Inequalities in Natural Gas Demand Forecasting

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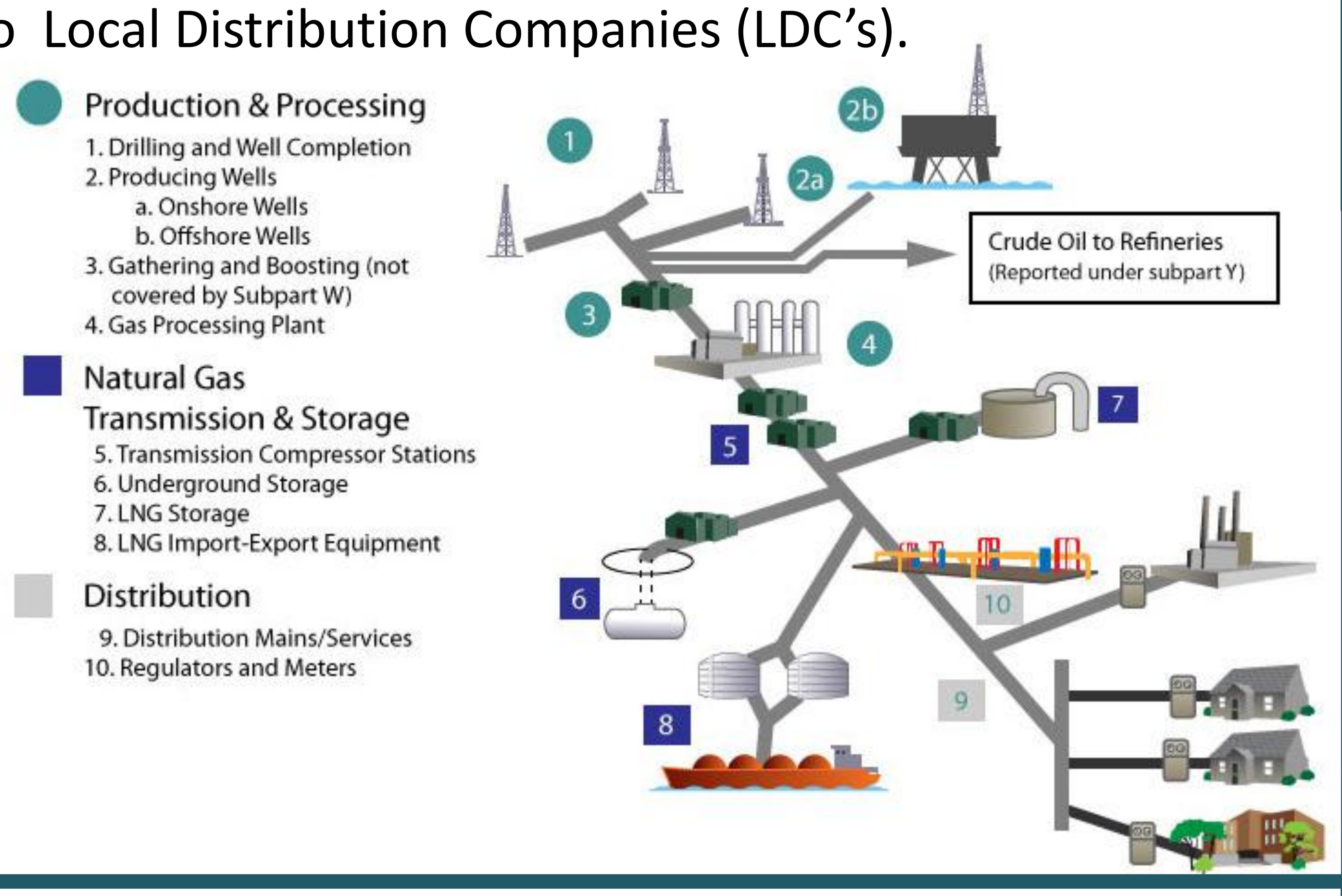
What is GasDay?

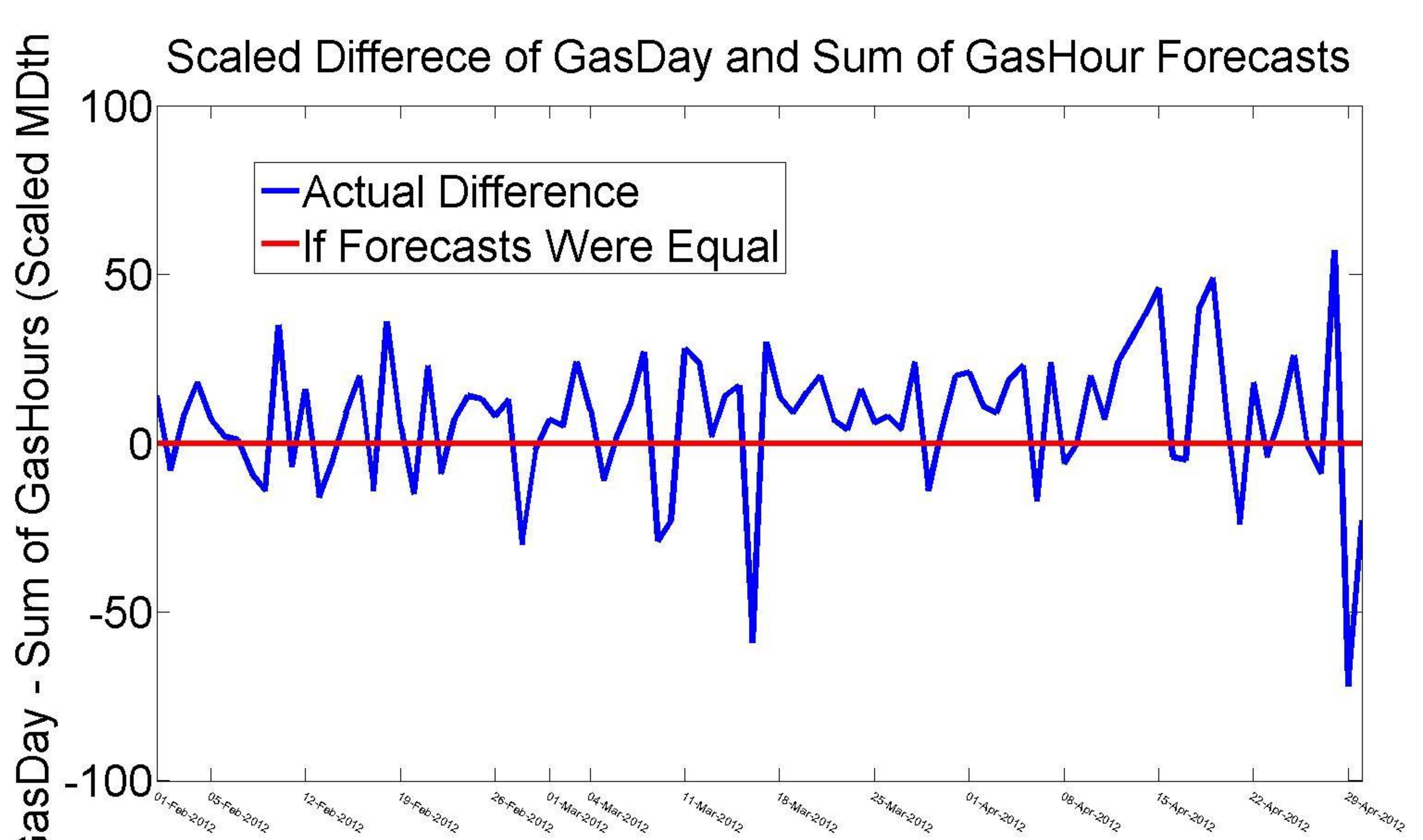
- GasDay research lab licenses natural gas demand forecasting software to Local Distribution Companies (LDC's).
- GasDay software founded by Dr. Brown, and developed with over 200 students since 1993



Problem Statement

- GasDay has multiple time horizons of forecasting: Hours, Days, Months, Years
- GasHour forecasts gas demand for each of the next 106 hours
- GasDay forecasts gas demand for each of the next 8 days

$$\sum_{h=1}^{24} GasHour_h \neq GasDay$$



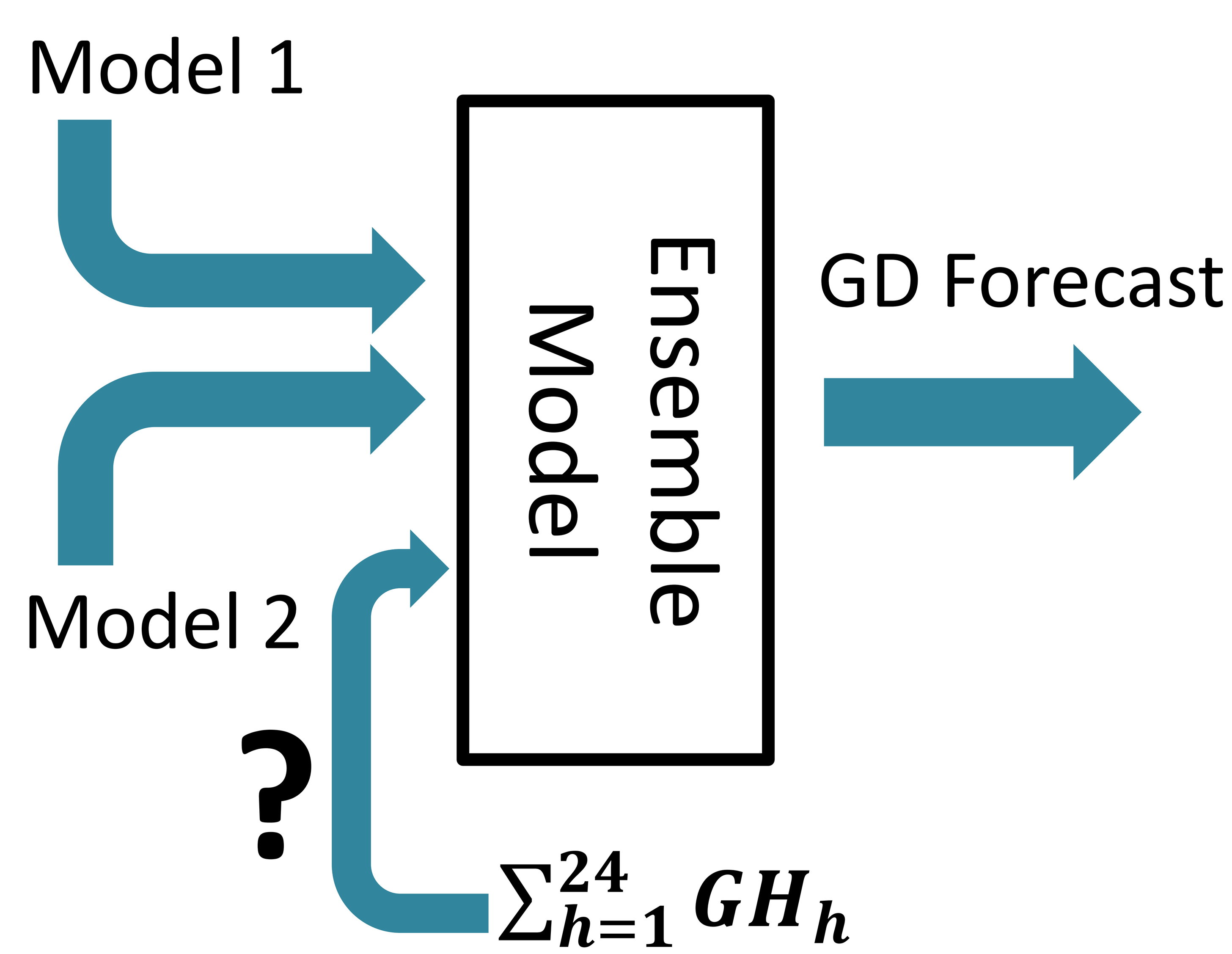
Date Range: 2/1/12 – 4/30/12

Why is this Important?

- Customer has asked about this inequality
- Potential to improve the GasDay and GasHour forecasts

GasHour as an Input to GasDay

- What if the $\sum_{h=1}^{24} GH_h$ is a good forecast?
- How to adjust the GD forecast



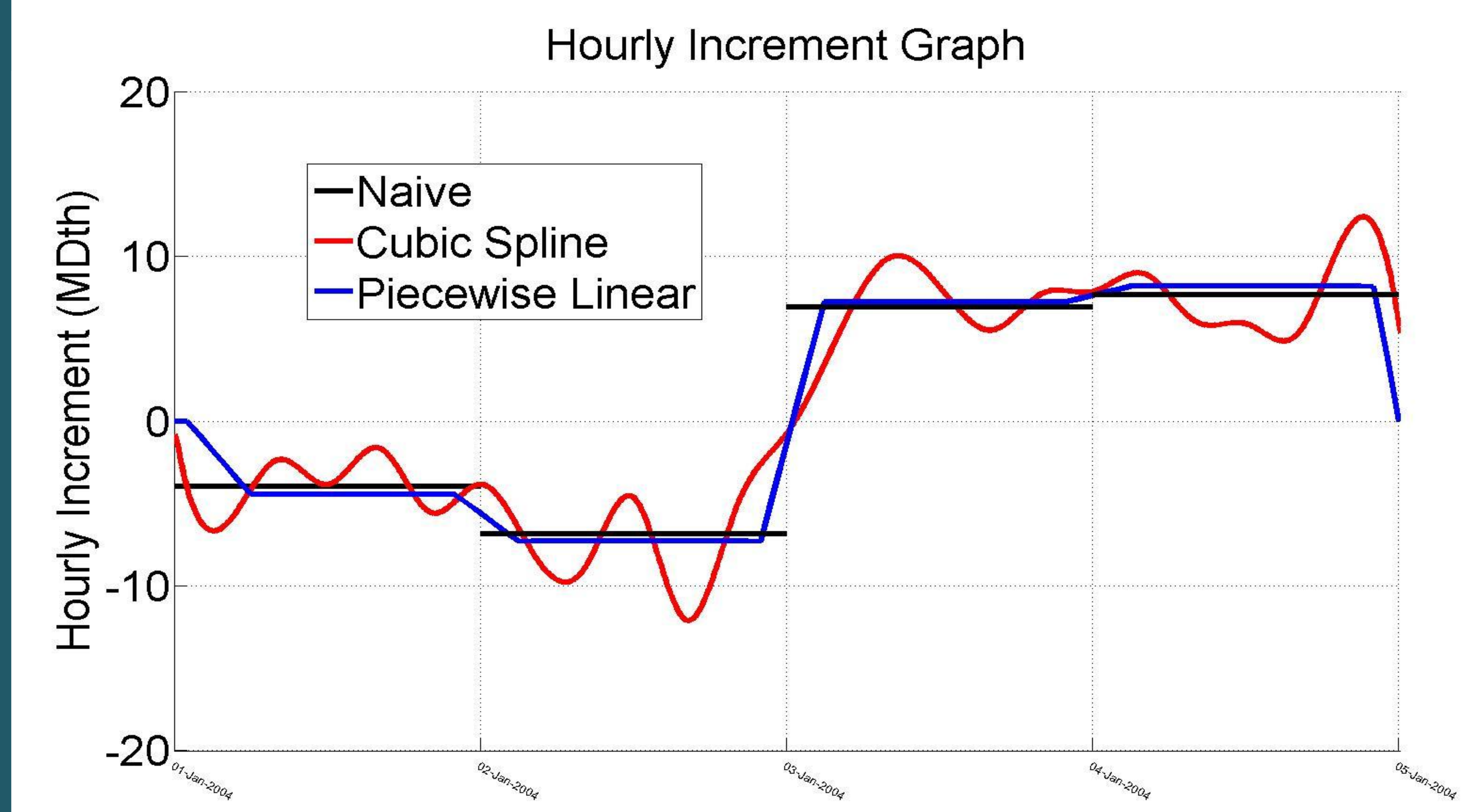
- GD forecast created by Ensemble of 2 forecasts
- If GH forecast is good, and GD forecast is bad, we do not want to adjust toward a bad forecast
- Use $\sum_{h=1}^{24} GH_h$ as an input to GD forecast
- Uses GH when its accurate
- Ignores GH when its inaccurate

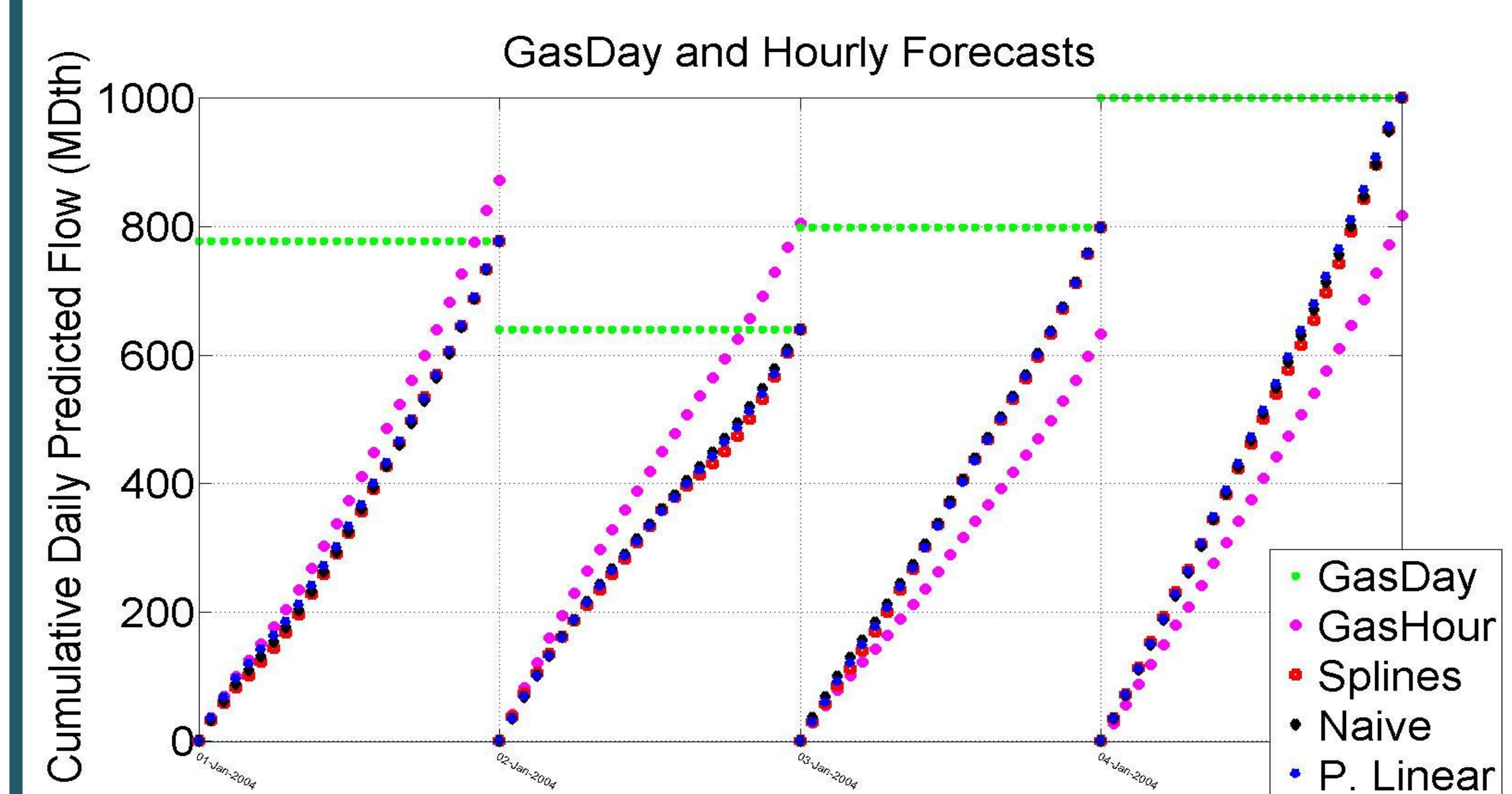
Future Work

- Implement piecewise linear solution into GasDay software
- Observe how adjustments affect accuracy of both forecasts over extended periods

Results

- Take the difference of the GD and $\sum GH$ forecast, and disperse that error to the hourly forecasts.
- What is the best way to disperse the error?





Date Range: 1/1/2004 – 1/4/2004

- Naïve solution equally disperses the error, but is not continuous
- Cubic Splines are continuous, but the adjustments are oscillatory
- Piecewise Linear solution is continuous and offers similar adjustments to each hour

Result of Adjustments: $\sum_{h=1}^{24} GasHour_h = GD$

Acknowledgements

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References

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