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Transport Decarbonisation of a Food Retailer (Sainsbury's Research Project)

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AIM & BACKGROUND

The Fast Moving Consumer Goods sector is anticipated to be one of the main drivers towards reducing transport emissions in national and international level. According to the Department of Transport, the fifth biggest contributor in UK emissions is transport related emissions with a 25% contribution in 2013 [1]. Indeed, retailers generated 19% of the total GHG emissions in the UK in 2008 [2].

The *objective* of the research is to assess the long term feasibility of Sainsbury's transport activities, project for the first time emissions levels until 2030 and propose a complete roadmap towards meeting organizational emissions targets, by applying the back-casting approach.

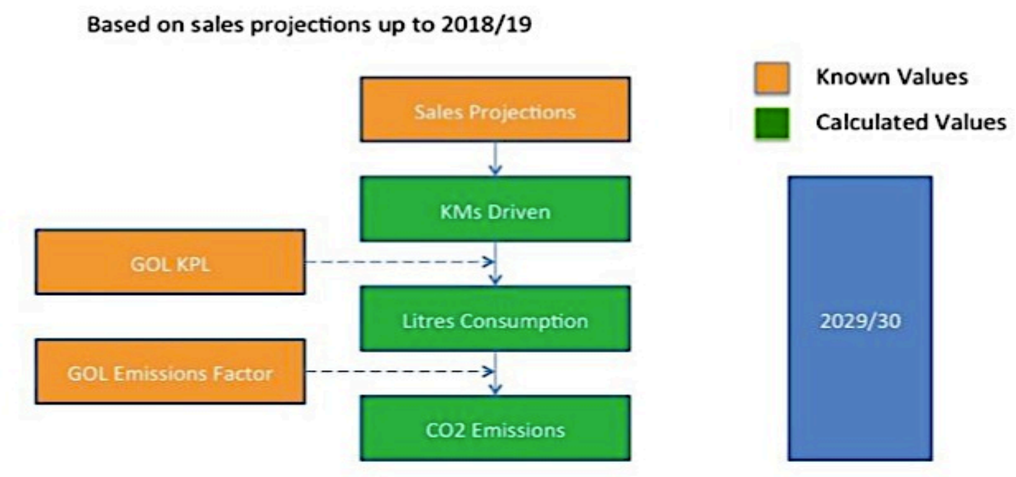
SAINSBURY'S AT A GLANCE

The Sainsbury's distribution network comprises of 22 depots, which are distinguished in five products categories: chilled, produce, bakery, ambient and frozen. The depots currently supply products to 1,136 stores around the country, a number which is expected to increase in the future, due to the aggressive expansion strategy Sainsbury's follows. This is a factor anticipated to increase transport related emissions in the future, as more deliveries will be required.

BASELINE MODEL PRINCIPLES

The baseline model employed follows the principles set by DECC in terms of calculating and reporting transport emissions and projects Sainsbury's carbon emissions in three different scenarios. More specifically, the first two scenarios project emissions for the distribution of products from depots to stores, one being restricted to Sainsbury's relative emissions targets ("20x20") and the other one unrestricted ("Not Do Anything"). The third baseline scenario covers Goods Online ("GOL"). The modeling path-flow for the third baseline scenario is represented in Figure 1.

Figure 1: GOL Emissions Model Schematic



BASELINE KEY RESULTS

It is important to compare the results between the two scenarios, in order to understand the significance of the relative target set by Sainsbury's. Key results include:

Table 1: Baseline Key Results

2030 Comparison	20x20	Not Do Anything	GOL High	GOL Medium
20x20	-	➢ 52% greater emissions in 2030 ➢ 33.9% more kg CO2/Case	➢ Greater emissions after 2028/29 ➢ 104.7% more KMs ➢ Marginally larger fuel consumption	➢ 21.8% more KMs
Not Do Anything	-	-	➢ 35.4% more KMs	-

BACK-CASTING MODEL

Several possible low carbon technologies that could be implemented by Sainsbury's to assist towards achieving the organization's emissions targets by 2030 were assessed, in terms of carbon benefit, cost implications, technology risk, safety and maturity. A number of alternatives were screened out, since they have already been considered or implemented by Sainsbury's. The technology alternatives were mainly restricted to fuel alternatives (FAME, BTL, HVO, CNG, Biogas, Hydrogen and Biomethane) as well as tyres replacement. The back-casting model follow the principles and equations employed for the baseline scenarios.

BACK-CASTING MODEL RESULTS

The estimated impact of each fuel alternative is initially assessed based on the assumption that Sainsbury's will increase the amount of biodiesel used in the blend from 7.5% to 10% to obey with the UK fuel blend target for 2020 [3]. The analysis indicated that by 2030:

- FAME 90% can assist reduce emissions by 2.27%
- Hydrogen 100% can assist reduce emissions by 2.51%

Nevertheless, such a reduction is insignificant. Moreover, the aforementioned fuels are not commercially used, hence no complete information is available, hence biomethane (gas) was chosen as the most complete fuel alternative.

PROPOSED ROAD-MAP

The proposed roadmap consists of two projects. Project A denotes the replacement of the current diesel-dependent fleet with biomethane trucks. Project B denotes what Project A does, accompanied with the replacement of dual tyres with single wide tyres and the introduction of a tyre pressure monitoring system. The implementation plan was decided based on two main factors:

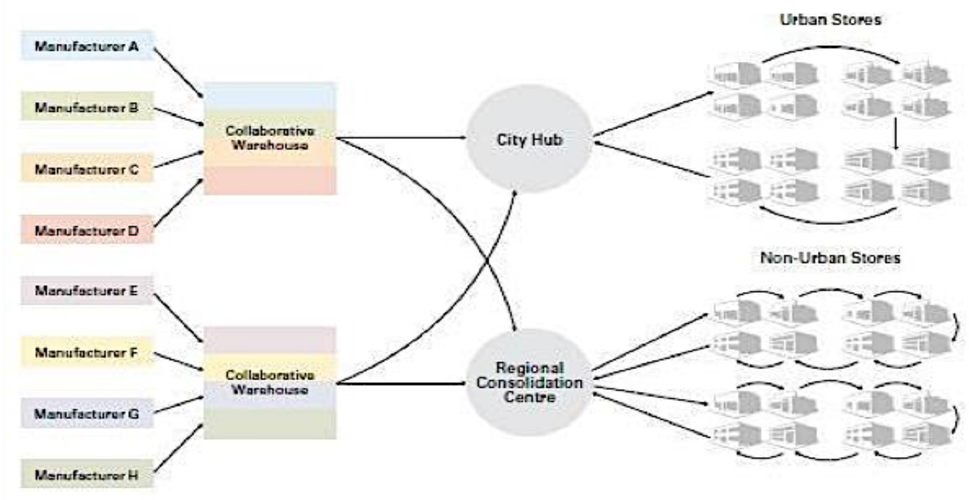
1. The amount of carbon benefit
2. The carbon abatement cost of each alternative

Figure 2: Proposed Road Map Results

CONCLUSIONS & RECCOMENDATIONS

- The proposed roadmap allows for 23.2% absolute reduction in carbon emissions and 6.2% reduction in total costs until 2030.
- The proposed implementation abates 490 ktons/CO2e at cost of £4.1k per ton of CO2e.
- The introduction of a stricter regulative framework or sectorial guidelines globally, that will allow all organizations monitor and report the same parameters and researchers or the public could make easier comparisons is vital.
- The importance of setting GOL emissions targets is highlighted.
- Sainsbury's should reassess distribution emissions targets.
- Sainsbury's should consider delivery alternatives, such as collaborative logistics [4].

Figure 3: An Approach to Implement Collaborative Urban Logistics



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