

2007: The Research Councils establish seven research networks in synthetic biology to bring together different disciplines, develop a common language and develop potential research projects.

2009: The Research Councils provide £2m of co-funding for the European Science Foundation's synthetic biology EUROCORES programme, EuroSYNBIO, including grants that aim to build an artificial genetic system and develop biomolecular building blocks that can be combined into a synthetic 'nanocell'.

2009: The Centre for Synthetic Biology and Innovation at Imperial College is launched with funding from the Research Councils.

2009: RCUK partners with the US National Science Foundation (NSF) to enable UK and US researchers to develop transformative synthetic biology projects.

2010: An MRes course in synthetic biology is established using Research Council funding.

2011: Joint funding from RCUK and the NSF supports synthetic biology research projects focussed on enhancing photosynthesis – the process by which plants harness sunlight to create food and fuel.

2011: Three international symposiums bring together the UK's Royal Society and Royal Academy of Engineering, the US National Academy of Sciences, US National Academy of Engineering and Chinese Academy of Sciences and Engineering to allow researchers, policy makers and companies to discuss synthetic biology.

2011: Working with the UK's Defence Science and Technology Laboratory, the Research Councils announce a £1.7m Joint Synthetic Biology initiative to fund 14 proof-of-concept research projects on the use of synthetic biology to meet national security and defence needs.

2012: Research Councils award a total of £20m for six large strategic synthetic biology projects in areas including biofuels and biotechnology; industry provides a £3m contribution.

2012: The Centre for Chemical and Synthetic Biology is established at the MRC Laboratory of Molecular Biology in Cambridge through a £2m enhancement to help provide resources to drive synthetic biology forward.

2013: To date, the Research Councils have invested more than £100m in synthetic biology research and training.

2013: A new Innovation and Knowledge Centre, SynbiCITE, is announced by Research Councils and the Technology Strategy Board (TSB). Based at Imperial College London, the centre aims to integrate university- and industry-based research in synthetic biology and translate that into industrial processes and products.

2013: Frontier engineering awards are announced for two synthetic biology projects at the Global Grand Challenges Summit. 'Scaling up synthetic biology' and 'Synthetic biology applications to water' are led by Imperial College London and the University of Glasgow respectively.

2013: The TSB and Research Councils award £5.3m to UK companies using synthetic biology to develop novel products and processes. The companies receiving the funding include several spinouts from Research Council-funded research.

2013: Twelve partner countries, including the UK and US, commit €15.5m to the European Synthetic Biology ERA-NET. The first call for research projects aims to build synthetic biology capacity through innovative transnational projects.

2013: As part of a larger 'Synthetic Biology for Growth' programme, the Research Councils invite applications for up to six multidisciplinary Synthetic Biology Research Centres.

2002: Spinout company TMO Renewables Ltd is founded to develop and commercialise bacteria that can produce bioethanol from waste. Funding from the Research Councils enables the company to develop its idea.

2006: Scientists at the University of Glasgow receive Research Council funding to study the structure and composition of microbial communities used in waste management which can be used in engineering design.

2009: A University of Glasgow researcher is awarded a Research Council Fellowship to develop mathematical models of microbial communities as a precursor to engineering and optimising these communities for wastewater treatment or for use in microbial fuel cells.

2010: Research Council scientists use the Diamond Light Source to take the first steps towards engineering a bacterial cell that can sense and respond to novel environmental cues. The groups show that it should be possible to design synthetic signalling circuits inside a cell, ultimately enabling the development of new biosensors.

2010: TMO Renewables signs a \$500m deal with US company Fiberight to build fifteen municipal waste-to-ethanol plants across the US over 20 years.

2010: Cardiff University and Rothamsted Research scientists receive RCUK funding to develop a synthetic biology approach to produce new and more useful versions of odour molecules called sesquiterpenes for use in pest control and, potentially, in medicine and perfumery.

2012: University of Bristol researchers, supported by the Research Councils, are using rational protein design to convert a water-soluble protein structure called CC-Hex into membrane-spanning proteins that could be used in desalination and water purification.

2012: Researchers at the University of Glasgow, with RCUK and NSF funding, are using synthetic biology to develop an artificial 'leaf' that uses energy from sunlight to produce liquid fuel, replicating the process of photosynthesis.

2012: RCUK-funded scientists synthesise a new molecule that captures the energy of light and uses it to drive useful chemistry. The activity of the new molecule is determined using the Central Laser Facility, providing information that will help develop artificial photosynthesis systems.

2013: A synthetic foot-and-mouth disease vaccine, made from engineered protein shells, is produced by RCUK-funded researchers.

2013: RCUK and the NSF fund a project which aims to build a synthetic nitrogen fixing unit, based on the cellular machinery that allows cyanobacteria to fix nitrogen, which can be transferred into a new bacterial host and ultimately into crops, reducing their dependence on nitrogen fertiliser.

2013: UK scientists receive £1m funding from the Research Councils to contribute to a global consortium building a synthetic version of the yeast genome. Once finished in 2017, the genome could help researchers create novel yeast strains to produce biofuels, vaccines and other valuable products.

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2007: A global consortia begin to develop a semi-synthetic artemisinin-based combination therapy for malaria by identifying the genes required to generate the artemisinic acid pathway in the wormwood plant and inserting this pathway into microorganisms.

2009: Bicycle Therapeutics Ltd is spun out of Research Council-funded research in Cambridge to develop and commercialise unique cyclic peptides that could deliver a new class of therapeutic drug.

2010: RCUK scientists redesign a cell's machinery for producing proteins so that it reads the genetic code in quadruplets. This system, which does not interfere with normal cellular processes, potentially allows the cell to use synthetic amino acids to produce proteins with unique properties that could deliver novel protein-like medicines.

2011: For the first time, Research Council scientists expand the genetic code of an animal (*Caenorhabditis elegans*) by incorporating synthesised amino acids into its proteins. This will enable the study of development, disease and neurobiology in model organisms with molecular precision.

2011: A millisecond pulse of light is used by Research Council scientists to activate an enzyme in mammalian cells. This will allow the study of single steps in cell signalling cascades, changes to which often lead to diseases, such as cancer.

2012: Scientists supported by the Research Councils expand the genetic code of a second model organism, the fruit fly *Drosophila melanogaster*, by incorporating synthesised amino acids into its proteins.

2012: Research Council scientists engineer enzymes that can copy DNA templates into 'XNA' polymers, which could play an important role in the construction of cellular 'factories' for producing new medicines and other useful compounds.

2013: Scientists at the University of Bristol, supported by RCUK, design small protein molecules that, when combined, form a hollow sphere. The spheres could form the basis of new vaccines, or deliver drugs to cells and diseased tissues in the body.

2013: Using bacteria engineered with novel gene pathways, UK scientists discover the molecule that inhibits HIF-1, the protein that enables the survival of cancer cells at low oxygen levels. The identification of this molecule could lead to new cancer treatments.

2013: RCUK-sponsored chemists from the University of Bristol develop a method to create synthetic prostaglandins in only seven steps – compared to 20 using conventional technologies. Prostaglandins regulate a range of activities including blood circulation, digestion and reproduction in the human body.

2000: The Genetically Modified Organisms (Contained Use) Regulations (2000) come into force in the UK, regulating the use of GMOs in contained environments such as laboratories, industrial plants or greenhouses. Such regulations also apply to GMOs created via synthetic biology.

2002: The Research Council-funded Genomics Network is established to examine the social impact of the development and use of genomics and emerging developments in life sciences, including synthetic biology.

2002: The Genetically Modified Organisms (Deliberate Release) Regulations (2002) come into force, implementing a 2001 EU Directive for the release of GMOs into the environment for commercial or research purposes.

2004: Regulations on the use of GMOs in food and animal feed are implemented in England, following the publication of an EU Directive in 2003.

2008: The report 'Synthetic Biology: social and ethical implications' which was commissioned by the Research Councils, is published. It identifies ethical and social concerns, and recommends that researchers continue to engage with broader society and regulators to discuss the implications of synthetic biology.

2007: BBSRC's Bioscience for Society Strategy Panel forms a synthetic biology subpanel to provide strategic input on the social implications of the new technology.

2010: RCUK, together with Sciencewise Expert Resource, commission and run a public dialogue on synthetic biology to ensure that future policies reflect the views, concerns and aspirations of the public.

2012: An independent panel of experts, including those from academia, industry and the Research Councils, produce a Synthetic Biology Roadmap for the UK to provide the vision and direction for supporting a world-leading synthetic biology community in the UK.

2012: A review by the UK Health and Safety Executive concludes that synthetic biology is currently covered by regulations aimed at controlling GMOs, including the Environmental Protection Act (1990).

2012: The Synthetic Biology Leadership Council is established by the UK Government to provide strategic coordination between funding agencies (including RCUK and TSB), researchers, industry, government sponsors and others. It will shape priorities for synthetic biology research and oversee delivery of the recommendations from the UK roadmap.