

Academy EASAC, ALLEA and ICSU International Delegates Report 2016

Table of Contents

| | |
|---|----|
| Foreword | 1 |
| Introduction | 2 |
| EASAC | 3 |
| Michael B. Jones | 4 |
| Richard O’Kennedy | 5 |
| Mark J. O’Malley | 7 |
| Dr Aifric O’Sullivan | 9 |
| Bert Rima | 11 |
| Geraldine A. Cusack | 13 |
| ALLEA | 16 |
| Dr Maura Hiney..... | 17 |
| Imelda Maher | 19 |
| Cliona Murphy | 20 |
| Natalie Harrower | 22 |
| International Council for Science | 23 |
| Luke Drury | 24 |

Foreword

‘The Academy is “punching above its weight” on the European and broader international stage.’



Professor Peter McHugh

MRIA, Policy and International Relations Secretary
NUI Galway

The Royal Irish Academy is very actively engaged with a number of international associations of academies, in particular the European Academies’ Science Advisory Council (EASAC), the Federation of All European Academies (ALLEA) and the International Council for Science (ICSU). These are highly active associations focused on promoting the academic mission for the betterment of humanity, society and the natural world. They do so through engaging in high-level policy-generation projects, such as pan-disciplinary projects concerned with the development of science education policy and the establishment of a code of conduct for research integrity, and specific sector-focused projects such as the development of policies for energy storage, food and nutrition security, and genome editing for human healthcare. In all such activities a truly inter- and multi-disciplinary approach is taken, harnessing the talents of the key opinion leaders in the relevant areas through the membership of the constituent national academies and their external contacts.

As is clearly evidenced by the contents of this report, the Royal Irish Academy is heavily involved in a broad range of activities within these associations, in many cases through project leadership roles, and consequently is making key contributions to the development of future European and international policy in the relevant domains. This is something we should be very proud of; from what I have seen from my own participation at ALLEA and EASAC general assemblies, for example, since taking up the role of policy and international relations secretary in 2016, I can directly attest to the high-profile and hugely positive contribution that the Academy is making to these efforts, and the high esteem and respect that is afforded to us on the European and international stage, all the result of significant positive efforts made by our membership, officers, staff and external nominees over many years. We are certainly ‘punching above our weight’!

I wish therefore to express my sincere thanks to those who represent the Academy and Ireland in these international Working Groups and associated projects. Significant time and energy is demanded, but it is clearly evident this is given generously and enthusiastically, and for this the Academy is extremely appreciative. I should express a special word of thanks to our former president, Luke Drury, for his positive and continued engagement with ICSU on behalf of the Academy. Finally, I need to express my thanks to the hard-working and always positive and helpful Academy staff for making it all happen.

Introduction



Ms Sinéad Riordan

RIA Head of Policy and International Relations

Higher education and research thrives on the flow of people, ideas and learning and in support of this the Royal Irish Academy pursues and identifies opportunities to showcase the very best Irish researchers and experts on the European and global science policy stage.

The Academy is particularly excited by the opportunities arising from the newly created Science Advice for Policy by European Academies (SAPEA), launched in December 2016 by the European Commission. SAPEA works within the European Scientific Advice Mechanism and is an initiative of the five European academy networks (ALLEA, EASAC, Euro-Case, Academia Europea and FEAM). It pulls together timely, independent and evidence-based scientific expertise from more than 100 European academies from over 40 countries to contribute to the highest-level policy debate in Europe for the benefit of policy and public information and awareness.

The Academy was successful in its March 2017 nomination of an Irish expert to a current SAPEA project, 'Food from the Oceans' to help the Science Advice Mechanism (SAM) in its consideration of how more food and biomass can be obtained from the oceans in a way that does not deprive future generations of their benefits. The formation of a scientific opinion on this topic is expected by the end of 2017.

Initial reports suggest that the Commission is already reaping much benefit from access to this network of experts from the humanities, social sciences and sciences and the Academy will grow its strategic engagement with SAPEA over the coming years.

The benefits accrue in multiple ways: not only do Irish researchers and experts offer their expertise to global and European science policy debates but the learning from these debates is brought home and conveyed to interested and relevant parties in government, higher education, industry and others. Our successful Breakfast Briefing Series brings together policymakers, business, civil society and academia to debate the implications for Ireland of European science policy reports.

We continue to be active members of long-standing academic and research networks bringing together academies across Europe and globally, such as ALLEA, EASAC and ICSU. Through its participation in EASAC and ALLEA, in particular, the Academy contributes to the development of high-quality science advice on a range of issues of interest to policymakers both nationally and internationally. Through our membership of Steering Panels and Permanent Working Groups in EASAC and ALLEA the Academy contributes to the strategic identification of policy issues as well as nominating experts to participate in policy projects.

Our thanks as always to those who, acting on the Academy's behalf, offer their time and expertise to participate in Working Groups, and to review and draft papers.

The European Academies Science Advisory Council

www.easac.eu

European Academies



EASAC – the European Academies’ Science Advisory Council – is formed by the national science academies of the EU member states to enable them to collaborate with each other in providing independent science advice to European policymakers. It thus provides a means for the collective voice of European science to be heard. EASAC was founded in 2001 at the Royal Swedish Academy of Sciences.

With the growing importance of the European Union as an arena for policy, national science academies recognise that the scope of their advisory functions needs to extend beyond the national to cover also the European level. Through EASAC, the academies work together to provide independent, expert, evidence-based advice about the scientific aspects of public policy to those who make or influence policy within the European institutions. Drawing on the memberships and networks of the academies, EASAC accesses the best of European science in carrying out its work. Its views are vigorously independent of commercial or political bias, and it is open and transparent in its processes.

EASAC activities include:

- substantive studies of the scientific aspects of European policy issues
- reviews and advice about policy documents
- workshops aimed at identifying current scientific thinking about major European policy issues
- workshops aimed at briefing policymakers
- short, timely statements on topical subjects
- lay summaries aimed at communicating with non-expert audiences.

Report of the Academy's Nominee to the EASAC Environment Steering Panel



Professor Michael B. Jones

MRIA, Trinity College Dublin

*Professor Mike Jones was elected a member of the Royal Irish Academy in 2003. He is Emeritus Professor of Botany at Trinity College Dublin. His main research interests are in plant ecophysiology, which involves the study of climate-plant interactions, particularly the effects of changing climate, and the direct effects of rising CO₂ on agricultural and natural grasslands. He is internationally recognised for his research on plants with C₄ photosynthesis, their adaptation to temperate climates and their potential uses as energy crops. He is currently subject editor of *Global Change Biology* and *GCB-Bioenergy* and has published over 120 refereed research papers in lead international journals as well as four books and many book chapters. He was appointed a member of the EASAC Environment Steering Panel in November 2016.*

The EASAC Environment Steering Panel is chaired by Lars Walloe (Norway). Environment Programme Director Mike Norton (Japan / UK) is responsible for the Panel's general organisation and day-to-day business. The Panel meets normally twice yearly to discuss the latest issues of concern to the environmental science community, general strategy and decisions on project proposals.

The EASAC Environment Programme provides independent and leading-edge scientific assessments and advice to EU environment policy communities, drawing together experts from across the science academies of the EU. Topics are selected by EASAC Council on the basis of advice from the Environment Steering Panel and can encompass a wide range of environmental issues of priority interest to the EU (such as climate change, air and water quality, wastes and resources, biodiversity, ecosystems and sustainability).

The development of a circular economy remains a critical issue in the European Union. The EU needs to choose the right approach to indicators of progress and 'critical materials' to achieve its circular economy objectives of reducing environmental impact and increasing European competitiveness. The EASAC Council recognised that review of this issue requires a combination of science, technology and social sciences and cannot easily be compartmentalised into one or the other. They therefore made a decision to actively engage, for the first time in a major project, social scientists. The results of that original project was a statement released in November 2015 and this has been followed by two reports, 'Indicators for a Circular Economy' and 'Priorities for Critical Materials in the Circular Economy', released in November 2016, which take a rigorous approach to the factors that must be considered if Europe is to achieve the circular economy. A member of the Circular Economy Working Group was Geraldine A. Cusack from Siemens Ireland.

During 2017 the Steering Panel intends to release two reports, on 'Sustainability and Multifunctionality in European Forests' and 'Sustainability of Soils in Europe', as well as a short note on 'Negative Carbon Emissions'.

Report of the Academy's Nominee to the EASAC Biosciences Steering Panel Steering Panel



Professor Richard O'Kennedy
MRIA, Dublin City University

Professor Richard O'Kennedy was elected a member of the Royal Irish Academy in 2014. He is a founding member and Professor in the School of Biotechnology in Dublin City University (DCU). He has supervised 65 PhDs, published extensively (over 230 peer-reviewed papers, 30 reviews, 40 book chapters, two books), reviews for many journals and international scientific bodies, has several patents and licensed technologies/reagents and works closely with Irish/international companies. Currently he is president of both the Institute of Biology of Ireland and the London International Youth Science Forum.

The objective of the Biosciences Panel is to explore where the scientific evidence base can help to inform policy development in priority areas for the European institutions, particularly in health and agriculture and in the progression of novel technologies with potentially multiple applications. EASAC's Biosciences Panel is very active in preparing papers and views on topics of key importance to scientific research, specifically in Europe but also globally. It has members drawn from across the EU and their level of expertise and inputs are very impressive. The value of EASAC is that it provides an excellent opportunity for interaction with other European academies with the aim of presenting a scientifically informed view that has wide support, is viewed positively by the EU and the associated legislators and ensures that key issues are addressed in a timely fashion.

I represent the Academy at meetings of EASAC's Biosciences Steering Panel. In cases where the topic area is outside my expertise it is referred to the Academy and input from members within the Academy, with the relevant expertise, is requested to ensure very active participation from this learned society.

Several significant issues have arisen over the past twelve months.

Genome editing

There is considerable interest in this topic in many EU member states. There are forthcoming meetings in Hungary and Ireland (the latter stimulated in part by the EASAC scoping document) and EASAC is developing a report on genome editing to be launched in June 2017.

Balance between fundamental and applied research

My inputs have focused on this area and it was discussed at EASAC and in the Academy. The paper developed was further modified, based on discussions with both groups, with the hope of publishing it in 2017. All countries have recognised the importance of the balance between basic and applied research and the need to maintain a very healthy pipeline for novel ideas.

Homeopathy

The level of control and deficiencies in this area were highlighted at EASAC by representatives Sweden. A discussion paper was developed and further work is underway to develop a more detailed report.

Use of animals in scientific research

This is an ongoing issue. It is vital that all countries in EASAC continue to address this topic and actively engage with the public to explain the value and importance of animal research. While it is essential that animal use is minimised it must be emphasised that it is still of major importance for the development of new diagnostics and ensuring the safety of therapeutics and devices.

Science Advice Mechanism

EASAC is reviewing its own strategy in this area. It is deemed to be a highly important function of EASAC where it can generate well-researched and balanced reports that can be used to inform decision makers. Potential future topics suggested are:

- antimicrobial resistance
- robotics
- horizon-scanning for understanding brain function and new approaches to tackle mental health problems
- inequalities in public health.

A joint meeting took place between the Panels of EASAC in order to ensure good communications while highlighting areas of mutual interest. The joint Bioscience and Environment Steering Panel meeting discussed food and nutrition security, including land use and soil sustainability and the impacts of climate change on food, health and agriculture. The effects of livestock farming on greenhouse gas emissions and climate and problems with invasive species and the spread of disease were highlighted.

The EASAC Panels provide very important discussion forums for widely diverse topics that can call on the expertise and knowledge of scientists from all over Europe. The Bioscience Panel depends to a very large degree on excellent secretarial inputs from the UK and it is vital that this is maintained in the future.

Report of the Academy's nominee to the European Academies Science Advisory Council Steering Panel on Energy



Professor Mark J. O'Malley
MRIA, University College Dublin

Professor Mark O'Malley was elected a member of the Royal Irish Academy in 2008 and is a Fellow of the Institute of Electrical and Electronic Engineers. He is Professor of Electrical Engineering at University College Dublin (UCD) and founding director of the Electricity Research Centre, a multidisciplinary, multi-institutional, industry-supported research activity. Mark is also co-founder of the International Institute for Energy Systems Integration (iiESI), a global community of scholars and practitioners engaged in developing an efficient world energy system, and coordinator of the European Energy Research Alliance Joint Programme in Energy Systems Integration. He is recognised as a world authority on grid integration of renewable energy and has active research collaborations in Europe, China (Tsinghua University and State Grid China) and the United States (Department of Energy National Renewable Energy Laboratory). Mark was appointed to the EASAC Energy Steering Panel in 2010 following his participation in the study on Transforming Europe's Electricity Supply – An Infrastructure Strategy for a Reliable, Renewable and Secure Power System.

Background

The remit of the Steering Panel on Energy is to provide independent expert advice from member academies on the scientific and technical issues impacting on Europe's energy policy. The Energy Programme draws upon leading scientists and engineers who are working in Europe on energy issues, to develop robust advice on key questions pertaining to energy. The Steering Panel advises on the focus of the Energy Programme, peer reviews outputs, and makes inputs to energy debates internationally. Once a project has been agreed upon by the Steering Panel, Working Groups are formed to formulate EASAC'S response.

Summary of Panel activities¹

Meetings

The Panel met in the Royal Belgian Academy of Arts and Sciences in Brussels on 25 October 2016. New members have been nominated by Switzerland and Norway, and these new members bring additional expertise in energy for transport and in energy and climate policy.

¹Edited extract from Dr William Gillett, EASAC Energy Programme Director Progress Report, May – November 2016.

Current projects

Electricity storage (chaired by Mark O'Malley) – The project has been ongoing since 2015. A final meeting was held in Dublin on 24 March 2016, in conjunction with an open workshop on Energy Storage in Electricity Grids on 23 March. The event was hosted by the Royal Irish Academy and UCD, and was attended by delegates from industry and academia. The report has now been finalised and completed a peer review process. The report is scheduled to be launched in Brussels on 19 June 2017. A local launch event at the Academy is being planned for 7 September 2017.

- **Sustainable Forests (with EASAC Environment Panel)** – The third project meeting was held in February, preceded by an open workshop at which presentations were given by Commission experts. The main findings were presented by Prof. Jaana Bäck of the University of Helsinki at a conference organised by the Commission DG Environment on 23 May 2016. Publication of the final EASAC report is scheduled for late Spring 2017.

- **Smart Villages** – Following on from a scoping study in 2012 funded by the Malaysian Commonwealth Studies Centre (MCSC), EASAC and MCSC are undertaking a study of sustainable energy provision to enable the creation of 'smart villages' in Africa, Asia, the Caribbean and in Central and South America. A progress report was given by Sir Brian Heap to the Energy Steering Panel during a meeting in Oslo. The Smart Villages Reference Group commented on a draft outline of a new report for policymakers towards the end of 2016. This new report, which will be produced jointly by EASAC and the Smart Villages Initiative, will summarise findings and recommendations up to early Spring 2017.

Looking to the future

The Panel proposed that work on a new project entitled 'Integrated energy options for meeting Europe's Paris COP21 emission targets – Project 1: Decarbonisation of Transportation' begin in 2017. This is to be the first of a series of related energy projects, aiming to examine the scientific, technical, environmental and economic implications of energy integration options, which could help to achieve the GHG emission reductions that the EU must meet in order to deliver its specific COP21 target for 2030 as well as, on a longer term, to make an appropriate contribution to keeping global warming below 2° in this century (Paris Agreement in December 2015).

Report of the Academy's Nominee to the EASAC Working Group: Food, Nutrition, Security and Agriculture



Dr Aifric O'Sullivan
University College Dublin

Dr Aifric O'Sullivan is a Principal Investigator in the UCD Institute of Food and Health and member of faculty in the UCD School of Agriculture and Food Science. She joined UCD as an Assistant Professor in Human Nutrition in 2012 from the University of California, Davis. Her research focuses on early origins of malnutrition and the major global challenge of providing food and nutrition security for all. She is a member of the Board of Trustees for UCD Volunteers Overseas and is a deputy director of the UCD Childhood and Human Development Research Centre.

Global food systems present complex challenges for the science community. Demands on global food systems such as climate change, population growth, economic equality and instability make it even more difficult to deliver food and nutrition security for all. The Sustainable Development Goals (2015) provide a framework for meeting the challenges posed, but require engagement from science to address the complexities of evidence-based policies and programmes, so that goals can be realised.

The EASAC Working Group on Food, Nutrition, Security and Agriculture is contributing to a larger project organised by the InterAcademy Partnership (IAP) to provide scientific recommendations on the topic of 'Food and Nutrition Security and Agriculture' (FNSEA) to policymakers and the public at a global level. The IAP initiative calls on regional academy networks in Europe (EASAC), Africa (NASAC), Asia (AASSA) and the Americas (IANAS) to present the opportunities and challenges for the science-policy interface, advise on ways to increase food and nutrition security and identify how inter and trans-disciplinary research can contribute to resolving issues for agriculture and food systems. Reports from the four regional networks will form the basis of a global report.

The EASAC Working Group is Chaired by Prof. Joachim von Braun, Director of the Centre for Development Research (ZEF) at University of Bonn, and Prof Volker ter Meulen, Co-Chair of the IAP.

Working Group Report 2016

The Working Group includes experts from a range of disciplines, nominated by national academies of science across Europe. The Group started work in early 2016. The first meeting took place in Brussels in April 2016 and participating experts discussed the common IAP themes and agreed on EASAC objectives aligned with the thematic goals of regional projects as specified by the IAP.

The aim of the Working Group is to explore and clarify where there is consensus on key questions, and to advise where further assessment of the issues is required with particular regard to:

- Facilitating the translation of scientific advances into applications for societal benefit and into informing the choice of policy options;
- Identifying where there are particular scientific opportunities for inter- and trans disciplinary research throughout food systems;
- Emphasising that what happens in the EU often has significant international ramifications.

The EASAC 'Food, Nutrition, Security and Agriculture' report reflects the IAP themes and the EASAC objectives. I took the lead in writing Chapter 5, 'Nutrition, consumption patterns and health', which focuses on 'Policy opportunities', 'Scientific frontiers in nutrition' and 'Innovative foods and innovative, sustainable diets', drawing on existing European programmes and identifying gaps that require further attention. In brief, the evidence supports a call to align nutrition, agriculture and economic policies in Europe, paying attention to consumer views and vulnerable sub-groups to benefit public health. New technologies in nutrition and consumer research will not only contribute to improve understanding of complex food and health interactions, but will also help to inform and change behaviour towards healthy sustainable diets. Finally, collective engagement along the chain from production to the public is required to maximise innovative solutions to current and future nutrition and health challenges.

The EASAC report takes a systems approach to food and nutrition security, assessing issues horizontally from climate to environment and food systems, as well as cross-cutting themes such as agriculture, nutrition and health. While the focus remains on Europe, the report places great emphasis on local-global interconnections. A number of key research questions remain with regards to sustainable nutritious diets, from the supply and demand perspectives. We need to be ambitious to capitalise on scientific opportunities, but this can only happen with input and investment from producers, manufacturers, policymakers and the public.

Working Group Agenda 2017

The EASAC 'Food, Nutrition, Security and Agriculture' report will be published in 2017. In addition, the EASAC Working Group will meet at the second plenary meeting of the IAP project which will bring together members of all regional groups to discuss respective progress and next steps.

Report of the Academy's Nominee to the EASAC Working Group: Genome Editing – Scientific Opportunities, Public Interests and Policy Options in the EU



Professor Bert Rima
MRIA, Queen's University Belfast

Bert Rima was appointed Professor of Molecular Biology in 1993. His main research interest is to use techniques to genetically modify human pathogenic viruses such as the mumps and measles viruses and the evaluation of the mutant viruses in animal model systems including ferrets and macaques. His work now centres primarily on viral evolution and how viruses are attenuated for vaccines and what barriers prevent animal viruses from infecting humans and vice-versa.

Genome editing, the deliberate alteration of a selected DNA sequence in a cell using site-specific DNA nucleases, has become an important tool in basic research. Genome editing has been described by some as a transformative technology and, certainly, in some areas of research and innovation, it is transforming expectations and ambitions. Genome editing has the potential to specifically modify individual nucleotides in the genome of living cells, and together with a growing ability to monitor and reduce off-target effects, it brings new opportunities within range. Because of its general applicability (in microbial, plant, animal and human cells) it has a very wide range of potential uses to tackle societal objectives.

The advent of genome editing has evoked enthusiasm but also controversy. Concerns have been expressed, by some NGOs for example, that genome editing is 'not natural', that there are too many gaps in our knowledge, that impacts are uncertain and may be inequitable, and that regulation cannot keep pace with the speed of technological innovation.

Working Group Recommendations in the Area of Control, EU regulation and Mitigation

Present knowledge gaps and uncertainties emphasise the need for more basic research. We expect that research advances will fill many of the current knowledge gaps and that progressive refinement of genome editing tools will further increase their efficiency and specificity, thereby reducing off-target effects. EASAC anticipates that the fast pace of change in research and innovation will continue and is willing to return to the subject of this report in due course to review our assessments.

EASAC concludes that policy considerations should focus on the applications in prospect rather than the genome editing procedure itself as an emerging technology. It is important to ensure that regulation of applications is evidence-based, takes into account likely benefits as well as hypothetical risks, and is proportionate and sufficiently flexible to cope with future advances in the science. A number of recommendations will be made specific to the area of genome editing in plants, animals and microbes as well as the clinical use of the technology in human medicine. In the latter area the group has not made any new observations or recommendations that have

not already been made by other academies and the Federation of European Medical Societies. A number of general recommendations for cross-cutting issues have been identified as:

- Public engagement – There has to be trust between researchers and the public and, in order to build trust, there has to be public engagement. Stakeholders, including patients, clinicians, farmers, consumers and NGOs, need to be involved in discussions about risk and benefit and scientists need to articulate the objectives for their research, potential benefits and risk management practices adopted. There is need for additional social sciences and humanities research in order to improve public engagement strategies.
- Enhancing global justice – There may be a risk of increasing inequity and tension between those who have access to the benefits of genome editing applications and those who do not, although the widespread adoption of the technique might facilitate the sharing of benefits. The scientific community must work with others on the determinants to narrow the societal gap: for example, by active knowledge transfer, collaboration between researchers worldwide, open access to tools and education, and education efforts. It is also vital for EU policymakers to appreciate the consequences, sometimes inadvertent, of EU policy decisions on those outside the EU. There is evidence that previous decisions in the EU (for example, on GMOs) have created difficulties for scientists, farmers and politicians in developing countries. Reforming current regulatory frameworks in the EU and creating the necessary coherence between EU domestic objectives and a development agenda based on partnership and innovation is important for developing countries as well as for Europe.

The Working Group will produce its report in the Spring of 2017 and no further meetings are envisaged.

Report of the Academy's Nominee to the EASAC Working Group: Circular Economy



Geraldine Ann Cusack

Siemens Ireland

Geraldine A. Cusack is a chartered engineer and a chartered water and environmental manager and has a Bachelor's degree in Geology (engineering) and Master's degree in Energy (economics & enviro-legislation). Geraldine's technical background (geological engineering, mineral resources and environmental hydrogeology) and project work has been focused on environmental consulting throughout the US, in Ireland and the UK, Azerbaijan (Baku) and Chile (Antofagasta). Geraldine works in the Energy & Environmental Services (Sustainability) division of Siemens Industry (Digital Factories) in Dublin and helps to drive and implement sustainable solutions for industry through the mechanisms of electrification, automation and digitisation. Previously, she worked in the Meath County Council Local Authority Infrastructure and Environmental departments on water infrastructure and energy management. Prior to working in the Irish public sector her career was in environmental engineering consulting for oil and gas upstream/downstream, pharmaceutical and mining industries in the United States. In April 2015 Geraldine was nominated by the RIA to be a member of the European Academies Science Advisory Council (EASAC) on the Circular Economy (CE) Working Group.

In 2013 /14 intensive debate took place within the European Commission and Parliament on the Circular Economy (CE) regarding an initial CE package presented in July 2014, titled 'Turning waste into a resource – Moving towards a "circular economy"'. It was withdrawn and a new CE package was presented in December 2015, titled 'Closing the Loop'.

The CE involves an inseparable combination of science, technology and social sciences and cannot easily be compartmentalised when discussing the development of a CE, so EASAC Council decided to actively engage social scientists in a Circular Economy Working Group. The result of the EASAC project was a statement released in November 2015 addressing some of the issues related to the CE from the perspective of the natural and social sciences.

The EASAC Statement, titled 'Circular Economy: a commentary from the perspectives of the natural and social sciences', was published in November 2015 to help inform EU plans for revised proposals (for a more ambitious CE strategy). The focus of the group's work considered the potential economic and climate change benefits of increasing the efficiency with which resources are used in the EU, and thereby contributing to the EU vision of a 'resource-efficient Europe' which is an important part of the 'Europe 2020 Strategy'.

Specific points raised in the statement highlighted that:

- Linear economy is the result of failure of current pricing systems to fully integrate all costs (including social and environmental costs).
- There is potential for improved competitiveness and new markets, but there are also potential disadvantages from an economic theory perspective where policies for a circular

economy are applied only within the European Union.

- New indicators and special measures may be needed for particularly critical elements required for key economy sectors.

In 2016 EASAC therefore decided to conduct a further analysis on two topics:

- indicators
- critical materials.

The CE Working Group was slightly unusual in that the original Working Group that worked on the 2015 Statement gave rise to two smaller follow-on groups to contribute to the Commission's considerations. Members of the original Working Group delivered two reports, 'Indicators for a Circular Economy' and 'Priorities for Critical Materials for a Circular Economy'.

Working Group Report 2016

I was a member of the original Working Group and contributed to the 2015 Statement. As a member of the EASAC Working Group in 2016 I then contributed to the publication 'Indicators for a Circular Economy', and provided comments and review for the publication 'Priorities for Critical Materials for a Circular Economy'.

EASAC make the following specific points in the 'Indicators for a Circular Economy' report:

- Resource productivity is already widely measured but captures only information when output is growing more than resource use and emissions. Other measures are required to provide information on environmental pressures in absolute terms.
- Recycling and reuse targets exist under five existing Directives, which provide an obvious potential source of indicators. A composite indicator expressing the degree to which EU member states were reaching the Directives' targets could be considered.
- Material flow indicators should take into account the complexities of recycling and the potential trade-offs between outputs of different recycled metals from mixed waste streams.
- To support policy objectives, indicators by industrial sector on critical raw materials may be desirable, in consultation with industry.
- Indicators should provide insights and raise public awareness on the global effects of EU production and consumption.
- Indicators on materials should receive equal importance as those on energy: Summary 2 | November 2016 | Indicators for a circular economy EASAC.
- In view of the emphasis in the circular economy package on economic outcomes (global competitiveness, sustainable economic growth and new jobs), data on cost reduction and economic benefits of circular activities are desirable. These could include indicators of social change, infrastructure, human resources and changes in business models, and the scale of economic activities related to the circular economy (employment, circular economy-related business).
- The Commission needs to monitor the performance of markets in the recycling business and address regulatory barriers, such as those related to transforming waste into secondary raw materials. An indicator that showed the extent to which waste was being transformed to 'end-of-waste' secondary raw materials would allow this important basic activity to be illuminated.
- Indicators for industry should aim as far as possible to minimise costs of implementation by exploiting information that is already collected for other purposes (including sustainability reporting).
- In areas of recycling that are complex (particularly those of rarer metals), the value of economic output from the recycling process may be an indicator that best reflects whether the physical realities of the recycling process have been optimised.
- Since some potential indicators may show positive development when their values are decreasing and others a regression, composite indicators may be useful for communicating trends in a circular economy. An illustrative example is given in the report.

- Particular challenges exist in developing an indicator for water, but in view of the need for proper water accounting and maximising potential for reuse, EASAC concludes that water should be included in the indicator sets for the circular economy.

Most of the work was accomplished through email collaboration but a joint Working Group meeting for both projects was held in Brussels in May 2016. The meeting on 5 May 2016 was held at the Palais des Academies, Brussels, to work through drafts of the reports. It was very productive but also quite controversial in parts. In fact our project director had a tough challenge to find wording that could be signed off by members with quite different approaches and thinking. However, having been through many revisions, a draft was available in July 2016 which was shared with the EU Commission. They and other reviewers' comments were incorporated, and additional external peer review nominated by academies was received during September 2016 when the reports were published. On 30 November 2016 we launched both reports at Palais des Academies, Brussels.

Working Group Agenda 2017

The groups' project leader, Professor Mike Norton (EASAC Environment Director), received correspondence from EU Commissioner Elżbieta Bieńkowska (Internal Market, Industry, Entrepreneurship and SME) in February 2017 thanking the CE Working Groups for sending on copies of the publications 'Indicators for a Circular Economy' and 'Priorities for Critical Materials for a Circular Economy'. The commissioner indicated in her response that both reports offer useful contributions and advice to their ongoing reflections under two actions in the Circular Economy Action Plan of December 2015:

- Developing an EU Monitoring Framework for the Circular Economy;
- Preparing a report on Critical Raw Materials and the Circular Economy.

Both these actions will result in Commission documents that are to be issued later in 2017.

The commissioner welcomed the opportunity to comment on the draft reports and on being invited to the launch event in Brussels on 30 November 2016.

At present the CE Working Groups have disbanded having successfully completed the aforementioned project work.

All European Academies

www.allea.org



ALLEA – the European Federation of Academies of Sciences and Humanities – was founded in 1994 and currently brings together 59 academies in more than 40 countries from the Council of Europe region. Member academies operate as learned societies, think tanks and research performing organisations. They are self-governing communities of leaders of scholarly enquiry across all fields of the natural sciences, the social sciences and the humanities. ALLEA therefore provides access to an unparalleled human resource of intellectual excellence, experience and expertise.

Independent from political, commercial and ideological interests, ALLEA's policy work seeks to contribute to improving the framework conditions under which science and scholarship can excel. Jointly with its member academies, ALLEA is in a position to address the full range of structural and policy issues facing Europe in science, research and innovation. In doing so, it is guided by a common understanding of Europe bound together by historical, social and political factors as well as for scientific and economic reasons.

Report of the Academy's nominee to the ALLEA Permanent Working Group on Science and Ethics



Dr Maura Hiney
Health Research Board

Dr Maura Hiney has a PhD in Molecular Diagnostics and Epizootology from NUI Galway. She is currently Head of Post-Award and Evaluation at the Health Research Board, Ireland. Maura worked as a senior researcher and managed a disease diagnostics service for the Irish fisheries industry for 10 years and from 2000-2007 Maura was Head of Research Support Services at NUI Galway. She has been influential in raising awareness of RI issues in Ireland since 2008 and was instrumental in establishing a National RI Forum of key stakeholders and developing a national RI framework for broad adoption. Internationally, Maura chaired a Working Group of ESF Forum on Research Integrity (RI), is a member of the European Network of RI Offices (ENRIO) and chaired the Science Europe Working Group on RI. With ALLEA she coordinated a revision of the European Code of Conduct. She sits on the European Advisory Committee for the 5th World Congress on RI and the Advisory Board of the EU-funded PRINTEGER and ENTiRE projects on research climate. She was an expert advisor to the 2015 Luxembourg EU Presidency, during which the Competitive Council adopted Conclusions on RI.

Revision of the European Code of Conduct on Research Integrity

In 2016, ALLEA Permanent Working Group on Sciences and Ethics primarily focused on a revision of the European Code of Conduct for Research Integrity. This work was prompted by a request from the European Commission which was viewed as an exceptional opportunity for ALLEA to continue framing the conditions for science and scholarship in Europe, thereby demonstrating the capacities and strength of the academies in Europe to provide policy-for-science advice to policy-makers through their European network. To drive the revision of the Code, a subgroup was formed, comprising experts from Belgium, Finland, Hungary, Ireland, the Netherlands, Sweden, and Switzerland. The group was chaired by Dr Maura Hiney from the Permanent Working Group Science and Ethics in the Royal Irish Academy.

First published in 2011 in cooperation with the European Science Foundation (ESF), this document addressed the principles of research integrity, good research practices and potential forms of misconduct in scientific and scholarly research. The Code was well received and is widely used within the research community across Europe. However, since its first publication, new developments such as technological advances, new forms of publication and peer review, and challenges arising in the context of Open Science, among others, have evolved and needed be taken into account in the Code.

It was agreed that stakeholder consultation would take place through representative bodies, since opening the floor to individuals across Europe would be unmanageable. The Stakeholder consultation took place in two phases – an initial scoping consultation of the issues that stakeholders saw as missing or inadequate (deadline mid-August 2016), and a second consultation seeking a much more detailed feedback from stakeholders that could lead to a draft revised document on which there was broad consensus (deadline mid-December 2016). Phase 2 of

the consultation process was greatly helped by an EC-sponsored Stakeholder Workshop, held on 24th November 2016 in Brussels, to which a representative of all stakeholder bodies was invited. This was a very productive event that allowed the various stakeholders to share their thoughts/tease out issues and inform their own submissions.

The Drafting group worked through December 2016 to map and consider all stakeholder feedback, and draft a much simplified and concise Code of Conduct. The planned launch date for the finalised European Code of Conduct for Research Integrity is April 2017, when a copy will be presented to the commissioner for Research, Science and Innovation (Carolos Moedas) and the director general for Research and Innovation (Robert-Jan Smits) of the European Commission.

Membership of the European Network of Research Ethics and Research Integrity (ENERI)

The ALLEA Permanent Working Group on Science and Ethics was a partner in the successful EU ENERI project, funded as a Coordinated Action in the Science With and For Society Strand of Horizon2020. ENERI is based on existing networks, projects and infrastructures that already initiated and developed important steps in sharing information, training and capacity building. Research ethics committees, review boards, ombudspersons' offices, research integrity offices and supporting structures are the established bodies monitoring, accompanying and assisting the process of responsible and justifiable research. The ultimate aim of the network is to achieve a sustainable mutual learning process and an active exchange of experiences among the existing networks and between various stakeholders. This will be done through development of appropriate communication tools allowing borderless communication among all partners involved. This will encourage all partners to actively share their perspectives, knowledge and experience in the field and to hear and take into consideration the perspectives, knowledge and experience of others in their own field of activities. In this process, the platform ENERI of research ethics and research integrity will also encourage interaction with other stakeholders and society at large.

Ethical aspects related to patents and patentability of plant varieties

At its meeting in February 2016, Professor Pere Puigdomènech presented a discussion paper to the PWG 'Science and Ethics' on the patenting of plant varieties, stating that the present directive on stem cells and patenting of plant varieties needs to be reconsidered for its ethical implications. Joseph Straus pointed to a 2002 report by the European group of ethics which looked into the ethical issues surrounding the patenting of stem cells, but was ignored by policymakers at the time. He reiterated the complexity of the issue and stated that there is confusion about what constitutes plant variety protection and patenting. The final note was published on the ALLEA website.

Open Access

At its meeting in February 2016 Prof László Fésüs presented an updated draft paper on emerging ethical concerns in open access publishing, based on recommendations and amendments given at the last ALLEA PWGSE meeting in October 2015. Members were updated on national initiatives such as the deal struck between the Dutch government and the three publishing houses Elsevier, Wiley and Springer to make scientific research freely accessible. The Dutch government will only fund research if its result will be published open access, including in the humanities. It was also noted that the ALLEA PWG IPR has published two statements on the topic in the past and considered it vital that a reference to them will be made in the final note. It was agreed that a concentrated effort by the group to work together with other stakeholders in the European Commission and publishers will enable a clearer picture of what can be achieved. The group called on ALLEA President Günter Stock to establish a core group which would be able to efficiently liaise with European Institutions and publishers on the matter.

Report of the Academy's Nominee to the ALLEA Framework Programme 9 Working Group



Professor Imelda Maher

MRIA, Secretary for Polite Literature and Antiquities
University College Dublin

Professor Imelda Maher MRIA was elected to the Academy in 2011 and is Polite Literature and Antiquities Secretary. She became the Academy representative on ALLEA in Autumn 2016. She is the Sutherland Full Professor of European Law in the UCD Sutherland School of Law. She has published extensively on EU law and governance in various law and politics journals. She is a founding member of the European Law Institute, Vienna and is former general editor of Legal Studies. She is currently president of the Society of Legal Scholars in the UK and Ireland.

Professor Imelda Maher MRIA is the Academy representative on the recently established ALLEA Framework Programme 9 Working Group. The purpose of the Working Group is to develop suggestions for the successor research programmes to Horizon 2020. Building on the work of the EASAC/ALLEA Social Sciences and Humanities Working Group, this Working Group aims to ensure that the successor programme is developed with the interests of social sciences and humanities in mind and that these fields are fully represented.

To achieve this end, the group will engage with EU institutions, academies and relevant stakeholders in relation to both the mid-term review of H2020 and its successor. It will encourage deliberation within the ALLEA member academies to contribute to the shaping of the new research programmes by ensuring suggestions following deliberations can be forwarded in a timely manner to the EU institutions so as to contribute to the shaping of the next research programme. As part of this process it will regularly produce updates and indicate instances where member academies may wish to work within their national contexts.

The European Commission consultation is due in Spring with further consultations in the Autumn followed by a formal Commission proposal in early 2018. Within these major milestones a European Commission staff working paper is due in May, followed in June by the Report of the High Level Working Group on Research and Development (chaired by Pascal Lamy). A European Parliament report on the interim review of H2020 will be due in July.

The Working Group (of 20 members) is chaired by Professor John Bell FBA of the British Academy. It has held one meeting in Brussels with another due towards the end of April/early May. So far it has held discussions on the review of H2020. It has also held discussions on high-level questions relating to the guiding principles and values, objectives and purposes of the EU R&D programme as well as more specific issues such as the content, structure, themes and budgets, implementation and evaluation of the next programme, Framework Programme 9.

Report of the Academy's Nominee to the ALLEA Working Group on Science Education



Dr Cliona Murphy

Dublin City University

Dr Cliona Murphy is been lecturing in the area of science education at tertiary level for seventeen years. Currently, her principle work focuses on the research, development and facilitation of pre-service, post-graduate and continuing professional development programmes in science education. She has conducted and published research in the areas of the nature of science, inquiry-based science education and education for sustainability. She has developed a range of innovative educational resources to support the teaching and learning of science. Dr Murphy was the Irish coordinator and principal investigator for Ireland in the European Fibonacci and SUSTAIN projects. She is currently one of the principal investigators on the Educating School Teachers and Faculty for Sustainability through Continuing Professional Development project, being funded by the Global Consortium for Sustainability Outcomes (GCSO).

THE ALLEA Working Group on Science Education is currently focussed on fostering science education and improving its quality through the promotion of inquiry-based pedagogies and continuing professional development of teachers and teacher educators. The Working Group is actively engaged in raising awareness amongst policymakers of the critical importance of these issues and on fostering closer links between science education and industry throughout Europe in an effort to enhance science education.

Key issues and topics of note for 2017

Throughout 2016 the Working Group produced three documents: a declaration of the ALLEA SE WG on the European Commission Report on Science Education; the DAKAR Declaration; and a message from ALLEA and NASAC. All three documents were sent to relevant European Union Authorities by the ALLEA Secretariat.

Declaration of the ALLEA SE WG on the EC Report on SE

The Working Group carefully examined the recently published Report to the European Commission of the Science Education Expert Group (SEEG) entitled 'Science Education for Responsible Citizenship' (Hazelkorn *et al.*, 2015). THE SEEG, which comprised ten members from ten EU member states, was asked, amongst other things, to review the 'State of Affairs... And to assist the European Commission services to further elaborate and reflect on possible new challenges as well as to formulate the premises on which the future strategy to be undertaken in the framework of the new Science with and for Society (SWAFS) Work Programmes (2015–2017) could be shaped'. The report recommended that 'Given the multi-faceted nature of the objectives and recommendations...key actors across the European Commission come tougher to initiate an EU-wide response to include a participatory consultation and dialogue process on the report and the proposed actions'.

As the ALLEA SE WG could represent one of these key actors the WG discussed the report at length and prepared a detailed written response. Cliona Murphy worked with the chair (Giancarlo Vecchio) to write this response. In April the response, 'A declaration of the SE WG on the Report Science Education for Responsible Citizenship' was sent to the president of the SEEG, Professor Hazelkorn and other members of the Expert Group from whom the ALLEA Secretariat received positive responses. It is anticipated that ALLEA's declaration will encourage the European Commission to pursue the recommendations of the Hazelkorn et al 2015 report.

AEMASE (African-European-Mediterranean Academies of Science Education) Network

Throughout 2016 the ALLEA Science Education Working Group has continued to work on promoting the cooperation between academies in the African, European and Mediterranean (AEM) regions. The overall aim of the informal AEMASE network is to improve science education in schools in the AEM area. At the second AEMASE conference, held in Dakar, Senegal in October 2015, delegates of European and African academies signed the 'DAKAR Declaration' calling for a sound cooperation amongst academies, ministries of education, the African Union, the European Commission, UNESCO and foundations for the renewal of science education at the inter-continental African – European level.

In April 2016 two documents, the 'DAKAR Declaration' and 'A message from ALLEA and NASAC' were sent to the president of the European Commission, calling for funding a sound cooperation between Africa and Europe to improve science education. In June 2016 ALLEA received a response from the European Commissioner for Research Science and Innovation outlining funding programmes, mobility schemes and all actions promoted by the European Union that would support research and science education in Africa. The Working Group has responded to the commissioner requesting a meeting to discuss specific calls on international collaborations on science education projects.

Working Agenda for 2017

The Working Group are focussing on the following activities for 2017:

- Organising the third AEMASE conference, which is being held in Paris in October 2017. This conference will again provide a unique opportunity to bring together an international audience of scientists and researchers, science education experts and teacher educators, policymakers and politicians, representatives of funding agencies and foundations, to provide a platform to discuss the current and future challenges for science education. The importance and benefits of reform in science education in Africa and Europe and the promotion of AEMASE projects on teacher and teacher-educator professional development will also be at the forefront.
- Organising an international conference on Inquiry-Based Science Education in Europe (date and location to be confirmed).
- Updating the 2012 ALLEA Report on Science Education to incorporate the exchanges of initiatives amongst European and extra-European academies.
- The development of a network to participate in calls for European and other funds.
- Building a European platform that would be open to ALLEA members and all parties interested in science education.

Report of the Academy's Nominee to the ALLEA e-Humanities Working Group



Dr Natalie Harrower

Digital Repository of Ireland

Dr Natalie Harrower is director of the Digital Repository of Ireland. Appointed chair of the ALLEA E-Humanities Working Group in 2015, Dr Harrower is also a member of the OECD Global Science Forum High Level Expert Group on Sustainable Business Models for Data Repositories, on the Board of Directors for the Research Data Alliance Europe project, a member of the National Open Access Committee, and a member of the DARIAH Ireland Steering Committee.

The ALLEA E-Humanities Working Group was established in 2014 and charged with identifying and raising awareness for priorities and concerns of the digital humanities, and contributing to the open access agenda from a humanities and social sciences perspective, and building consensus for common standards and best practices in E-Humanities scholarship and digitisation. Humanities data can be rich and complex, non-standardised in format, without common or consistent metadata and ontologies, and can be subject to complex rights issues. Consensus and best practice regarding digitisation and metadata standards for common usage which still retain the richness of different disciplines and data types, could enable open access to humanities data, and facilitate data exchange and sharing between the wealth of archives, repositories and libraries across Europe. In 2015 the group published *Going Digital: Creating Change in the Humanities* (edited by Natalie Harrower), which was launched at a special meeting to representatives of the European Commission and stakeholders of the European scientific community in Brussels.

In 2016 the Working Group started to shift its focus to the European Open Science agenda, and the role that humanities disciplines can play in that agenda. In collaboration with Ireland's Health Research Board, Dr Harrower co-organised a two-day event in June 2016 on 'Open Science and Ireland' at Academy House. The event featured Professor Barend Mons, Chair of the High Level Expert Group on the European Open Science Cloud (EOSC), on his first official EOSC visit to a member state. The EOSC is a central aspect in implementing the EU Commission Digital Single Market Strategy. As chair of the Working Group Dr Harrower joined the Scientific Advisory Board for AGATE, a new project to build a European internet gateway for Academy research. For 2017, work on AGATE will continue, and the E-Humanities Working Group will reconvene to plan new strategies for humanities and open Science.

The International Council for Science

www.icsu.org



ICSU –The International Council for Science – is a non-governmental organisation with a global membership of national scientific bodies and International Scientific Unions.

ICSU's mission is to strengthen international science for the benefit of society. To do this, ICSU mobilises the knowledge and resources of the international science community to:

- Identify and address major issues of importance to science and society.
- Facilitate interaction amongst scientists across all disciplines and from all countries.
- Promote the participation of all scientists – regardless of race, citizenship, language, political stance or gender – in the international scientific endeavour.
- Provide independent, authoritative advice to stimulate constructive dialogue between the scientific community and governments, civil society and the private sector.

The long-term strategic vision is for a world where science is used for the benefit of all, excellence in science is valued and scientific knowledge is effectively linked to policymaking. In order to achieve this vision, ICSU developed a Second Strategic Plan, 2012–2017 which identifies key priorities and associated activities. These activities focus on three areas:

- International research collaboration.
- Science for policy.
- Universality of science.

Report of the Academy's Nominee to the Management Board of the European Group of ICSU Members (EURO-ICSU)



Professor Luke Drury

MRIA, Dublin Institute for Advanced Studies

Luke Drury graduated from TCD in pure mathematics and experimental physics in 1975 and went on to study astrophysics at the Institute of Astronomy, Cambridge, UK obtaining his PhD in 1979 under the supervision of Dr John M. Stewart. He then worked in the Max-Planck-Institut für Kernphysik in Heidelberg with Prof. H.J.Voelk before returning to Ireland as Senior Professor in the then Cosmic Ray Section in 1986. He was president of the Royal Irish Academy from 2011 to 2014.

The Euro-ICSU group is a federation of the various national bodies (mostly academies) affiliated to the International Council for Science (ICSU) and coming from the broader European area (not confined to the EU). Its purpose is to increase awareness of ICSU within the European academic community and to allow Europe to play a more effective role in ICSU policymaking and governance. The group elects a secretariat for five years (currently the Swiss National Academy of Sciences, formerly the Finnish Academy) and a small management group to organise its affairs.

The main focus of activities for the last year was the coordination of input into the strategic planning process of ICSU and coordination of the European perspectives on the proposed merger of ICSU with the ISSC, which was the subject of a special general assembly of both organisations in Oslo. I attended the Oslo meeting on behalf of the RIA and supported the merger (which reflects the ethos of the RIA in seeing strong advantages in having both natural sciences and the social sciences represented in one body).

The Euro-ICSU group is currently planning a meeting to discuss the issues associated with open data and open science in the European context and will be involved in coordinating the European voices at the next ICSU general assembly to be held in Tai Pei in 2018.

