Sustaining our uncertain future

science to save our planet

"What we choose for lunch can effect the climate in a small but measurable way in 200 years. Time makes this estimation challenging, we need to balance our immediate needs with considerations for the coming decades and centuries," says **Dr Christopher Dey** from the Centre for Integrated Sustainability Analysis (ISA) in the School of Physics.

To estimate the impacts of our actions on greenhouse gas emissions, the ISA adapts input-output theory, traditionally the tool of economists. This accounting-physics hybrid relies on maths, data handling, complex systems and integrated science, to create a consistent model of the economy that documents all supply chain interactions and links them to emission generation, and other physically important processes.

This emissions accounting framework has a gamut of applications. Educating businesses and communities about the use of these systems, as well as framework and application development, is a full-time collaboration of colleagues at the ISA including Dey, Professor Manfred Lenzen and Dr Joy Murray.

The ISA continually refines the framework making it the best method for generating estimates of environmental impact, triple bottom line accounting, ecological footprint analysis, environmental impact assessment, industry sector studies, population studies, and economic systems research. Motivated by the users' perspective, these models are the most comprehensive approach to emissions

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accounting. "Such methodology is useful for informing policy, making it relevant, accurate and effective," explains Dey.

"Physics is about understanding the world, we're just thinking about this more generally," explains Dey. The principles of scientific discovery apply to this research as they do other scientific endeavours. The ISA team begins by identifying a world issue, and then develops, tests and refines a model to explain implications of the observed phenomenon.

"The challenge is to integrate various sorts of data of different quality, completeness and with divergent baseline values, to form a set with the best self-consistency. There is real uncertainty in the data and it takes skill to deduce relationships and patterns," explains Dey. "It is important to deal with complexity. An oversimplified model will reduce accuracy and efficacy, but we need to balance this with a pragmatic approach."

Dey is quick to point out that in making a substantive response to climate change we must pace our response so that we don't disrupt social and economic systems. "In the end sustainability is really about making better decisions based on a consideration of many aspects, such as competing interests, complexity and varied time scales."

Sustainability is much bigger than any one city: it applies globally, and the same principles and considerations apply to many different sectors. "It's the philosophy of the ISA that producers and consumers should be responsible for their contribution to pollution, waste, climate change and resource depletion. Partitioning responsibility is perhaps the best chance of creating policies that are viewed as fair by industry, government and individuals," explains Dey.