

You are invited to an important public workshop
hosted by the School of Government



Are there biophysical limits to growth? If so, how should public policy respond?

Economic growth has become culturally, politically and institutionally engrained at a global scale. Is that sustainable?

Four International Speakers:

Associate Professor Simon Michaux (Geology)

Professor Steve Keen (Economics)

Professor Tim Jackson (Economics)

Professor Susan Krumdieck (Mechanical Engineering)

will bring global and local perspectives on environment, resource, energy and economics to these two vital questions for open discussion.

Chair: **Dr Girol Karacaoglu**, Head of School of Government

Zoom address: <https://vuw.zoom.us/j/97767754989>
7.00 – 9.00pm, Monday, 20 September 2021



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Presentation outline

Simon Michaux



Current industrialization has a foundation in the continuous supply of natural resources. The methods and processes associated with this foundation have significant momentum. This paradigm will not be undone easily. Human nature and human history make it so. Currently, our industrial systems are absolutely dependent on non-renewable natural resources for energy sources.

Current thinking is that all industrial businesses, will replace a complex industrial ecosystem that took more than a century to build. This system was built with the support of the highest calorifically dense source of energy the world has ever known (oil), in cheap abundant quantities, with easily available credit, and unlimited mineral resources. This task is hoped to be done at a time when there is comparatively very expensive energy, a fragile finance system saturated in debt, not enough minerals, and an unprecedented number of human populations, embedded in a deteriorating environment.

It is apparent that the goal of industrial scale transition away from fossil fuels into non-fossil fuel systems is a much larger task than current thinking allows for. The majority of infrastructure and technology units needed to phase out fossil fuels has yet to be manufactured. Recycling cannot be done on products that have yet to be manufactured. It is clear that society consumes more mineral resources each year. It is also clear that society does not really understand its dependency on minerals to function. Availability of minerals could be an issue in the future, where it becomes too expensive to extract metals due to decreasing grade.

Bio:

Simon Michaux is an Associate Professor working for the Geological Survey of Finland, in the KTR Circular Economy Solutions unit. His current roles at GTK is to develop geometallurgy capability in battery minerals, develop the GTK-Mintec pilot plant with digitization and machine learning upgrades, and develop the Circular Economy. Work has been done in the Mineral Intelligence project.

His education is a Bachelor of Applied Science in physics and geology. His PhD was in Mining Engineering, done at the JKMRRC, graduating in 2006. Most of his work experience is from the Australian mining industry. Simon studied and worked for the JKMRRC (Sustainable Minerals Institute) for 18 years, where he was involved in several high-profile industry funded research programs.

His areas of technical interest are rock & material characterization, comminution, blasting, electrical dynamic fragmentation, process engineering separation, material science, and multi-phase data analysis of geometallurgical data sets and modelling the mining process as a dynamic system. He is most interested in modelling the energy systems that support the industrial ecosystem and the environmental fallout of industrialization.

Presentation outline

Steve Keen



How is output produced? Today's economics models, especially “Integrated Assessment Models” in the economic analysis of climate change, such as Nordhaus's DICE, have labour and capital as inputs, and goods and services as outputs. No physical inputs are included, as they once were in “Computable General Equilibrium” models. Consequently, these models are blind to the material implications of growth.

In the real world, nothing can be produced without energy, energy itself cannot be produced but only exploited, and waste energy and matter are inevitable consequences of production, which should be seen as using energy to turn raw materials into useful energy, useful matter, and waste. The fabled decoupling of energy and GDP is a fable. A biophysical perspective on production shows there are biophysical limits to growth within the biosphere of the planet.

Mainstream economic projections of climate change, such as Nordhaus's claim that a 6°C increase in temperature would reduce gross world product by 8.5%, are oblivious to these limits, in contradiction of the scientific literature. Since this misguided economics and vested interests have encouraged us to ignore these limits, humanity's pressure on the biosphere has to be reduced. This reduction cannot be achieved by private sector mechanisms alone.

Bio:

Professor Keen is a Distinguished Research Fellow at UCL, the author of *The New Economics: A Manifesto* (2021) *Debunking Economics* (2011) and *Can We Avoid Another Financial Crisis?* (2017), and one of the few economists to anticipate the Global Financial Crisis of 2008, for which he received the Revere Award from the Real World Economics Review.

His main research interests are developing the complex systems approach to macroeconomics, and the economics of climate change. He has over 100 refereed publications on financial instability, money creation, logical and mathematical flaws in conventional and Marxian economic theory, the role of energy in production, and many other topics. He is ranked in 19th in Academic Influence's list of influential economists.

He designed the Open Source system dynamics program Minsky (<https://sourceforge.net/projects/minsky/>), which is the first program to allow monetary economic models to be designed visually. He has previously been Professor of Economics at Kingston University London and the University of Western Sydney, Australia. He is active on Twitter as @ProfSteveKeen, and is crowdfunding his non-mainstream research into economics via Patreon at <https://www.patreon.com/ProfSteveKeen>. He is active on Twitter as @ProfSteveKeen, and is crowdfunding his non-mainstream research into economics via Patreon at <https://www.patreon.com/ProfSteveKeen>.

Presentation outline

Susan Krumdieck



Maybe the problem is the economic model we use, maybe it's not. As beings with competing self and social interests, we have an amazing capacity for creating and curating our understanding of the reasons why things happen and how we fit in. In simple language, we believe the stories we tell ourselves.

I am going to posit that our current story is about economic growth, capitalism, progress and free markets being the reason things happen, and that our place in this economic story is to be laborers and consumers. Maybe that seems about right, but how did this get to be our story? Is it based on history? science? culture? coercion? stupidity? delusion? My argument is that the story of us is like every other cultural belief construct story throughout history – it is based on experience, making sense of things, and power. The experience of the last 100 years has been of ever-growing industrialization. The economic stories we tell ourselves about maximising utility and the magic hand seem to make sense, and our belief serves to establish control by the powerful. What is it really then that caused the unprecedented, planet-cooking growth since 1950? There is only one possible root cause – engineering standardization.

This is good news. You can ask 100 economics experts and not one of them will tell you that economic growth is subject to biophysical limits. You can ask 100 engineers and every one of them will tell you that the industrial technology enterprise operates within physical limits. When engineering transitions the industrial technical enterprise to the regenerative biophysical enterprise, then the new stories of economics will emerge. The way to change the industrial technical enterprise is to develop, write and adopt the Transition Engineering Standards. And that could be done by 2022.

Bio:

Susan Krumdieck MNZM is a Professor of Mechanical Engineering with specialization in Energy Transition Engineering, the work of downshifting the unsustainable industrial technical enterprise.

Susan is very interested in the new methodologies and tools needed to change existing systems to rapidly shift away from fossil fuels. She has carried out research on every type of renewable and alternative energy technology, and sustainable energy systems. Like Safety Engineering, Transition Engineering actions social responsibility and sound science to deliver change projects that down-shift the exposure to fossil fuel supply and climate change risks. This has included research in energy transition of buildings, cities, transportation and freight. She has also worked with rural and remote communities on sustainable development. www.transitionengineering.org

She is currently Chair of Energy Transition at Heriot-Watt University, Edinburgh, Scotland, and academic lead of the Islands Centre for Net Zero in Orkney. The ICNZ is putting Transition Engineering into practice through an action research programme with the Scottish Islands communities and organisations. Susan is the co-founder of the Global Association for Transition Engineering and the author of the Transition Engineering handbook (2019).

Presentation outline

Tim Jackson



Critics have long questioned the feasibility (and desirability) of exponential growth on a finite planet. More recently, mainstream economists have begun to recognize some 'secular' limits to growth. In fact, growth rates in advanced economies have been declining since the mid 1960s. Underlying this decline is a fall in labor productivity growth that – in the hands of capitalism – has squeezed margins, suppressed wages, led to rising inequality and precipitated a dangerous financial instability.

The most profound lesson from the global pandemic was that it is health rather than wealth which constitutes the basis of prosperity. Without health the relentless accumulation of wealth and status is meaningless. What's most fascinating about this insight is that the defining metaphor of health is balance – rather than growth. Capitalism's obsession with growth obscures our ability either to recognise where the point of balance lies or to stop when we get there. Diseases of overconsumption now kill more people worldwide than undernutrition, for example.

None of this is inevitable. What's needed is a 'post-growth' economics which replaces the relentless pursuit of GDP with a broader conception of social and planetary wellbeing and builds the foundations for an economy of care for people and planet. Enterprise as service, work as participation, investment as commitment, and money as a social good: these four principles provide solid foundations for the economy of tomorrow. The task for government is to create the conditions under which these innovations can thrive.

Bio:

Tim Jackson is an ecological economist and writer. Since 2016 he has been Director of the Centre for the Understanding of Sustainable Prosperity (CUSP) at the University of Surrey in the UK, where he is also Professor of Sustainable Development.

From 2004 to 2011 he was Economics Commissioner for the UK Sustainable Development Commission where his work culminated in the publication of *Prosperity without Growth* (2009/2017) which was subsequently translated into 17 foreign languages. It was named as a Financial Times 'book of the year' in 2010 and UnHerd's economics book of the decade in 2019. His latest book *Post Growth – life after capitalism* was published by Polity Press in 2021.

Organised jointly by:

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