Mathematics and Sustainability: Realigning Curricula for the Future Agenda

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Mathematics and Sustainability

- Energy numeracy
- Carbon numeracy
- Climate numeracy
- Thermodynamics
- Atmospheric fluid mechanics
- Statistics
- Optimisation of energy systems
- Modelling and computation: numerical mathematics
- Conceptualisation: e.g. what is bio-diversity?
- …
Numeracy

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There are currently 1200 heat pump installers in the UK.....
Numeracy

What surface area of the Sahara desert would need to be covered with solar PV panels to generate electricity for Africa and Europe?

By how much will ocean levels rise due to thermal expansion of water if the Earth’s temperature increases by 2 C?

What is the carbon footprint of international students coming to the UK for their education?
The power and wisdom of `order of magnitude’ calculations:
Physics, chemistry and maths drove the industrial revolution
1776

- Watt’s steam engine design introduced commercially
- Adam Smith publishes `The Wealth of Nations’
Lord Kelvin 1824-1907  J C Maxwell 1831-1879  Max Born 1882-1970
... and will underpin the transition to net-zero:

- Thermodynamics: the science of work, energy, temperature and entropy
- Atmospheric fluid mechanics: the science of continuum motion
• Facets of Mathematics (Y2): statistics, modelling of energy systems
• Maths in Action (Y4): climate change and impact modelling
• Operational Research in the Energy Industry (MSc)
• UG projects
• MSc projects
• Thermodynamics
• Fluid Mechanics
• UG projects
• MSc projects
African Institute for Mathematical Sciences

- Thermodynamics and Atmospheric Physics
- Climate modelling
- Atmospheric fluid mechanics
- MSc projects
Mathematics and Sustainability

- Embed energy + climate numeracy in the School’s community life
- Involve students & staff in decarbonising the School’s operation
- Offer at least one specialist course related to sustainability in each year of the syllabus
- Work with University/College to create interdisciplinary courses
- Develop partnership with AIMS