Has Covid-19 switched our green lights off?

As the Covid-19 pandemic spread throughout the world, many governments had to make the difficult decision of shutting down schools, shops and many other public spaces. From then, the evolution of the pandemic determined the pace at which countries adapted their response, either by enforcing tighter restrictions or by relaxing them. A by-product of economic and mobility restrictions, Covid-19 has been having effects on pollution levels, energy consumption and, ultimately people's behaviours. One such example is the decrease of pollution levels in major cities during lockdown.

Now, governments and institutions wonder how to measure this impact. In the Emergent Alliance, IBM and R_2 Data Labs are keen to understand:

1. What has the impact of Covid-19 been on the supply & demand of energy in the UK? What would have happened if the Covid-19 crisis did not happen?
2. How have people's habits changed during the pandemic and what is the impact on UK Sustainability targets as a result of these changes?
3. How did the economy react when businesses had to close? Were some sectors (for instance energy production) more affected than others? Is there a particular impact onto the economy and energy usage levels?
4. What information can we put in the hands of authorities, suppliers and consumers to increase awareness and decision making to further enhance UK focus in moving onto relying onto sustainable energy sources?

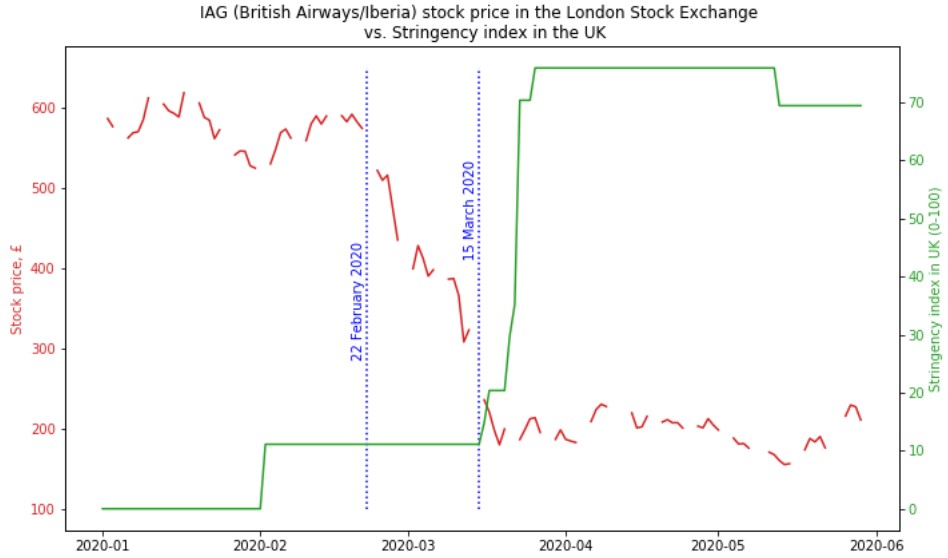
Note the importance of the word *when*. By asking these questions in these terms, we want you to tell us a story of cause and effect: *when A happened, then B followed*. In our case, our A event would be the announcement of lockdown measures by governments, whilst B would be people's behaviour in terms energy usage, or alternatively some economic reaction (for instance a drop in a commodity price). We know by experience that this is a tough question, as there is a lot of data out there, many different explanations in the news and it is hard to make sense out of everything. The selection of data that we provide is aimed at narrowing the scope of the question and give you an idea of what we expect you to work with. In the selection of datasets for this challenge you will find:

- Daily series of stock prices of publicly traded companies in different sectors of the economy such as air travel, tour operators, etc., and stock indices (i.e. aggregates of the stock prices of the most important companies of a country). – we'll provide you some data, but you can find much more on Yahoo Finance
- Yearly, quarterly and monthly series of industrial production indices for the UK (data source: OECD).
- Daily series of the prices of some commodities such as gold, aluminium or brent oil. – again, we'll give you data from Yahoo Finance, but feel free to use more from the site!
- A stringency index collated by the University of Oxford that measures the severity of lockdown in different countries based on several indicators such as economic severity of lockdown, public health measures, etc.
- https://www.gov.uk/government/statistics/electricity-section-5-energy-trends
    - Electricity generation by fuel type
    - Shares of electricity by fuel type

    - Low carbon electricity
    - Interconnectors & trade-in electricity
    - Electricity final consumption
    - Fuel used for electricity generation
- https://gridwatch.co.uk/downloads
    - Energy usage data of UK for the month of July 2019 in hours and days by fuel type

As an example:

The image below is an example of what the data looks like. In there, we can see the stock price of the IAG conglomerate (which includes airlines such as British Airways and Iberia) and the stringency index for the UK. As you may have noticed, government actions (green) seem to follow stock prices (red), whereas what we are asking is the reverse. Tricky one, right?



Ideas for Deliverables:

- A pipeline that tracks electricity usage and stock market in the UK as well as people's behaviours
- A model that shows the effect of Covid-19 and stringency index on stock market, commodities prices, energy supply and demand
- Jupyter Notebooks with your reasoning process, including data ingestion, preparation, exploratory analysis and models.

The code must be written in Python.

You are welcome to use other datasets as well; we are open to hear what you have to say with your own tools!

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We are a team of data scientists from IBM's Data Science & AI Elite Team, IBM's Cloud Pak Acceleration Team, and Rolls-Royce's R_2 Data Labs working on *Regional Risk-Pulse Index: forecasting and simulation* within Emergent Alliance. Have a look at our example challenge statement!