

# Power Market Analysis (PMA) Weather Comparison for the Last 10 Years

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*"Know where to find the information and how to use it - that's the secret of success."*

Albert Einstein

# Weather Takeaways

- 30 year normals by NOAA have far been normal in the last 10 years. Compared to the 10 year average normals have been too cool.
- Given the last 10 years, nationally cool winters have not lead to extreme summers.
- The most extreme case was 2010 when cold winter in the middle part of the country followed by a hot summer in the same part. However the west showed a mild summer and the far east had a mild winter and normal summer.
- Load and gas consumption are not equally tied due to generation profile differences across the region.
- Weather analog years are readily available.

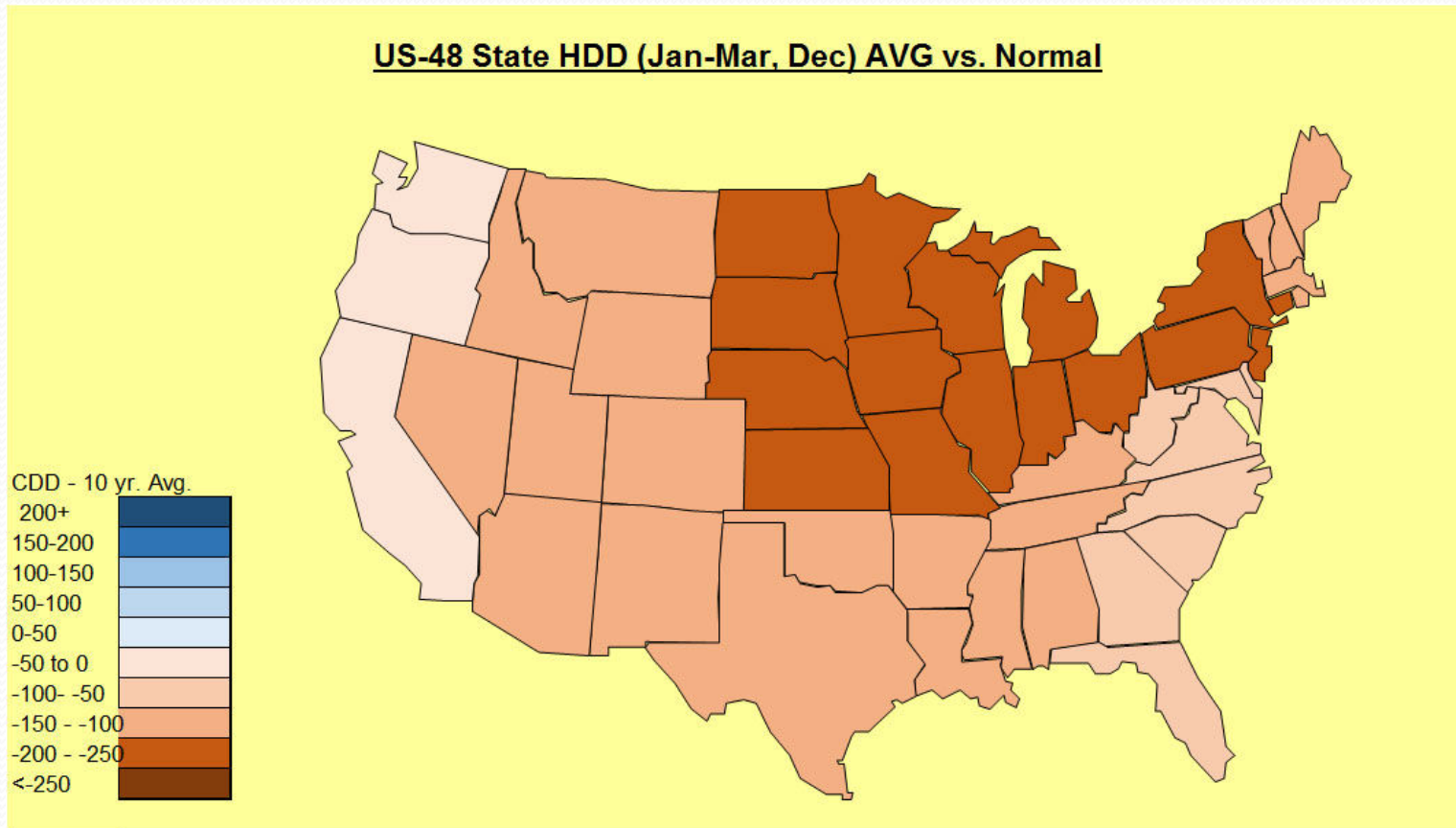
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# Weather Comparison

- The purpose of this analysis was to initially understand the variation of weather to get a sense of electric load changes for the year.
- The focus on load resulted in focusing on only the primary months (Jan-Mar, Dec, Jun-Sept) not the shoulder season.
- Weather was placed into a load generating model taking economic data and weather data to produce load forecast for 119 load zones in N. America.

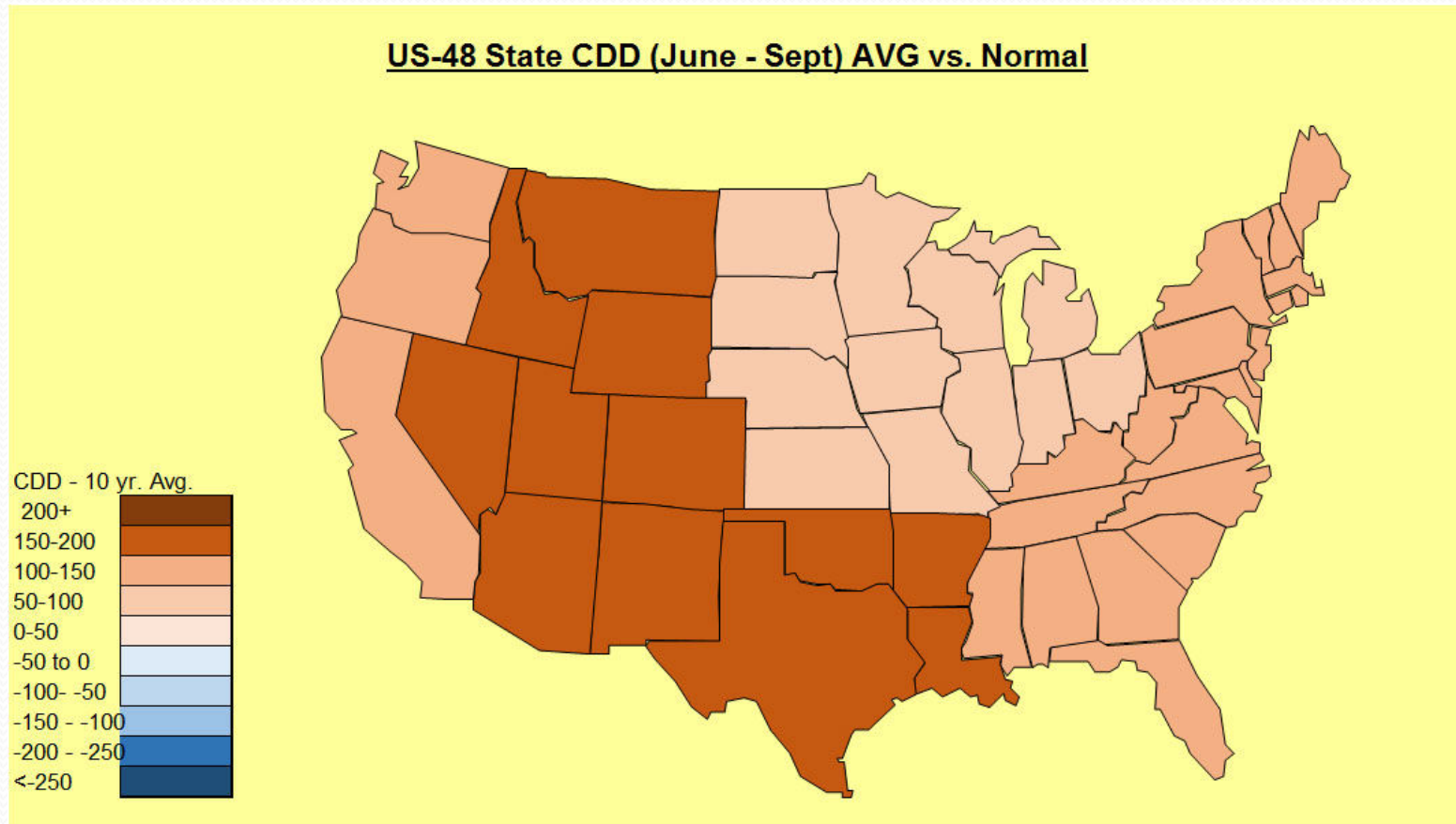
# 30 year normal not really “Normal”



- All regions experienced warmer than normal Cooling Degree Days when comparing to the last 10 years.

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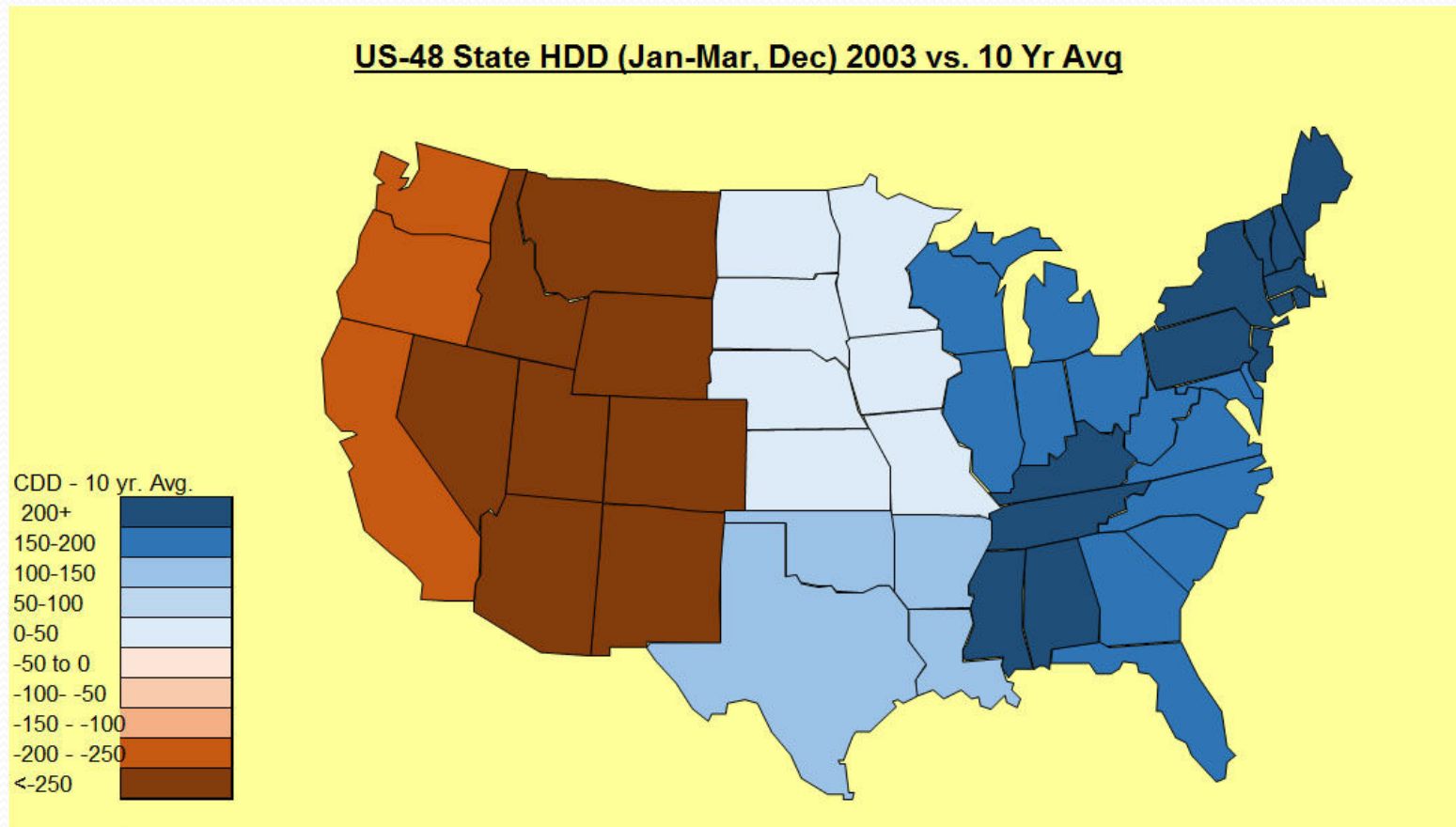
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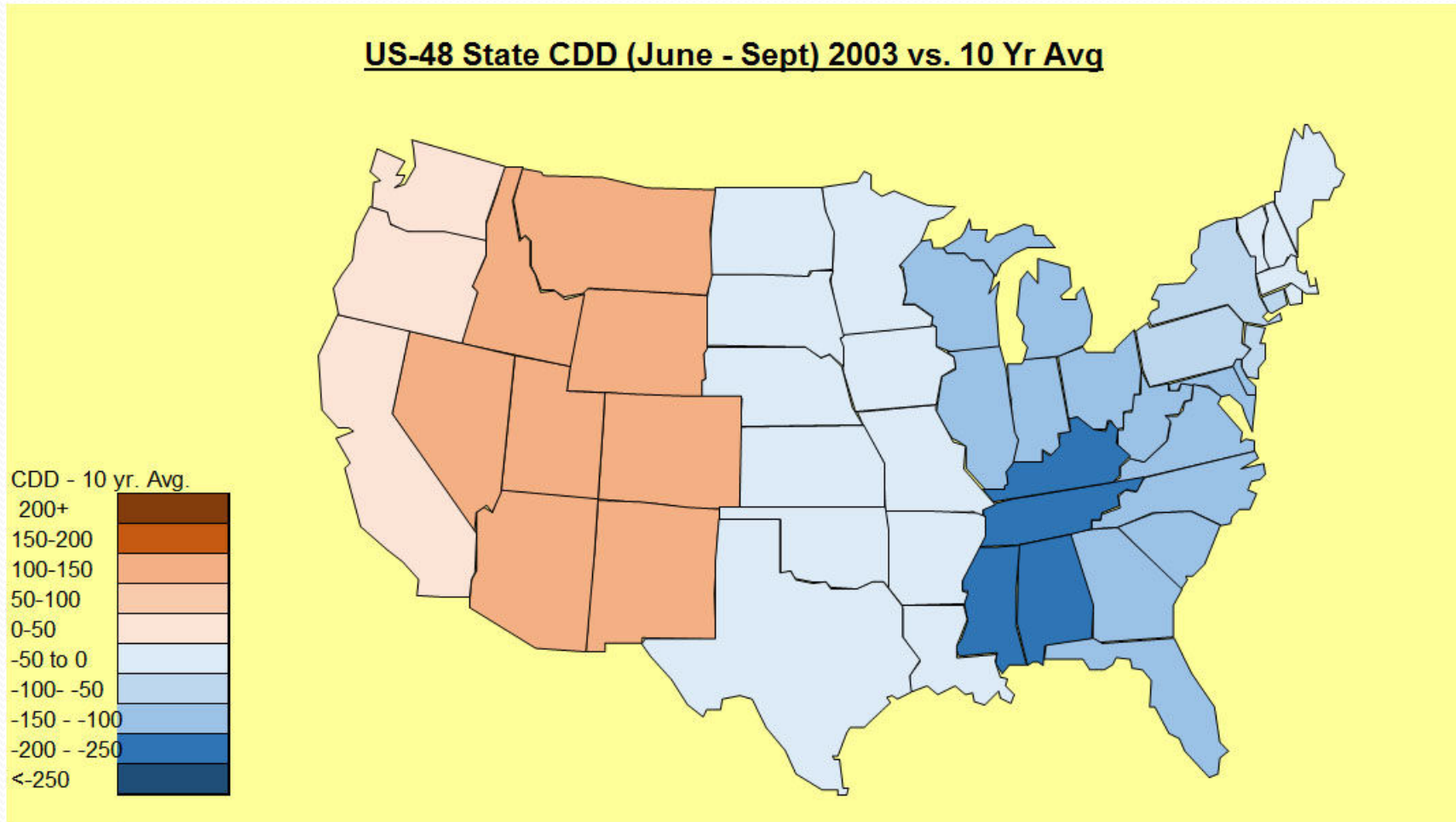
# 2003 Compared to 10 yr. Avg.



- 2003 bifurcated winter with the East colder and West warmer than 10 year average.

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# 2003 Compared to 10 yr. Avg.

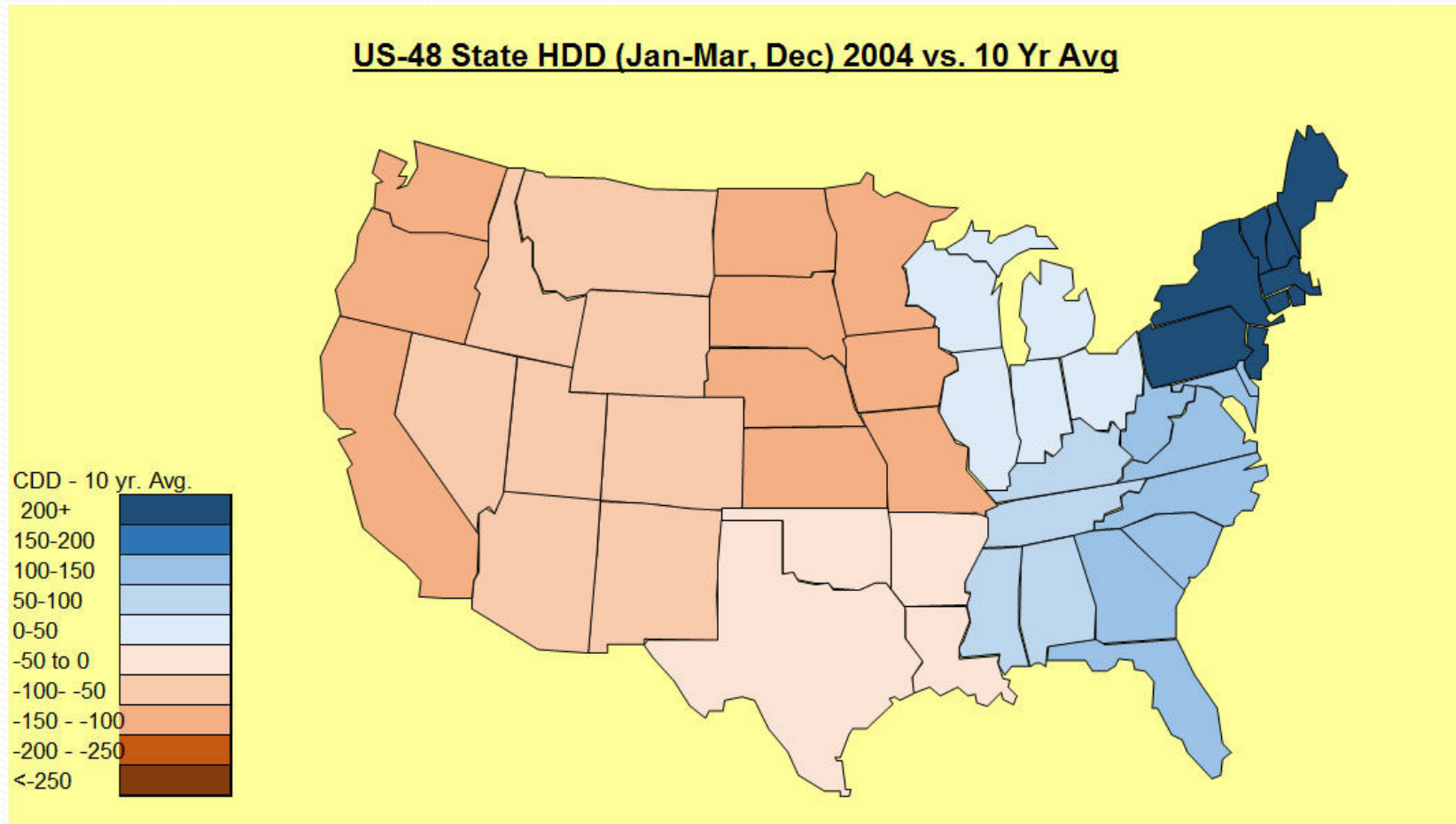


- 2003 summer in general was a cooler year than the 10 year average

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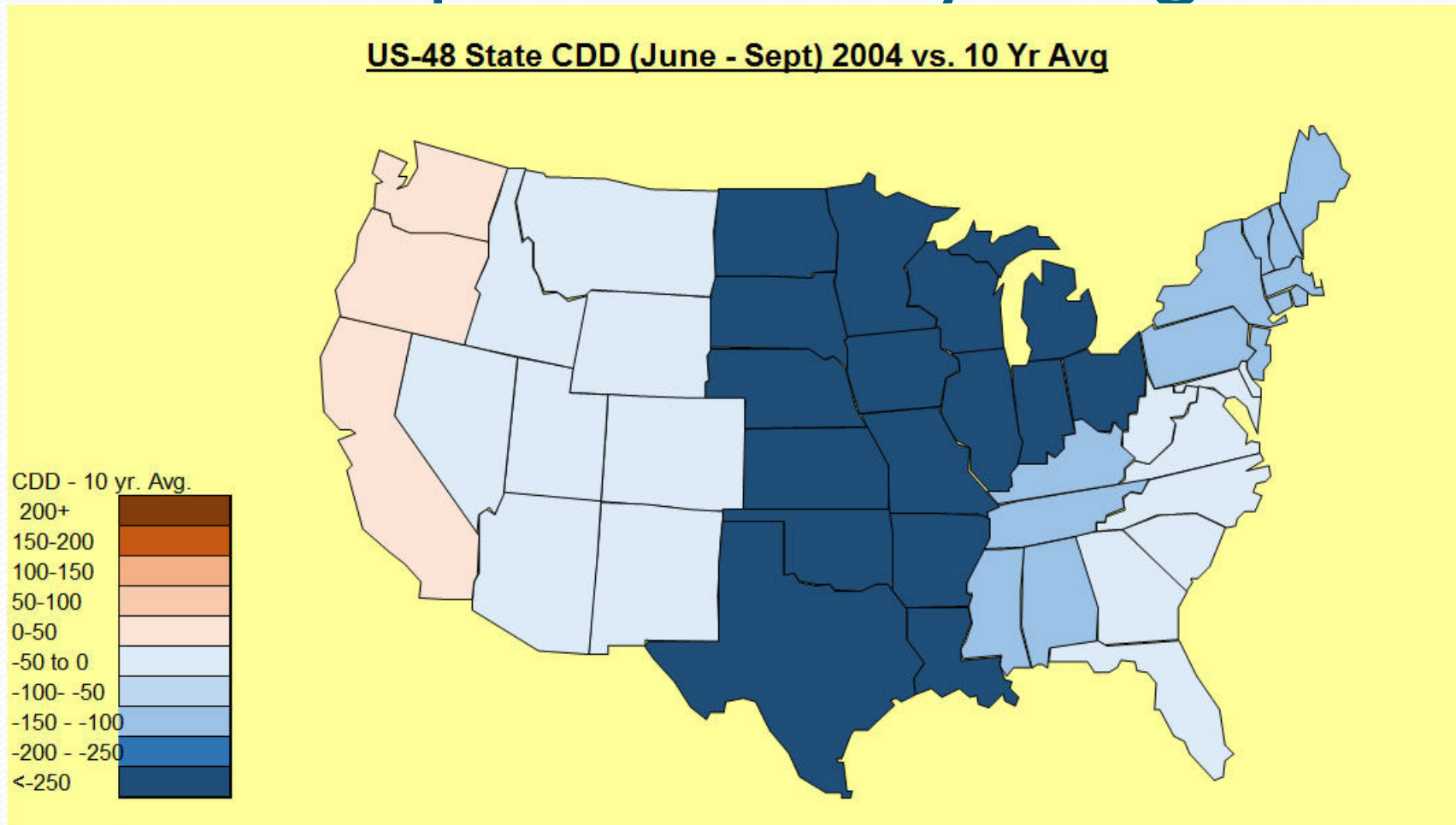
# 2004 Compared to 10 yr. Avg.



- 2004 winter was warm in west and cold in the east.

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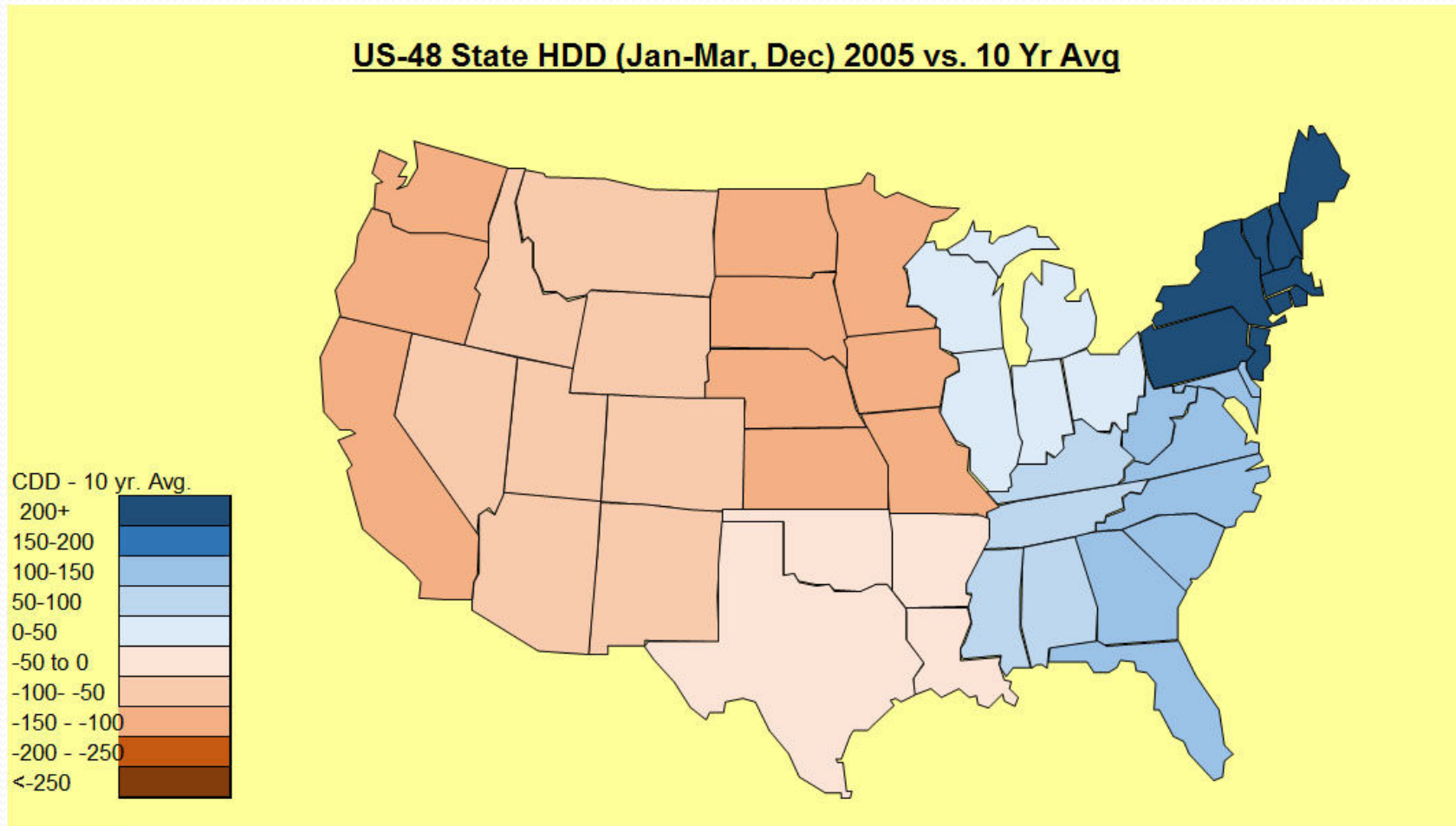
# 2004 Compared to 10 yr. Avg.



- 2004 summer was a cooler year than the 10 year average

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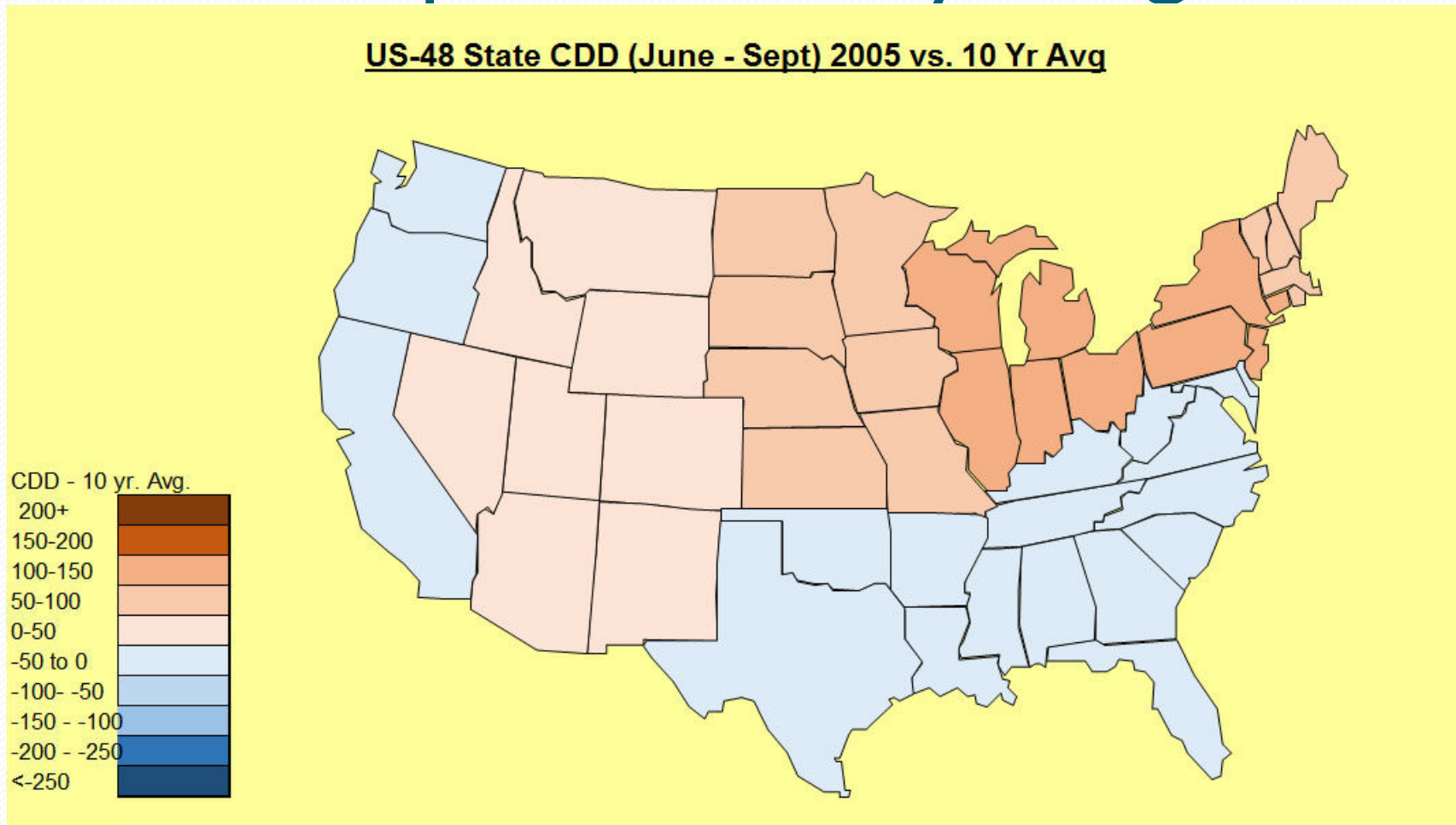
# 2005 Compared to 10 yr. Avg.



- 2005 winter was cold in the northeast elsewhere close to normal.

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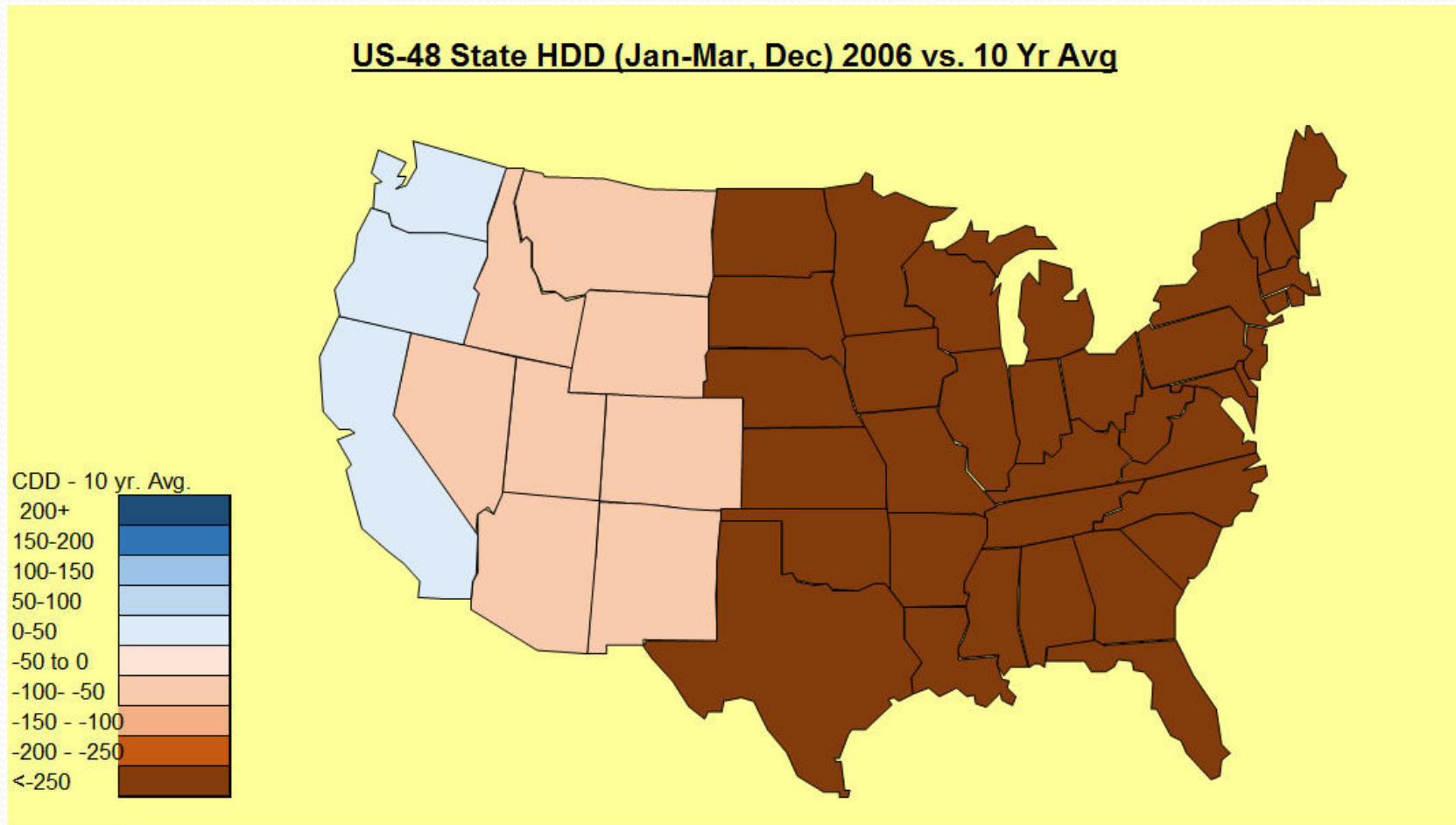
# 2005 Compared to 10 yr. Avg.



- 2005 summer ended up close to the 10 year average.

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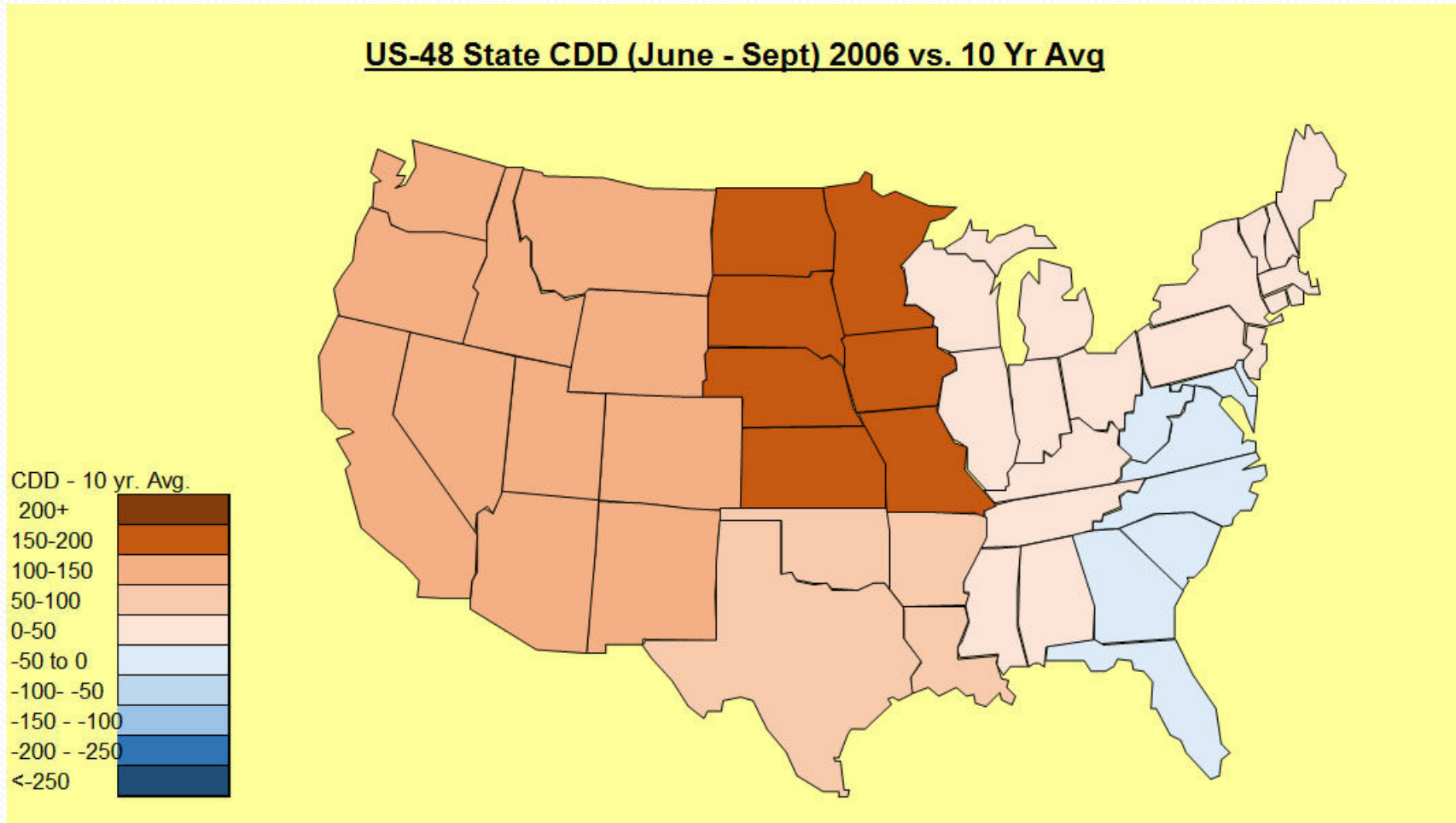
# 2006 Compared to 10 yr. Avg.



- 2006 winter was significantly warmer in the East half compared to the 10 year average.

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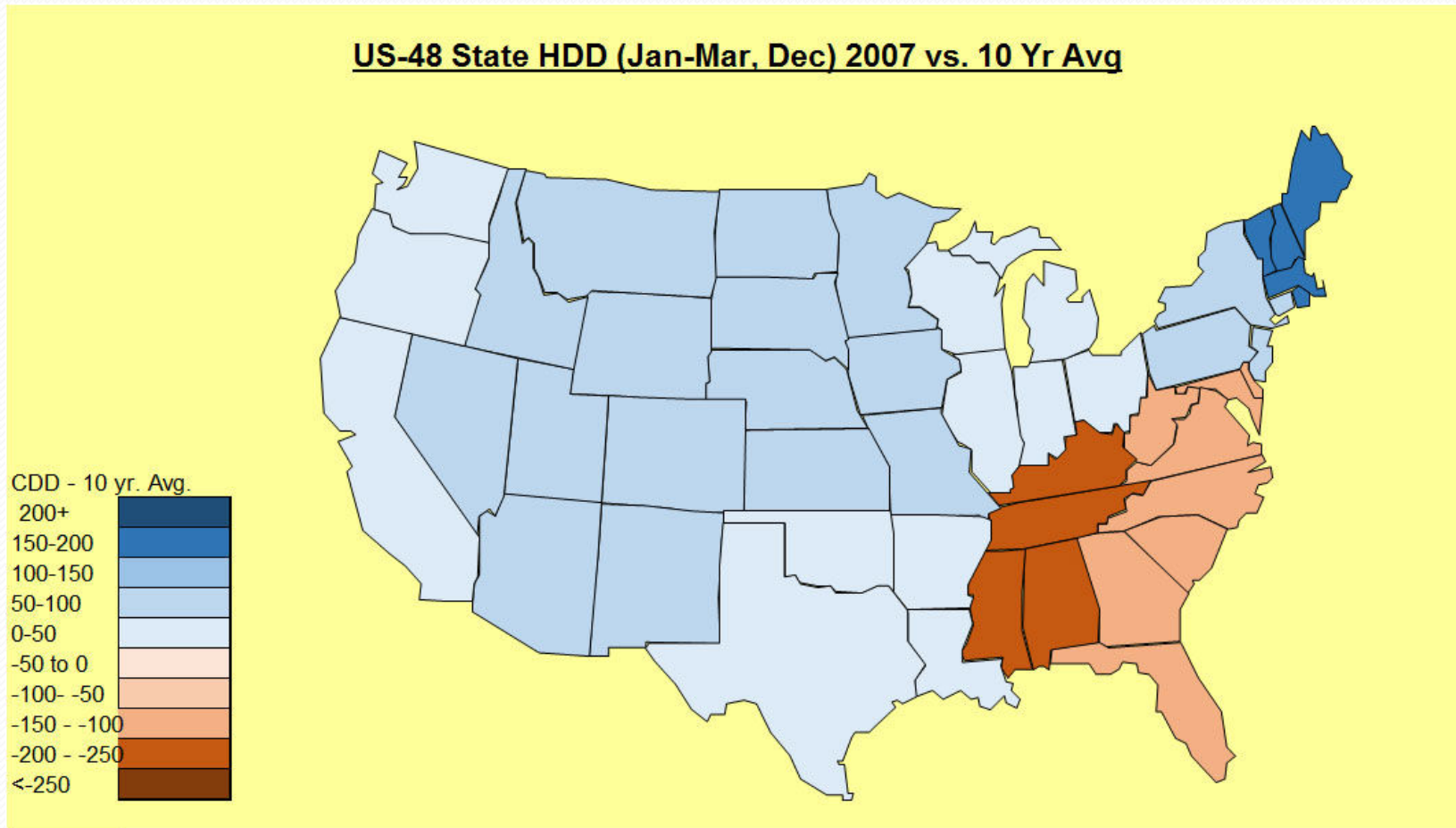
# 2006 Compared to 10 yr. Avg.



- 2006 produced a slightly warmer summer than the 10 year average.

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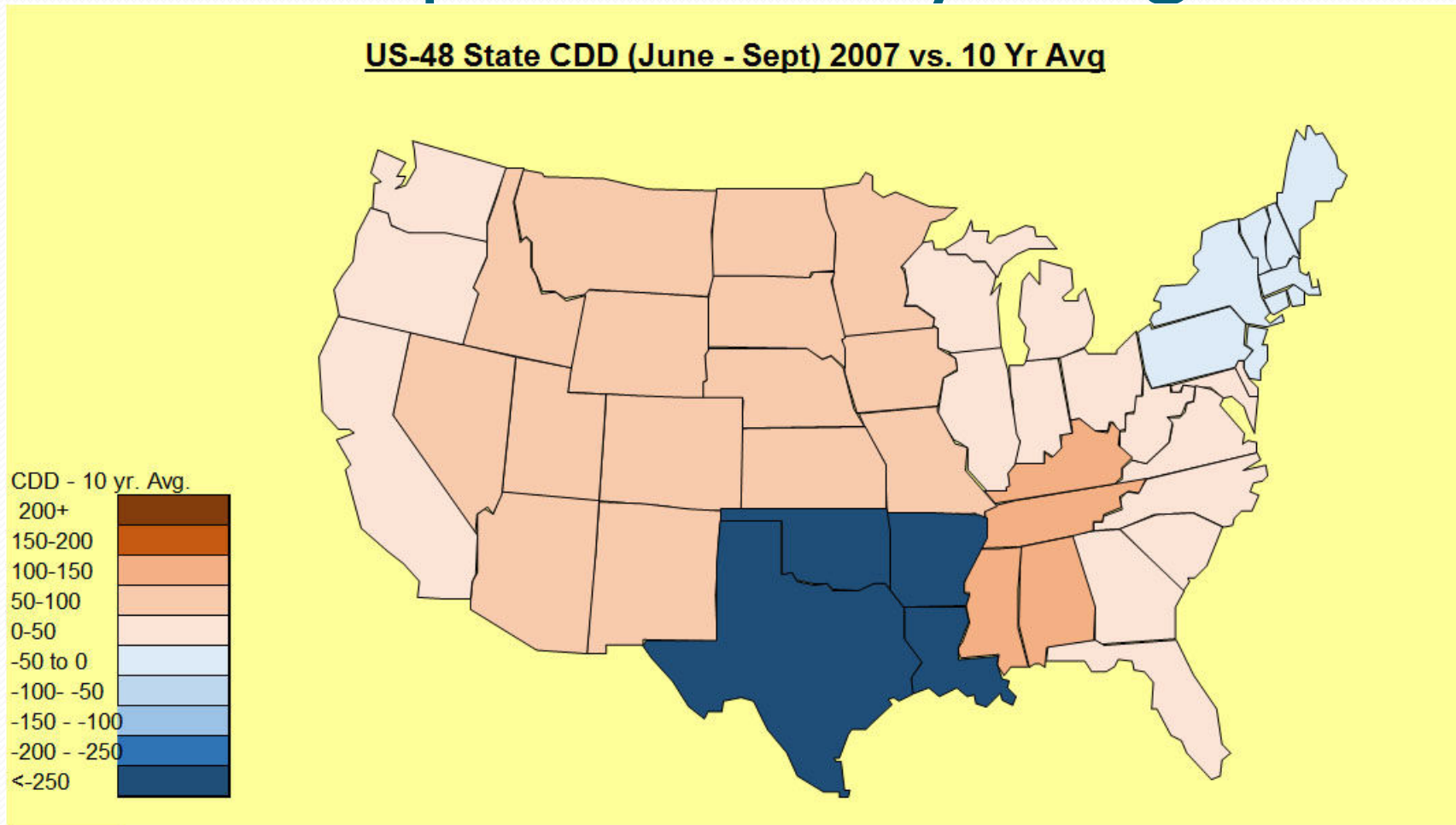
# 2007 Compared to 10 yr. Avg.



- 2007 was close to normal other than the far northeast and east south central.

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# 2007 Compared to 10 yr. Avg.



- 2007 was close to normal other than the West South Central Region.

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# 2008 Compared to 10 yr. Avg.



- 2008 winter over half the country was colder than the 10 year average. With the East side being slightly warmer.

# 2008 Compared to 10 yr. Avg.

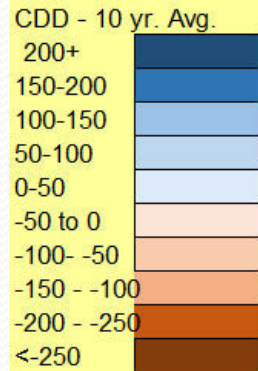
US-48 State CDD (June - Sept) 2008 vs. 10 Yr Avg



- 2008 was a cool summer compared to the 10 year average.

# 2009 Compared to 10 yr. Avg.

US-48 State HDD (Jan-Mar, Dec) 2009 vs. 10 Yr Avg



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- 2009 winter colder than the 10 year average all across the US.

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# 2009 Compared to 10 yr. Avg.

US-48 State CDD (June - Sept) 2009 vs. 10 Yr Avg

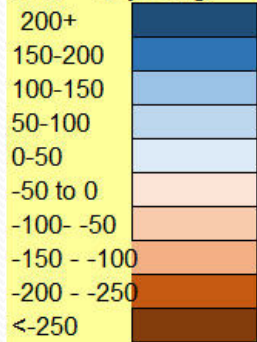


- 2009 was a cool summer compared to the 10 year average.

# 2010 Compared to 10 yr. Avg.

US-48 State HDD (Jan-Mar, Dec) 2010 vs. 10 Yr Avg

CDD - 10 yr. Avg.



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- 2010 winter was cold for the middle part of the country.

# 2010 Compared to 10 yr. Avg.

US-48 State CDD (June - Sept) 2010 vs. 10 Yr Avg

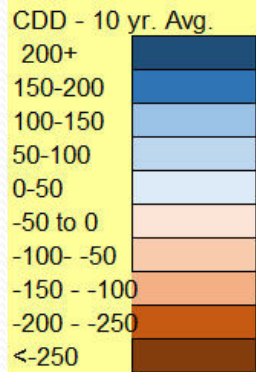


- 2010 produced a bifurcated weather pattern for the summer with the east being warmer and the west cooler than the 10 year average.

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# 2011 Compared to 10 yr. Avg.

US-48 State HDD (Jan-Mar, Dec) 2011 vs. 10 Yr Avg



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- 2011 was close to the 10 year average other than the mountain and west north central region.

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# 2011 Compared to 10 yr. Avg.

US-48 State CDD (June - Sept) 2011 vs. 10 Yr Avg



- 2011 summer was generally warmer across the country other than the west.



# 2012 Compared to 10 yr. Avg.

US-48 State HDD (Jan-Mar, Dec) 2012 vs. 10 Yr Avg



- 2012 was a super warm/mild winter with almost all regions seeing significant reductions in the amount of Heating Degree Days other than the West.

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# 2012 Compared to 10 yr. Avg.

US-48 State CDD (June - Sept) 2012 vs. 10 Yr Avg

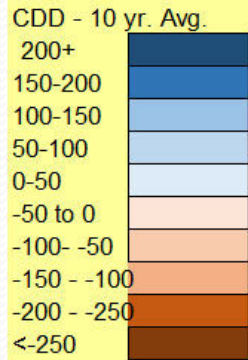


- 2012 was close to normal other than the Midwest which showed a warmer summer compared to the 10 year average.

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# 2013 Compared to 10 yr. Avg.

US-48 State HDD (Jan-Mar, Dec) 2013 vs. 10 Yr Avg



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- 2013 winter was very close to normal other than the Mountain and West North Central region which observed a very cold winter relative to the 10 year average.

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# 2013 Compared to 10 yr. Avg.

US-48 State CDD (June - Sept) 2013 vs. 10 Yr Avg



- 2013 summer was a mild to normal summer compared to the 10 year average.

# Total Year

- The gas demand and electric demand rankings are not the same due to different generation portfolios.

<u>Electric Demand for Year</u>	
Rank	Year
1	2010
2	2011
3	2005
4	2007
5	
6	
7	
8	
9	
10	

<u>Gas Demand Year</u>	
Rank	Year
1	2010
2	2011
3	2007
4	2005

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# Summer

- The gas demand and electric demand rankings are not the same due to different generation portfolios.

<u>Electric Demand Summer (Jun-Sept)</u>	
Rank	Year
1	2010
2	2011

<u>Gas Demand Summer (Jun-Sept)</u>	
Rank	Year
1	2011
2	2010

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# Winter

- The gas demand and electric demand rankings are not the same due to different generation portfolios.

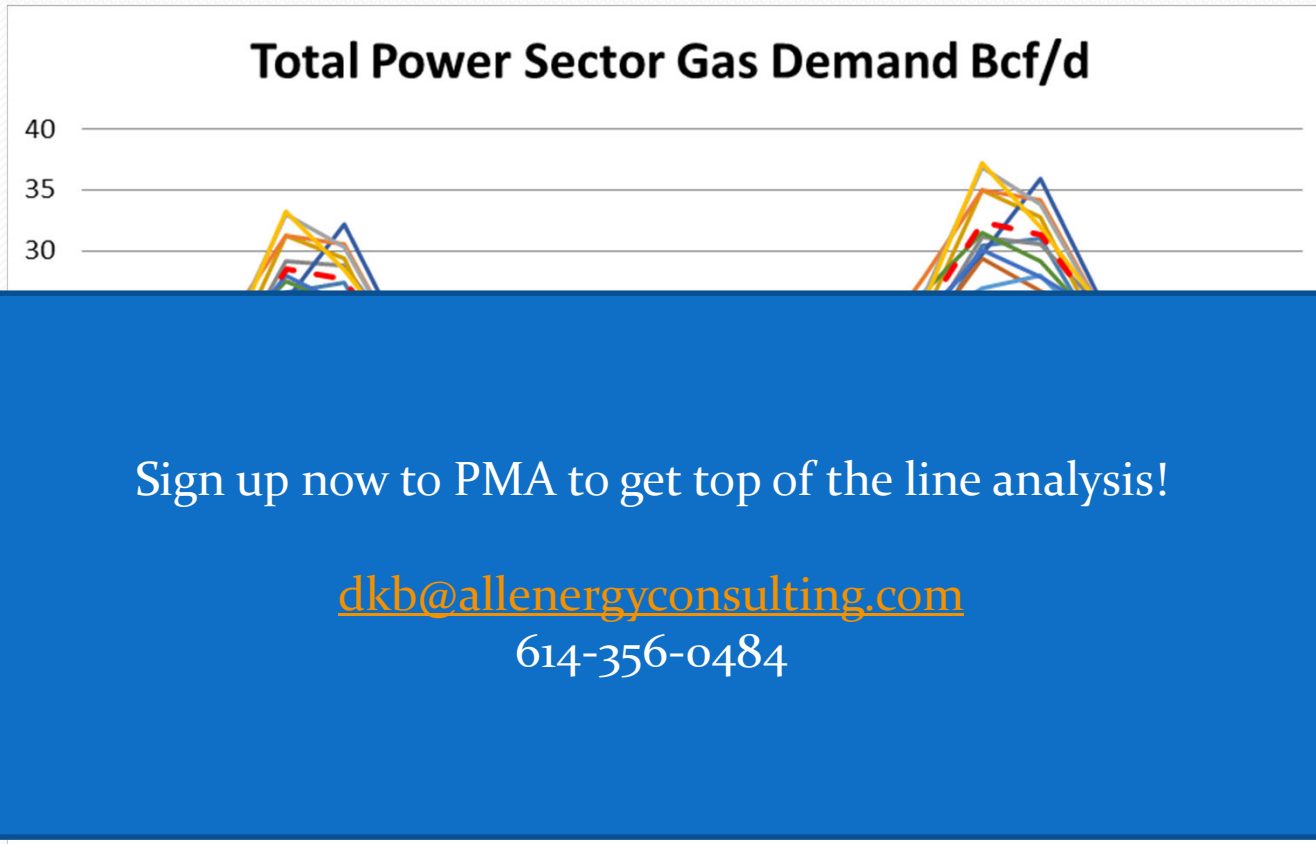
<u>Electric Demand Winter (Jan-Mar, Dec)</u>		<u>Gas Demand Winter (Jan-Mar, Dec)</u>	
Rank	Year	Rank	Year
1	2010	1	2010
11	2012	11	2012

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# Gas Demand Chart



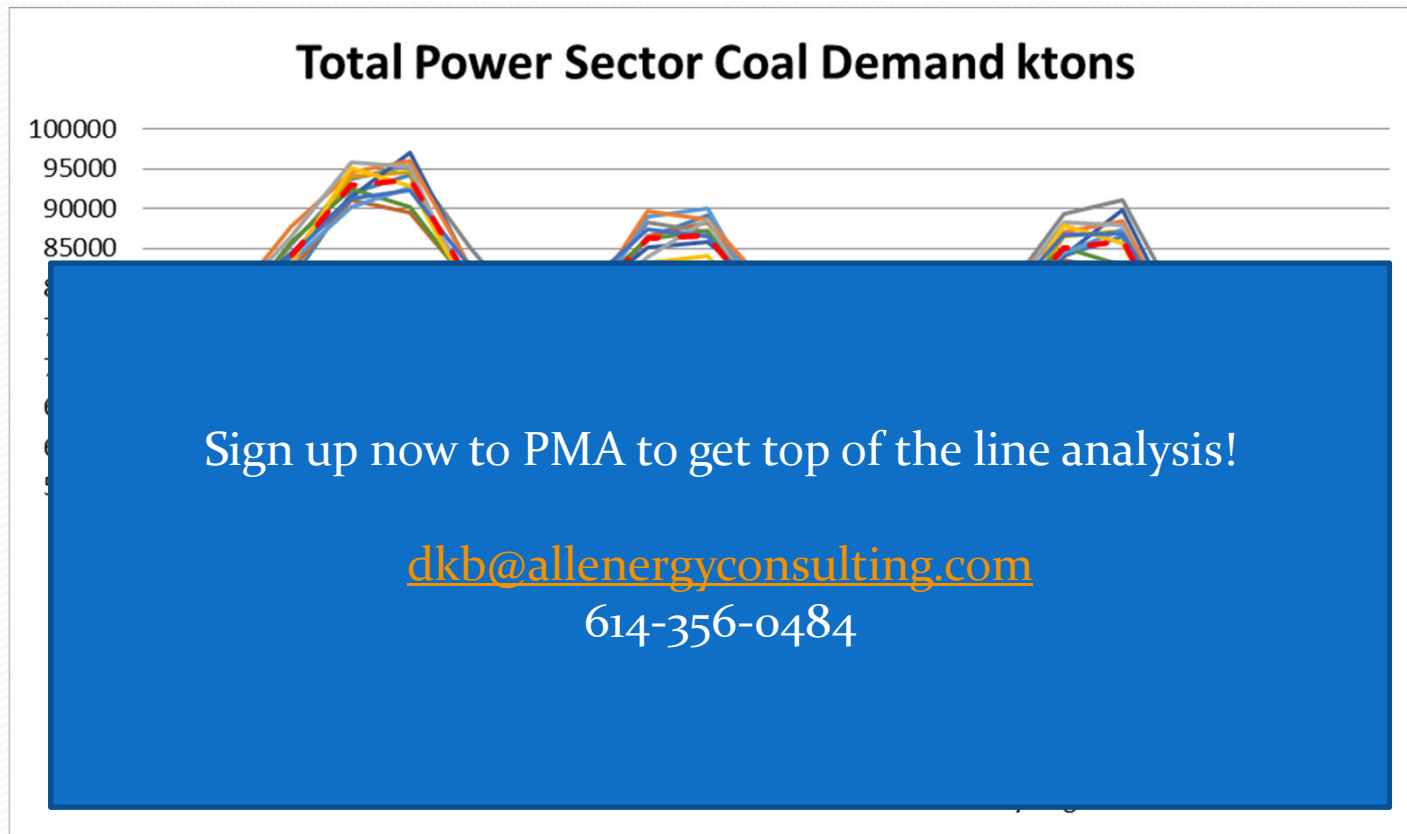
- Weather by itself can change the balance significantly.

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# Coal Demand Chart



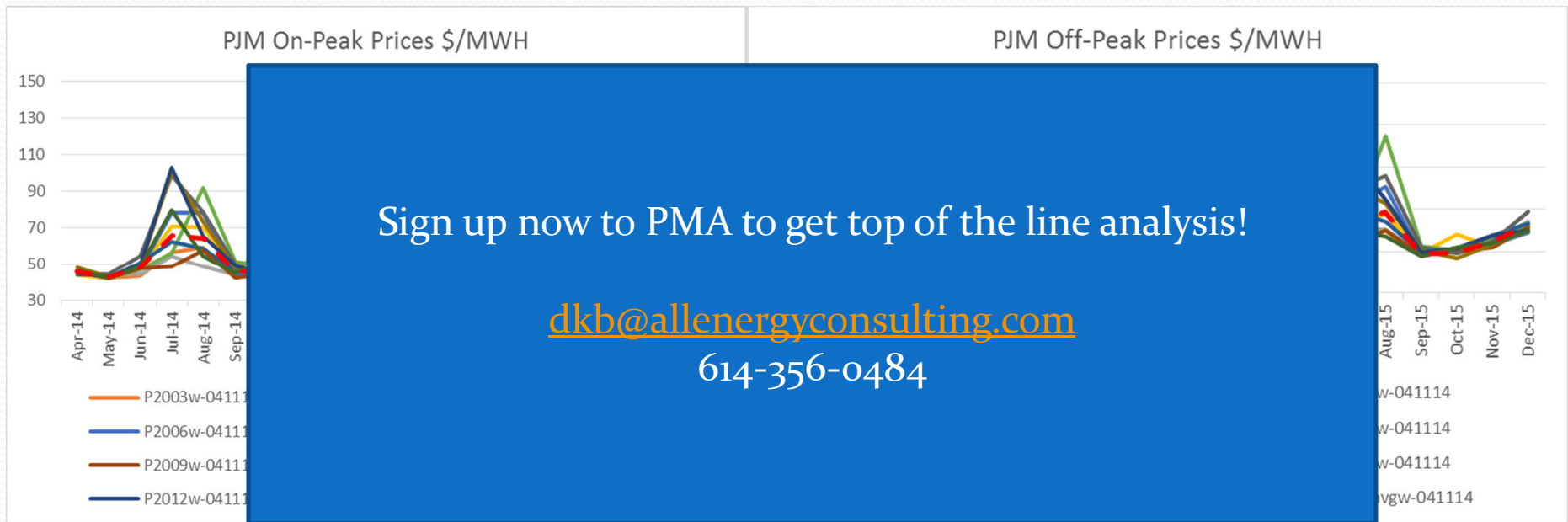
- Weather by itself can change the balance significantly.

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# PJM-West Power Price

- Power prices show some extreme volatility depending on weather conditions.
- More areas available upon request.



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# Customized Runs

- Next step analysis is to decide upon an analog year and run pricing and other sensitivities to it.
- Call or email to setup a customize run.
- Email analog year custom runs only \$2K per run for subscribers.

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