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Systems Transformation: Transitioning towards low carbon, resource efficient, and circular economy for global sustainability

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In the coming decades the world that we know today will be drastically transformed. Population and economic growth, particularly in developing countries, are radically changing the demand for food and natural resources. Due to the transformations caused by these megatrends, especially economic growth which is rapidly expanding the middle class and changing consumption patterns worldwide, it is expected that this will result to an increase of approximately 40 percent in the demand for food, water, energy and other resources in the next decades. To fulfil this demand in a sustainable and efficient manner while avoiding food and water scarcity as well as environmental catastrophes in the near future, some industries, particularly the ones involved in food and energy production, have to drastically change its current production systems towards circular and green economy.

In Australia, the agri- food industry has played a very important role in the scenario described above. It is one of the major food exporters in the world, supplying fast growing international markets in Asia and the Middle East. Though the Australian food supply chains are economically and technologically developed, it has been facing enduring challenges about its international competitiveness and environmental burdens caused by its production processes. An integrated framework for sustainability assessment is needed to precisely identify inefficiencies and environmental impacts created during food production processes.

This research proposes a combination of industrial ecology and systems science based methods and tools intending to develop a novel and useful methodological framework for life cycle sustainability analysis of the agri-food industry. The presentation highlights circular economy paradigm aiming to implement sustainable industrial processes to transform the current industrial model of agri-food supply chains. The results are expected to support government policy makers, business decision makers and other stakeholders involved in agri-food-energy production system in pursuit of green and circular economy. The framework will assist future Life Cycle and Integrated Sustainability Analysis and eco-redesign of food and other industrial systems.

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