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Identifying the Implications of most Warming Foods: a Pilot Analysis

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The new found popular interest in sustainable development is highly skewed towards areas that are politically visible, such as transport and in particular the evils of air travel. This situation is mirrored in the academic community with an explosion of articles on sustainable transport (an EBSCO web search yielded 552 academic references to Sustainable Transport while for example Sustainable Livestock only found less than 10% of that number¹). Nonetheless, only 14% of GHG's actually result from transport, with as little as 2% coming from aviation, against 32% resulting from agriculture and land use – a major part of which can be directly attributed to the food chain (Stern, 2006). Moreover within the food system, certain areas such as livestock production are particularly problematic with meat and dairy products contributing more than 50% of the total GHG's emitted (Kramer *et al.*, 1999). Another recent study in the UK shows that GHG emissions attributable to meat and dairy consumption are about 4 times more than the GHG emissions generated from fruit and vegetable consumption (Garnett, 2007).

“Over the next decade, the requirement is to ensure the costs generated by greenhouse gases across the economy are fully priced so that the polluter pays. That means greenhouse gases generated in producing food or in food miles need to be recognised in the same way as greenhouse gases generated in other industries” (Miliband, 2007). However, authors believe that key food production areas go largely unaddressed. While there are few recent studies drawing attention to the impacts of the biggest polluters in the food system such as primary livestock production (Steinfeld *et al.*, 2006, Garnett, 2007), there has been very limited input to policy makers and consumers. Consequently the Innovative Manufacturing Research Centre at Cardiff University launched a project to understand, analyse and explain the potential policy, economic, environmental, technological and social (health/diet and ethical/welfare) impacts that a representative range of UK food consumption scenarios will have on helping to develop a more GHG neutral agri-food industry. This paper reports on the purpose, underpinning thoughts, methodologies deployed, design and some of the early findings of this potentially momentous project. The authors identify in detail what the major policy and research gaps are and hence what research is required within the broad area of creating a more GHG neutral agri-food industry. The novelty of the work lies not only in its holistic and multi-disciplinary approach but especially in its potential impact on sustainability of agri-food supply chains through shining the light on possible policy solutions and mitigation actions. Methodologies deployed in this project include interviews, ethnographic consumer behaviour study (consumer shadowing), scenario identification and scenario planning. The authors will conclude by putting forward a framework that will equally guide future academic research, policy making and consumer behavioural change.

1. Undertaken 16th July 2007 within Business Source Premier

Literature Review

The world faces an uncertain future due to the effects of climate change (Stern, 2006). However, until very recently the issue has not been taken very seriously by the general public and arguably even now only at a lip service level (Webster & Riddell, 2006). As explained in the above, interest in sustainability is highly skewed towards transport (Robertson, 2007) and the situation is mirrored in the academic literature. However, according to the Stern Review (2006) only 14% of GHGs actually result from transport. So what about the other 86% that comes from areas such as industry, buildings and agriculture? A major part can be directly attributable to the food chain (Horrihan *et al*, 2002, Zhu *et al*, 2006, Risku-Norja & Maenpaa, 2007) with certain areas such as livestock production particularly problematic (Leitzmann, 2003, Pimentel & Pimentel, 2003, de Boer *et al*, 2006, Baroni *et al*, 2007).

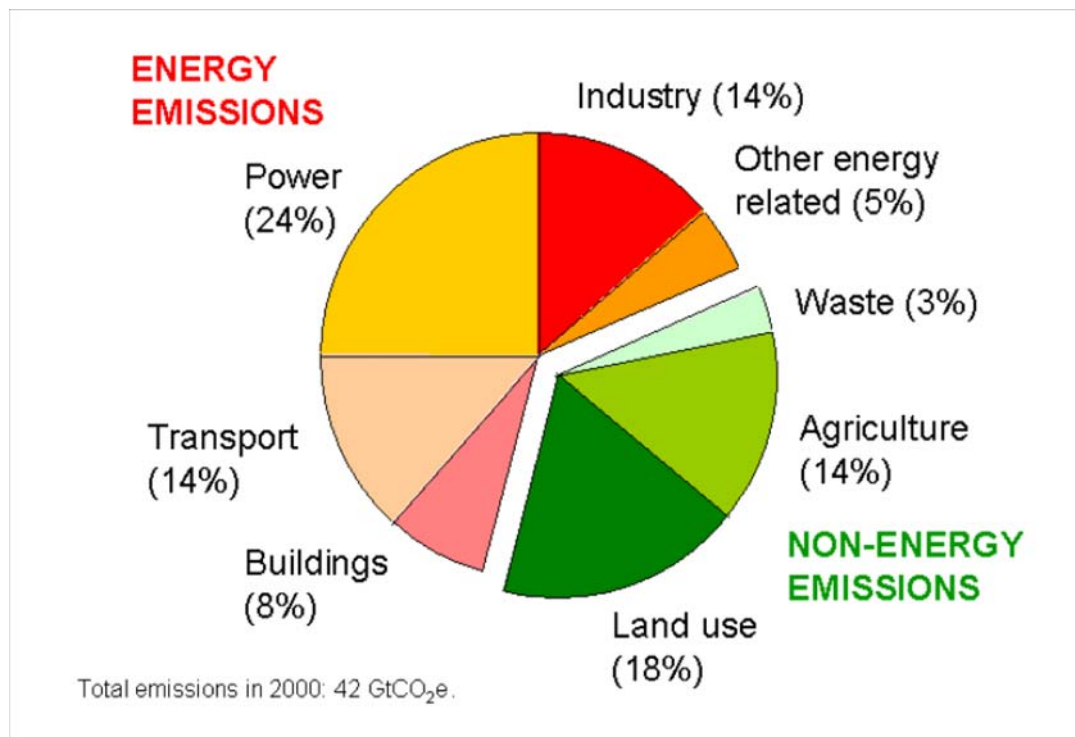


Figure 1. Global GHG Emissions Contribution (Source: Stern, 2006)

Research by the Food Climate Research Network (FCRN) shows that 8% of the total UK GHG emissions is attributable to meat and dairy consumption which is about 4 times more than the GHG emissions generated from fruit and vegetable consumption (Garnett, 2007). A similar study by Kramer *et al* (1999) shows that meat and dairy products contribute more than 50% of the total GHG's emitted from the food chain. However, at this point there is only a small body of academic literature addressing this point with only 51 references in our EBSCO search to Sustainable Livestock¹, i.e. less than 10% of the work done on sustainable transport. "Over the next decade, the requirement is to ensure the costs generated by greenhouse gases across the economy are fully priced so that the polluter pays. That means greenhouse gases generated in producing food or in food miles need to be recognised in the same way as greenhouse gases generated in other industries" (Miliband, 2007). Although the food miles issue has received much recent popular and academic debate, the larger food production area goes largely un-

1. Ibid

addressed (The Sunday Times, 2007, Knowles, 2007). Where there is a focus, it tends to be recent in nature and within deep but disparate and rarely inter-connected narrow pockets, for instance:

- By vested interest groups that arguably lack academic depth to their cases (Pye, 2002, Mohr, 2005, Animal Aid, 2007, grownupgreen, 2007, Imhoff, 2007, The Vegan Society, 2007, The Vegetarian Society, 2007)
- Academic dieticians or epidemiologists interested in diet and health issues (Horrigan et al, 2002, Pimentel & Pimentel, 2003, White, 2005, Allender et al, 2006, Baroni et al, 2007)
- Academic animal scientists (Ogina et al, 2004, O'Mara, 2004, Ominski & Wittenberg, 2004, Wright et al, 2004, Hegarty et al, 2007)
- Academic environmentalists (Leitzmann, 2003, Risku-Norja & Maenpaa, 2007, Shanahan & Carlsson-Kanyama, 2005)
- Academic agriculturists (Keyser et al, 2005, de Boer et al, 2006)

In addition to this there are two seminal reports on the area of sustainable agri-supply chains which pay particular attention to impacts of the primary livestock area (Steinfeld *et al*, 2006, Garnett, 2007). While such studies provide valuable building blocks for our research, their summary information requires further focused research to be able to provide specific input to policy makers and consumers. Moreover, this is a huge subject requiring further research covering a complete supply chain of farm input manufacturers (fertilisers, farm machinery etc), growers, primary and food secondary manufacturing, distribution and retailing (Hines & Samuel, 2007). As the implications are also at a policy level it concerns interest groups, industry bodies and government bodies. It is also likely to require academic input from a wide range of disciplines to review the technological, economic, industry structure, environmental, health, ethical, welfare and policy issues that are raised. Currently, the emphasis in UK policy circles is on areas that are laudable but arguably might have a lower impact on GHGs, such as Emissions Trading, Packaging, Food Industry and Household Waste than the broader issues we wish to address in this piece of research.

Research Framework and Methodology

The research began by creating a portfolio of all relevant academic and practitioner literature leading to a structured review which is on-going due to the field being in its infancy and new important work being published continuously. As expected, the literatures are in isolated silos. Also, an all-embracing stakeholder list was generated a number of which have been interviewed so far with a larger number having been approached for interviews. The purpose of interviewing is to establish various stakeholders' take on the problem and their potential solutions and/or actions taken, e.g. the U.K. government, NGO's, academics and various parts of the food chain. The following framework encapsulates various aspects of this research.

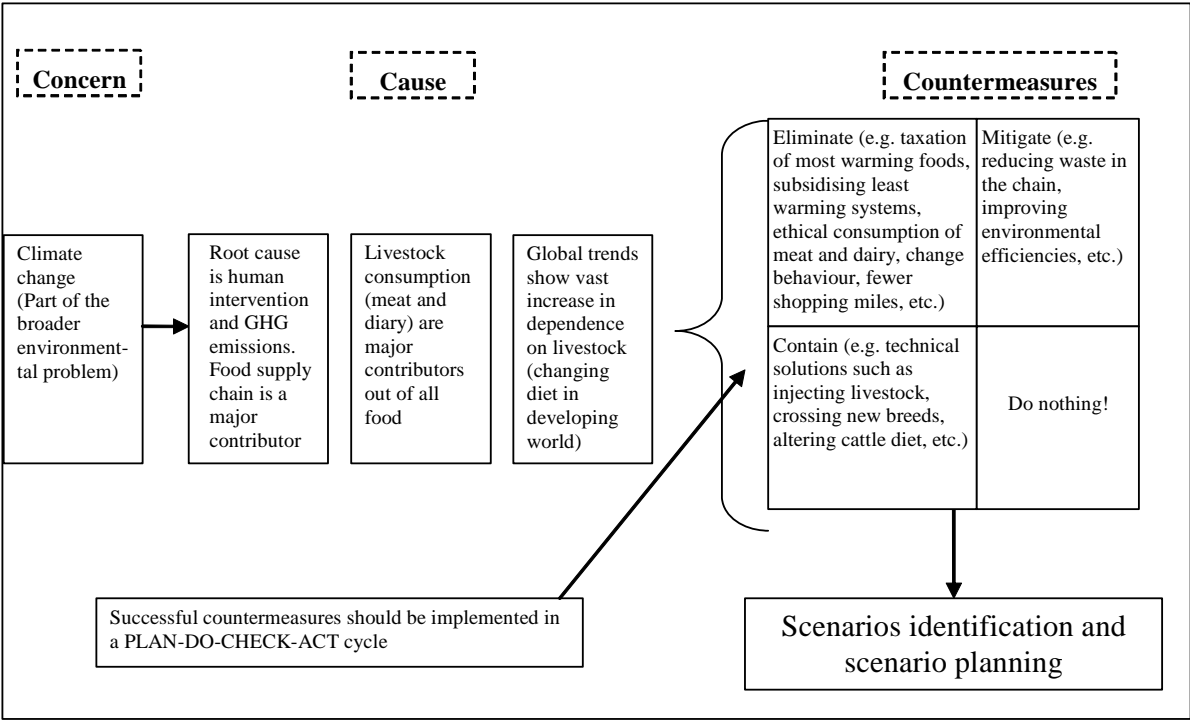


Figure 2. Research Framework (Source: Authors)

The above model describes certain parts of the agri-food system as key contributors to the global warming concern (i.e. primary production in meat and dairy industries). This assumption is based on the above literature review. It also explains that countermeasures can be implemented at four different levels:

1. Eliminating part of GHG emissions generated by the food system by focusing high level fiscal and policy mechanisms on the most polluting foods. It has been suggested that the polluter should pay and that GHG emissions (CO2 equivalent) should be treated as a secondary currency within the system. Simple mechanisms include taxation for the most warming foods and/or subsidising the least warming foods. Therefore, elimination largely depends on government intervention. Another solution is to influence the force field which shapes consumer behaviour in the food system such behavioural changes in favour of more ethical consumption (reduced meat and dairy content, fewer shopping miles, etc.).
2. Mitigation is about reducing waste in the food chain and improving environmental efficiencies along the chain. Research by WRAP (2007) shows that equivalent to a third of the food bought in the UK ends up in the bin most of which could have been eaten. This is equal to £8 bn in retail value and contributes at least 15 mt CO2 associated with food waste that could have been eaten. Reducing environmental waste and burden within food systems is a key strategy for mitigating against the existing global warming trends.

3. Containment: Various technical solutions could be devised to mitigate against GHG's emitted by livestock such as agri-science solutions (injection of livestock, crossing new breeds, altering cattle diet, etc.) and engineering solutions to reduce emissions at processing and logistical stages of the food chain.
4. Clearly the last possible scenario is to do nothing.

Conclusions and Further Research

Solutions to the problem GHG emissions from the food network are disparate and come from various disciplines. The only certainty is that certain parts of the system emit far GHG's and that efforts to face the problem should be directed towards those areas, i.e. the upstream in the meat and dairy industries. The research team is currently interviewing various stakeholders to establish level of interest in the subject, scale of resistance against change, and effectiveness and availability of countermeasures. The team has particularly focused on ethical food consumption scenario development to inform policy makers. Several different types of food consumers were identified and then shadowed to understand their shopping and eating habits.

The next stage in this project is to develop various potential consumer behavioural change scenarios and to understand impact of each on the environment. One scenario is the no change scenario (drastic global increase in meat and dairy consumption). The second and third scenarios will be based on different levels of ethical food consumption behavioural changes. The outcome will provide a great policy tool both for the government and the industry to adopt the right behaviour in favour of least polluting food products.

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