HEC canteen Carbon Expriment : F. A. Q.

General questions about the experiment

- **Q: What is the experiment about?**
  A: The goal of the experiment is to assess how people respond to being informed about the carbon footprint of products, as well as how introducing price changes based on carbon footprint affects their decision-making. This study is part of a larger research agenda aimed at identifying policies that can promote a shift toward a more sustainable economy.

- **Q: For how long will the price experimentation be run?**
  A: There will be experimentation with prices for a total of 4 weeks between March and May 2023 (see original communication's PDF file for the schedule).

- **Q: Where the experiment is taking place?**
  A: The experiment takes place at the HEC main self-service restaurant.

- **Q: What will happen after the experiment is over?**
  A: The experiment is run according to scientific standards. It will lead to research papers that we will submit for publication in peer reviewed scientific journals. The papers will be publicly available inside and outside the HEC community.

- **Q: Is HEC canteen users' privacy respected?**
  A: Yes, we are strongly cautious about this issue. Data about individuals' choices at the HEC canteen as well as some demographic characteristics are collected in an anonymized manner. Maximum care is devoted to guarantee that it is impossible to identify from our research database the actual identity of any of the HEC canteen users.

- **Q: Who has access to the experiment dataset?**
  A: The dataset is only accessible to the three researchers involved in this project, and only after it has been anonymized by the HEC IT service.

Questions about carbon footprint of dishes and their ratings

- **Q: What is carbon footprint?**
  A: A carbon footprint is the total greenhouse gas (GHG) emissions caused by an individual, organization, service, or product. Since there are various greenhouse gases (carbon dioxide CO_2, methane CH_4, nitrous oxide N_20 etc.), it is common to convert their per-kilogram global warming potential into kilograms of CO_2 equivalent, providing a unified metric of carbon footprint. Kilograms of CO_2 equivalent (kg CO_2 eq.) will be the main metric of carbon footprint in our experiment as well.

- **Q: What does it mean, in practical terms, a carbon footprint of 1 kg CO_2 eq.?**

A: Approximately, 1 kg of CO_2 eq. is the amount of greenhouse gas emitted by a conventional European car to travel 7.5 km (link). For example, in terms of contribution to global warming, having a steak haché, which carbon footprint is 6.4 kg CO_2 eq., is equivalent to traveling by a typical car for 48 km.

- **Q: How is the carbon footprint of each main dish determined?**
  A: We rely on the publicly available database offered by the ADEME, available at https://agribalyse.ademe.fr/app/. The main dish carbon footprint results from the entry "Détail changement climatique" which is given for 1 kg of the dish. The Carbon footprints posted at the HEC canteen for each main dish are scaled to one portion of the dish.

- **Q: Does the carbon footprint include emission due to transportation?**
  A: Yes, it does. As indicated on https://agribalyse.ademe.fr/app/, estimate of a dish contribution to climate change includes transportation.

- **Q: How are the letter grade of dishes determined?**
  A: The letter grade is set according to the following scale:

Rating	CO_2 footprint/portion
A+	Less than 0.5 kg CO_2-eq.
A	Between 0.5 and 1 kg CO_2-eq.
B	Between 1 and 2 kg CO_2-eq.
C	Between 2 and 3 kg CO_2-eq.
D	Between 3 and 5 kg CO_2-eq.
E	Between 5 and 7 kg CO_2-eq.
F	More than 7 kg CO_2-eq.

- **Q: Does the letter grade take into account nutritional facts?**
  A: No, the rating is only about CO2 emission necessary to produce the dish as indicated by the website https://agribalyse.ademe.fr/app/.

- **Q: Does the letter grade take into account impact of food on bio-diversity?**
  A: No, the rating is only about CO2 equivalent emission necessary to produce the dish as indicated in the "Changement climatique" entry on https://agribalyse.ademe.fr/app/.

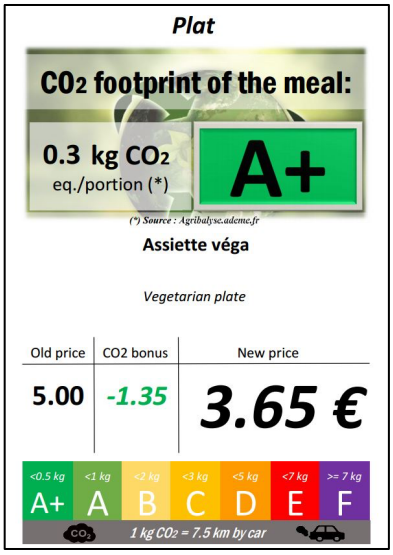
- **Q: What about the carbon footprint of side dishes, salads, fruits, and desserts?**
  A: We decided to focus on the carbon footprint of the main dishes only, and we do not include the side dish carbon footprint. Also, we provide no carbon footprint information about appetizers, salads, fruits, and desserts.

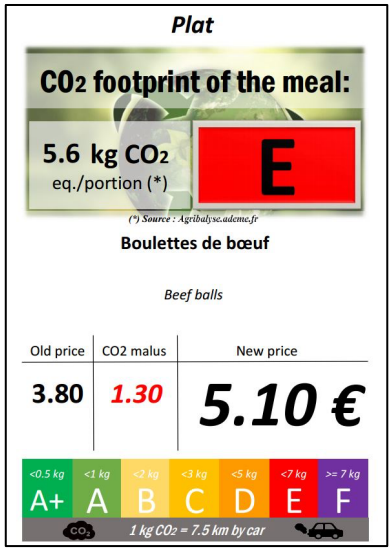
Questions about Bonus-Mauls pricing system

- **Q: How does the bonus-malus functions?**
  A: The bonus-malus decreases (increases) the price of dishes whose carbon footprint is below (resp. above) 3 kg CO_2 eq. The formula we use is the following:

  NEW PRICE = OLD PRICE - (3 - F) × VCO2

  where:
  ***F** = carbon footprint of the main dish (in kg CO_2)*
  ***VCO2** = value of 1 kg of CO_2 eq.*
  The picture below illustrates two examples for a VCO2 of 0.5€





- **Q: Why the threshold of 3 kg CO_2 eq.?**
  A: 3 kg CO_2 eq. is the median carbon footprint of all dishes that the HEC canteen offers in the year. Half of the dishes that are offered within a year have a carbon footprint above 3 kg CO_2 eq. and the other half have a carbon footprint below 3 kg CO_2 eq.

- **Q: Is the bonus-malus system the same as introducing a carbon tax?**
  A: No, it is not. A carbon tax would lead an increase in the price of a dishes that is proportional to the dish carbon footprint. Because no dish has 0 carbon footprint, with a carbon tax the prices of all dishes would increase, although the increase would differ across dishes. The bonus-malus system generates both an increase in the price of the most carbon intensive dishes (those above 3 kg CO_2 eq.), and a decrease in the price of low-carbon footprint dishes (those below 3 kg CO_2 eq.).

- **Q: Is the bonus-malus system similar to introducing tradeable CO2 emission permits distributed to people?**
  Yes, there is a link between the economics of both systems: The bonus-malus system is similar to a system where the HEC canteen users are endowed with personal emission coins of 3 kg CO_2 eq. per meal. In such a system, those who wish to have a dish whose carbon footprint is below the 3 kg CO_2 eq., can sell their excess emission coins for a

price of VCO2 € each. For example, if VCO2=0.5€ and one wants to consume a dish with a footprint of 1 kg CO_2 eq., this person must give up 1 emission coin and can sell the 2 other emission coins for 2x0.5= 1€, thus gaining 1 €. In the end, the person will spend less for her food than in the absence of emission coin system. Similarly, those who wish to have a dish whose carbon footprint exceed the 3 kg CO_2 eq. will have to purchase the additional emission coins at the price VCO2 € per kg CO_2 eq. For example, if VCO2=0.5€ and one wants to consume a dish with a footprint of 4.6 kg CO_2 eq., this person would have to purchase 1.6 emission coins for 1.6x0.5= 0.8€, and then, give up 4.6 emission coins.

Clearly this emission coin system, while somewhat equivalent, is less practical to implement than the bonus-malus system we adopt in our experiment.

- **Q: How is the value of carbon determined**
  A: We will experiment with different levels of the VCO2, between 0.1€ per kg CO_2 eq. and 1€ per kg CO_2 eq. We will have four different levels of VCO2.

- **Q: Will the bonus malus-system be permanently implemented at the HEC canteen?**
  A: The bonus malus system will be implemented during four separate weeks between March and May 2023 for the purpose of the experiment. We are aware of no intention or project by the HEC direction of permanently changing dishes prices in a way to reflect their carbon footprint or their sustainability in general. However we cannot exclude that the results of our experiment will affect future policies inside and/or outside HEC Paris

- **Q: During the price experimentation what can be the effect on the cost of food of HEC canteen users?**
  A: Whether a consumer will spend more or less than usual at the HEC canteen during the price experimentation, will depend on how this person reacts to the change of price. However, based on the observation of dish choices made at the HEC canteen before the price experimentation, we can estimate how much people would spend if they were to maintain the exact same dietary habits. We find that, in the presence of the bonus-malus system, 6 HEC canteen users out of 10 would spend on average per meal less than what they spend in the absence of the bonus-malus system.

  We can also use past consumption habits to measure what would happen to people spending if they were to maintain the same animal-based proteins intake but replace carbon intense animal-based proteins (i.e., veal and lamb) with low carbon animal proteins (i.e., chicken or fish). In that case, we find that 100% of the HEC canteen users would spend less than what they have spent in the absence of the bons-malus system.

- **Q: Will HEC canteen gain more money during the price experimentation?**
  A: At this stage we cannot tell, but the information we have so far suggests that it is very likely that the HEC canteen sales revenue per meal will decrease during the price-experimentation weeks.