

EU Climate Change News Index: Forecasting EU ETS prices with online news

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Research objective

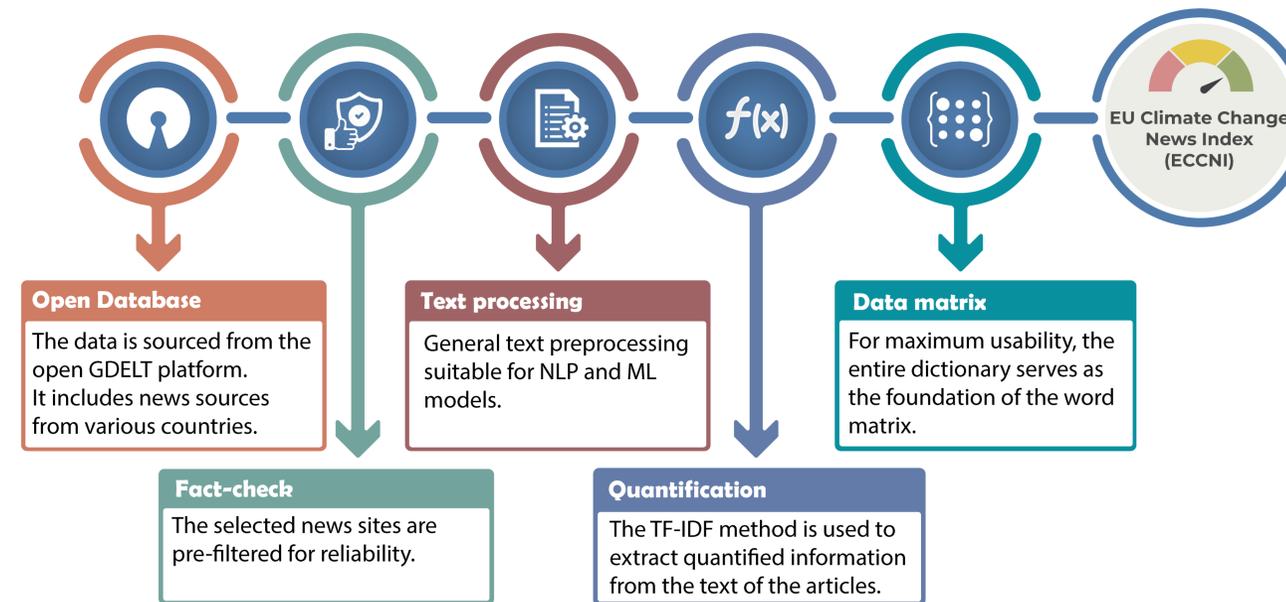
Our contribution to the literature on carbon pricing is twofold.

- We propose a new EU Climate Change News Index (ECCNI) that tracks the ongoing discussion in the EU about climate change using global media sources.
- We apply the news index to predict the next day's ETS allowance price returns.

Based on the results we conclude that:

- The TF-IDF features help to quantify the intensity of the discussion about climate change in the EU and to incorporate policy context in the analysis of carbon prices.
- Our results suggest that the integration of the occurrence of climate change-related keywords in the most reliable news sites improves the forecasts of the ETS price returns, in line with recently documented findings by Ye and Xue (2021) and Zhang and Xia (2022) regarding the utilization of news data.

Feature generation workflow



Keywords

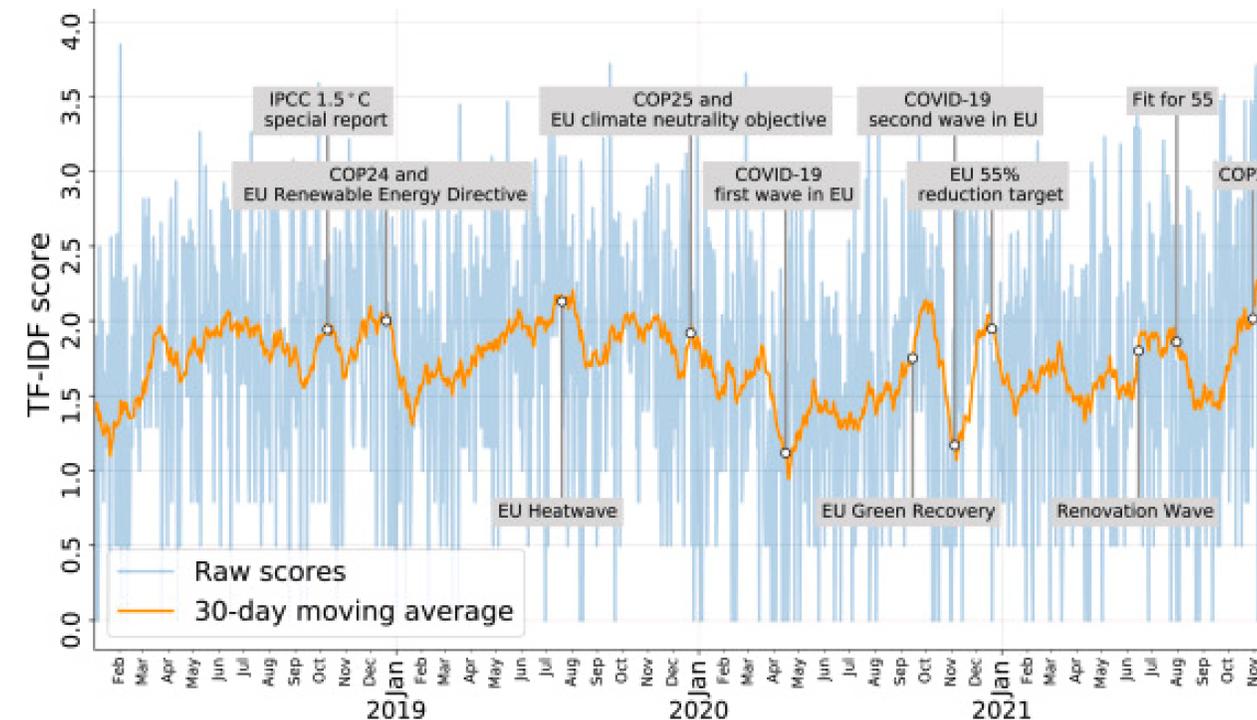
- **EMISSIONS** - carbon dioxide, CO2, green deal, greenhouse gas, GHG
- **FOSIL FUELS** - coal, oil, crude, gasoline, diesel, petrol, fuel
- **GAS** - gas
- **POLICY**- climate, sustainability, sustainable, environment, ETS
- **RENEWABLES** - renewable, electricity, solar power, solar panel, solar energy, wind power, wind turbine, wind energy, nuclear power, nuclear plant, nuclear energy, clean energy, green energy

Forecasting models

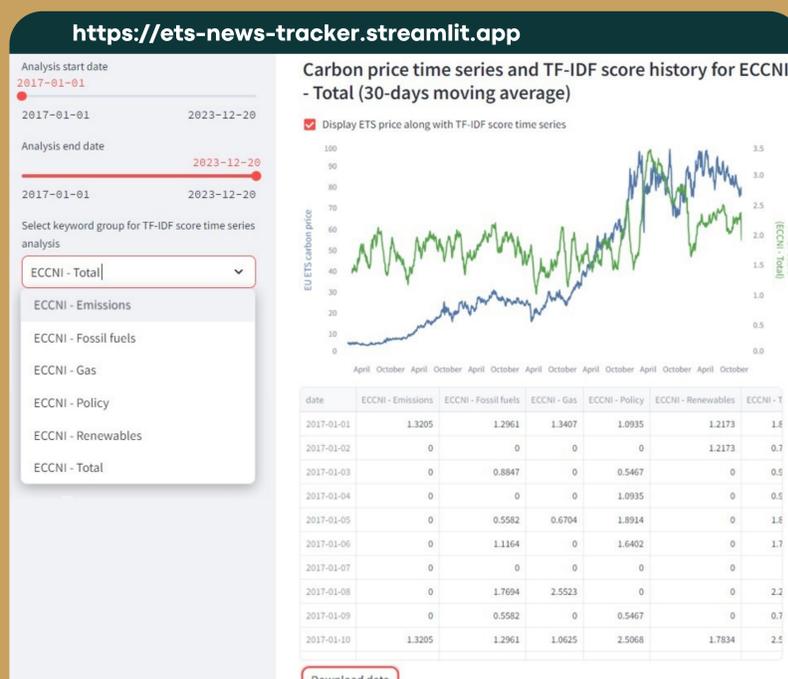
- We use ARIMAX models to test whether the ECCNI can provide predictive power to ETS forecasts.
- Our best model includes all predictors: the lags of the ETS price returns, the standard predictors' price returns and the 30-day moving average deviation of ECCNI (fitted with OLS & ElasticNet)

$$r_t = c + \sum_{i=1}^k (\eta_i r_{t-i} + \beta_i^T x_{t-i} + \lambda_i MAD(ECCNI_{t-i}))$$

ECCNI time series and climate events in the EU



Dashboard



Conclusion

- ECCNI accurately reflects the ongoing discussion about climate change in the EU. It outlines the most influential events in the topic like the annual United Nations Climate Change Conferences or the endorsement of the EU's emissions reduction target
- We showed that the index brings valuable additional information and predictive power to ETS price return forecasting compared to a baseline model where the traditional predictors of carbon prices are included.

References

- [1] Hartvig, Á. D., Pap, Á., & Pálos, P. (2023). EU Climate Change News Index: Forecasting EU ETS prices with online news. *Finance Research Letters*, 54, 103720.
- [2] Ye, J., & Xue, M. (2021). Influences of sentiment from news articles on EU carbon prices. *Energy Economics*, 101, 105393.
- [3] Zhang, F., & Xia, Y. (2022). Carbon price prediction models based on online news information analytics. *Finance Research Letters*, 46, 102809.

