



# ANALYZING ATTITUDES TOWARDS BIOFUELS WITH SOCIAL MEDIA

**PARTNERS: THE DAVID AND LUCILE PACKARD FOUNDATION**

**PROGRAMME AREA: REAL-TIME EVALUATION**

## SUMMARY

This project analysed how public perceptions of and attitudes towards biofuels in the UK and Germany evolved over a period of three years, from 2013 to 2015. The project analysed around 350,000 public tweets from the UK and 35,000 tweets from Germany about biofuels to understand whether any changes occurred in the balance between statements for and against the use of biofuels. The analysis also tried to identify if the stated reasons of being against biofuels changed with the emergence of advanced biofuels. Findings revealed no existing trend towards more positive or more negative tweets about biofuels over the three-year period. However, tweets from the UK revealed an increased focus on environmental and climate change related opposition, with less focus on a debate of “food” versus “fuels.”

## BACKGROUND

Ensuring access to affordable, reliable, sustainable and modern energy for all is central for the achievement of the Sustainable Development Goals. To date, the use of biofuels has been controversial. A new generation of waste-based biofuels might be changing public perceptions about biofuels’ potential.

A collaboration with the David and Lucile Packard Foundation, this project examined two major European countries - The United Kingdom and Germany - where energy policies directly impact the economies of fuel exporting states. The overall objective of the project was to explore whether changes in sentiment around biofuels can be captured using a passive data source such as social media.

The project explored (i) whether any changes occurred in the balance between statements in favour of and in opposition to biofuels over time and (ii) whether discussions around biofuels shifted from a previous set of “food vs. fuel” stance to a more varied discussion about newer types of biofuels that are not manufactured from crops but more often from agricultural waste.

## BUILDING TAXONOMIES AND TRAINING ALGORITHMS TO UNDERSTAND SENTIMENT ON BIOFUELS

The study filtered out the full corpus of tweets from the UK and Germany from 2013-2015, using a customized keyword taxonomy to retrieve tweets referencing biofuels or related issues. To create the taxonomy, the project consulted biofuels and social media experts, who helped build a comprehensive list of keywords used in academic literature and on social media and mainstream media. To supplement the inputs, the research also explored data from Reddit, The Guardian and DataSift.

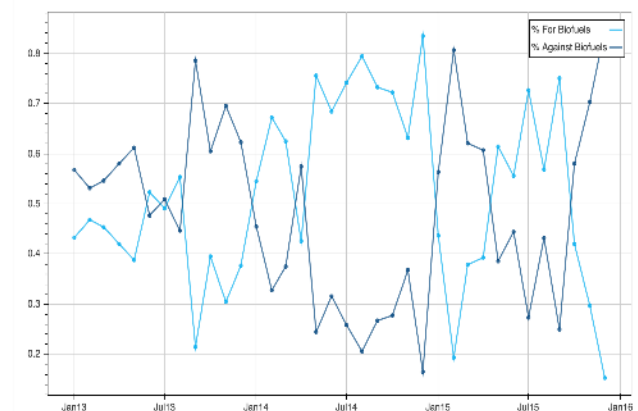
As most tweets relay no information about where they originated, their location was inferred based on where the Twitter user reported being based in their profile and on statistical guesses based on known geographies of similar tweets [1]. One indicator the research used was a language algorithm so that very few non-

English tweets were classified as UK tweets, and very few non-German tweets were included into the dataset of German tweets.

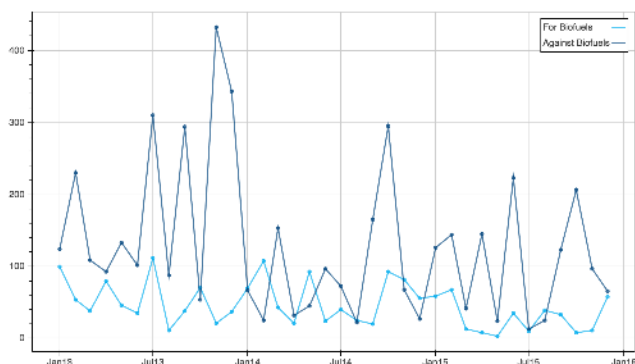
The final datasets consisted of approximately 350,000 tweets from the UK and 35,000 from Germany. Relevant content was first extracted by filtering for one of the comprehensive set of terms directly relevant to biofuels and types of materials used for the production of biofuels such as: “biodiesel,” “renewable fuels,” “palm oil,” and “ethanol.” Subsequently, a subset of tweets were manually categorized into the following categories: “For biofuels,” “neutral,” against biofuels,” and “not relevant.” Moreover, “neutral” tweets were divided into “for & against” (in which both sentiments are expressed in one tweet) and “no sentiment” while tweets being either for or against biofuels were divided into “food related” and “not food related.”

After the subset of tweets had been manually categorized, they were used to train an algorithm that could automatically classify the rest of the dataset [2,3].

The results of the automatic classification showed the proportion of messages in favour of and in opposition to biofuels, as well as how these messages related to the “food vs fuel” debate.



Proportion of UK tweets for and against biofuels, from January 2013 to December 2015.



German tweets for and against biofuels, from January 2013 to December 2015.

## INSIGHTS & OUTCOMES

The research yielded a number of key insights into how populations discuss biofuels and their positions on them.

### In the UK:

- Out of the 350,000 tweets analysed, the algorithm found around 122,000 tweets to be relevant to the topic of biofuels. Over the three-year period, 62% of all tweets were classified as **“No Sentiment.”**
- Analysis revealed similar proportions of tweets “for” - 17%, and “against” - 18% biofuels in the UK. A large variation in the proportion of tweets from the two categories was observed over time but not in a consistent direction.
- With regard to the categorization of “food” vs “fuel” debate, research revealed that spikes in the three-year period took place mostly driven by mainstream media stories or biofuel related campaigns.
- “Food” was a prevalent word used in 2013 and 2014 while “climate” was mostly used in 2015.

### In Germany:

- Out of some 35,000 tweets, the automated classification identified more than 8,000 as relevant to the topic of biofuels. The research revealed there were consistently more tweets against biofuels than in favour of biofuels in Germany.
- Changes in the proportion of tweets in favour of and in opposition to biofuels were observed over time but with no single overall shift or pattern.
- The overall most used non-biofuel word after “EU” was “@rettetregenwald” (the Twitter handle of an NGO dedicated to saving the rainforest); followed by “stoppen” (to stop); and “Regenwald” (rainforest).

### HOW TO CITE THIS DOCUMENT:

UN Global Pulse, ‘Analyzing Attitudes Towards Biofuels with Social Media’, Project Series, no. 23, 2016.

## CONCLUSIONS & RECOMMENDATIONS

The project demonstrated the potential of using social media data to reveal public perceptions of sustainable energy sources at a national scale, while also highlighting some shortcomings of the approach.

- Research revealed no clear majority of tweets with messages either for or against biofuels over the period observed and no clear trend in favour of one or the other.
- The analysis suggests that news and events related to politics and new research define what is being relayed via Twitter.
- For both the UK and Germany, research revealed high-frequency fluctuations in a) the proportion of tweets supporting and opposing biofuels and b) the way people discuss the topic on Twitter.
- One long-term trend that the analysis suggested was a shift in arguments against biofuels in the United Kingdom. These arguments appear to have shifted from focusing chiefly on food-related issues to focusing chiefly on climate change and other sustainability issues. Further studies would need to be conducted to confirm these findings.
- While the proportions of tweets supporting and opposing biofuels changed over time, this analysis suggests that the development of advanced biofuels has either had relatively little long-term impact on the proportions of pro- and anti-biofuel tweets in the UK and Germany – or it is too early to identify.

## REFERENCES

- [1] Crimson Hexagon: Frequently Asked Questions (<http://www.crimsonhexagon.com/platform/frequently-asked-questions/>, accessed 31 August 2016).
- [2] Crimson Hexagon: Introduction to BrightView™ Algorithm and Validation Methodology (<http://bit.ly/CH-Intro-to-BrightView>, accessed 31 August 2016).
- [3] Gary King, & Daniel J. Hopkins. (2010). A Method of Automated Nonparametric Content Analysis for Social Science. *American Journal of Political Science*, 54(1), 229–247.