

1 Executive Summary

This report summarizes the findings of the Condensate Equalization Density Model Review, conducted at the request of the Equalization Steering Committee. Initiated from discussions in 2023, the review was formally scoped, funded, and approved in 2024 as a desktop study, with no additional laboratory work required. This review focused on the Condensate Equalization Density Model, with the objective of confirming whether the current model continues to support fair and equitable pricing for varying condensate qualities under current market conditions. The review also aimed to identify potential adjustments to improve transparency, simplification, and long-term stability.

Current Condensate Density Penalty Model: The Condensate Density Penalty model calculates a monthly density adjustment and is the combination of two components: (1) blending efficiency and (2) bitumen blend value. Key inputs into the calculation include the thermal/conventional ratio of heavy crude volumes, Enbridge reference temperature, average Enbridge CRW condensate density, and monthly allowance prices. It incorporates coefficients derived from laboratory testing of heavy crude blends with various condensates, capturing density blending, viscosity and volumetric shrinkage effects. A key assumption is that bitumen realization remains constant regardless of the condensate used. The model is updated monthly to reflect market conditions and provide relative value adjustments based on quality.

Condensate Density Model Review: The review assessed the components of the Condensate Density Model using available historical data on heavy crude volumes, condensate quality, and model input and pricing. Detailed crude price data were obtained from Argus Media (Houston close) for available delivery locations. Seasonal variations and the impact of each model component were also evaluated.

Discussion and Key Findings:

Thermal/Conventional Ratio:

Conventional production has remained relatively steady while thermal production has grown, shifting the thermal/conventional ratio to 86%/14% in 2024 from 84%/16% in 2018. Although the updated ratio did not have a statistically significant effect on the density penalty during the evaluated period, updating it is recommended as it better reflects current market conditions.

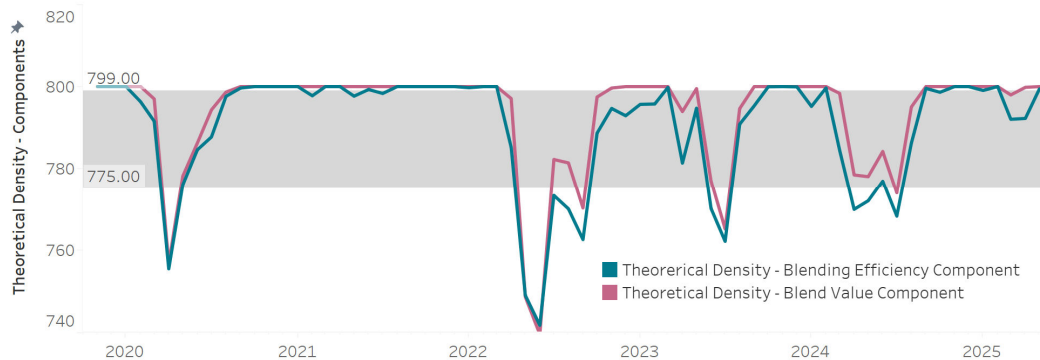
Condensate content and heavy crude blend pricing: seasonal variation in blend density is attributable to changes in condensate content. Regression analysis of Blend Value against condensate (diluent) percentage and Nymex CMA showed a tendency for higher condensate content to reduce Blend Value. The association was statistically significant for AWB and CDB blends, but not for CL and LLB blends, making the overall results inconclusive. Other factors, including supply/demand dynamics and transportation constraints, also influence pricing.

Component evaluation: A total of four model components were evaluated with key insights for each model component summarized below:

- ***Blending Efficiency*** – (current model component)
 - Assuming bitumen realization and blend value remain constant, while condensate value varies according to blending efficiency. Based on laboratory data, it remains a robust and reliable method for assessing the relative value of condensates.
- ***Bitumen Blend Value*** – (current model component) –
 - Assumes bitumen realization and condensate value remain constant, effectively implying that higher condensate usage (heavier condensates) would increase blend value. Regression analysis using actual market pricing data from Argus Media showed a negative association between condensate content and market Blend Value across all blends, although this was statistically significant only for AWB and CDB. While heavier condensates can contain more valuable components, the overall findings remain inconclusive.

- Variable Bitumen Realization assumption:
 - Assumes that blend value and condensate prices remain constant while bitumen realization varies. The committee concluded that it does not reflect observed market behavior; as a result, it was rejected.
- Transportation component:
 - Assumes higher condensate usage increases total transportation costs due to additional bitumen blend volume. Evaluation used the Enbridge Canadian Mainline heavy crude tariff from Edmonton to the International Boundary. Although sensitive to assumed tariff values, it has minimal impact on the overall condensate density adjustment and was therefore excluded from the model.

Theoretical Density: this metric represents the density at which a stream would be indifferent between contributing to the CRW or MSW pools. Although it does not account for quality compatibility, it provides insight into potential impacts on pool volumes. Compared to the CRW-MSW price differential, Blending Efficiency produces lower theoretical densities than Blend Value, reinforcing that the Blend Value component favors heavier streams. The following chart compares Blending Efficiency and Blend Value components.



Final thoughts: A general observation is that most refineries do not purchase condensates for direct processing. In practice, condensate is primarily acquired for blending with heavy bitumen to facilitate transportation, with demand driven by heavy oil producers rather than refineries.

To conclude the study, in October 2025, the committee coordinated a vote to finalize its recommendation to industry. Following the vote, and by majority, the committee recommended:

- Update *Thermal/Conventional Factor (86%/14%)*
- Removal of the **Blend Value** component.

Using the inputs described above, the density slope implied by the recommendation was compared with the current density slope. Key results are presented on the table below.

Month	Condensate Allowance Price, \$Cdn/m3	Heavy Allowance Price, \$Cdn/m3	Ref Temp, °C	Average Condensate Density, kg/m3	Published Density Slope \$/m3 per kg/m3	Density Slope w/ Proposed Recommendation \$/m3 per kg/m3
Sep-23	734.14	619.31	17.75	738.5	0.26	0.36
Oct-23	723.14	569.90	14.73	739.9	0.37	0.52
Nov-23	666.17	479.36	11.50	737.7	0.45	0.66
Dec-23	576.20	375.48	8.98	744.4	0.51	0.76
Jan-24	602.94	447.78	7.74	743.3	0.38	0.57
Feb-24	614.06	483.64	7.50	743.3	0.31	0.47
Mar-24	642.78	513.73	7.50	740.4	0.30	0.45
Apr-24	701.26	582.95	8.00	741.5	0.27	0.40
May-24	636.91	559.74	10.53	734.6	0.16	0.23
Jun-24	647.46	572.43	14.00	740.1	0.16	0.22
Jul-24	660.47	577.17	16.52	738.9	0.18	0.25
Aug-24	611.95	522.13	18.26	739.1	0.20	0.28
Sep-24	563.93	473.12	17.75	744.5	0.21	0.29
Oct-24	616.20	497.02	14.73	745.9	0.29	0.41
Nov-24	611.65	501.15	11.50	738.8	0.25	0.37
Dec-24	628.18	511.80	8.98	745.1	0.28	0.41
Jan-25	674.85	562.25	7.74	741.8	0.26	0.38
Feb-25	631.11	528.76	7.50	741.8	0.23	0.35
Mar-25	586.83	485.21	7.50	745.7	0.24	0.36
Apr-25	532.55	442.89	8.00	747.0	0.21	0.31
May-25	523.58	446.18	10.53	747.1	0.18	0.26
Jun-25	599.99	496.58	14.00	741.8	0.24	0.34
Jul-25	573.53	497.50	16.52	744.2	0.17	0.23
Aug-25	533.03	460.93	18.26	748.6	0.16	0.23
Sep-25	537.03	444.45	17.75	748.5	0.22	0.31
Oct-25	508.40	423.20	14.73	749.4	0.20	0.29
Nov-25	503.29	427.04	11.50	745.1	0.17	0.25
Dec-25	483.48	398.66	8.98	752.3	0.21	0.30
Jan-26	522.51	402.80	7.74	753.4	0.31	0.45
Feb-26	545.33	426.11	7.50	743.7	0.29	0.43
Mar-26	774.99	647.15	7.50	744.4	0.30	0.44