

IGI 20th Anniversary Event

Athlone

11th October 2019

Geoscientists in the greenhouse: Professional roles and responsibilities in a climate emergency

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20TH ANNIVERSARY
1999 - 2019



1999...

- Some new dictionary entries:

- dashcam
- blog
- vape
- texting
- carbon footprint



The New York Times

Human Imprint on Climate Change Grows Clearer

By William K. Stevens

June 29, 1999

...2 years after the Kyoto Protocol

...11 years after the establishment of the IPCC

...10 years after Margaret Thatcher addressed the UN on the global threat of climate change

2019...

- Increasingly unequivocal scientific evidence that human-induced climate change is happening
 - Observation
 - Climate modelling
 - Geoscience (palaeoclimatology etc)
- Improving understanding of nature and implications of this change
- Increasing urgency of addressing it



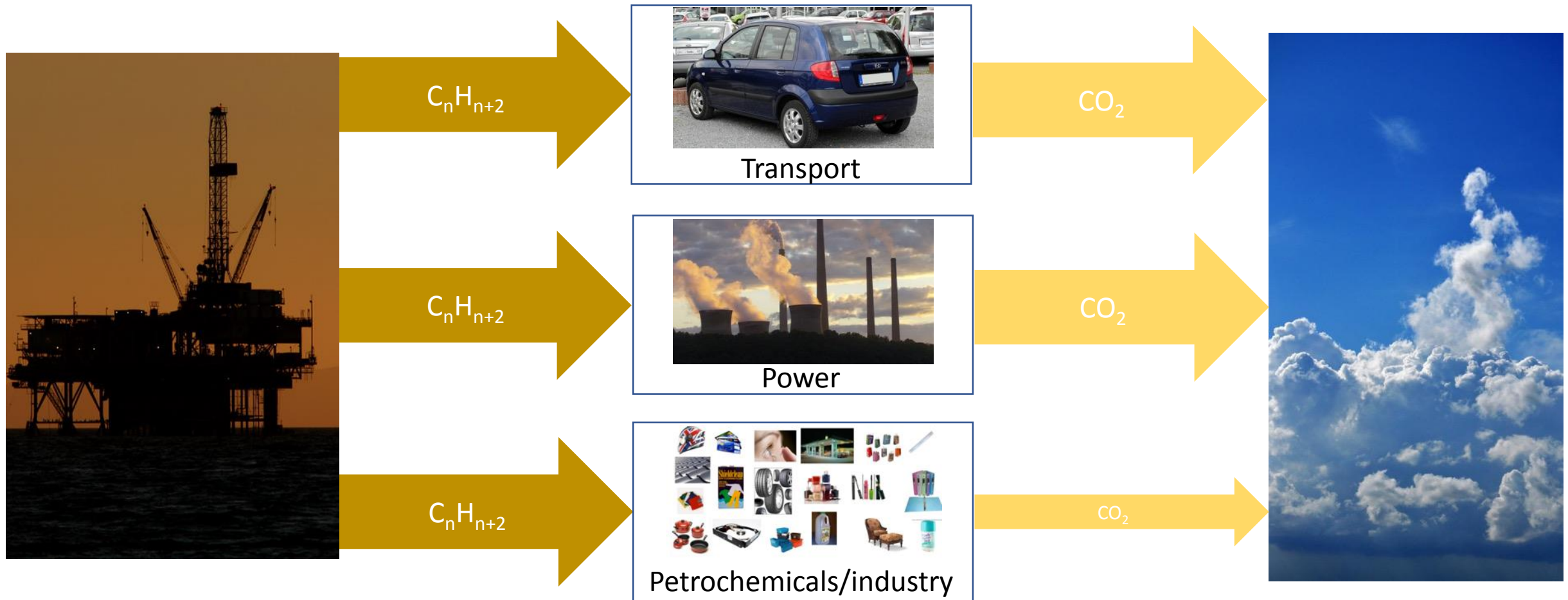
Roles for geoscience and geoscientists

- Mitigating
- Adapting
- Understanding
- Communicating

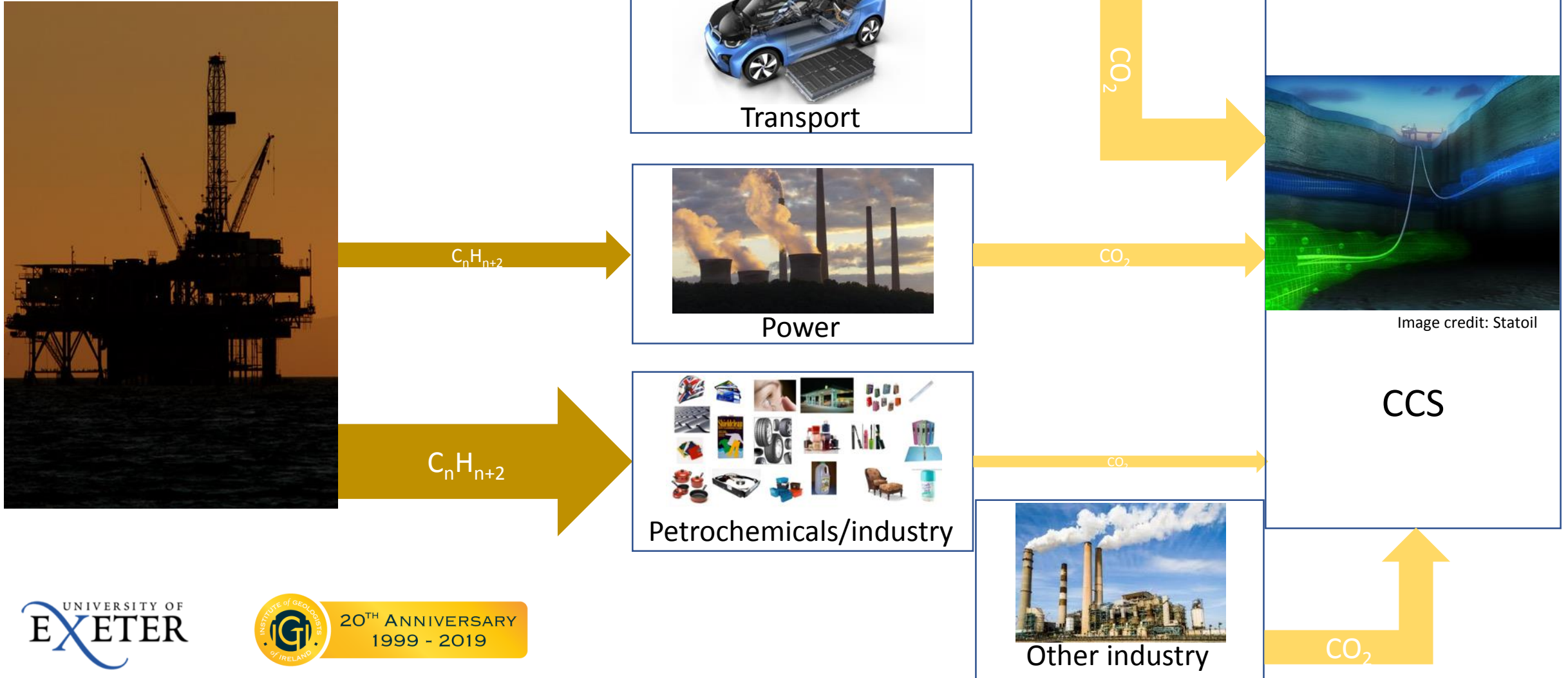
The energy transition –
an urgent global priority...



Hydrocarbons today...



A hydrocarbons transition

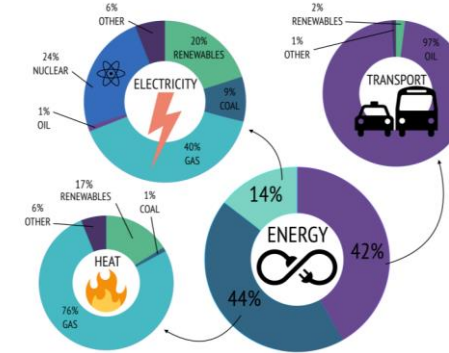


Carbon Capture and Storage

- Role of geoscience in carbonisation – and now decarbonisation
- *'It is hard to see us achieving 80% reductions by 2050, let alone more than that, without CCS'* (Chris Stark, UK Committee on Climate Change, GSL Bryan Lovell Meeting, January 2019)
- Necessary even if we eliminate fossil fuels altogether (industry, biomass, hydrogen)
- BECCS – 'negative emissions'
- So far, massive failure of political and industry leadership

At the Geological Society 2019 Bryan Lovell Meeting, 100 delegates gathered to discuss the opportunities for decarbonisation offered by geoscience and the subsurface. The meeting was attended by both geoscience and social science academics, representatives from industry (BP and Equinor), the British Geological Survey, statutory bodies such as the Committee on Climate Change and public organisations such as Radioactive Waste Management.

The decarbonisation of electricity production, industry, transport and heating to meet both UK and international climate change targets is a major challenge, and the subsurface has an important role to play.



UK energy demand and supply by sector. Data: Digest of UK Energy Statistics 2018.

Geoscience was central to the carbonisation of our environment through the exploration, extraction and use of fossil fuels. The same skills and expertise that developed these resources can significantly contribute to decarbonisation solutions.

Many of the technologies involved share common scientific, regulatory and technical challenges, which will be a priority to address moving forward.

Key challenges to address

Policy and regulatory

- Secure funding to deliver pilot schemes scaled-up from successful experimental or lab-based projects.
- Development of regulatory and licensing frameworks to deliver technologies such as geothermal energy for heat. Development of the UK's geothermal resources requires a Contract for Difference (CFD) for heat and licensing to regulate the use of the subsurface.

Decarbonisation and the subsurface

Energy storage

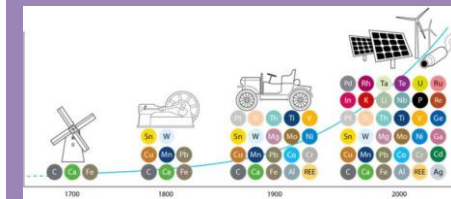
Intermittency of energy supply must be addressed by increasing our energy storage capabilities. This could include advancement in battery technologies (which rely on secure sources of minerals and metals e.g. lithium and cobalt), as well as subsurface thermal energy storage, pumped hydro storage schemes, and compressed air energy storage.

Geothermal energy

Use of geothermal energy for electricity, heating and cooling will require drawing from UK resources and the establishment of effective licensing frameworks. Deep geothermal resources could meet UK heat demand for a century.

Critical metals and raw materials

Decarbonising electricity generation requires expansion in renewables and nuclear, many of which require critical raw materials and metals to manufacture. This requires a sustainable and secure supply of mined materials.



Consumption of mineral raw materials has significantly increased since the industrial revolution, both in volume and variety of minerals used.
© World Economic Forum, 2018

Subsurface disposal and storage

Fuel switching from coal to natural gas and hydrogen would reduce CO₂ emissions. This will require underground storage of hydrogen fuel and natural gas. Carbon capture and storage (CCS) and bio-energy with CCS (BECCS) have the potential to store atmospheric carbon over geological timescales, removing carbon from the atmosphere permanently. Both could be critical in meeting the Paris Agreement. Geological disposal is the UK Government's adopted policy for dealing with our nuclear waste and the siting process for a facility is ongoing.

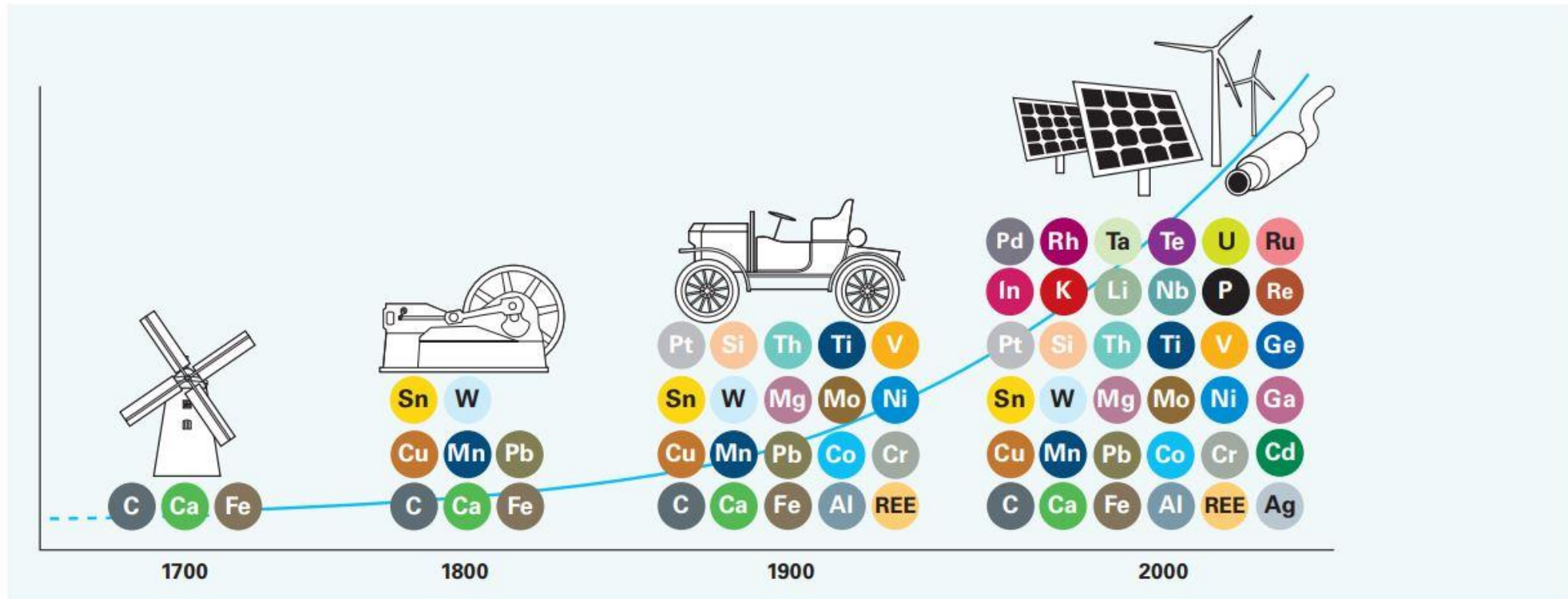
Minerals







Minerals for the energy transition



Elements widely used in energy pathways

Volker Zepf et al. (2014)

Energy and the subsurface

- Geothermal
- Energy storage
 - Gas
 - Heat
 - Hydrogen
 - Pumped air
 - Pumped water
- 'Waste disposal'
 - CCS
 - Radioactive waste
- Modelling, developing and regulating the subsurface

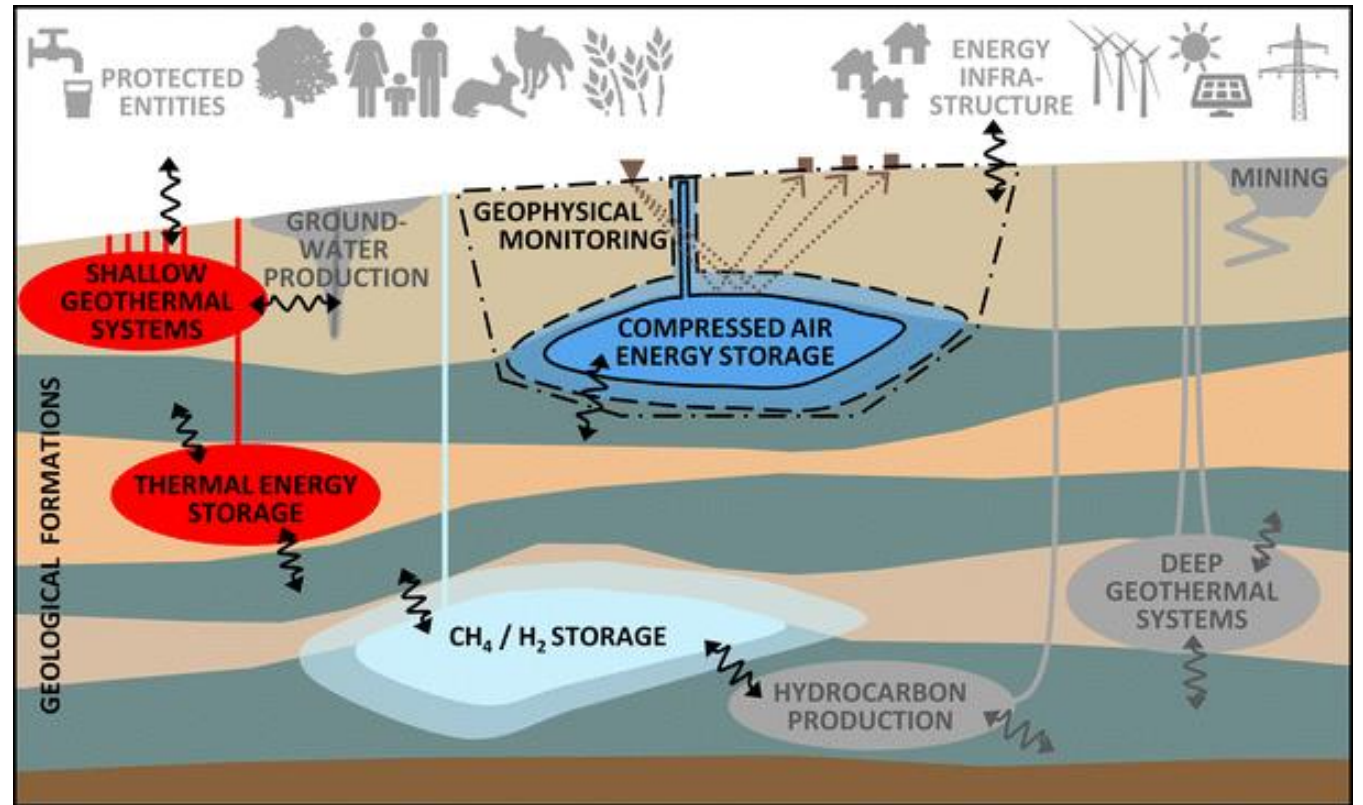


Image credit: ANGUS+ project

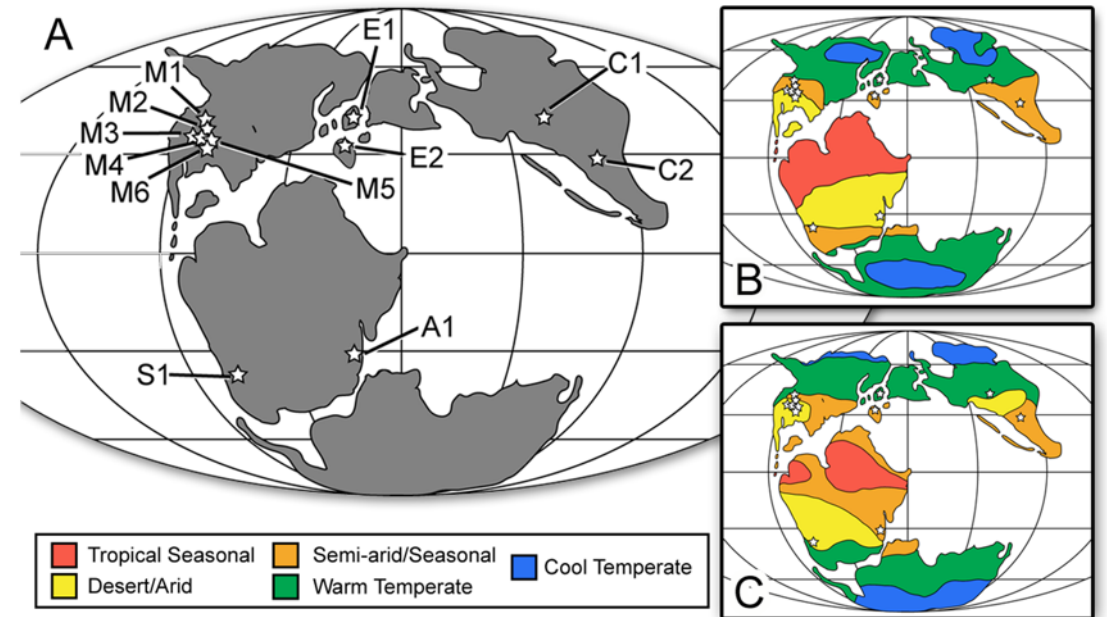
Living with environmental change

- Sustainable supply and use of water
- Coastal defences
- Infrastructure renewal
- Social inequality
- Urbanisation
- Migration
- A fairer, more sustainable world for all?



Geoscience research and climate change

- Confirming the climate emergency and ‘triangulating’ with observation and climate modelling
- Improving our understanding
- Informing our response



Education and communication

- Training the next generation of geoscientists to tackle the climate emergency
- Empowering the citizenry of today and tomorrow to be informed participants
- Informing and demanding action from policy-makers and business leaders




Responsibilities

- Individual
- Collective
- Societal



Responsibilities for geoscientists

- Individual
 - Collective
 - Societal
- 
- **Professional**
 - **Institutional**



Institutional leadership

- IGI: 'Geologists will play a key role in the response to the climate emergency, ecological breakdown and the energy transition... [IGI will] support a community of geoscientists that is... socially and environmentally responsible.'
- GSL: 'We promote social and environmental sustainability, responsibility and stewardship... [and] the role of geoscience in sustainable global development.'



**Serving science,
profession and society**
*A strategy for the Geological Society,
2017-2027*



 **The
Geological
Society**
serving science, profession & society

Delivering on these commitments

- Public and political engagement
 - Not lobbying, but be bold – don't shy away from the challenging topics...
 - Champion the science – don't equivocate to avoid upsetting vested interests...
 - Empower professionals to behave ethically and create positive change – especially those at the start of their career
- Build interdisciplinary and inter-professional links – vital to addressing societal challenges
- Ensure geoethics and social and environmental impacts are considered in geoscience education (e.g. through degree accreditation)



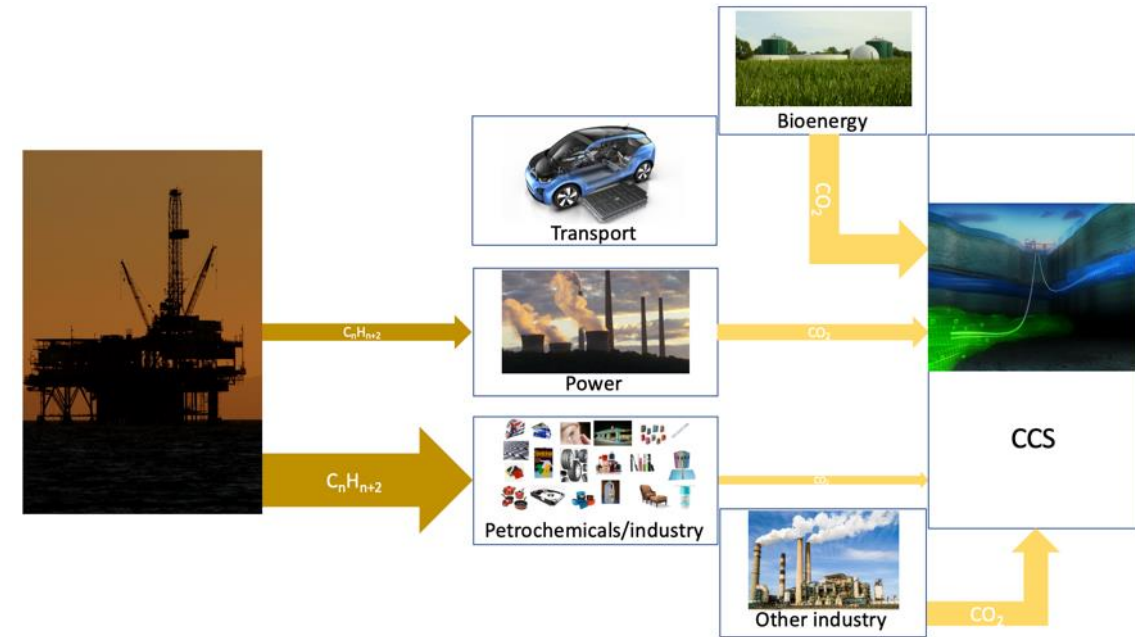
The responsible geoscientist

- Professional codes of ethics/codes of conduct are necessary but not sufficient to ensure ethical behaviour
- Geoethics – an evolving field of research and practice
- Act collectively!
- Geoscientists in leadership positions
 - Work to steer your company responsibly
 - Support and champion junior colleagues acting ethically



Responsibility in the hydrocarbons sector

- Champion the energy transition and rapid delivery of net zero emissions
- Lead the transformation of the hydrocarbons sector
- Lead delivery of CCS
- Value oil and gas as chemical feedstocks
- Ensure that a hydrocarbons transition is real and urgent, not window-dressing
- Consider what role the sector wants to play, and be seen to play...



Responsibility in the mining sector...



Maximise the positive impacts, minimize the negative impacts –
environmental, social, economic

(Don't win the mined resources needed to address climate change at the
expense of addressing other global challenges...)

Responsibility in the mining sector...

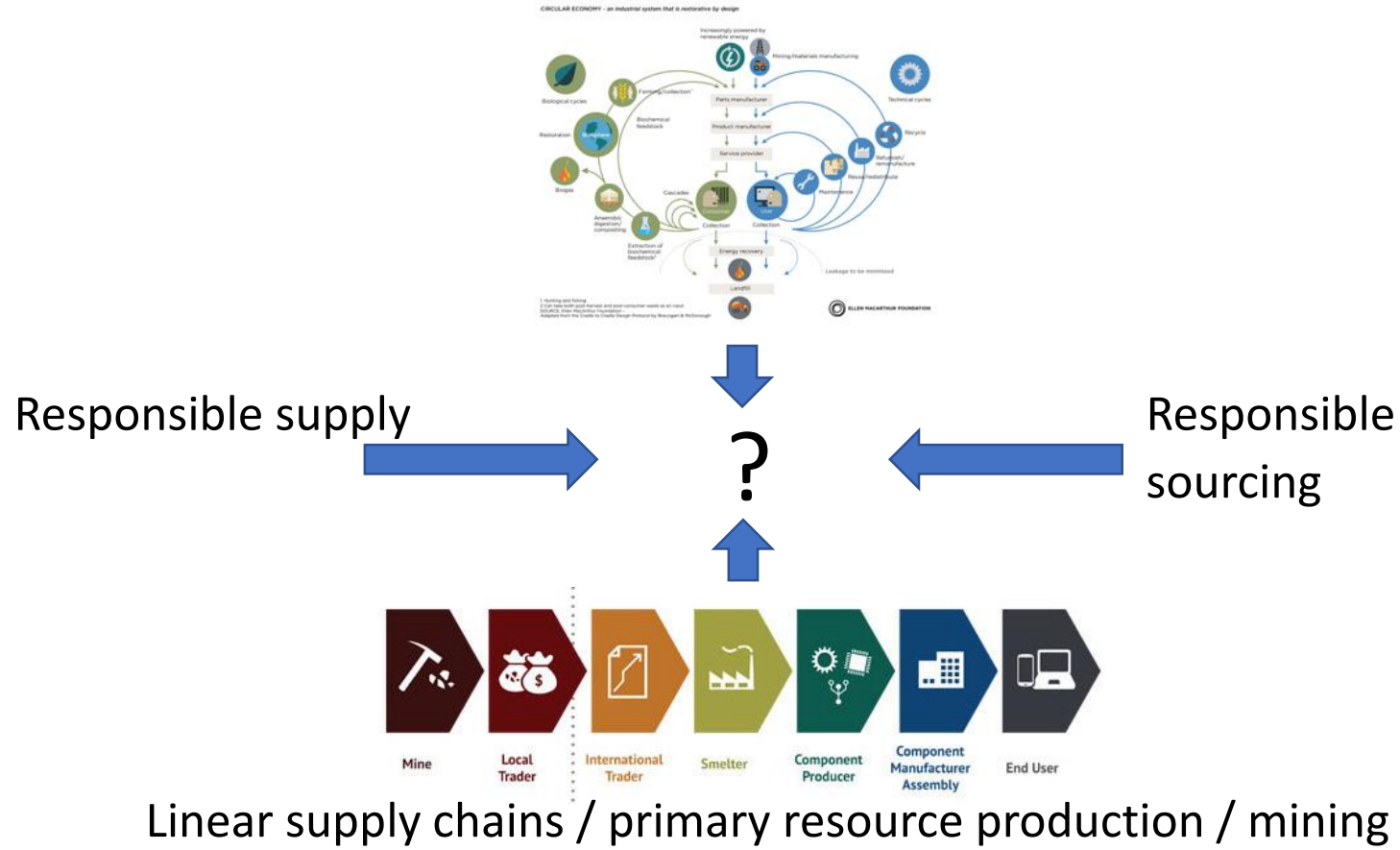


ALLIANCE FOR
RESPONSIBLE MINING

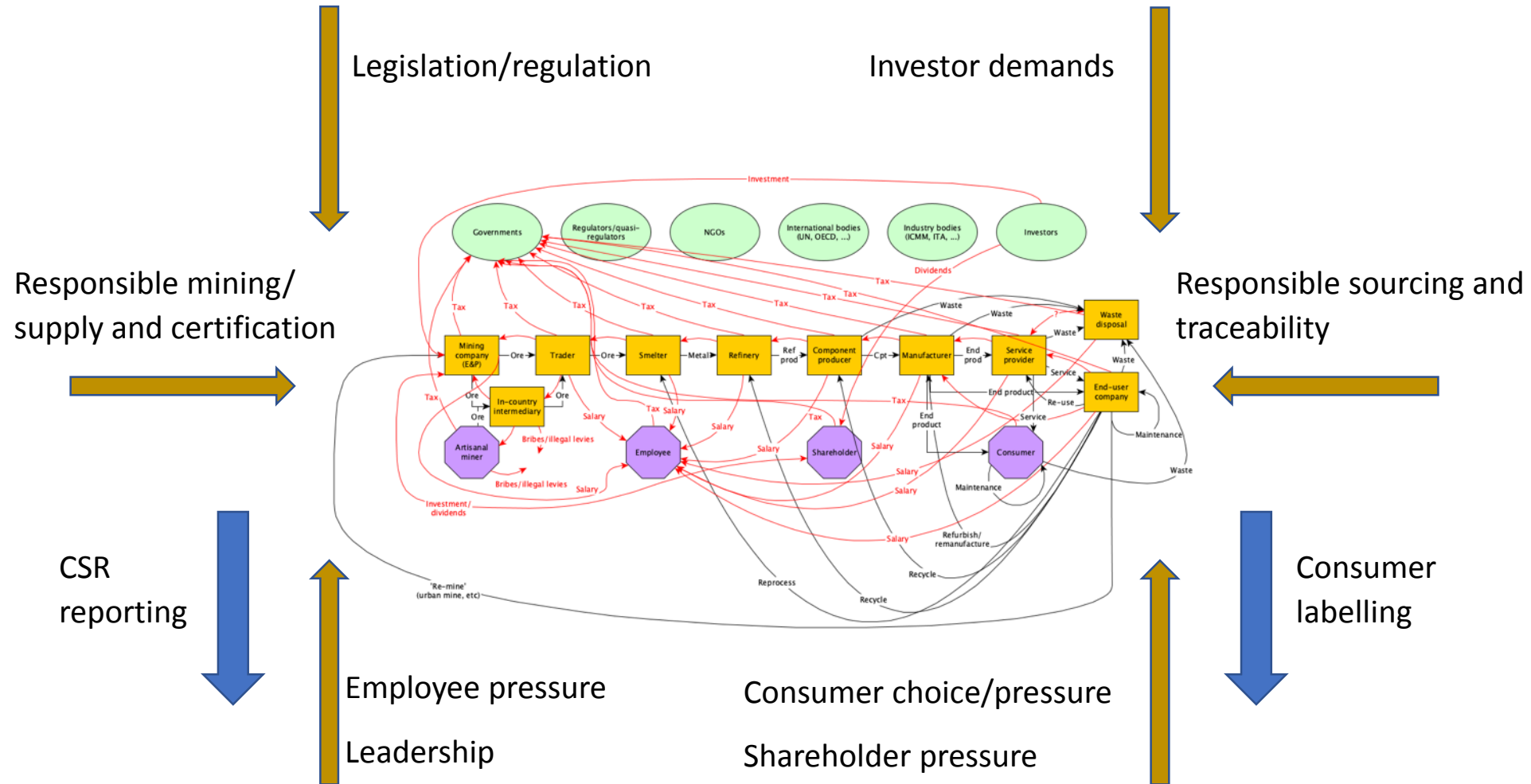


...and in mineral supply chains

Circular economy / secondary resource production / recycling etc



Transition to a 'new minerals economy'?





SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD



...a common purpose?

Geology for Global Development

- Championing the role of geology in sustainable development, and mobilising the geological community to help deliver the SDGs
- Strong student and early-career focus
- University groups
- Network of Professionals
- Lead geoscience presence at UN Forum on Science and the SDGs (2018 and 2019)
- And much more – visit www.gfgd.org...





3 GOOD HEALTH
AND WELL-BEING



Geology for Global Development 7th Annual Conference

EARTH SCIENCE, HEALTH & WELLBEING

Friday 15th November
Geological Society of London
7thgfgdconf.eventbrite.co.uk

2039...

- What sort of world do we want to live in?
- What sort of geoscience profession do we want to be?
- If we are bold and embrace change, we can...
 - ...do the right thing
 - ...be seen to be doing the right thing
 - ...attract talented, enthusiastic and principled people who want to make the world a better place into geoscience!



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