



Executive Summary

| What we learned?

What it means?

What should we do in the future?



Motivation

Some questions from my primary stakeholder: **Trading Desk**

If inventories build, what's the modeled directional impact on WTI?

What are the top drivers we should cite in the Monday morning trading meeting?

WTI Weekly Drivers Analysis

Business Question

**Which WPSR (EIA)-reported
fundamentals most strongly
correlated WTI weekly spot prices?**

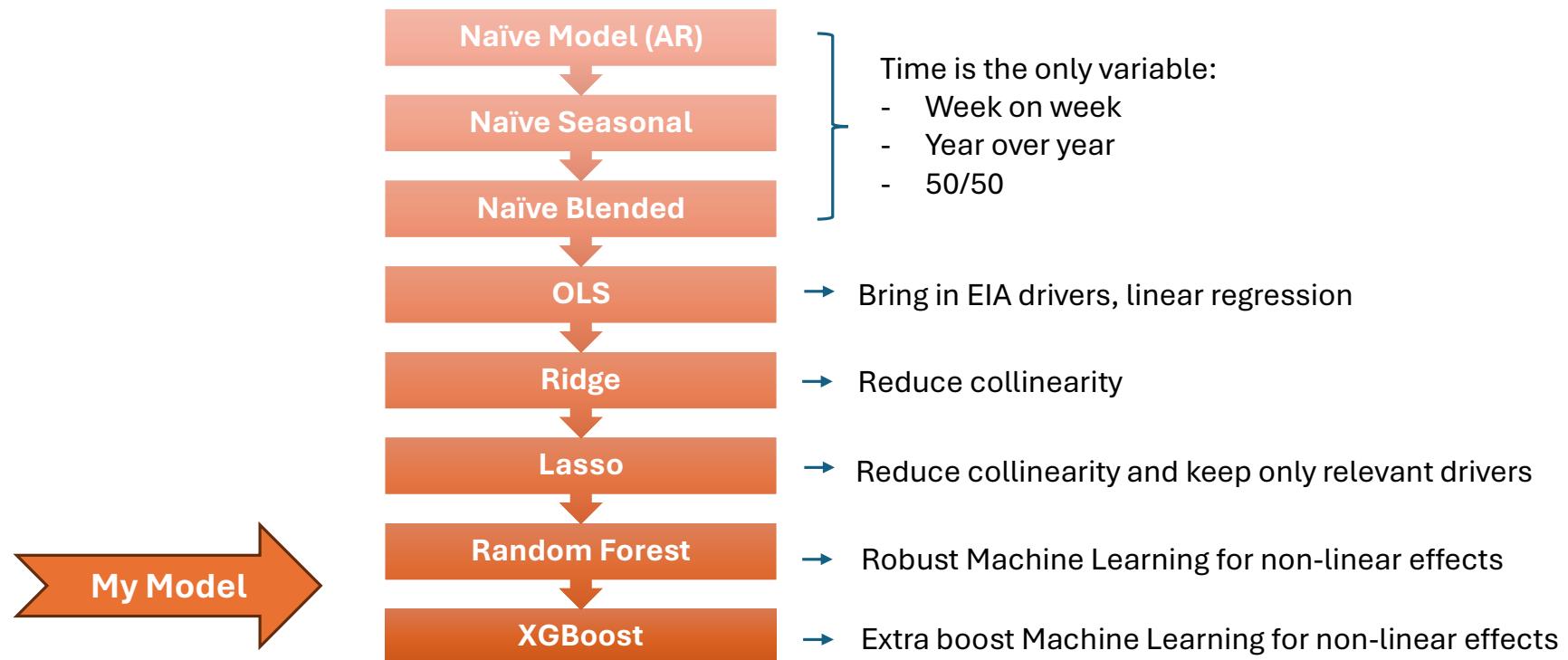




Data & Scope

- Only **EIA** stats <https://www.eia.gov/>
- Coverage: **2010–present** in weekly base
- **26 Features:** Levels / year-over-year changes
- **Target: Next week WTI spot price**
- **Missing values** properly handled

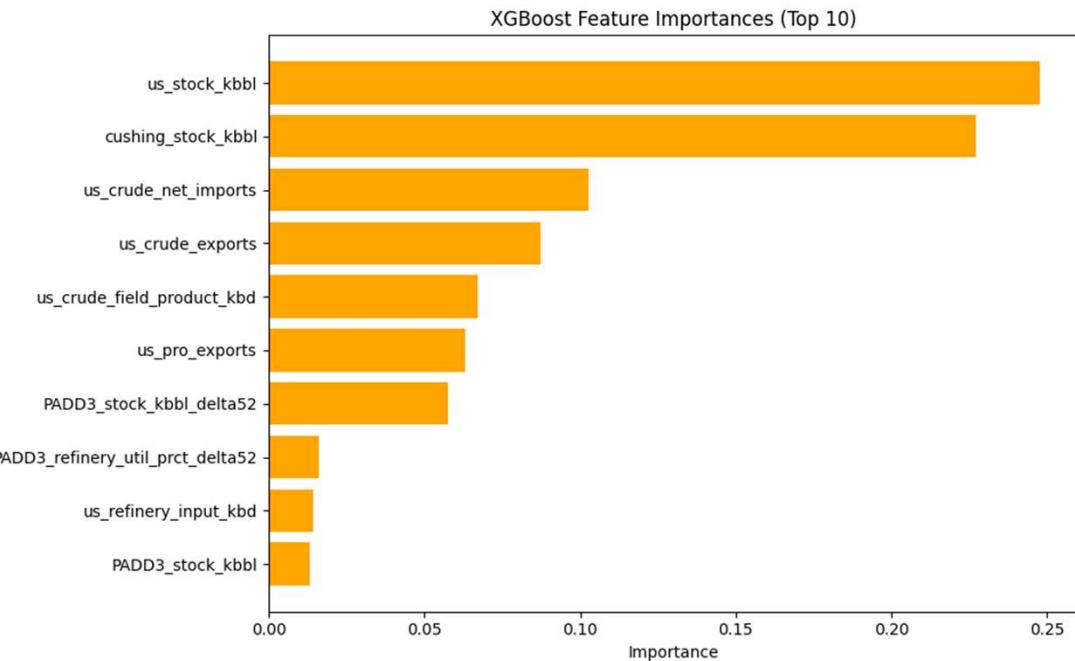
Models Flowchart



Top Features Drivers

U.S. total stocks and Cushing stocks are the top two drivers of WTI. Across models, their importance is roughly **2x** that of the next factors, marking them as the primary levers

Top Drivers	Ridge	Lasso	Random Forest	XGBoost
1	Stocks US	Stocks US	Stocks US	Stocks US
2	Stocks Cushing	Stocks Cushing	Stocks Cushing	Stocks Cushing
3	Stocks PADD3	-	Exports US Crude	Net Imports US Crude
4	Δ52 Stock PADD2	-	Exports US Product	Exports US Crude
5	Δ52 Stock Cushing	-	Δ52 Stock PADD3	Field Production US Crude



Answer to the Business Question

Which WPSR (EIA)-reported fundamentals most strongly correlated WTI weekly spot prices?

US and Cushing crude inventories are the dominant drivers.





Relevance for Stakeholders: **Trading Desk**

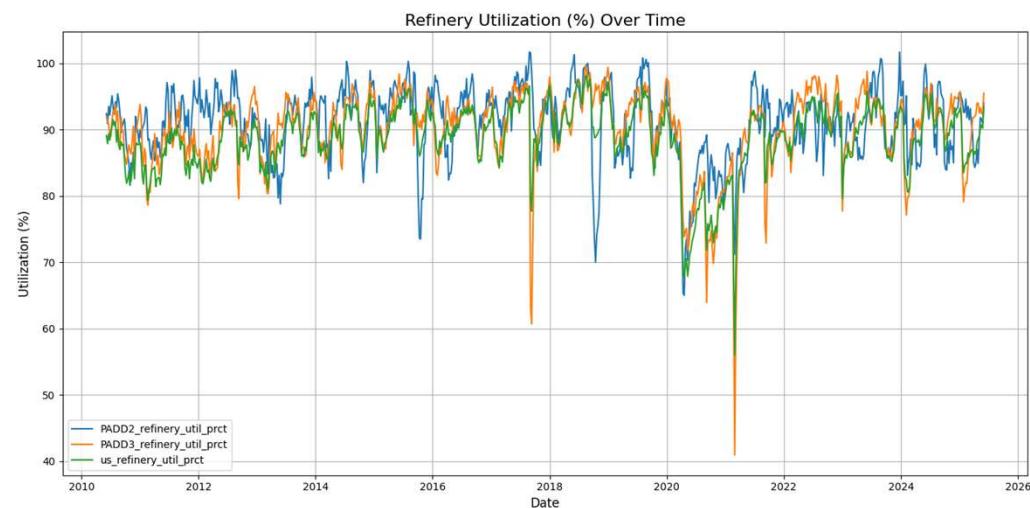
The model is fit to support operational decisions:

- Trading positions
- Weekly planning
- Hedging
- Risk alerts

Current accuracy is not for price prediction

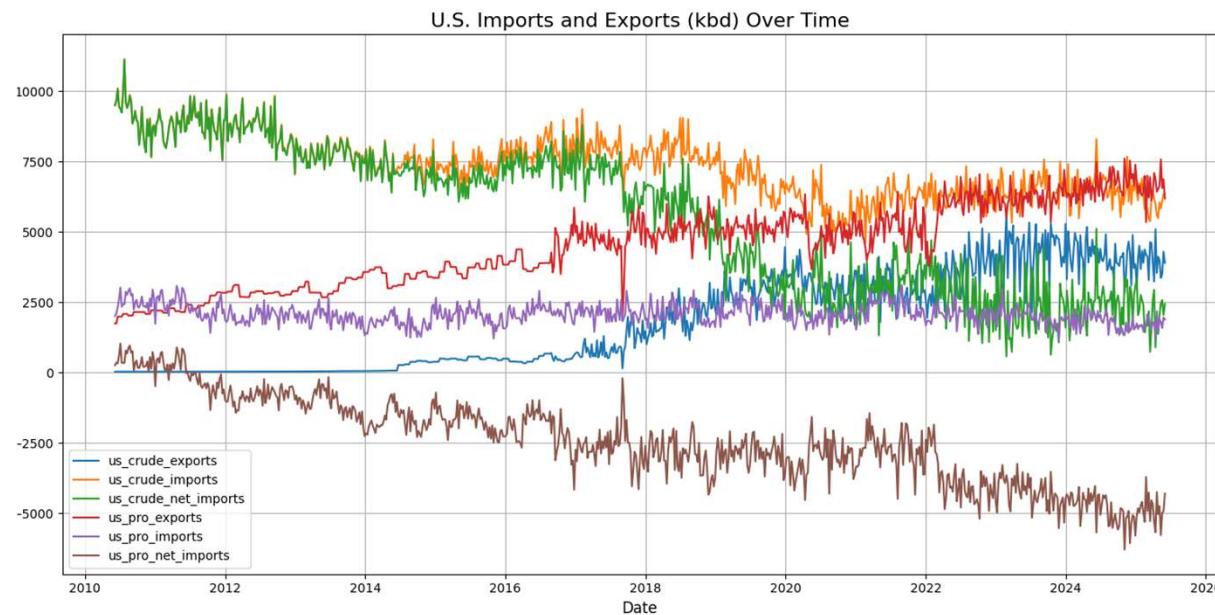
Model Limitations & Risks

Scope is limited to EIA weekly fundamentals;
Natural disasters, unexpected turnarounds, geopolitical issues are out of scope.



Model Limitations & Risks

Government policies also shape these fundamentals and , in turn WTI



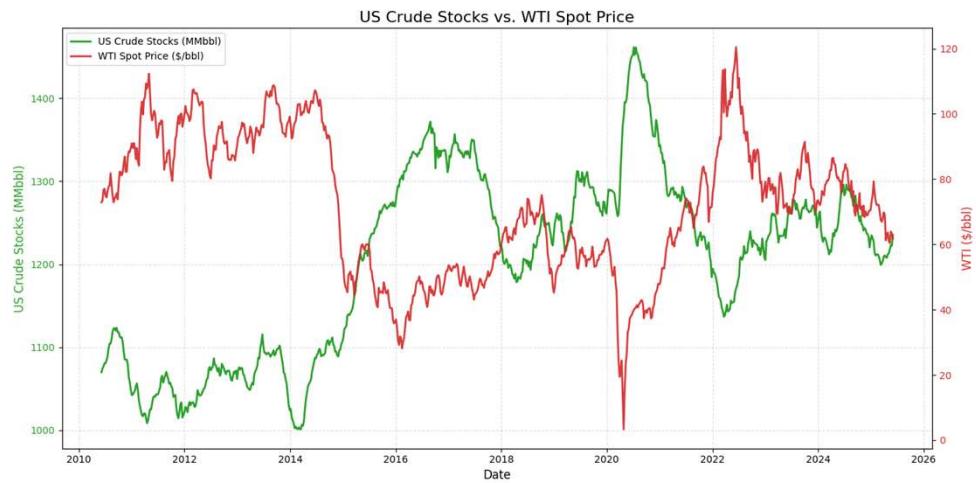


Conclusion

- US and Cushing inventories are the dominant, stable drivers of next-week WTI in negative direction.
- EIA Stats influence WTI spot price the following week
- Cushing stocks behave as a distinct signal
- Results are only for driver monitoring
- The framework can ingest **not only EIA data but also live signals**
- Trading desks (Main Stakeholder) can take data driven-decision in real time.

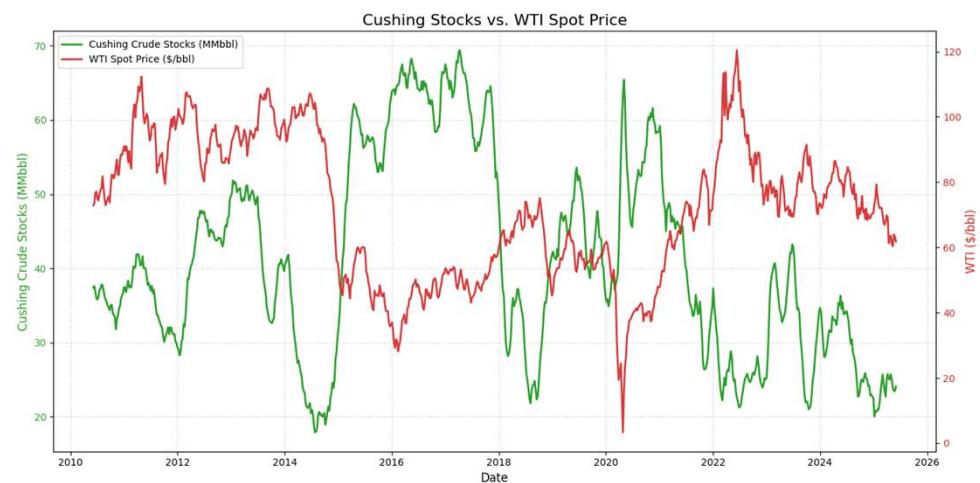
Conclusion - Showcase Visual

→ WTI Spot Price (\$/bbl)



builds → softer prices, draws → firmer prices

Inverse { stocks ↔ WTI }



Cushing holds independent, price-relevant information



Recommendations and Next Steps

Now (1-4 weeks): Keep updating the model with fresh newer data, so features drivers stay reliable.

Ongoing: Consider events and potential outliers generated

Long- term (*1-4 months*): Expand the pool of features outside EIA stats like economical indexes, oil product, miles driven, airplanes seats, etc.



By Alejandro Silva

Back up slides...

Methodology and Technical Resources

Python, pandas, numpy, matplotlib, seaborn, sklearn

Reproducible sklearn pipelines with train/validation.

Baselines models: naïve forecast, OLS, Ridge/Lasso, Random Forest and XGBoost.

Year-over-Year change to reflect seasonality

Technical metrics tracked for errors: MAE, MAPE, RMSE, R².

All modeling adhered to governance & reproducibility standards



Governance & Reproducibility

Version-controlled notebooks and pipelines; deterministic seeds (42); clearly documented train / validation / year over year.

End-to-end **audit trail**: data lineage, feature catalog, and parameter logs for every run.

Business-first reporting: clear **driver narratives, risk flags**, and fit thresholds defined before any deployment.

Only promote **driving features** and pass stakeholder sign-off, no forecasting power



Technical Metrics

Model	MAE	MAPE	RMSE	R2
Autoregressive (AR)	2.18	0.03	2.73	0.795
AR Seasonal	10.37	0.15	12.37	-3.215
AR blended	5.64	0.081	6.73	-0.248
OLS	9.39	0.136	10.93	-2.219
Ridge	6.66	0.092	8.51	-0.949
Lasso	7.1	0.099	8.88	-1.125
Random Forest	11.53	0.168	12.93	-3.506
XGBoost	15.70	0.227	17.36	-7.114

Top 10 WTI Drivers

Direction of Impact

Ridge	Sign
Stocks US	-
Stocks Cushing	-
Stocks PADD3	-
Δ52 Stock PADD2	+
Δ52 Stock Cushing	-
Δ52 Stock PADD3	-
Exports US Crude	+
Exports US Product	-
Net Imports US Crude	-
Field Production US Crude	-