

THE ENERGY CHALLENGE

IEA Workshop on Socio-Economics of Fusion
Culham Science Centre
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UKERC in brief..

- roles: conducting research and co-ordinating a National Energy Research Network
- thematically organised:
 - demand reduction
 - future sources of energy
 - infrastructure and supply
 - cross-cutting issues including systems and modelling, advanced materials
- Centre functions:
 - mapping the research landscape
 - identifying research needs
 - Technology and Policy Assessment

UKERC: THE CONTEXT

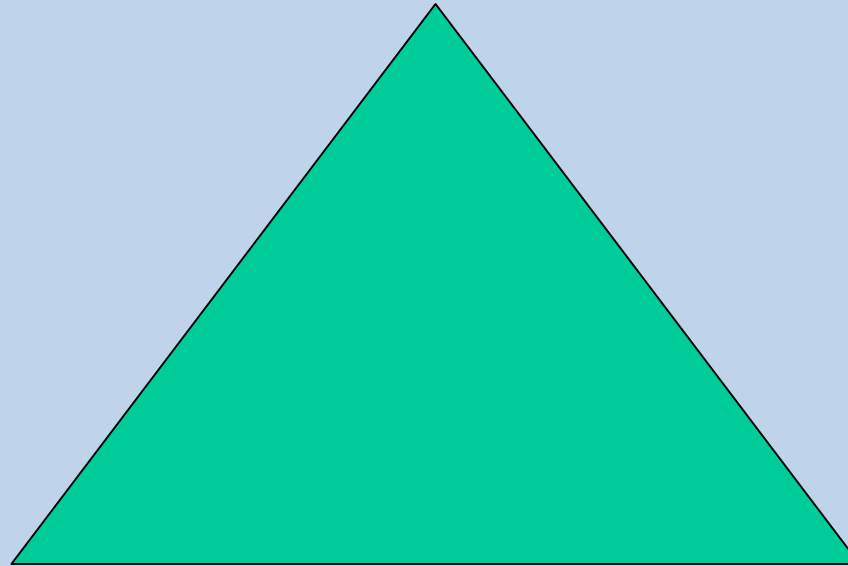
- sits within the Towards a Sustainable Energy Economy (TSEC Programme)
- sits alongside:
 - SUPERGEN Initiative (Sustainable Power Generation and Supply), EPSRC
 - Carbon Vision Partnership (Carbon Trust/research councils)
 - EPSRC fusion programme
 - Tyndall Centre on Climate Change

UK ENERGY STRATEGY

- put ourselves on a path to cutting CO₂ emissions by 60% by 2050
- maintain reliability of energy supplies
- raise the rate of sustainable economic growth and improve our productivity, through competitive markets
- (ensure that every home is adequately and affordably heated)

THE ENERGY POLICY TRIANGLE

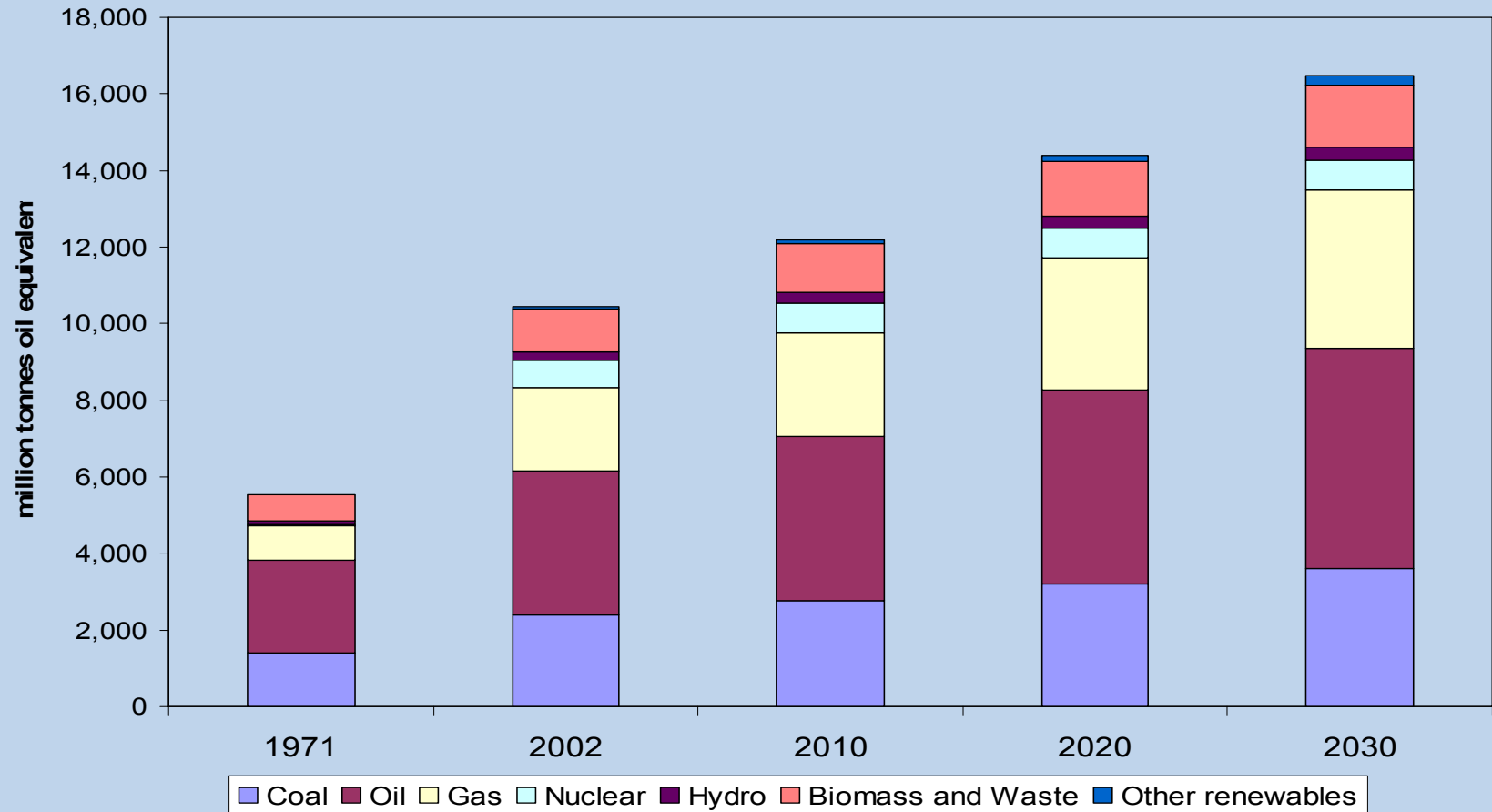
ENVIRONMENT



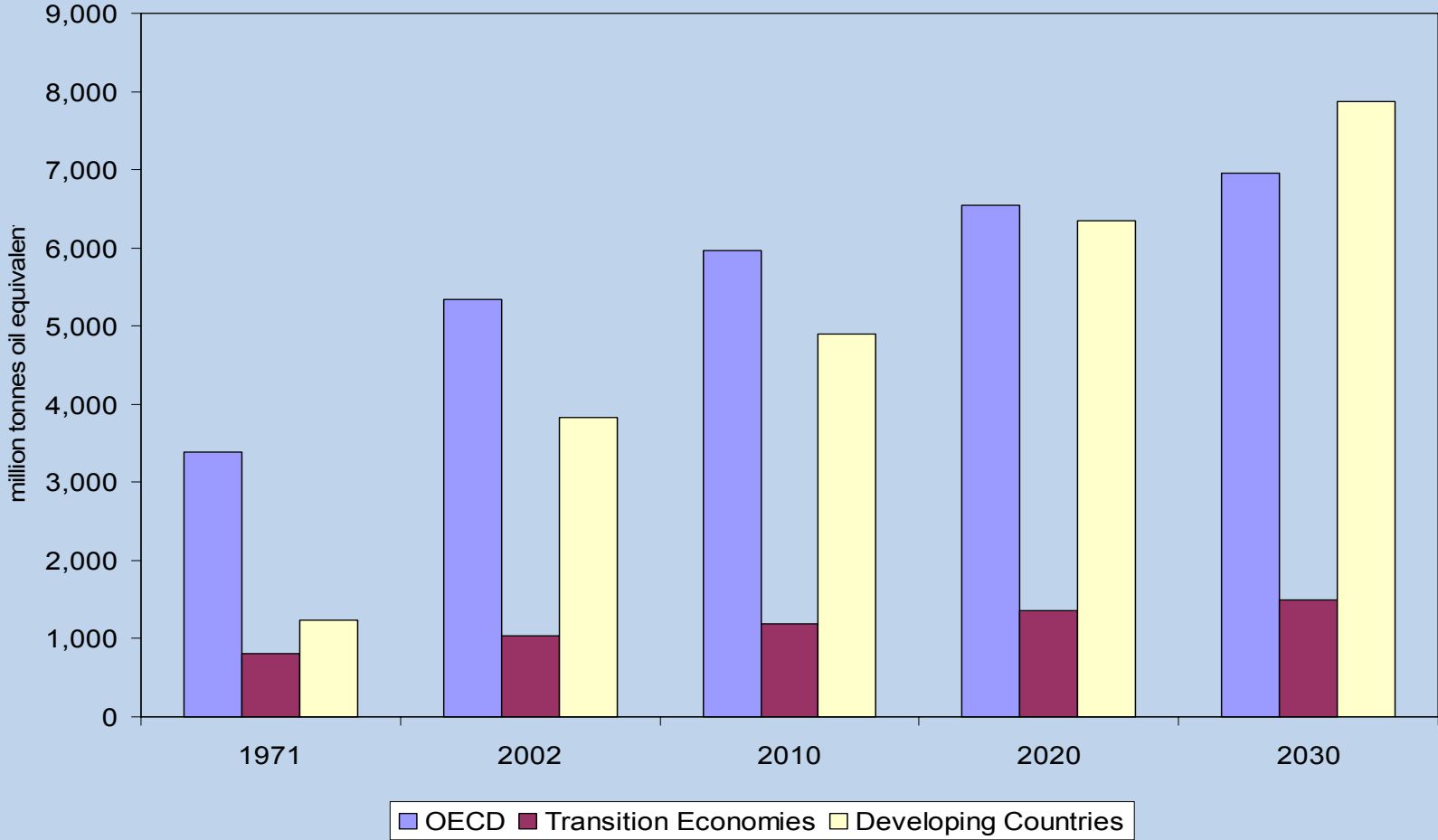
ECONOMICS

SECURITY

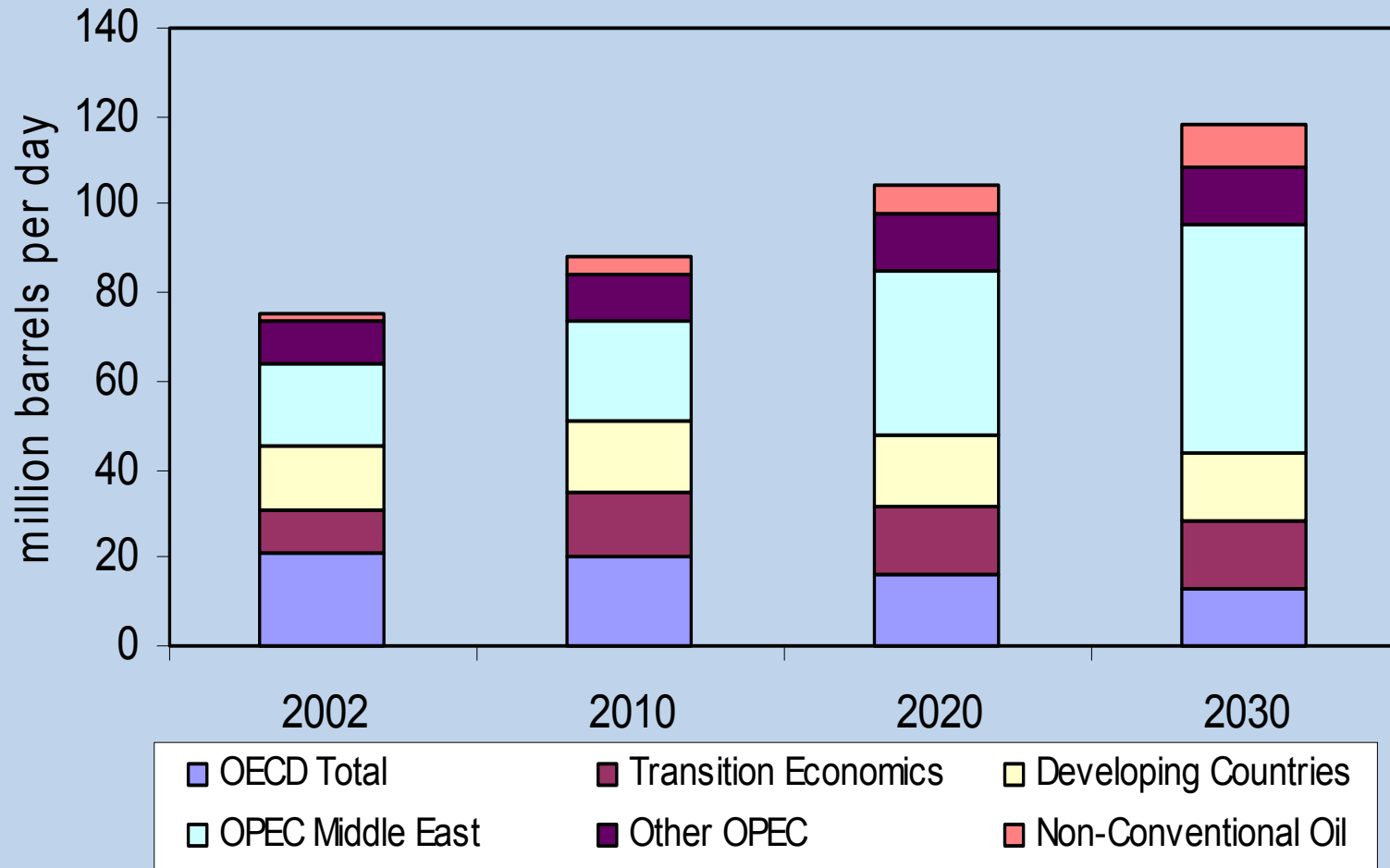
PROJECTED WORLD ENERGY DEMAND BY SOURCE



PROJECTED ENERGY DEMAND BY REGION



PROJECTED WORLD OIL SUPPLIES

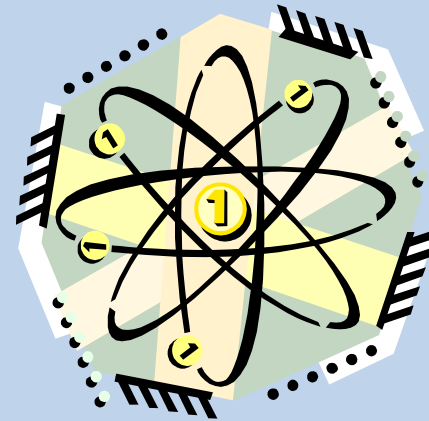


GLOBAL ENERGY CHALLENGES

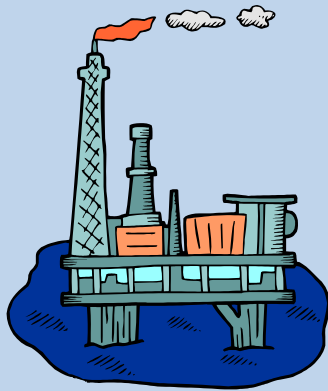
- climate change - long term deep CO₂ cuts needed, short to mid-term stepping stones for credibility, challenge of drawing in developing countries
- energy and development - outside Europe, development will require greater use of energy
- energy security - global reserves, concentration of supplies, network reliability
- the oil-transport nexus is strengthening not weakening = major source of energy insecurity - can technology weaken this link?
- the framework - liberalisation spreading, competitive (but regulated) markets becoming the norm

THE ENERGY OPTIONS

efficiency

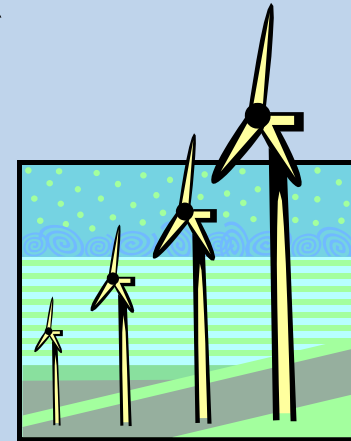


nuclear



fossil fuels with carbon capture and storage

+ *Long-term*: fusion;
the hydrogen economy



renewables

FUSION AND SOCIO-ECONOMIC ENERGY RESEARCH

- socio-economics in silos - not restricted to fusion!
- fusion research community not linked to broader energy research community - which is fragmented in any event
- timescales - commercial fusion starts when most scenarios stop
- socio-economic themes
 - economics
 - acceptability
 - system development
 - (institutions)
 - (policy and regulation)

ECONOMICS AND REGULATION

- will governments ever build power plants (other than demonstrations) again?
- how will regulatory systems evolve - will there be a planning element (e.g. IRP in US) or a “free” market (UK model)
- competitive markets bring investor risk. Need for transparency about rates of return and risk premia.
- question is not only cost. At what price for baseload power will investors become willing to provide capital.
- the challenge of “ordinariness”

THE POLITICAL ECONOMY OF FUSION

- will policies and measures translate computed external costs into market signals?
- political risk for investors associated with policies and measures - will governments stick to their guns?
- can governments construct institutional frameworks which will support innovative, large-scale generation facilities? (watch nuclear fission)
- how will acceptability play out when tested in real-life settings (planning inquiries etc)? Again watch fission.
- a policy/institutional roadmap for fusion?

WAYS FORWARD FOR SOCIO-ECONOMIC FUSION RESEARCH?

- closer links with the wider energy research community
- networking among scenario builders/modellers
- fora for comparing and contrasting models
- transparency of assumptions
- networking among researchers working on acceptability
- links to those working on energy infrastructure issues
- the fusion community's contribution to the mapping of energy research activity and energy technology roadmaps
- policies and institutional framework!

UK Energy Research Centre

www.ukerc.ac.uk