #52807 (2000-2010) - PJM vs World Assessment

Month	WK #	**PJM RTO** LM #52807 11 Yr Load Model - 2000 - 2010 Per-Unitized Peak	**World Region** LM #52896 Per-Unitized Peak
June	5	0.8402	0.8941
June	6	0.8930	0.9358
June	7	0.9121	0.9562
July	8	0.9109	0.9164
July	9	0.9671	0.9703
July	10	1.0000	1.0000
July	11	0.9940	0.9915
August	12	0.9380	0.9919
August	13	0.9650	0.9688
August	14	0.8631	0.9114
August	15	0.8103	0.8908

LM #52809 (2002-2012) - PJM vs World Assessment

Month	WK #	**PJM RTO** LM #52809 11 Yr Load Model - 2002 - 2012 Per-Unitized Peak	**World Region** LM #52897 Per-Unitized Peak
June	5	0.8419	0.8870
June	6	0.8930	0.9332
June	7	0.9121	0.9562
July	8	0.9290	0.9406
July	9	0.9415	0.9534
July	10	1.0000	1.0000
July	11	0.9677	0.9745
August	12	0.9650	0.9919
August	13	0.9045	0.9493
August	14	0.8502	0.8873
August	15	0.8043	0.8670

Summary

- Both selected load models have PJM peaking on the same week as the World
- Load Model #52807: 2000-2010 has a better overall performance under both approaches

Historical Peak Load Coincidence PJM / World

Year	PJM Peak Date	PJM Peak Hour	World Peak Date	World Peak Hour	World P.U. Load Coincident w/ PJM Peak	Same Day?	Hour Difference When Peak on Same Day
1998	21-Jul-98	17	21-Jul-98	17	100.0%	Yes	0
1999	30-Jul-99	17	28-Jul-99	17	97.0%	No	-
2000	9-Aug-00	17	31-Aug-00	17	98.7%	No	-
2001	9-Aug-01	16	8-Aug-01	16	98.2%	No	-
2002	1-Aug-02	17	1-Aug-02	16	99.7%	Yes	1
2003	21-Aug-03	17	14-Aug-03	16	98.2%	No	-
2004	3-Aug-04	17	2-Aug-04	18	98.8%	No	-
2005	26-Jul-05	16	25-Jul-05	17	99.7%	No	-
2006	2-Aug-06	17	1-Aug-06	16	99.5%	No	-
2007	8-Aug-07	16	8-Aug-07	17	100.0%	Yes	1
2008	9-Jun-08	17	21-Jul-08	16	96.6%	No	-
2009	10-Aug-09	16	10-Aug-09	16	100.0%	Yes	0
2010	7-Jul-10	17	4-Aug-10	16	99.6%	No	-
2011	21-Jul-11	17	20-Jul-11	16	99.6%	No	-
2012	17-Jul-12	17	17-Jul-12	16	99.8%	Yes	1
2013	18-Jul-13	17	18-Jul-13	16	99.6%	Yes	1
2014	17-Jun-14	18	17-Jun-14	16	98.3%	Yes	2
2015	28-Jul-15	17	28-Jul-15	16	99.6%	Yes	1
2016	11-Aug-16	16	22-Jul-16	17	99.6%	No	-
2017	19-Jul-17	18	20-Jul-17	17	96.9%	No	-
2018	28-Aug-18	17	29-Jun-18	17	99.3%	No	-
2019	19-Jul-19	18	19-Jul-19	17	99.4%	Yes	1
2020	20-Jul-20	17	20-Jul-20	16	99.4%	Yes	1

Average World P.U. Load Coincident w/ PJM Peak	99.0%
Median World P.U. Load Coincident w/ PJM Peak	99.5%
Peak on Same Day	10
Peak Not on Same Day	13
Average Hour Delta When Peak on Same Day	0.9

LM #52807 (2000-2010) - Switching of World peak week

		PJM RTO LM #52807 11 Yr Load Model - 2000 - 2010	**World Region** LM #52896
Month	WK #	Per-Unitized Peak	Per-Unitized Peak
July	8	0.9109	0.9164
July	9	0.9671	0.9703
July	10	1.0000	0.9915
July	11	0.9940	1.0000

2022 RRS Load Model Recommendation

- PJM recommendation to RAAS on selection of historical time period for load model:
  - **Use 11yr (2000-2010, #52807) Load Model for 2022 RRS Base Case and switch World peak to a different July week so that PJM and World peak in the same month but not in the same week.**
    - Switch in World peak week is performed to match historical diversity observed between PJM and World

- At August PC Meeting, PJM will request endorsement.

Contact

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