Carbon4PUR

Turning industrial waste gases (mixed CO/CO_2 streams) into intermediates for polyurethane plastics for rigid foams/building insulation and coatings.

Deriving economic value for steel flue gases

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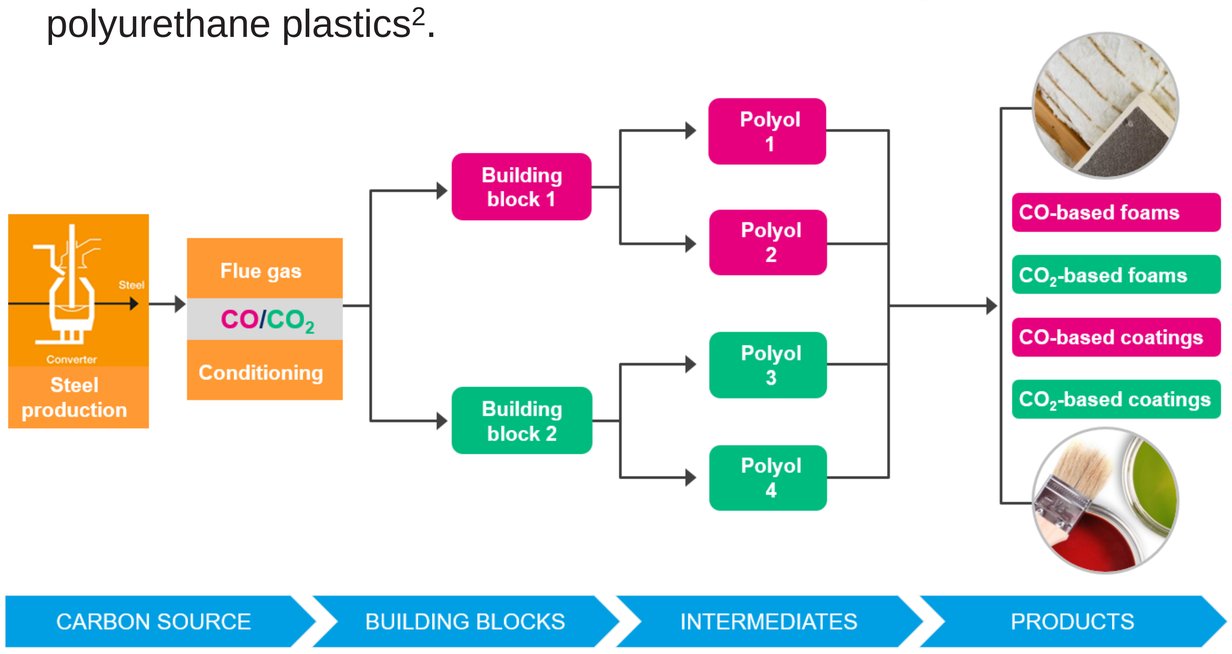
Industrial Symbiosis

Project Overview

- CO and CO_2 from flue gases could be used as a feedstock for chemical processes
- The steel industry is one of the world's largest contributors to CO_2 emissions, producing 4.5% of global CO_2 emissions[1].
- The Carbon4PUR project uses these steel mill gases to produce polyurethane plastics[2].

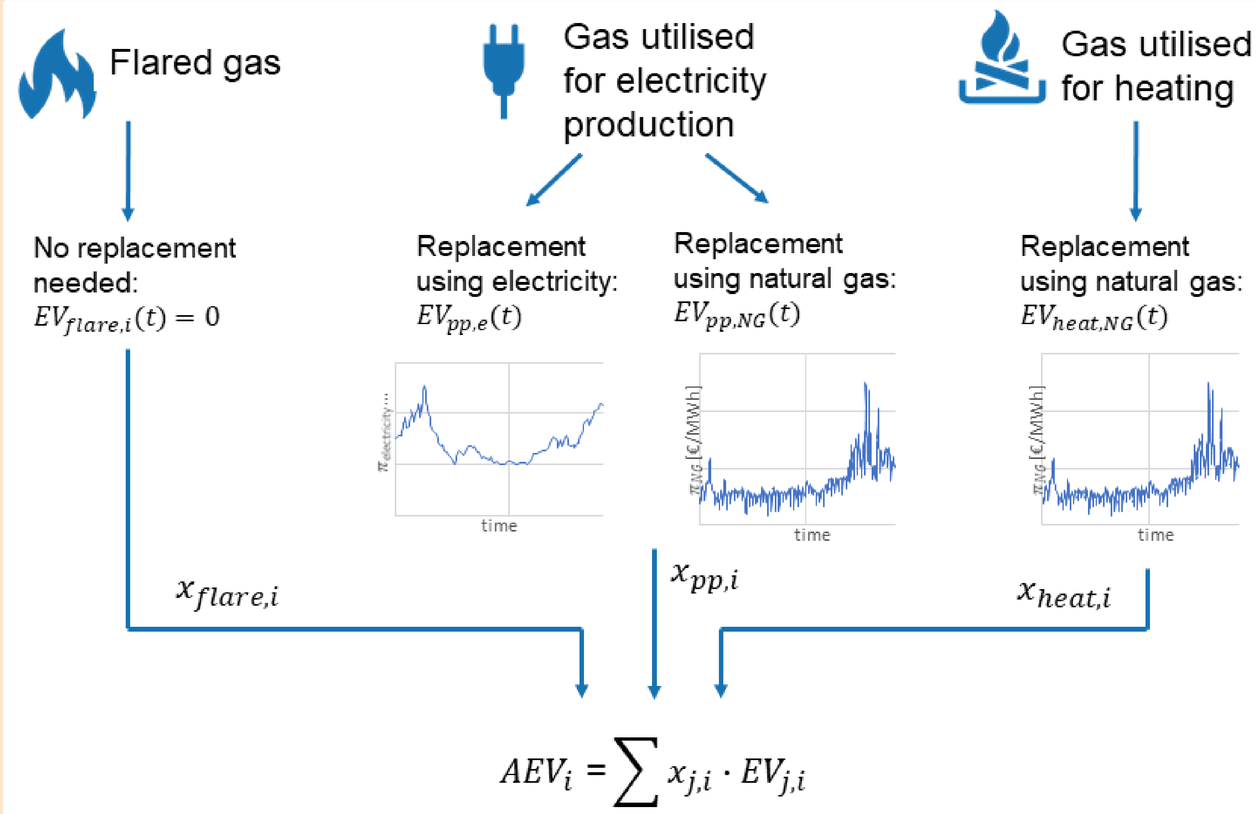


- How much should the chemical company pay for steel mill gas?
- The initial case study for the project will be at the port of Marseille-Fos, where an ArcelorMittal steel mill neighbours a Covestro production plant.

Deriving value for steel mill gas

- Value depends on how much it would cost the steel producer to replace this gas if it was sold, which in turn depends on what the gas is used for.

- 3 common 'usages' for steel mill gas:
  - Heating – can be replaced by purchasing natural gas
  - Electricity Generation – can be replaced by purchasing electricity from the grid or natural gas
  - Flaring - does not have any economic value, gas has an Effective Value (EV) of 0

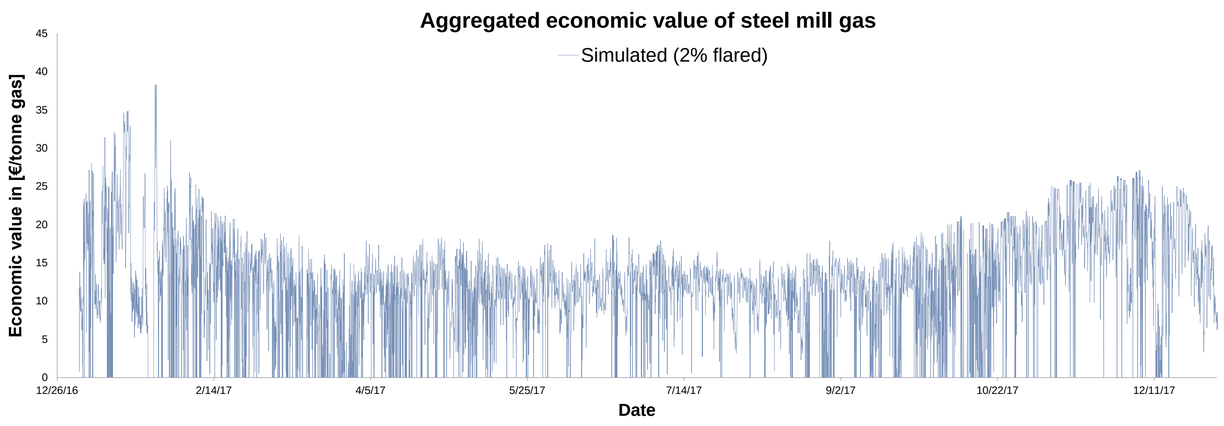


- MATLAB® model designed in order to take in the data from a steel plant in 10 minute intervals over a whole year, as well as the electricity and natural gas prices at those moments.

- Simulated data set describing an average European steel plant (2% flaring) calculated from real data describing one of the best-performing plants in Europe and one of the worst.

Economic Value of Steel Mill Gas

- Price is strongly dependent on:
  - Market price for electricity and natural gas
  - Efficiency of the steel plant
  - What the gas is used for (power generation or heating)



Conclusions

- Detailed MATLAB® model developed to assess value of steel gas
- Value of gas depends on usage, location, utility prices
- Value fluctuates highly but is overall a cheap source of CO and CO_2
- Economic feasibility of many CO_2 utilization options is not bound to the production cost of steel mill gas
- Incentives should be implemented in order for this to become a popular feedstock

References

[1] D.E. Wiley, T.M. Ho, A. Bustamante (2011). *Assessment of Opportunities for CO2 Capture at Iron and Steel Mills: An Australian Perspective*. Elsevier, Energy Procedia 4, pp 2654-2661.

[2] Carbon4PUR (2018). *The project – Concept*. Carbon4PUR. Retrieved from https://www.carbon4pur.eu/about/the-project/

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