**Food Waste: Challenges and Opportunity for the Emerging Bio-Economy**

**Guest Editorial Board:**

*Managing Guest Editors:* **Piergiuseppe Morone** (Unitelma-Sapienza, University of Rome. Viale Regina Elena 295, 00161 - Rome, Italy), **Apostolis Koutinas** (Agricultural University of Athens, Greece), **Katie Privett** (Green Chemistry Centre, Department of Chemistry, University of York, Heslington, York, YO10 5DD, UK)

*Guest editors:* **Mehrdad Arshadi** (Swedish University of Agricultural Sciences, Sweden), **Marija Bodroza-Solarov** (Institute of Food Technology, Serbia),**Nick Gathergood** (Tallinn University of Technology, Estonia), **Avtar Matharu**(University of York, UK), **Franka Papendiek** (German Council of Science and Humanities, Germany), **Ana Rosa Silva** (Aveiro University, Portugal), **Katerina Stamatelatou** (Democritus University of Thrace, Greece).

**1. Introduction to this Special Section**

The world population, which stands on 7.2 billion in mid-2014, is projected to increase by almost one billion people within the next decade, and to reach 9.6 billion by 2050 (FAO, 2015). At the same time, over the next fifteen years the composition of the global population will change significantly, with the number of people considered to be part of the ‘global middle class’ (i.e. those with incomes between $6,000 and $30,000 in PPP terms, Wilson and Dragusanu, 2008) projected to nearly triple, increasing from 1.8 billion in 2009 to 4.9 billion by 2030 (Kharas, 2010). The bulk of this growth will come from large and fast-growing Asian economies (such as China and India), which will experience a significant increase in wealth. To put this in perspective, by 2030 Asian countries will represent 66% of the global middle-class population compared to 28% in 2009 (Pezzini, 2012). A larger and wealthier world population will demand more food and food co-products, hence posing two types of environmental problems: (1) population growth contributes to GHG emissions through its effect on deforestation as land is grabbed for enhancing food production (Lambin and Meyfroidt, 2011); (2) as the world’s population grows and becomes more affluent, waste production rises and might double by 2025 (Hoornweg et al. 2013).

Food waste and food co-products waste create huge environmental, economic and social problems (Mourad, 2016): 1.3 billion tonnes of food are being lost or wasted annually (FAO, 2011) whilst packaging and non-consumable material associated with the food chain are added burdens to the consumer, the industry and the environment (Olsmats and Wallteg, 2009; Williams et al. 2012; Ferreira da Cruz et al, 2012; Ferreira da Cruz et al, 2014). With global climate change challenges and its various effects on ecosystems and on resource depletion, the issue of food waste and its diversion from landfill has captured the attention of governments, environmental and social organisations, businesses, and academics, becoming an increasingly urgent priority (FAO, 2014a; Mirabella et al. 2014).

According to the US Environmental Protection Agency (EPA), food waste currently represents the single largest type of waste entering landfills (Nishida, 2014). Wasted food leads to over utilization of water and fossil fuels and to increasing greenhouse gas emissions, i.e. methane and carbon dioxide arising from degradation of food in landfills (Hall et al., 2009). Therefore, the environmental impact of food waste is twofold (Morone, 2016): (1) it is associated with the depletion of natural resources used for its production (e.g. soil depletion) and distribution; and (2) it relates to the costs associated with waste disposal.

There is a growing recognition that these two problems (waste disposal and resource depletion) can be solved together through the utilisation of waste as a resource, using green and sustainable technologies (Luque and Clark, 2013; Thi et al. 2016). At the same time, there is growing awareness that new consumption models are needed to minimise the amount of food wasted at the end of the supply chain – an issue particularly relevant in high-income countries where more than 40% of the food losses occur at retail and consumer levels (FAO, 2011).

Globally, per capita food waste by consumers amounts to 95-115 kg/year in Europe and North-America, compared to 6-11 kg/year in South/Southeast Asia and Sub-Saharan Africa (Gustavsson et al., 2011). Waste reduction at the consumption level represents, indeed, a target for medium- and high-income countries, where evidence shows that the main source of the problem is the domestic setting (e.g. Monier et al., 2010; Braun, 2012). From an exclusively economic standpoint, an average family in the UK would save £470 a year just by eliminating avoidable food and drink waste (Quested et al., 2013). Further, food waste reduction would also contribute to reducing food prices. As an exemplification of this, consider that avoidable UK household food waste reduced in in 2012 compared to 2007 by 21%, which would have cost GBP 3.3 billion to purchase (WRAP, 2013). This means on average every household in the United Kingdom not having to spend GBP 130 a year on food bought but thrown away, helping to mitigate the impact of rising food prices (Parry et al., 2015).

A number of prevention and mitigation measures, proposed by various countries, have been already put in place to reduce food waste (FAO, 2014b). However, along with such practical solutions, new waste valorisation technologies as well as alternative consumption models are urgently needed. Hence, this proposed special section of the Journal of Cleaner Production (JCLP) is devoted to identifying preventable and non-preventable wastes along the life cycle of food supply chain and assessing the role of new consumption (behavioural) models as well as technological improvements in reducing and valorising food waste. The tentative topics to be covered include

* Reduction of preventable food wastes should consider: (i) evaluation of consumer habits and awareness towards food consumption and waste generation; (ii) improvement of stock management and marketing strategies; (iii) increasing of food shelf-life through usage of active food packaging; and (iv) utilisation of biodegradable food packaging, (v) legislation and policy issues; and
* Valorisation of non-preventable waste should consider: (i) fractionation, re-utilisation and valorisation of non-preventable wastes from the manufacturing sector; (ii) biorefining of non-preventable waste streams for the production of products ranging from specialities to commodities including food additives, chemicals, biodegradable polymers, materials and energy; (iii) development of different processing schemes based on case-specific life cycle steps of chosen food supply chain; (iv) creation of cascade processing focusing on re-utilisation of products generated from a waste stream; and (v) apply interactive process systems engineering to conduct simultaneous assessment of proposed valorisation technologies through multi-objective optimisation based on software-aided process design, costing, LCA and social impact.

Due to the variety of challenges and perspectives, several methodologies are needed to address in a holistic way this sustainability transition. To this aim, the team of Guest editors has identified three ***research macro-areas***:

(1)      Analysis of food waste related challenges from local/national/European/global perspectives and identification of potential solutions (consequences of those solutions should be addressed);

(2)      Review of methodologies and tools for food waste reduction and/or valorisation;

(3)      Case studies focusing both on new consumption/behavioural models as well as technological improvements leading to sustainable production models.

Therefore, the special section welcomes submission of high quality papers referring to any of these three *research macro-areas*.

Supplementary material is also welcome as well as videos and animations illustrating the topic of the research for researchers as well for the general public.

The Special Section development will be based primarily from papers presented at the **“*The Future of Food Waste: Challenges and Opportunities for Valorisation in Europe”, 20th-21st September 2016, Wageningen, The Netherlands.***(<http://www.costeubis.org/signup-wageningen-2016)>**conference.**