**Holt-Winters Exponential Smoothing: Graph Analysis**

Overall Performance: After tuning the hyperparameters, the model's performance clearly got better. We saw lower RMSE values for almost all utilities, and the forecasted trends now look more realistic and consistent. This shows that adjusting the parameters makes the model much more reliable.

Visual Analysis: The tuned model's predictions align more closely with the trends in the training data. The forecast looks smoother, and it does a better job of following the seasonal patterns. This is really important for time-series modeling like this, especially since energy consumption is all about capturing those repeating cycles.

Accuracy and Realism: The original model sometimes made predictions that didn’t make sense, like negative values for energy consumption—which is impossible. The tuning process fixed these issues, keeping all the forecasts within realistic, believable ranges.

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| Utility Name | Original Model RMSE | Tuned Model RMSE | Improvement (%) |
| AEP | 987.05 | 861.56 | 12.7% |
| COMED | 3430.74 | 1621.06 | 52.7% |
| DAYTON | 203.98 | 188.45 | 7.6% |
| DEOK | 381.55 | 361.58 | 5.2% |
| DOM | 587.28 | 517.25 | 11.9% |
| DUQ | 188.72 | 168.88 | 10.5% |
| EKPC | 184.68 | 168.66 | 8.7% |
| FE | 964.44 | 846.84 | 12.2% |
| NI | 2338.02 | 2042.30 | 12.7% |
| PJMEL | 272.18 | 252.18 | 7.3% |