



A Subsidiary of MDU Resources Group, Inc.

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December 6, 2024

Mr. Steve Kahl, Executive Secretary
North Dakota Public Service Commission
600 E Boulevard Ave, Dept 408
Bismarck, ND 58505-0480

**Re: Electric Service Agreement – APLD Amendment
Updated Data Center Load Increase Study
Case No. PU-24-332**

Montana-Dakota Utilities Co. herewith submits the original and seven (7) copies of an updated Data Center Load Study performed by 1898 Co. The Study reflects the latest data center load requests received by Montana-Dakota and is enclosed as Attachment A.

Please contact me at 701.222.7855 or travis.jacobson@mdu.com with any questions.

Sincerely,

/s/ Travis R. Jacobson

Travis R. Jacobson
Director of Regulatory Affairs

Enclosure

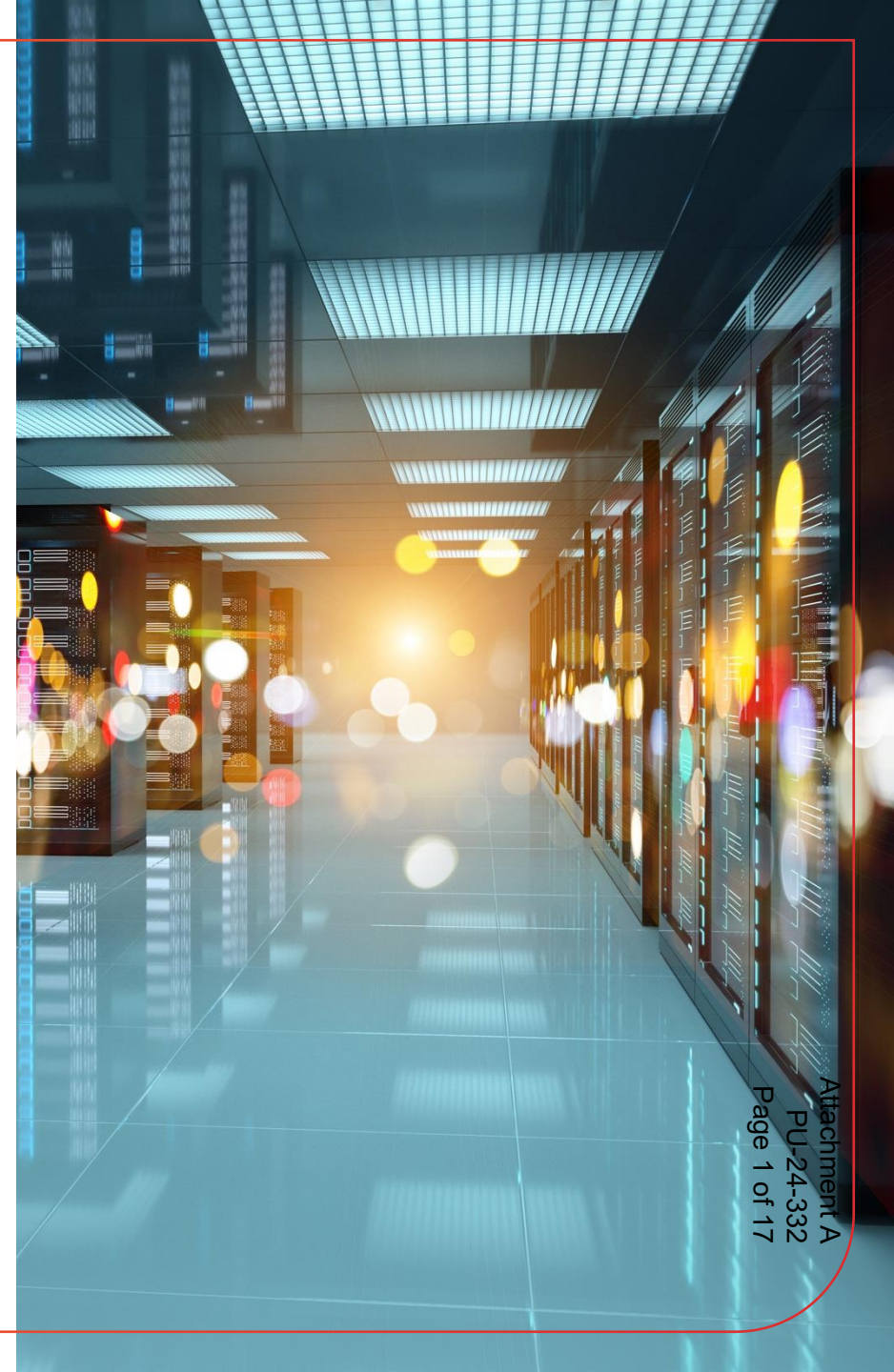
Attachment A
1898 Market Price Analysis

Montana-Dakota Utilities Co. & 1898 & Co.



Data Center Load Increase Study

05/21/2024



Background

- MDU serves nearly 431,000 customers across 271 communities¹, that have a cumulative expected load forecast¹ of ~3,800 GWh for the year 2024
- Data Center Change Case 1 (Existing Datacenter) explores the 2024 effects of siting a 170MW datacenter in MDU's territory
- Data Center Change Case 2 (Expansion Datacenter) explores the 2024 effects of siting a second 170MW datacenter in MDU's territory
- Data Center Change Case 3^{2,3} (3rd Ellendale Datacenter) explores the 2024 effects of siting an additional 190MW datacenter in MDU's territory in addition to the two 170MW datacenters from Change Case 1 and Change Case 2
- Data Center Change Case 4³ (Leola Datacenter) explores the 2024 effects of siting an additional 50MW datacenter in MDU's territory in addition to the two 170MW datacenters from Change Case 1 and Change Case 2 and the 190MW datacenter from Change Case 3

¹ [Website link](#)

² Change Case 3 replaces the SD DC Expansion case from the original study

³ Change Case also includes an upgrade of Ellendale limiting facilities

Summary of Results



- Without data centers, MDU native load buses experience average LMPs for the year of 2024 between \$21-\$23/MWh
- Increasing data center load in the Ellendale area causes...
 - Native load buses to experience marginal increases in LMP prices.
 - Datacenter load buses however experience a more aggressive rise in LMP's as wind curtailment declines
- MDU generation resources are being more heavily utilized as additional data center load is added

Notes:

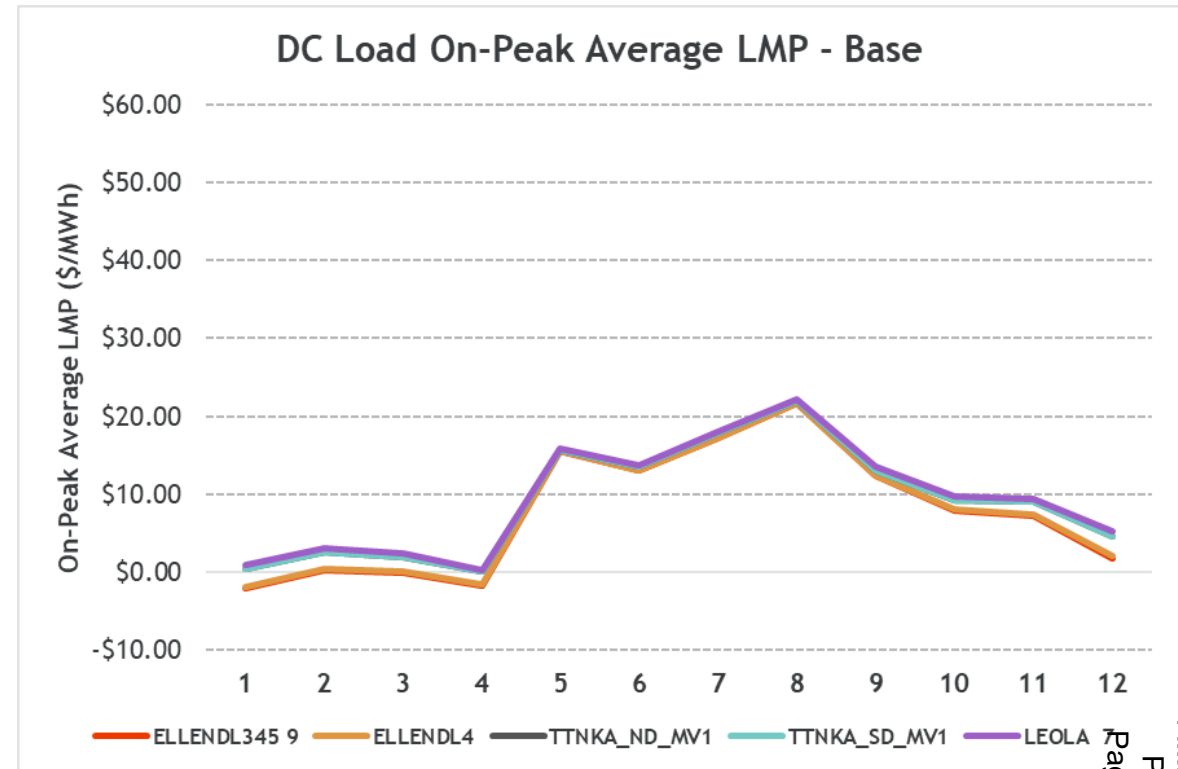
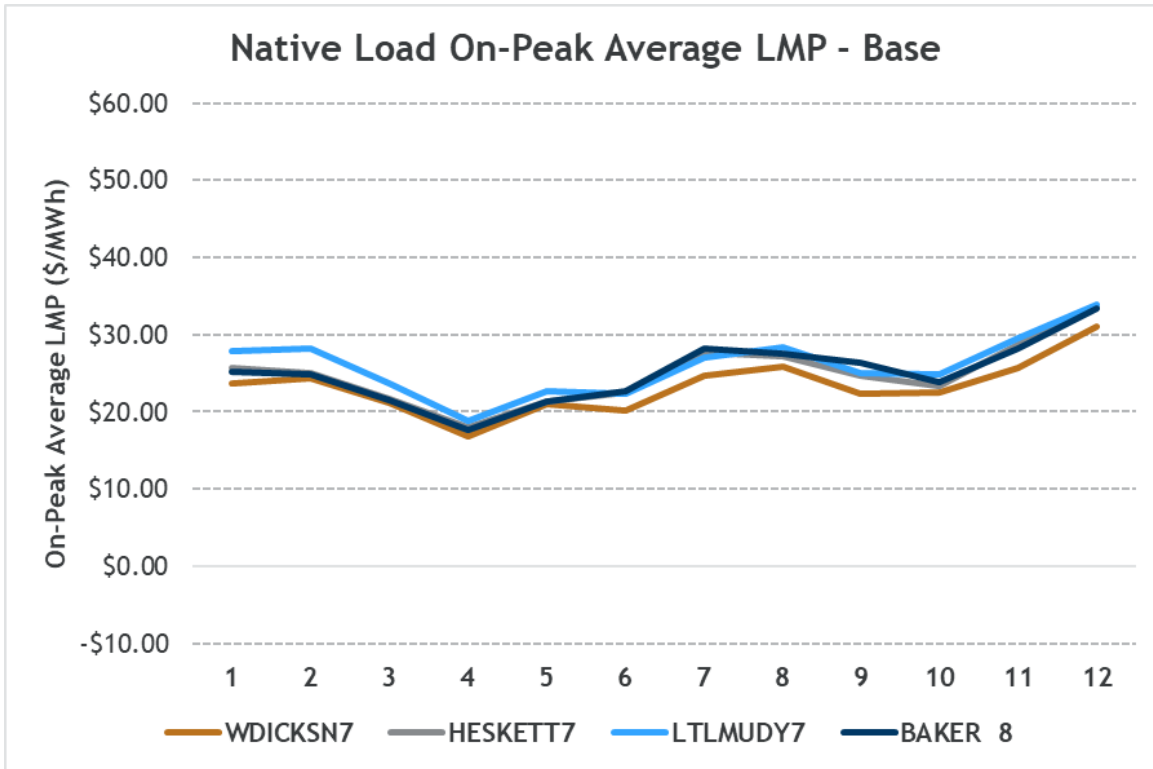
In the following LMP slides, the Base Case results along with Case 1 - Existing DC and Case 2 - Expansion DC are unchanged from the original 1898 study.

Case 3 represents the total additional load that is planning to be added at Ellendale on top of Case 2.

Case 4 represents the 50 MW load addition at Leola added top of Case 3.

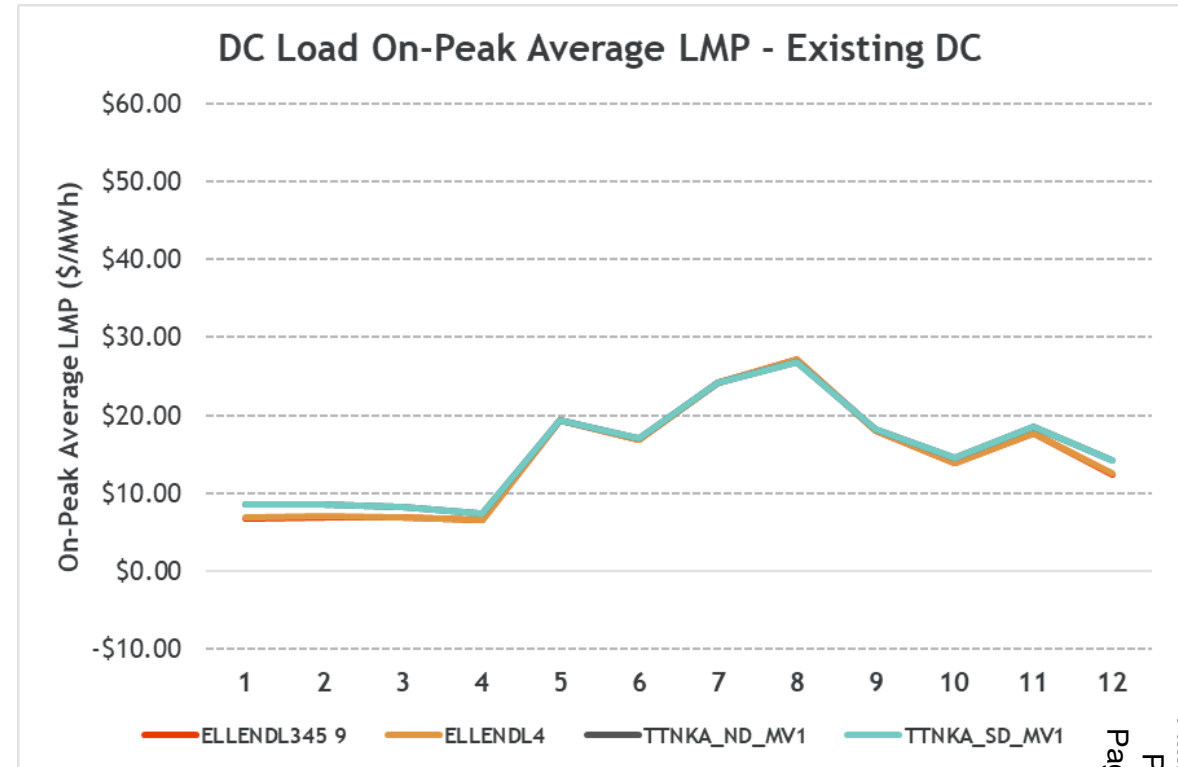
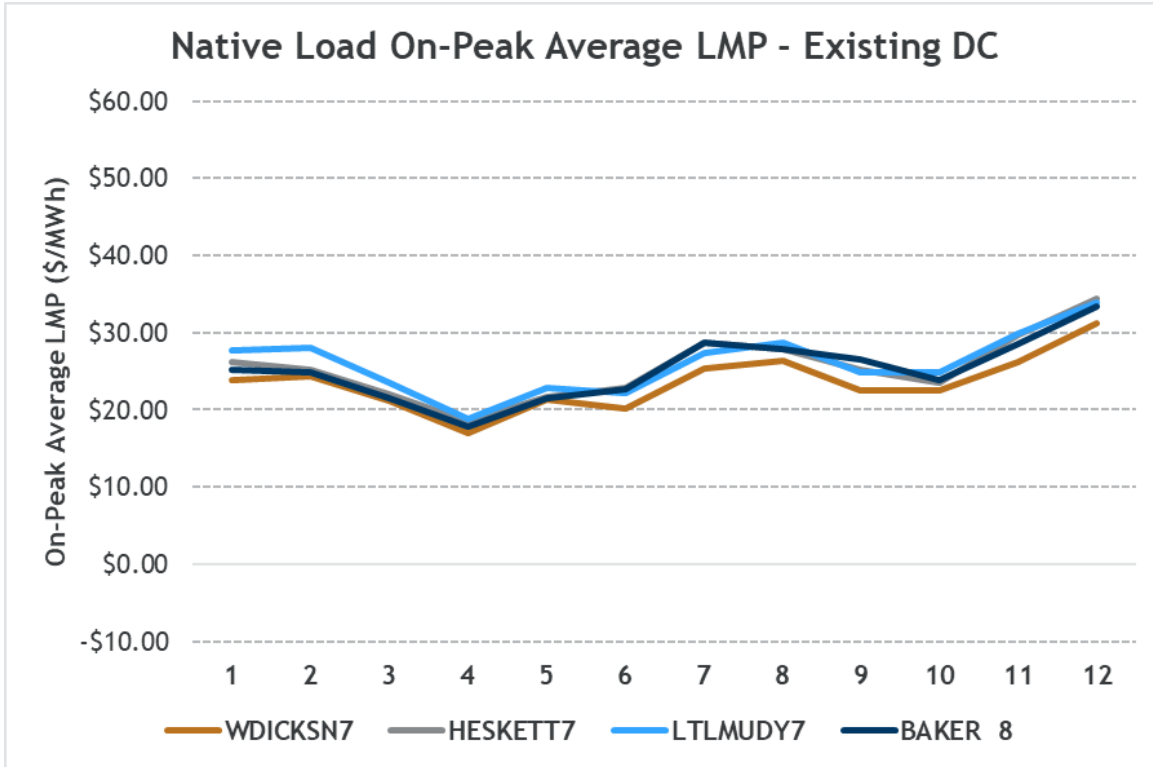
The No_NDEX labels are representative of the case with the removal of the North Dakota Export Limit (NDEX) from the PROMOD model. The NDEX has not been updated in several years and is outdated. MISO is working on updating or removing the NDEX limit with the expected results reflected in the NO_NDEX case results.

LMP Average Pricing - Base



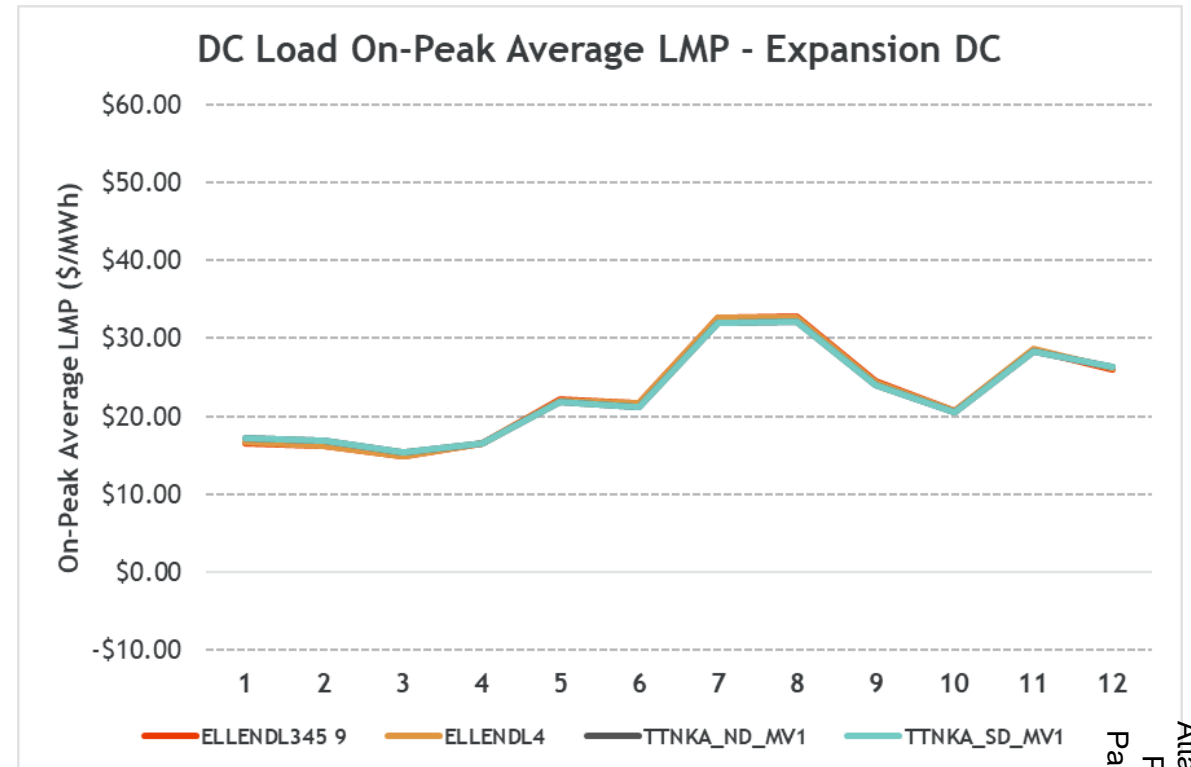
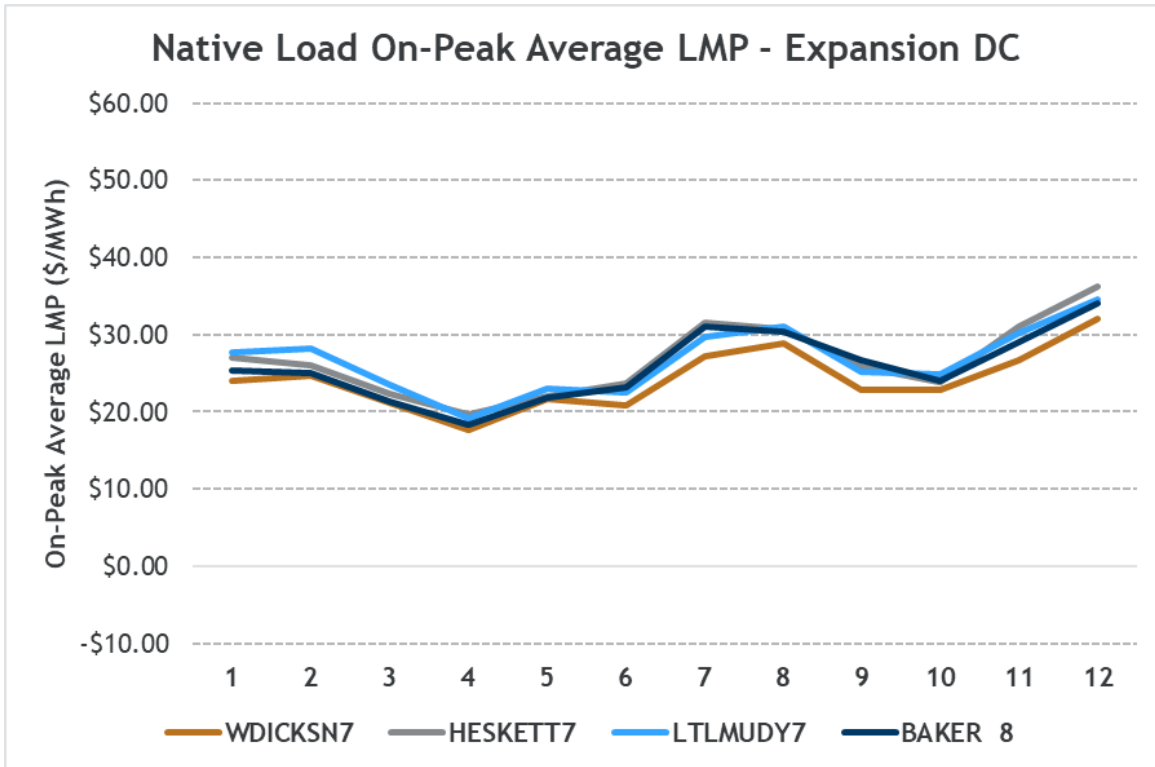
Marginal Energy Cost (MEC) is consistent between load and data center busses. Data Center load busses are experiencing about -\$21/MWh of congestion annually before adding any load.

LMP Average Pricing - Case 1: Existing DC



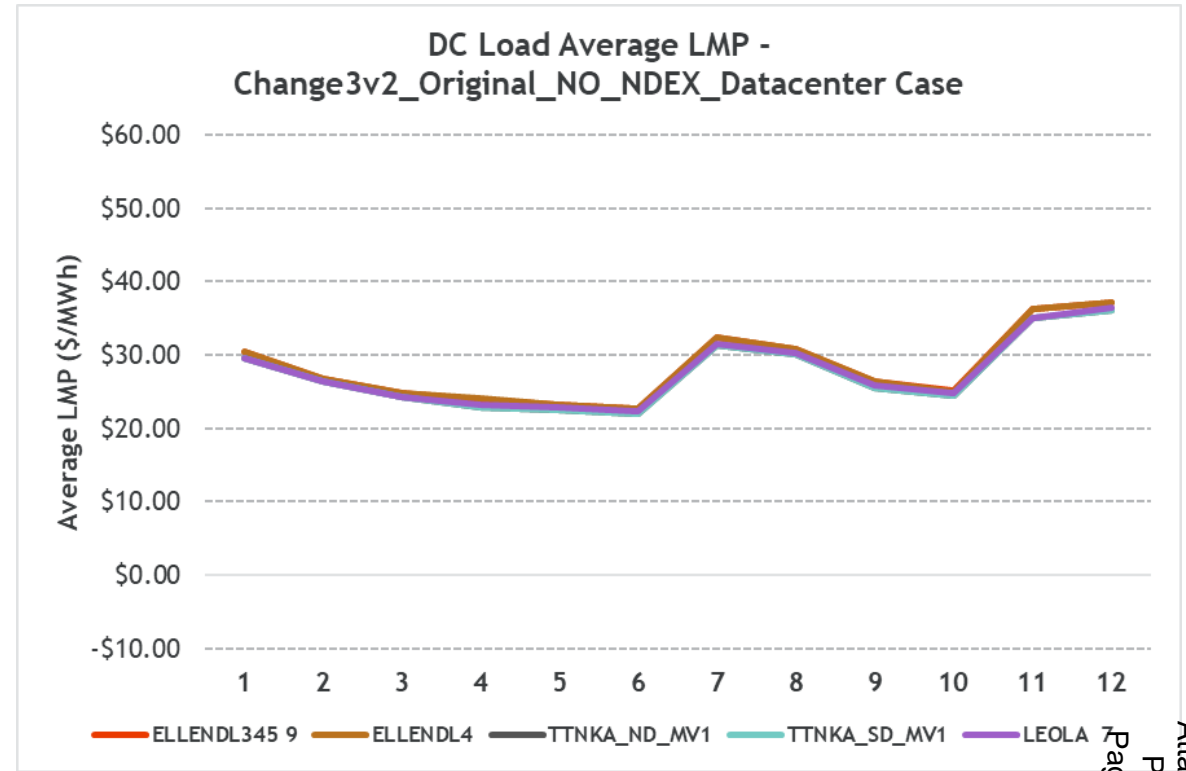
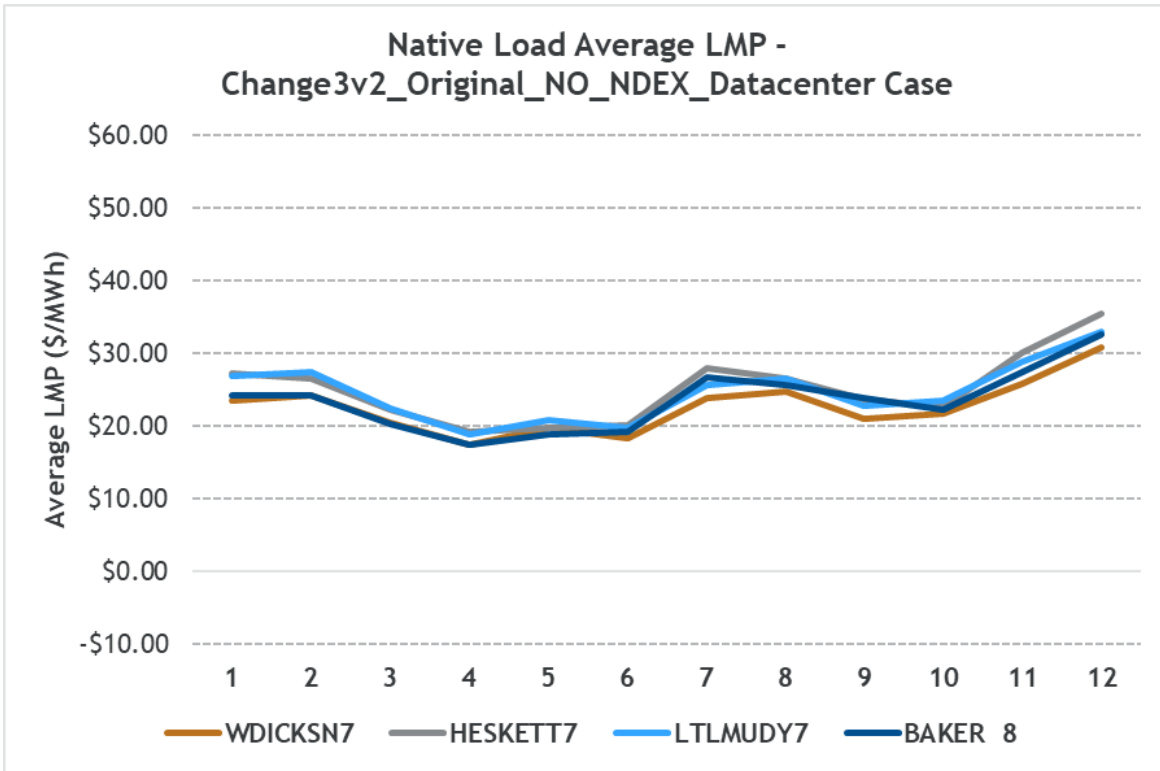
The introduction of data center load (+170 MW) into the system results in LMP price uplift. Data Center load buses are experiencing about -\$13/MWh of congestion annually after the first DC addition.

LMP Average Pricing - Case 2: Expansion DC



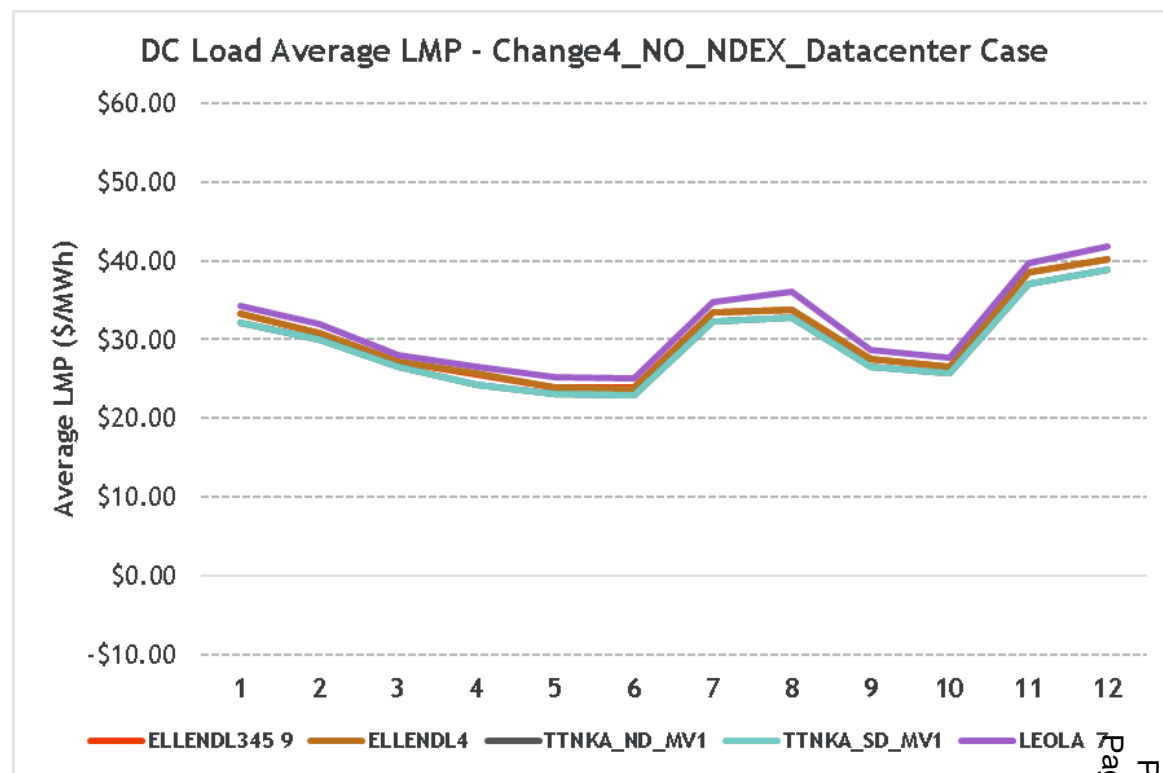
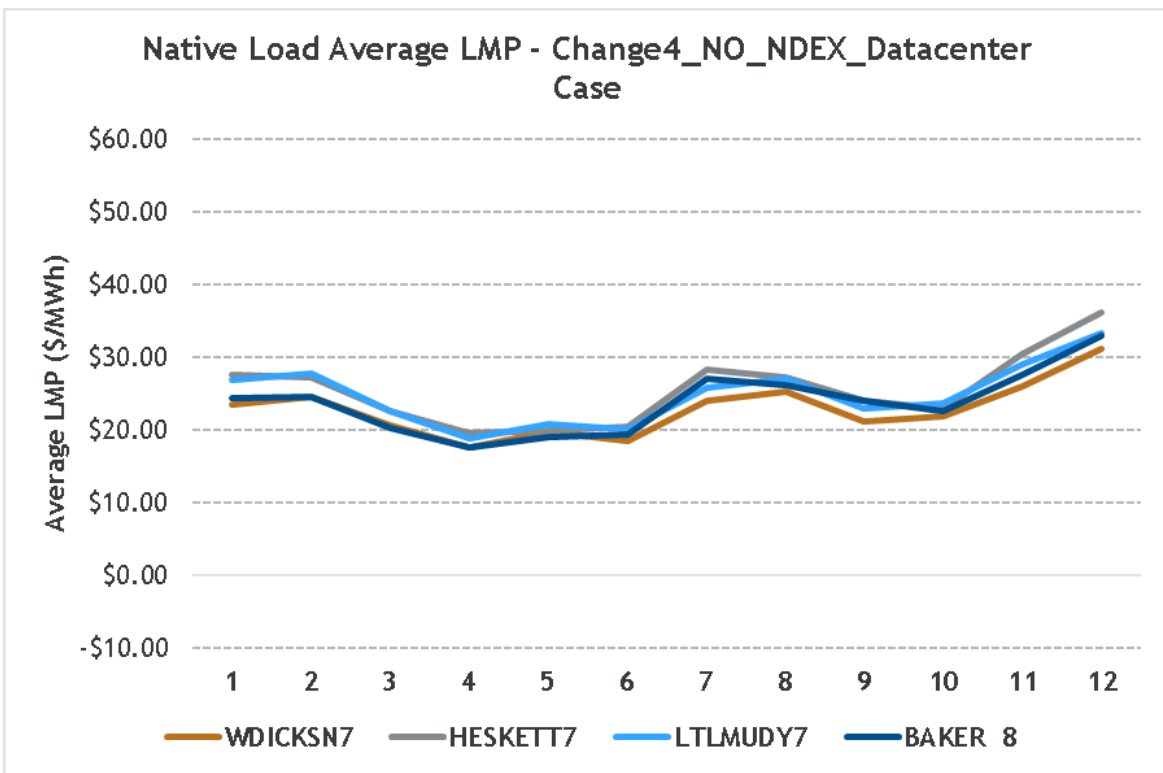
With the continued data center expansion (170MW + 170MW), LMP prices at the data center busses are converging towards the patterns observed at the native load buses.

LMP Average Pricing - Data Center Change Case 3 No NDEX



Removing NDEX constraints from the model drastically decreases the spike in LMP's observed in the July-August timeframe.

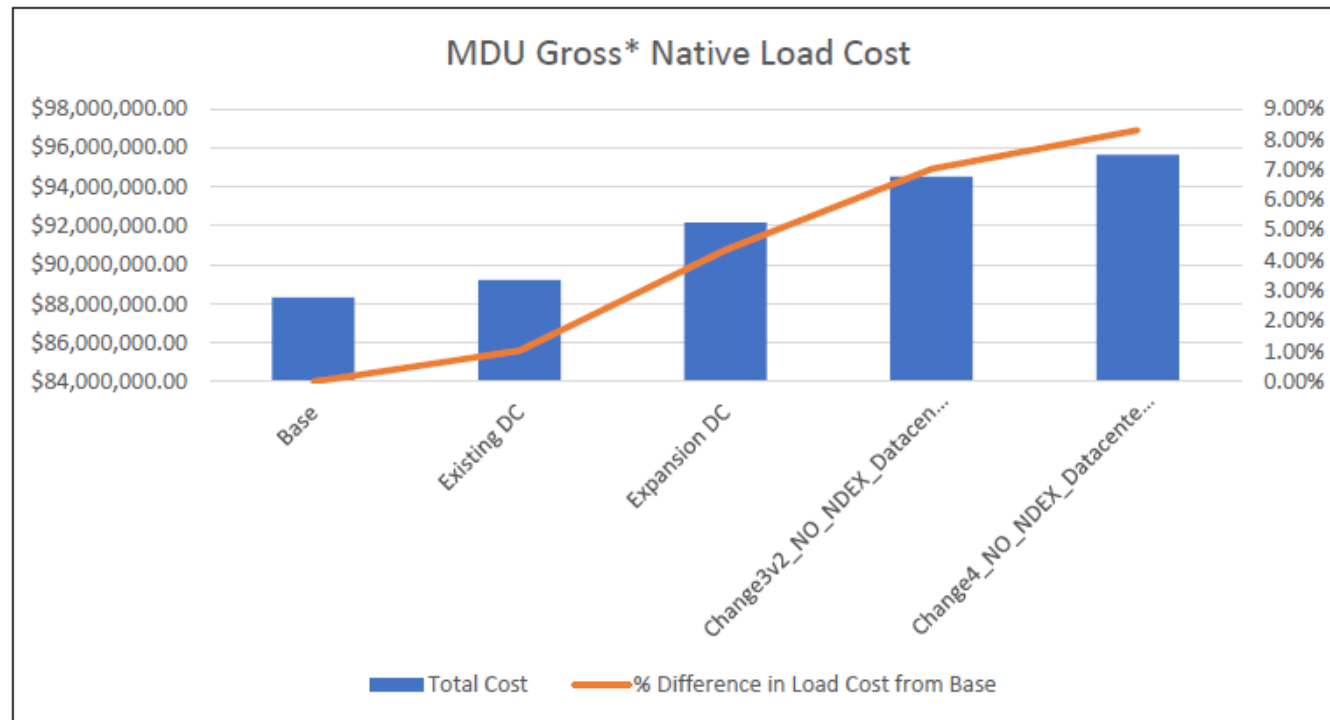
LMP Average Pricing - Data Center Change Case 4 No NDEX



Removing NDEX constraints from the model drastically decreases the spike in LMP's observed in the July-August timeframe.

Cost Impacts to Montana-Dakota's Native Load Associated with Data Center Load Additions

Cases	Total Cost	% Difference in Load Cost from Base
Base	\$88,322,972.97	0.00%
Existing DC	\$89,223,769.81	1.02%
Expansion DC	\$92,160,441.83	4.34%
Change3v2_NO_NDEX_Datacente	\$94,523,180.73	7.02%
Change4_NO_NDEX_Datacenter	\$95,658,805.16	8.31%



*Gross indicates that this load is not considering any cost reduction coming from MDU owned generation

Montana-Dakota Customer Fuel and Purchased Power Impacts

Including the 1898 Market Price Information for Montana-Dakota’s native load produces the following results in Montana-Dakota’s electric dispatch simulation model (PLEXOS) which includes the self-generation costs to service Montana-Dakota’s native load over the MISO only purchase assumption in the 1898 study.

	2025 Total Fuel and Purchase Power Costs (\$1,000)	Percentage Increase of Fuel and Purchase Costs Over Base
Base	94,870.84	
Change Case 1	95,105.16	0.2%
Change Case 2	96,488.65	1.7%
Change Case 3	96,350.88	1.6%
Change Case 4	96,583.82	1.8%

Summary of Results

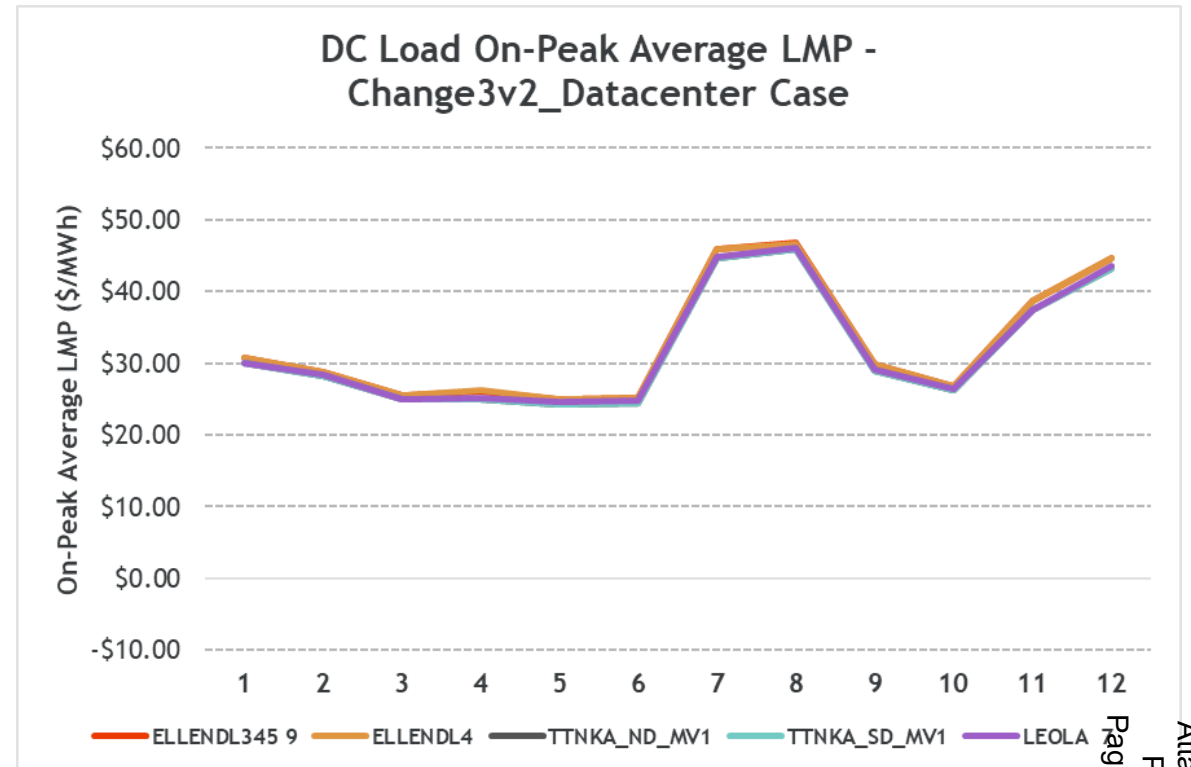
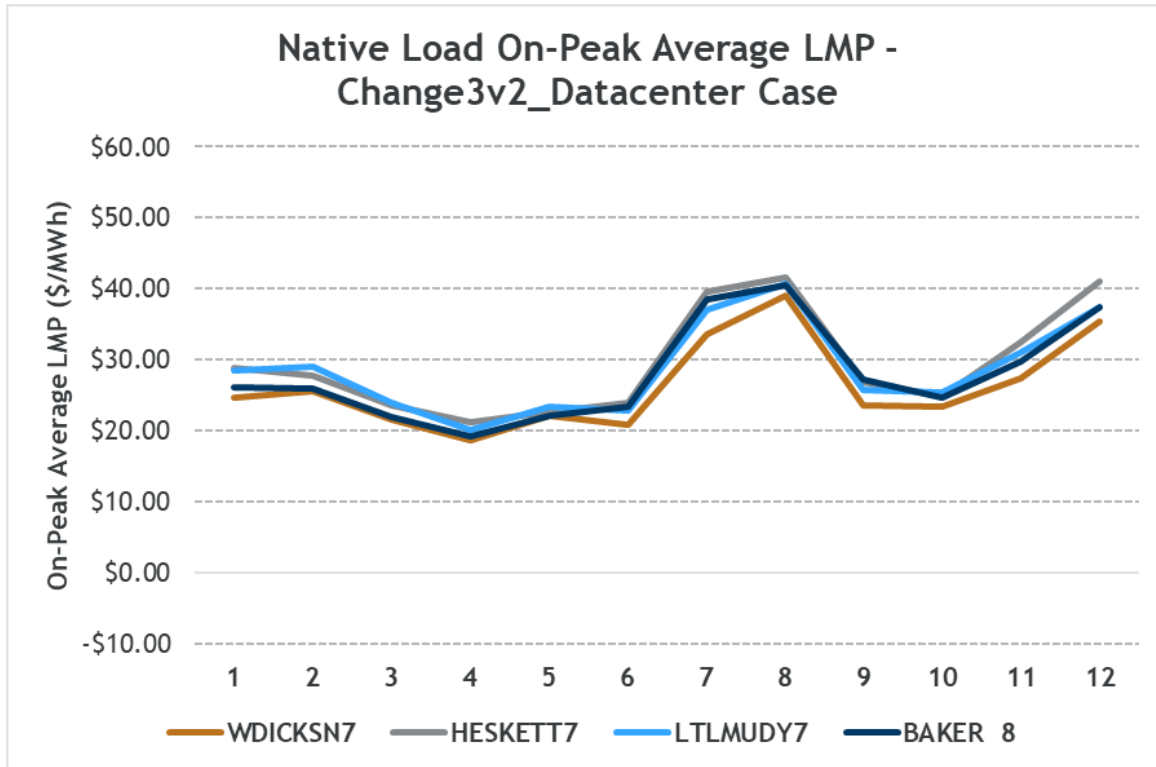
- Without data centers, MDU native load buses experience average LMPs for the year of 2024 between \$21-\$23/MWh
- Increasing data center load in the Ellendale area causes...
 - Native load buses to experience very marginal increases in LMP prices. Datacenter load buses however experience a more aggressive rise in LMP's as wind curtailment declines
- The additional load reduces curtailment in region... additional estimated \$292k in annual wind production tax to North Dakota
- MDU resources are being more heavily utilized as data centers are added

Summary of Results... Slide 2

- Congestion impacts in the Ellendale area result in increasing bus LMPs wiping out the financial advantage seen by the DC customers by the time all four data centers are added.
- Increased datacenter load in Ellendale area on the system generally results in lower congestion experienced by load center buses (increased cost of load).
- Increasing datacenter load has minimal impact on the congestion observed at Big Stone and provides a small price improvement at Coyote.

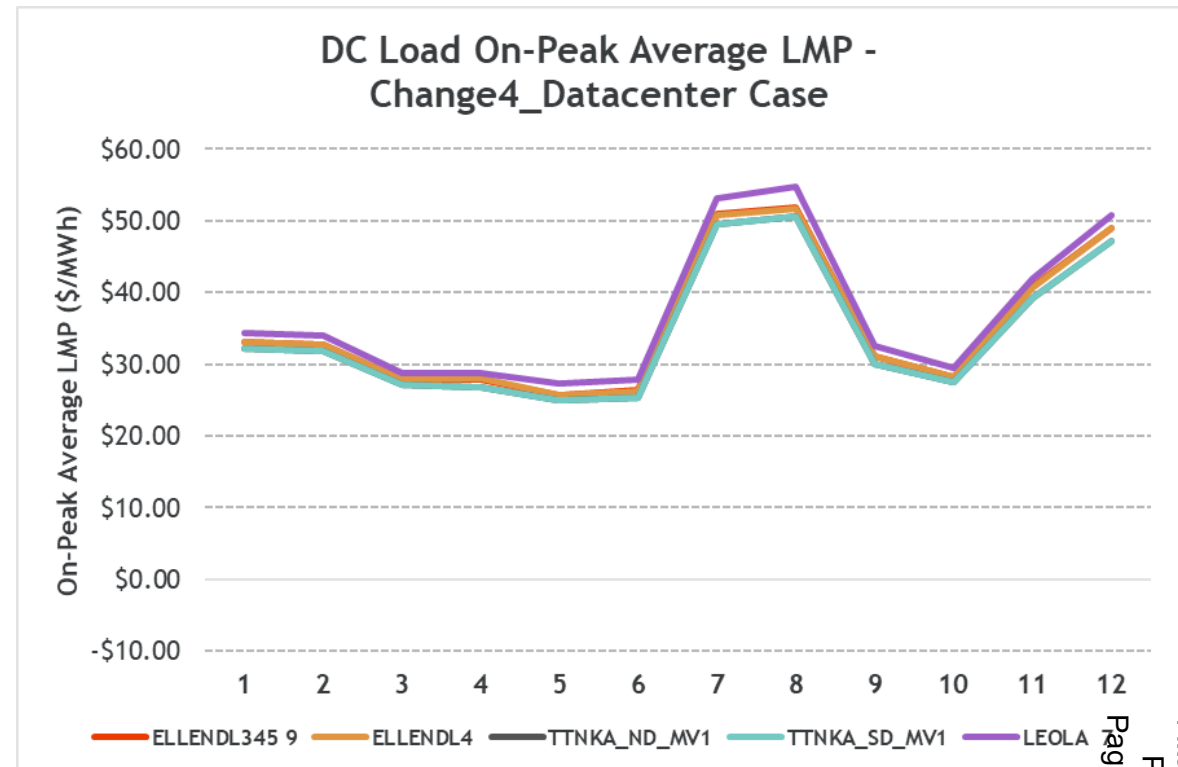
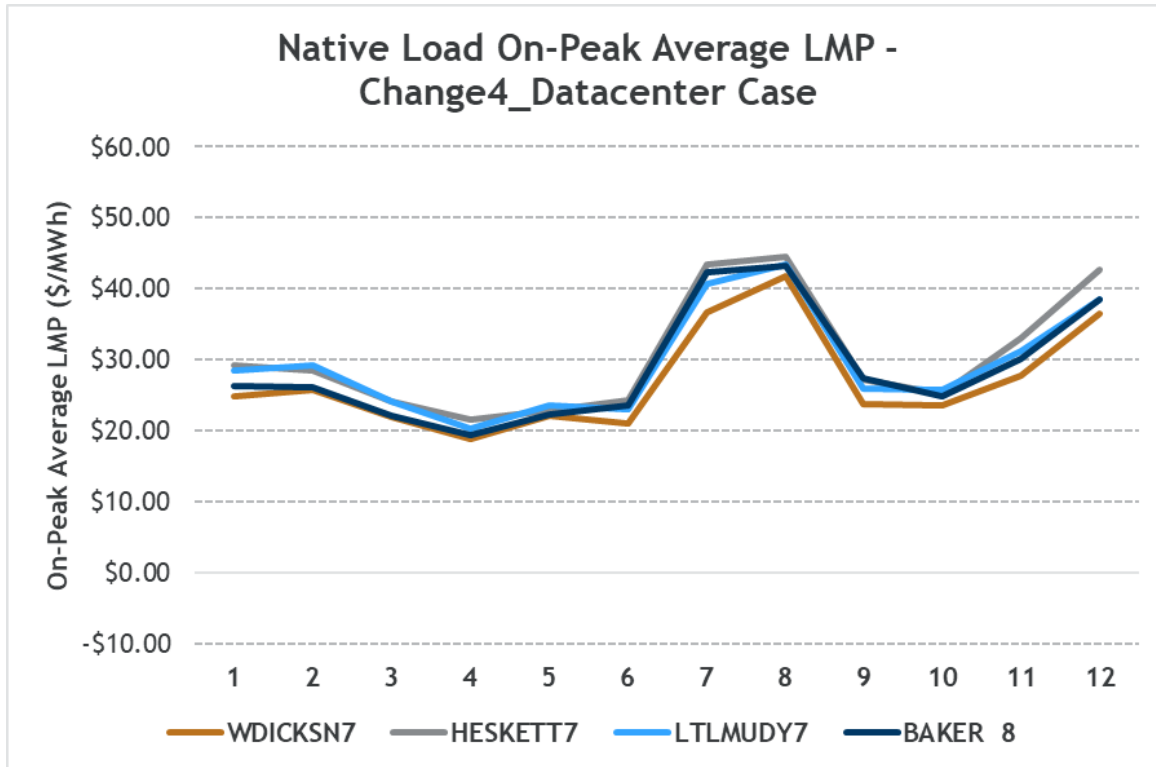
Additional result slides include the current NDEX Constraint limits in the model

LMP Average Pricing - Data Center Change Case 3



Further datacenter expansion at Ellendale puts the load and datacenter LMP's closer to lock-step, as well as drives prices higher in all months. A more exaggerated prices increase in the late summer months is also observed.

LMP Average Pricing - Data Center Change Case 4



Adding the final datacenter at Leola has minor effects on prices, as the price curves look largely the same as Change Case 3. Marginal price increases are observed in all months with the new Leola datacenter load.

MDU Gross* Native Load Cost



Cases	Total Cost (\$)	Percent Increase (%)
Base	\$88,322,973	
Existing DC	\$89,223,770	1.02%
Expansion DC	\$92,160,442	4.34%
Data Center Change Case 3	\$100,703,302	14.02%
Data Center Change Case 4	\$103,569,212	17.26%

