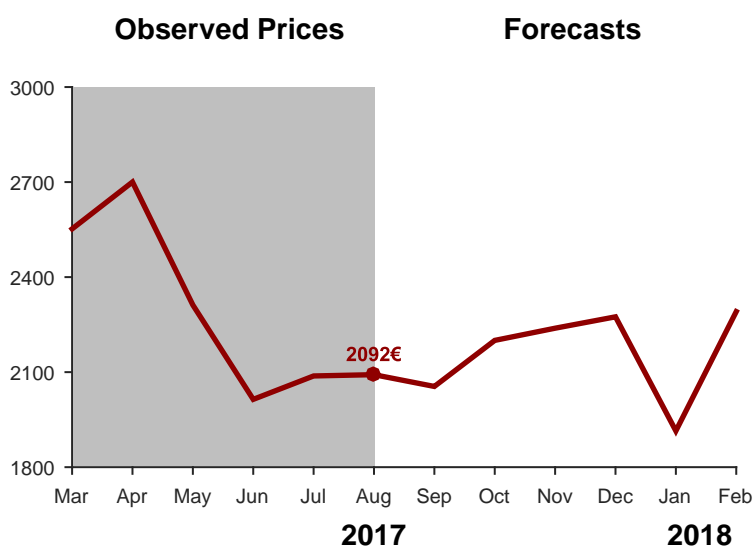


# Forecasting the Price of Polystyrene

<b>Commodity</b>	Polystyrene HIPS (Spot Dom. UK)
<b>Forecast Period</b>	September 2017 – February 2018
<b>Currency</b>	€
<b>Unit</b>	Metric Tonne
<b>Observations</b>	Monthly forecasts of the spot price in the first day of the month



## Forecasts



Month/Year	Forecast	Prob. of Raise
Sep. 2017	2055€	36 %
Oct. 2017	2200€	72 %
Nov. 2017	2239€	57 %
Dec. 2017	2275€	61 %
Jan. 2018	1914€	48 %
Feb. 2018	2291€	50 %

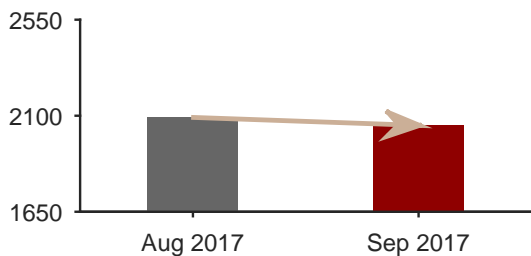
## Suggested Action for Procurement

Purchase Limit Month	Suggested Action
September 2017	Buy in September
October 2017	Buy part of requirements
November 2017	Buy part of requirements
December 2017	Buy part of requirements
January 2018	Buy part of requirements
February 2018	Buy part of requirements

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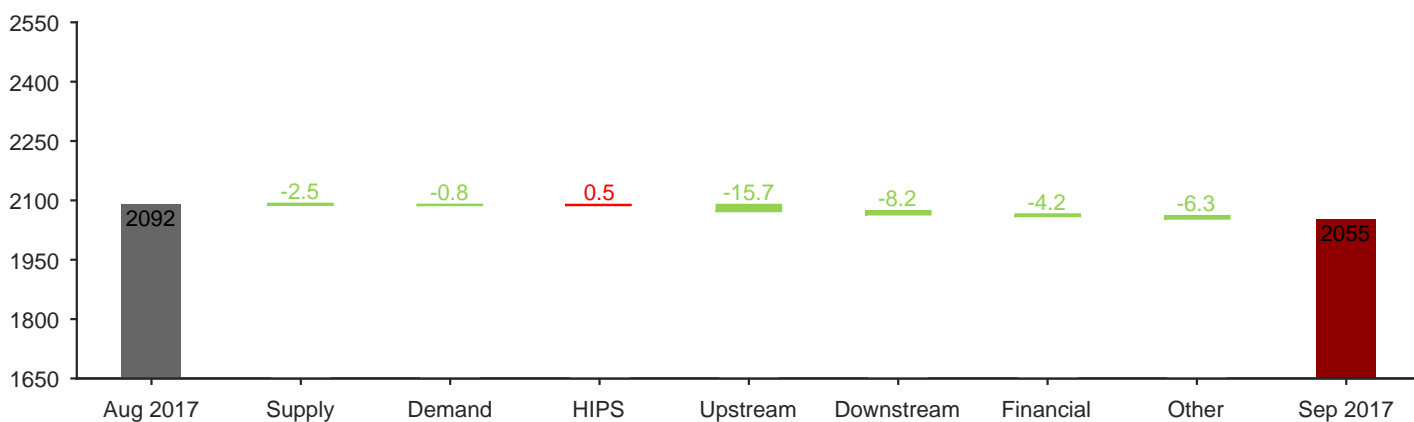
# Forecasting the Price of Polystyrene

## Impact Analysis: One Month Forecast



Our algorithm forecasts a lower price of HIPS in one month: it is expectable that the price decreases 1.77% from 2092€ to 2055€ until the beginning of September.

## Indices of Factors



### Interpretation

### Impact per Country

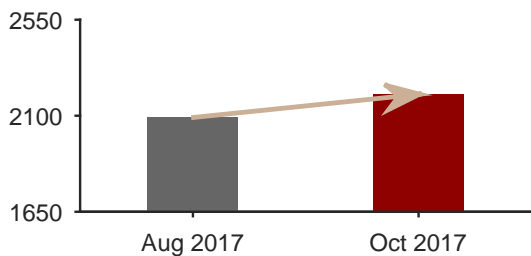
- **Increase of Supply:** Negative pressure of the Supply index
- Slight decrease of Demand: Negative pressure of the Demand index
- Slightly positive pressure of the index of HIPS
- **Considerably negative pressure of the index of variables representing the market upstream**
- Negative pressure of the index of variables representing the market downstream
- Negative pressure of the financial index
- Negative pressure of other commodities and other factors
- Focus on Belgium, South Korea, and Poland



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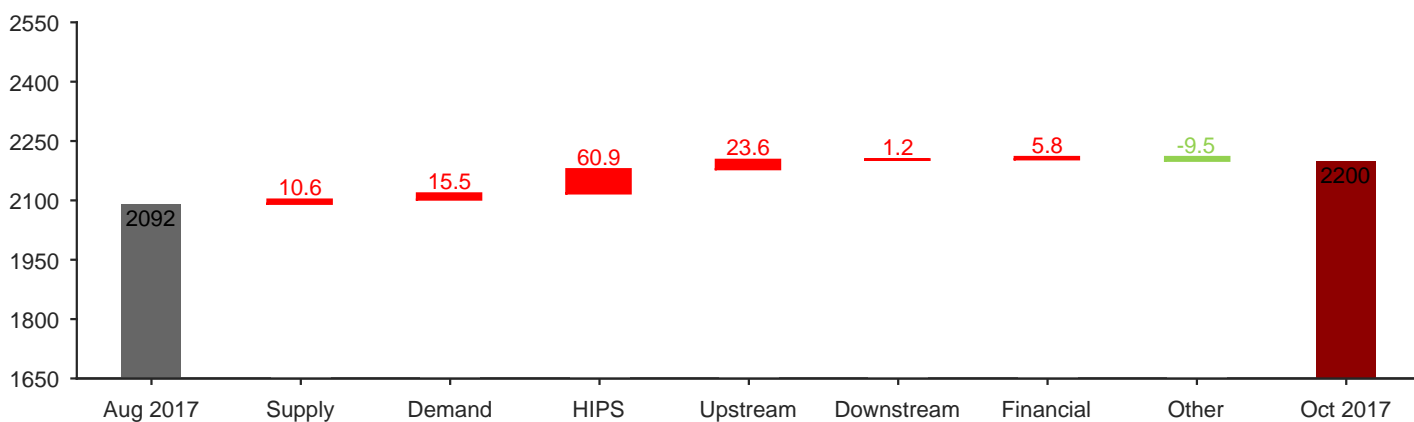
# Forecasting the Price of Polystyrene

## Impact Analysis: Two Months Forecast



Our algorithm forecasts a higher price of HIPS in two months: it is expectable that the price increases 5.17% from 2092€ to 2200€ until the beginning of October.

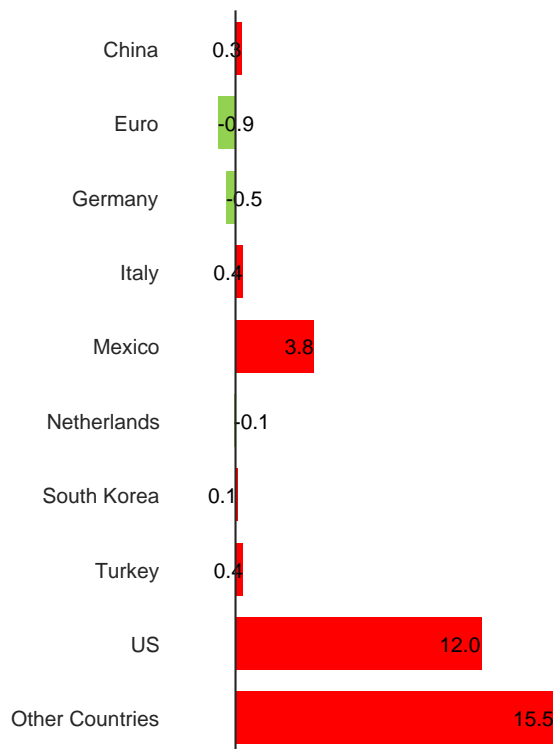
## Indices of Factors



### Interpretation

- **Decrease of Supply:** Positive pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- **Considerably positive pressure of the index of HIPS**
- Positive pressure of the index of variables representing the market upstream
- Slightly positive pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Negative pressure of other commodities and other factors
- Focus on US, Canada, and France

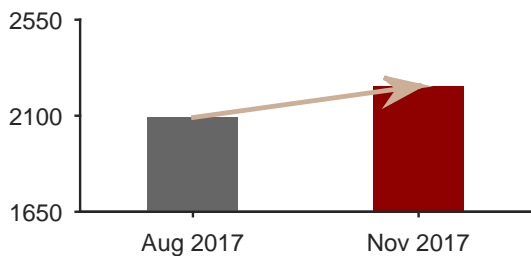
### Impact per Country



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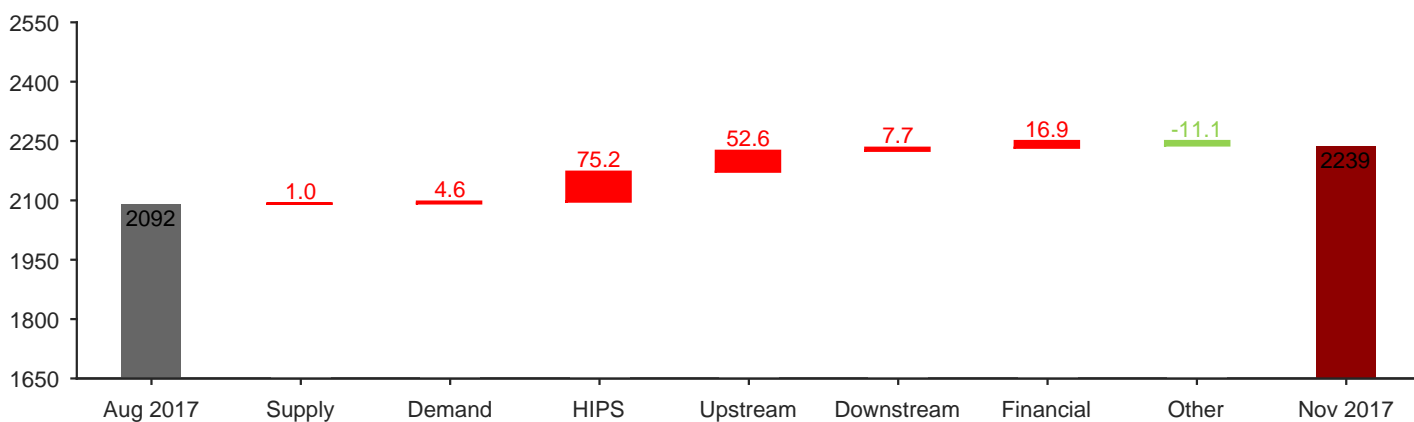
# Forecasting the Price of Polystyrene

## Impact Analysis: Three Months Forecast



Our algorithm forecasts a higher price of HIPS in three months: it is expectable that the price increases 7.01% from 2092€ to 2239€ until the beginning of November.

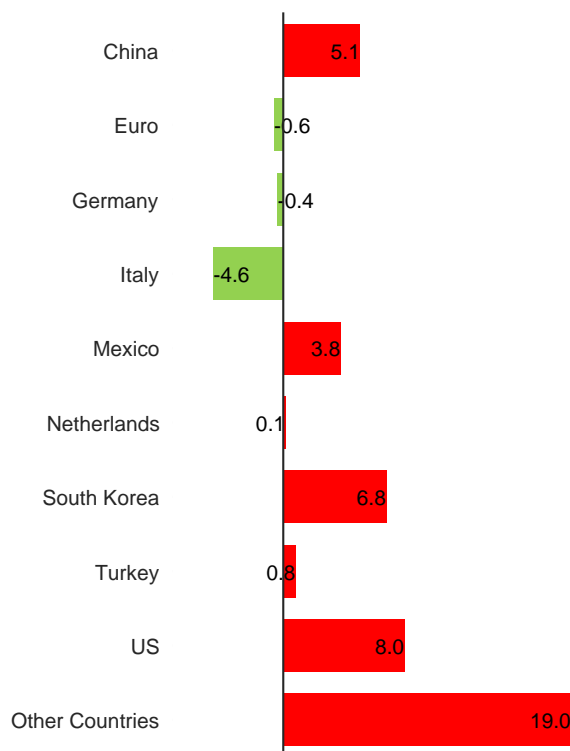
## Indices of Factors



### Interpretation

- Slight decrease of Supply: Positive pressure of the Supply index
- Slight increase of Demand: Positive pressure of the Demand index
- **Considerably positive pressure of the index of HIPS**
- **Considerably positive pressure of the index of variables representing the market upstream**
- Positive pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Negative pressure of other commodities and other factors
- Focus on Canada, Japan, and US

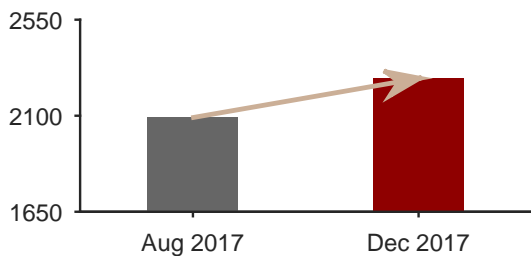
### Impact per Country



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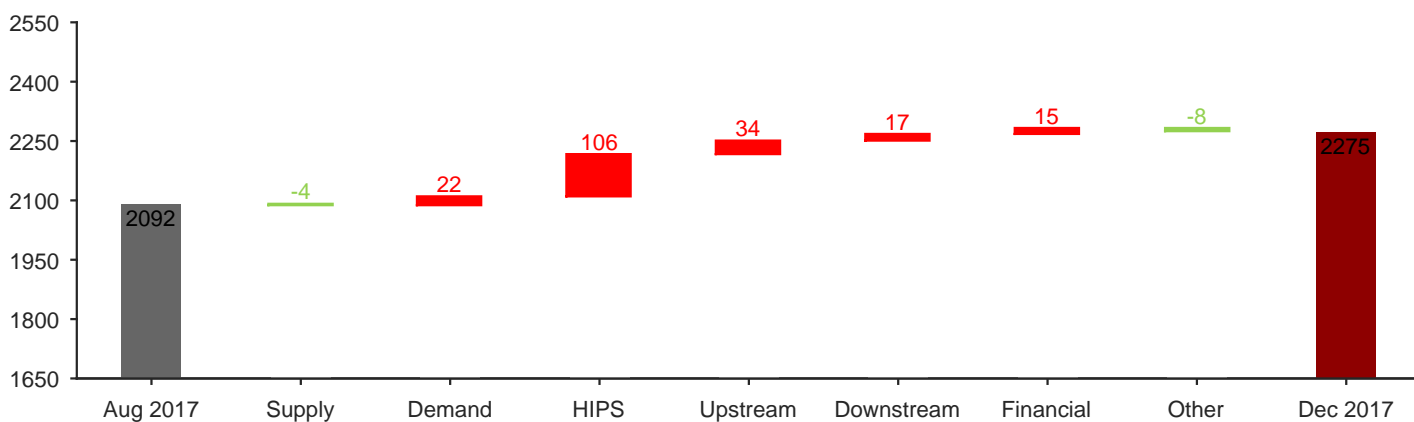
# Forecasting the Price of Polystyrene

## Impact Analysis: Four Months Forecast



Our algorithm forecasts a higher price of HIPS in four months: it is expectable that the price increases 8.72% from 2092€ to 2275€ until the beginning of December.

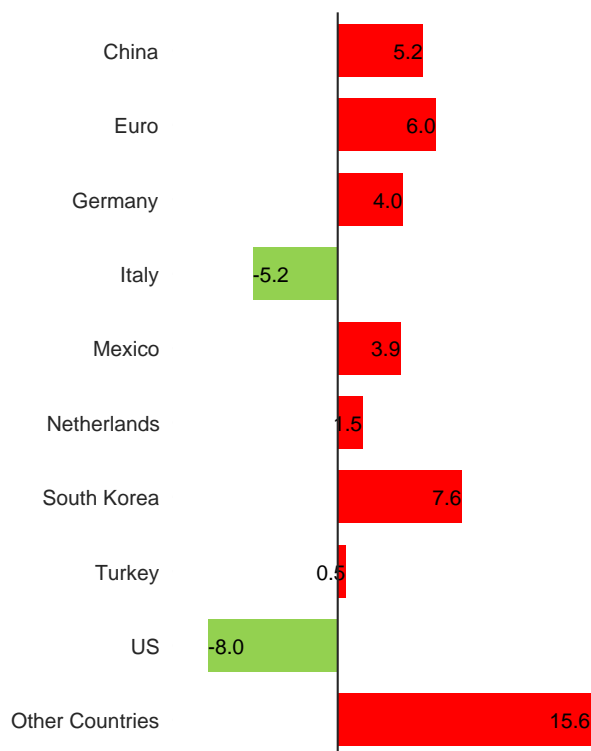
## Indices of Factors



### Interpretation

- Slight increase of Supply: Negative pressure of the Supply index
- **Increase of Demand:** Positive pressure of the Demand index
- **Considerably positive pressure of the index of HIPS**
- **Considerably positive pressure of the index of variables representing the market upstream**
- Positive pressure of the index of variables representing the market downstream
- Positive pressure of the financial index
- Negative pressure of other commodities and other factors
- Focus on Canada, Singapore, and UK

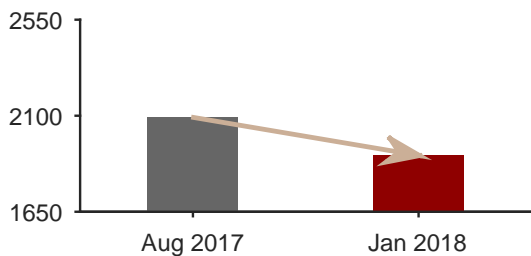
### Impact per Country



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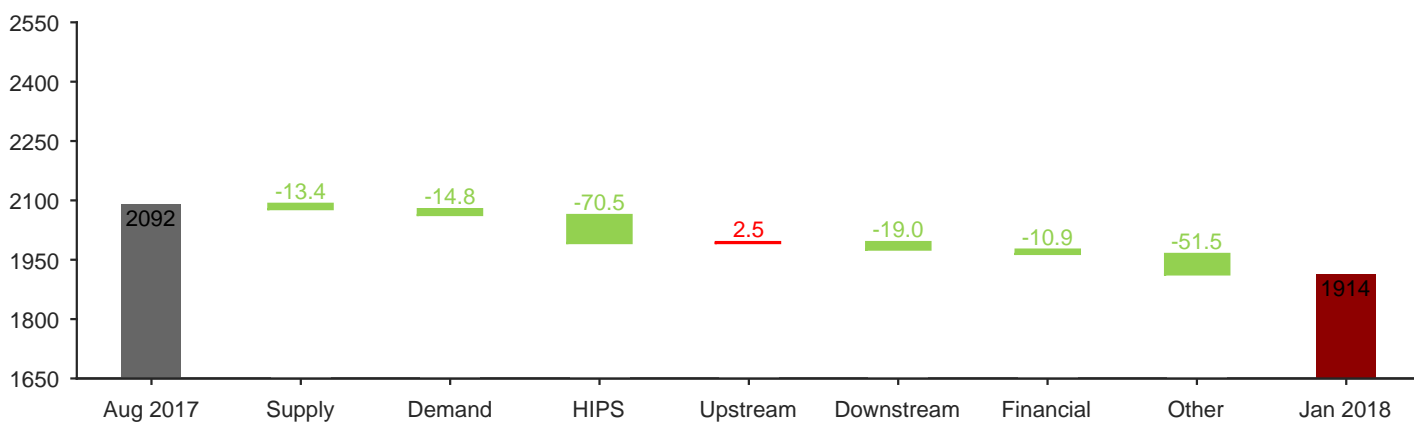
# Forecasting the Price of Polystyrene

## Impact Analysis: Five Months Forecast



Our algorithm forecasts a lower price of HIPS in five months: it is expectable that the price decreases 8.48% from 2092€ to 1914€ until the beginning of January.

## Indices of Factors



### Interpretation

- **Increase of Supply:** Negative pressure of the Supply index
- **Decrease of Demand:** Negative pressure of the Demand index
- **Considerably negative pressure of the index of HIPS**
- Slightly positive pressure of the index of variables representing the market upstream
- Negative pressure of the index of variables representing the market downstream
- Negative pressure of the financial index
- **Considerably negative pressure of other commodities and other factors**
- Focus on Japan, Mexico, and Italy

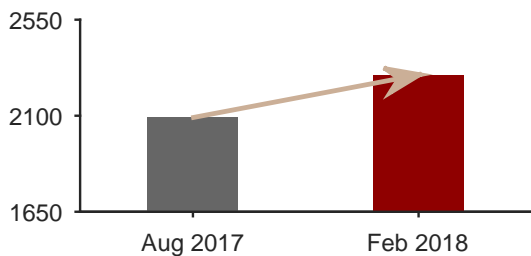
### Impact per Country



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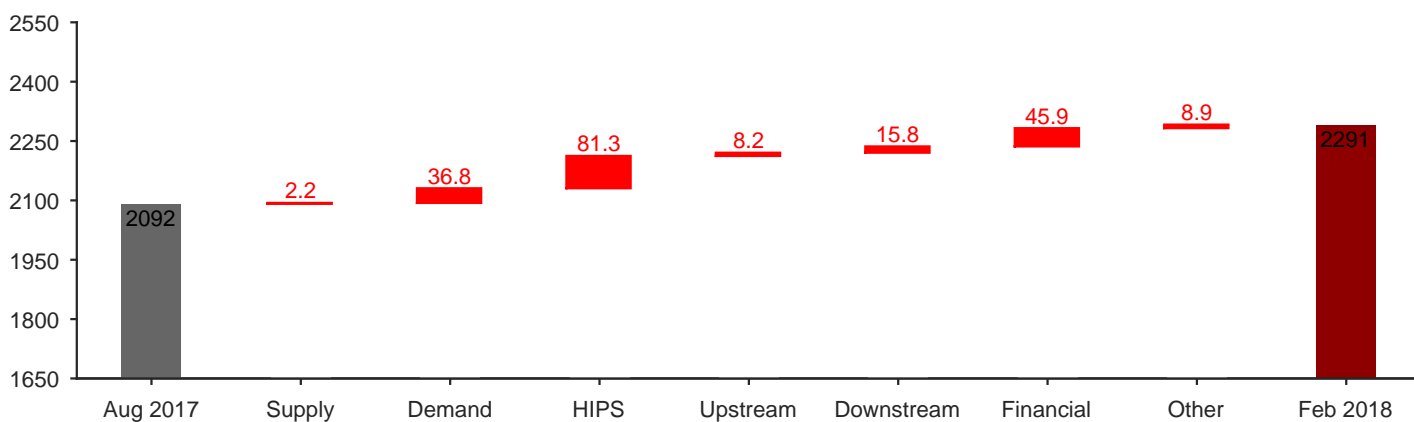
# Forecasting the Price of Polystyrene

## Impact Analysis: Six Months Forecast



Our algorithm forecasts a higher price of HIPS in six months: it is expectable that the price increases 9.51% from 2092€ to 2291€ until the beginning of February.

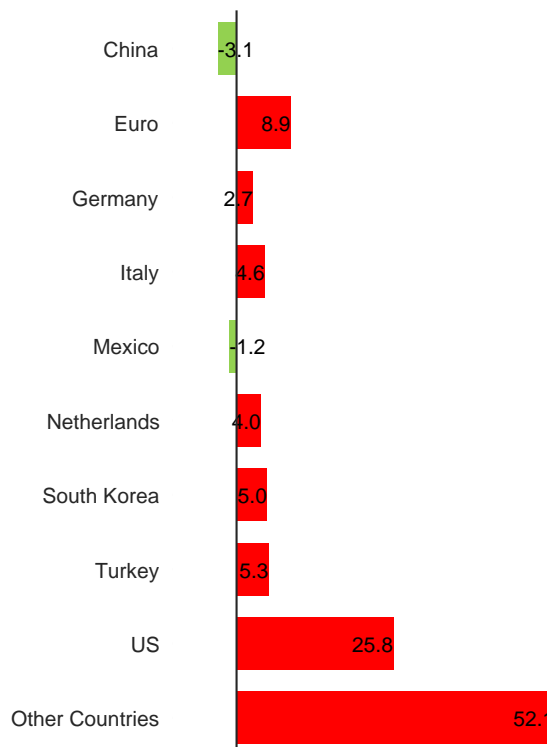
## Indices of Factors



### Interpretation

- Slight decrease of Supply: Positive pressure of the Supply index
- **Considerable increase of Demand:** Positive pressure of the Demand index
- **Considerably positive pressure of the index of HIPS**
- Positive pressure of the index of variables representing the market upstream
- Positive pressure of the index of variables representing the market downstream
- **Considerably positive pressure of the financial index**
- Positive pressure of other commodities and other factors
- Focus on UK, US, and Canada

### Impact per Country



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# Forecasting the Price of Polystyrene

## APPENDIX – Technical Explanation of the Impact Analysis

In this appendix, we explain the impact analysis of the factors that most contribute for our forecasts.

This Impact Analysis is conducted individually for **each time horizon**, allowing for a distinction between the indices of variables that contribute for our forecasts at short and medium run.

For each time horizon, our analysis has **two components**: first, we present the impact of variables grouped by **indices of factors**; second we present the impact of variables grouped by **indices of countries**.

### Indices of Factors

**Indices of factors** are indices of the weighted contributions of the variables grouped in those factors.

**Supply Index**: composed of macroeconomic variables of the producing and exporting countries. It includes variables such as production, exchange rates, inflation, monetary policy, and wages. For example, an increase in wages implies higher production costs which should (in linear, general, and ceteris paribus terms) generate an incentive to increase prices;

**Demand index**: composed of macroeconomic variables of the consuming and importing countries. It includes variables such as production, exchange rates, inflation, monetary policy, and wages. For example, a decrease in a consumer confidence index should (in linear, general, and ceteris paribus terms) increase savings and decrease demand, leading to lower prices;

**Polystyrene Index**: composed of variables related to Polystyrene. It includes variables such as the price of Polystyrene in different regions of the world and exports, imports, and producer prices of Polystyrene in some countries. For example, an increase in the price of Polystyrene in other region may imply an increase in the price of Polystyrene in Europe due to arbitrage movements;

**Upstream index**: composed of variables related to Benzene and Styrene. It includes variables such as the price and exports, imports, and producer prices of the inputs in some countries. For example, an increase in the price of Styrene should (in linear, general, and ceteris paribus terms) generate an increase in the price of Polystyrene;



# Forecasting the Price of Polystyrene

## APPENDIX – Technical Explanation of the Impact Analysis (II)

**Downstream index:** composed of variables related to downstream industries, such as Packaging. It includes variables such as the exports, imports, and producer prices of the Plastic Industry in some countries. For example, an increase in the demand of Plastic should (in linear, general, and ceteris paribus terms) generate an increase in the price of Polystyrene;

**Financial Variables Index:** composed of financial market variables. It includes the share price of companies that produce Polystyrene. It also includes financial indices related to this sector. For example, a positive change in the share price of a producer of Polystyrene should (in linear, general, and ceteris paribus terms) imply an increase in expected profitability of the firm. This may signal an expectation of increase in the price of Polystyrene;

**Other Variables Index:** composed of variables related to other commodities, such as Oil, Natural Gas, and other polymers. It includes the price, exports, and imports of these commodities. For example, a positive change in the price of a substitute commodity, should (in linear, general, and ceteris paribus terms) imply an increase of demand of Polystyrene, and thus, of the price of Polystyrene.

## Indices of Countries

**Indices of Countries:** are indices of the weighted contributions of the macroeconomic variables of each country. The countries we present are the most relevant countries in the production, consumption, and international commerce of Polystyrene.

## Interpretation Warning

It is important to note that the contribution of individual variables and indices of variables is not linear. The interaction between variables and between variables of different factors may not be neglectable, which means that the importance of each variable and indices of variables is determined together with the importance of all other variables.

Furthermore, the analysis of changes in variables is not linear. This means that the same variable with the same change in different moments of time may have different impacts given its previous evolution. For example, the algorithm contrasts the change in a variable with its expected change. A positive change but inferior to the expected change may originate an effect of price correction.