Euro-CASE

THE EUROPEAN COUNCIL OF
ACADEMIES OF APPLIED SCIENCES,
TECHNOLOGIES AND ENGINEERING

# ANNUAL REPORT
## 2020 & 2021

# A hub of collective intelligence

## About Euro-CASE

The European Council of Academies of Applied Sciences, Technologies and Engineering is an independent non-profit organisation of national academies of Engineering, Applied Sciences and Technology from 23 European countries. It was founded in 1992 upon French initiative by the members of CADAS (Conseil pour les Applications de l'Académie des Sciences). The Executive Committee meets four times a year. The Board meets twice a year. Euro-CASE acts as a permanent forum for exchange and consultation between European Institutions, Industry and Research.

Euro-CASE

Through its Member academies, Euro-CASE has access to top expertise (around 6,000 experts) and provides impartial, independent and balanced advice on technological issues with a clear European dimension to European Institutions, national Governments, companies and organisations.

In pursuit of this mission the objectives of Euro-CASE are:

- Maintain a leadership role in promoting attention to excellence in applied sciences and engineering and to related issues of key importance to Europe,
- Ensure that the societal impact of technological change is given proper attention with full consideration of environmental and sustainability aspects,
- Provide impartial, independent and balanced advice on engineering and applied science issues that affect Europe and its people to the European Commission and Parliament, and other European institutions,
- Promote the importance of applied sciences and engineering throughout Europe and to develop greater public understanding and interest,
- Attract young Europeans into careers in applied sciences and engineering in order to ensure future technological progress in Europe,
- Draw on the experience and best practices of the national academies of engineering and applied sciences in Europe, developing appropriate, Information networks.

ÖAW Austrian Academy of Sciences · Royal Academy of Engineering · SATW · IVA Royal Swedish Academy of Engineering Sciences · PAN Polish Academy of Sciences · AE · NAE · ATV · Leibniz-Gemeinschaft · National Academy of Technologies of France · AcTI technologie&innovatie · Académie royale des Sciences, des Lettres et des Beaux-Arts de Belgique · The Irish Academy of Engineering · Norges Tekniske Vitenskapsakademi · VS · IIA · KVAB · Hellenic Engineering Academic Community (HEAC) · acatech National Academy of Science and Engineering · IVA · CNR, INFN, ITT and Politecnico di Torino Consortium

### Mission statement

The mission of Euro-CASE is to pursue, encourage and maintain excellence in the fields of engineering, applied sciences and technology, and promote their science, art and practice for the benefit of the citizens of Europe.



# Editorial by Yves Caristan, Euro-CASE Secretary-General

Yves Caristan, Secretary General of Euro-CASE

The years 2020 and 2021 will be remembered as a period of turmoil. The COVID-19 pandemic had deep economic and social consequences, which are still being endured today. The shock was rough on our societies and still is. Most governments around the world have wisely set up Scientific Councils to help them in the complex decision-making process that followed, a process which arguably can be seen as policy making at its best. In the last decade Science and Technology professionals around the world have witnessed the rising tide of fake news and conspiracy theories. The time for observation is over. It is now time for action.

In 2017, Euro-CASE, together with its four other networks mobilized to assemble the SAPEA consortium (www.sapea.info) whose specific role is to council the Decision Makers of the European Commission through the Scientific Advice Mechanism. Today the need for independent science and technology advice is greater than ever as there is a vital need to develop and deploy technologies to better serve our society and planet. SAPEA Reports on issues such as: A Sustainable Food System, Food from the Ocean, Cybersecurity, Carbon Capture and Utilization among others have been particularly appreciated by the Commission. In 2020 Euro-CASE took the lead on a major new topic: A Systemic Approach to Energy in Europe, and despite the confinement challenges caused by the COVID-19 pandemic, managed to organize an excellent and very productive Expert Working Group, which engaged scientists and engineers from the private production sector. We would like to thank the two co-chairs Peter Lund, Christoph Schmidt, and the 20 members of the Working Group for the high standard of the report published in June 2021. We would also like to thank Antoine Blonce, Euro-CASE Scientific Policy Officer, for his talent in organizing the virtual meetings of the Group. The quality of nominations by Euro-CASE members and other Academies throughout Europe was greatly appreciated and ensured an excellent report was produced.

Throughout 2020 and 2021, our academy members have been very active at their national level posting relevant information and opinions about the ongoing COVID-19 pandemic on their national websites. To further facilitate knowledge exchange Euro-CASE shared these links on its website. At the same time, our colleagues from the Royal Academy of Engineering (UK), organized several virtual international meetings to exchange among academies. We thank them for this excellent initiative. Finally, we would also like to thank Luc Chefneux and Erol Gelenbe for setting up a virtual Working Group on **Challenges for Science and Technology driven Innovation in Europe**.

Other topics concern Early Career Professionals (ECPs) in the sector of Engineering and Technology. Under the leadership of RAEng and IVA, we will be reflecting on and questioning how ECPs interact with our institution, these interactions being increasingly valuable as technologies, engineering, services are evolving faster than ever. Thanks to Ben McAlinden and Elin Elliot who will be continuing this action in the future.

Last, but not least, Prof. Tuula Teeri has been elected to the position of Euro-CASE Chair. Her talents have been deeply appreciated since her appointment. Our previous Chair, Reinhard Hüttl has decided to step down from his position for personal reasons. The Euro-CASE Board expresses its gratitude and support to Reinhard, wishing him all the best.
Eloy Alvarez Pelegry has been elected Vice Chair of Euro-CASE, his contribution will be essential for the organisation.

From the very beginning, Euro-CASE's "raison d'être" has been to provide a platform for exchange among our members. Despite the challenges of the COVID-19 pandemic, Euro-CASE was able to deliver many activities virtually. But as member representatives at the Board and Executive Committee are changing regularly, we are looking forward to restoring in-person meetings soon to boost engagement and interactions between Euro-CASE members, a goal which remains at the heart of Euro-CASE.

Thank you to all Euro-CASE members for their active support.

**Yves Caristan, Secretary General**

# Euro-CASE Executive Committee in 2020 and 2021:

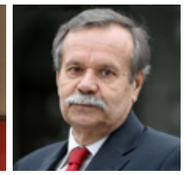
Tuula Teeri
IVA (SE)
Chair

Yves Caristan
NATF (FR)
Secretary General

Ric Parker
RAEng (UK)
Treasurer

Eloy Alvarez PELEGRY
RAI (ES)
Vice Chair

Petar Petrovic
AESS (RS)
Member



Stane Pejovnik
IAS (SI)
Alternate

Euro-CASE is governed by a Board consisting of senior representatives from each Member Academy. An Executive Committee is elected from the Board. The secretariat is based in Paris, hosted by the National Academy of Technologies of France in Immeuble Le Ponant / 19 rue Leblanc 75015 Paris, France.

Prof. Tuula Teeri, President of the Royal Swedish Academy of Engineering Sciences (IVA), was elected as Chair at the Euro-CASE Board meeting on 14 June 2021. Prof. Eloy Alvarez Pelegry from the Spanish Royal Academy of Engineering (RAI), was elected as Vice Chair at the Euro-CASE Board meeting on 26 November 2021.

The **Euro-CASE Board** includes Presidents and Honorary Presidents of individual national member academies: Prof. Vladimir Androcec, Croatia (HATZ); Porf. Miklós Bendzsel, Hungary (HAE); Prof. Torbjörn Digernes, Norway (NTVA); Dr. Willy Gehrer, Switzerland (SATW); Prof. Mihai Mihaita, Romania (ATSR); Dr. Mark Plesko, Slovenia (IAS); Mr Bruno Revellin-Falcoz, France (NATF); Prof. Fernando Santana, Portugal (PAE); Prof. Tuula Teeri, Sweden (IVA); Prof. Dr. Jan Wörner, Germany (acatech)

**Euro-CASE staff**: SAPEA Scientific Policy Officer, Antoine Blonce; Advisor, Wolf Gehrisch; Euro-CASE Executive Assistant, Nadia Pipunic

In 2020, the Euro-CASE Board members met remotely on 8 June and 20 November. Two remote meetings were held on 25 March and 16 October. The following year the Board meeting were organised on 14 June and 26 November while the Executive Committee met on 26 March and 22 October.

## Content:





## Highlights of publications 2020-2021

**Engineering Education Platform Report:**
**Engineering is vital to successful, sustainable civilization. So much rests on the shoulders of future generations of engineers that we must give them the best possible foundation to their professional lives.**

**SAPEA report: A systemic approach to the energy transition in Europe**
**There are many possible pathways towards a carbon-neutral future. Achieving it by 2050 is possible, but this requires urgent action.**

# SAPEA: Scientific Advice, evidence reviews and other scientific inputs

With the support of its member academies, in 2020 and 2021 Euro-CASE was involved in five SAPEA Evidence Review Reports (ERRs) and other scientific inputs, while leading a new ERR on the systemic approach to the energy transition.

These reports present the best available and most up-to-date scientific and technical evidence, including highlighting of all uncertainties, gaps, and contradictions in scientific knowledge to ensure trust and accuracy. The ERRs are prepared by fellows and experts from member academies of the SAPEA networks and feature robust and contemporary scientific content.

## A sustainable food system for the EU

The evidence review report A sustainable food system for the EU has been officially launched on 9 April 2020.

The following three Euro-CASE candidates from NATF, NTVA and HATZ were selected for membership in the Working Group: Hugo De Vries (NATF – France), Alf Håkon Hoel (NTVA – Norway) and Verica Dragović-Uzelac (HATZ – Croatia).

In addition, Frode Alfnes, who was nominated by NTVA participated in the expert workshop that was held in Brussels on the 8th of November 2019. This expert workshop was chaired by Yves Caristan, a SAPEA Board member. Finally, Mr Pierre Feillet (NATF) was selected as a peer-reviewer for the report.
Food systems have complex social, economic, and ecological components, and radical transformation is needed to make them sustainable. This SAPEA report outlines the science of how this transition can happen in an inclusive, just, and timely way. This was a very timely contribution from SAPEA to the EC "Farm to Fork" Strategy.

## Biodegradability of plastics in the open environment

The report Biodegradability of plastics in the open environment was published on 14 December 2020.

The following two Euro-CASE candidates from IVA and NTVA were selected for membership in the Working Group: Ann-Christine Albertsson (nominated by IVA) and Gunnhild Bødtker, Norway (nominated by NTVA).

It should also be noted that Ann-Christine Albertsson has been selected aschair of thisWorking Group.

Plastic pollution is a worldwide problem, and it is still growing. Each year, more and more plastic ends up in the natural environment, raising concerns of risk to the environment, animal and human health. Biodegradable plastics have a specific role to play in reducing the accumulation of plastics in the environment.

Replacing conventional plastic with biodegradable plastic can help with applications in the open environment – such as agriculture and fisheries, or plastics in fireworks – and where it is difficult or expensive to remove it from the environment.

But biodegradable plastics are not a 'silver bullet' to solve the problem of plastic pollution. For the majority of applications, including most single-use packaging and plastic bags, it would be better to reduce the amount of plastic we use, or to promote reuse and recycling.

## Adaptation to climate change-related health effects

On 7 June 2019, a workshop on Climate Change and Health was held in Brussels. It was organized by the SAM unit with support from SAPEA (led by FEAM). The purpose of this workshop was to review the state of scientific evidence on climate change and health. In particular, the workshop focused on the effectiveness of adaptation measures to prevent or mitigate the effects of climate change on health as a basis for an EU policy-orientated Scientific Opinion.

The workshop involved presentations about 3 major international reports (by EASAC, WHO and Lancet) and invited SAPEA to nominate experts to discuss and comment on these reports. The implications of these reports for public health in Europe were debated and the workshop helped to identify sub-questions to be addressed in the GCSA's Scientific Opinion, Adaptation to climate change-related health effects, which was subsequently published on 29 June 2020.

## COVID-19, future pandemics, and other crises in the global context

SAPEA nominated experts for scientific advice on the management of the COVID-19 pandemic, better preparedness to future pandemics and resilience to crises in general, published jointly by the Group of Chief Scientific Advisors, the European Group on Ethics in Science and New Technologies and Peter Piot, special advisor to Commission President Ursula von der Leyen.

With the economic crisis still fresh in our memories, a new crisis has emerged in the form of the coronavirus pandemic. This current crisis has taught us that much of Europe was insufficiently prepared. At the same time, we know that COVID-19 will not be the last pandemic or indeed crisis that we will face.

The Statement, published in June 2020, provides guidance for the provision of scientific advice in pandemic situations, in particular during the current COVID-19 crisis, characterised by complexity and uncertainty. Advice on better management of and preparedness for pandemics was published in November 2020, and advice on the wider topic of crisis resilience will be published later in 2021.

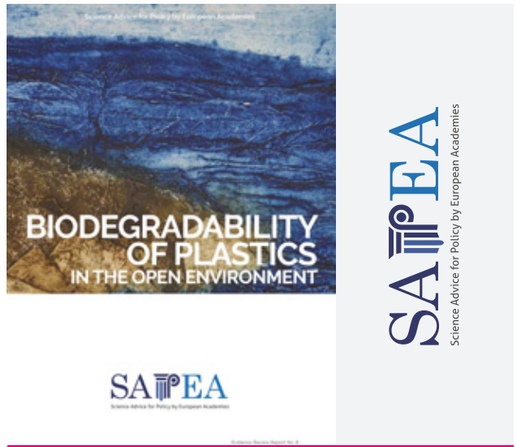
## A Systemic Approach For the Energy Transition in Europe

The report A Systemic Approach for the Energy Transition in Europe was published in June 2021.

The Euro-CASE Energy Platform, under the chairmanship of Prof. Eberhard Umbach from acatech, has prepared a concept paper for a SAPEA project on "How to meet the future challenges of the European energy system?" including social aspects, sector coupling, heating requirements and supply, and energy storage.

Euro-CASE assembled a dedicated Task Force with experts selected by the SAPEA networks involved in this topic (AE, ALLEA, EASAC and Euro-CASE), to prepare for a scoping workshop to help draft a scoping paper. The scoping workshop was held in Brussels in December 2019 and was attended by 30 participants including GCSA, SAPEA, Euro-CASE, DGs representatives (DG ENER, CLIMA, RTD, JRC, MARE, SG and EPRS) and the members of the Task Force. Following this initial scoping workshop, Euro-CASE, alongside a commissioned scientific writer, drafted the scoping paper for this new SAPEA bottom-up topic on the Systemic Approach For the Energy Transition in Europe. This scoping paper was published on 18 March 2020.

A Sustainable food system for the European Union



Biodegradability of plastics in the open environment

Adaptation to climate change-related health effects

It was proposed to have an impartial, independent, and systemic approach offering insight from experts with a multidisciplinary background in order to provide a robust information-based anticipation of future requirements for the energy transition in Europe. The main question to the European Commission's Group of Chief Scientific Advisors is therefore:

How can the European Commission contribute to the preparation for, acceleration, and facilitation of the energy transition in Europe given the present state of knowledge on the possible transition pathways?

A call for nominations of experts had been published and sent to all the Member Academies of the 5 SAPEA Networks. The deadline for nominating experts was 28 May 2020 and a Selection Committee was established to choose the Working Group experts, following the SAPEA Quality Assurance procedures. SAPEA therefore assembled an interdisciplinary Working Group of 20 experts in the different aspects of the energy transition: technical, socio-economical and regulatory. The Working Group met five times in 2020 and the report is expected to be published in summer 2021.

Finally, this report was a very timely contribution from SAPEA to the European Green Deal.

There are many possible pathways towards a carbon-neutral future. Achieving it by 2050 is possible, but this requires urgent action.

This is the central conclusion of SAPEA's evidence review report on the energy transition, and the corresponding Scientific Opinion of the European Commission's Group of Chief Scientific Advisors.


A Systemic Approach for the Energy Transition in Europe

But this is not just a technical challenge. To make the energy transition a reality, we need to solve a huge systemic problem, coordinating countless individual voluntary decisions on investment, consumption and behaviour across Europe.

This means transforming the entire European energy system – a change which will affect every part of our society and require huge investment during the transition. It must be done in a socially equitable way. And we already need to accelerate progress if we want to achieve the EU's target of net zero emissions by 2050.

Many different policy options must be evaluated for their potential to deliver emission targets, as well as their economic efficiency and the contribution they make to maintaining social balance.

Using these criteria, the best available evidence points to six main themes:

- **Technological diversity:** Huge global investments in technology will be needed in the coming decades. But in general it is often difficult to predict the winning technologies of the future. So, rather than searching for a single silver bullet, Europe must develop and deploy a broad range of technologies while maintaining common, EU-wide goals. This is important not only to create a dynamic and flexible energy system, but also because different countries in Europe have different structures and needs.
- **Managing deep complexity:** We must find new ways to balance supply and demand in a complex energy system that includes variable sources such as solar and wind power. Electrification, new infrastructure, energy efficiency, demand management, and innovative uses of data can all help to manage this complexity. For hard-to-decarbonise sectors, such as long distance transport and heavy industry, there are alternatives to direct electrification, such as green hydrogen fuels.
- **Governance and regulation:** We need a strong carbon pricing mechanism as part of a mixture of regulatory measures and incentives. The existing European Emissions Trading System should be extended to all relevant sectors, including transport and heating/cooling, and political leaders should commit to very high carbon prices by the middle of the century, reflecting the full environmental impact of greenhouse gases. Revenues raised in this way should be used to support a fair transition, to ensure that no-one is left behind.
- **Behaviour and participation:** Facilitating public behaviour and action at multiple levels is just as important as developing new technologies. In the energy system of the future, actions at individual, household, local and regional levels will play a central role in supporting energy generation and shifting patterns of use.
- **Global leadership:** The EU is well placed to take a global lead in reducing emissions in a way that is economically efficient and socially equitable, while maintaining competitiveness. Europe must strengthen its diplomatic efforts to ensure that the Paris Agreement is followed by everyone, and to account for the emissions which are generated by goods imported into Europe.
- Reciprocal commitments from other countries will be more effective than overachieving in Europe alone.
- **Supply chain security:** We must manage the global supply of materials needed to support clean energy technologies. Our dependency on imported fuels will decrease as we transition to green energy, but we must actively promote innovation, development and circular economy within Europe, or else we will end up with new dependencies on the imported materials that we need.

# Internal Euro-CASE topics: Platforms

## Engineering Education

The Euro-CASE Engineering Education Platform was launched in 2016 following approval from the Euro-CASE Board. Management of the platform was entrusted to Petar Petrovic, from the Academy of Engineering Sciences of Serbia (AESS).

Euro-CASE Committee on Engineering Education is an ad-hoc working group of 11 Euro-CASE member academies, which expressed interest in active participation in the operation of the Committee, appointed by the Euro-CASE Executive Committee and approved by the Euro-CASE Board. This report represents a joint research result with equal contributions from each Committee member.

The Euro-CASE Committee on Engineering Education was tasked with examining the needs of engineering in relation to the education of future engineers in Europe. The Committee examined a wide range of literature, experiences from universities and national Academies in different countries and the engineering industry. This information was synthesised through deep discussions within the committee and withspecific entities in academia and industry who have strengths and experience in this area.


Discourses on the Future of Engineering Education in Europe

The committee findings were comprehensive and illustrate the importance of considering the education and training of future engineers to take a multifaceted approach that brings together all stakeholders in the future European society in a combined endeavour. These findings can be summarised as a set of recommendations for universities, national Academies, Professional Institutions, the education sector as a whole, and individual companies within the engineering industry.

Discourses on the future of the Engineering Education in Europe **The Discourses on the future of Engineering Education in Europe** was approved by the Board and published in November 2020.

## Early Career Professionals

The Board recommended the creation of a working group which has been asked in 2020 to prepare a paper summarizing evidence and findings from the project to explore national academies' engagement with early-career professionals (ECPs). Euro-CASE members academies were invited to nominate a lead contact to join the project Working Group, chaired by Dr Shaun Fitzgerald OBE FREng (UK) and composed of: Joos Vandewalle, KVAB; Goran Vukelic, HATZ; Mikko Hupa, CoFA; Arto Miettinen, CoFA; Claudine Schmidt-Lainé, NATF; Philippe Jamet, NATF; Katja Windt, acatech; Luis Castaner, RAI; Elin Elliot, IVA; Ben McAlinden, RAEng.

The initial findings substantiate that this is a topic of high interest and importance and has become a common priority for many national academies over the last ten years. The importance of engaging with ECPs

is often indicated in academy statements of different sorts. Many academies have found innovative ways to do so and have created unique and beneficial offerings. However, engagement is evidently on the operational level and in a rather unstructured manner in particular Engaging ECPs in the governance of the academy is rare.

The survey and interviews, undertaken by the working group in June 2020, have also rerevealed that national academies operate in very diverse ecosystems, among various other professional engineering associations, and connections to research and industrial networks. Hence there is no "one-size-fits-all" standard format for European academies to enhance engagement with ECPs. Based on the evidence, the Working Group presents the following points which can be considered as best practices, guidelines and tips for individual academies wishing to enhance their engagement with ECPs. Following these recommendations would most likely result in a more strategic approach:

- Consider the value of engaging with ECPs
- Map out the existing engagement network for ECPs on a national level
- Develop a robust value proposition
- Consider different levels of engagement
- Engage with other academies who are experienced in specific aspects of ECP engagement

In parallel with recommendations for national academies to enhance their engagement with ECPs, the Working Group sets out some additional recommendations concerning actions at Euro-CASE level. The Euro-CASE Board has decided to consider and discuss in the future potential ways forward based on these recommendations:

- Develop a structured mechanism of interaction for Euro-CASE member academies on particular aspects of ECP engagement
- Stimulate exchange between Euro-CASE academies to learn from each other
- Consider the value of developing relations with the Young Academy of Europe (YAE)
- Consider the value of a pan-European network to connect young engineers, industrialists, and academics

## The Future of work

After the 2019 Annual Conference, the Board decided to setup a working group on "Future of work - Digitalisation and work in the context of sustainable development". This group is chaired by Torbjørn Digernes (NTVA) and composed of the following members: James Browne, IAE; Hendrik Van Brussel, KVAB; Jean-Pierre Chevalier, NATF; Jan Gulliksen, IVA; Fredrik Heintz, IVA; José-Manuel Sanjurjo, RAI; Asbjørn Rolstadås, NTVA.

One meeting was organized in 2020 and the group is currently drafting a scoping paper.

## COVID-19

### Academies' publications

Many Euro-CASE members are engaged in "post-COVID-19" programs at a national level have issued statements concerning the post COVID-19 situation. These contributions to national debates are available on Euro-CASE web site.

### Euro-CASE position paper on the Commission Recovery Plan.

Following a proposal by Luc Chefneux, ARB (from Belgium), there was a unanimous wish for Euro-CASE to launch a "Post-COVID-19" action taking account of the fact that several members have themselves launched similar action at the national level. Luc Chefneux drafted a Euro-CASE position paper on the Commission Recovery Plan. This document has been circulated to all member academies and published on the Euro-CASE website.

The goal was to get a Euro-CASE document to support our members at the national level, and address it to the SAPEA Networks, the commission, CGSA, SAM Unit, and eventually to the higher level of the Commission.

### Challenges for Science and Technology driven Innovation in Europe

At the initiative of Erol Gelenbe, ARB-NATF-PAN, a working group has been setup to discuss "Challenges for Science and Technology in the post-COVID-19 period". This group was composed of: Erol Gelenbe ARB, NATF, PAN; Olivier Appert, NATF; Guy Brasseur, ARB; Yves Caristan, Secretary General Euro-CASE & NATF; Luc Chefneux, ARB; Peter Cochrane, RAEng; Véronique Dehant, ARB; Anna Fabijanska, PAN; Véronique Halloin, ARB; Jean-Paul Haton, ARB; Michel Judkiewicz, ARB; Vladimir Mrša, HATZ; Ignacio J. Pérez-Arriaga, RAI; Bernard Rentier, ARB.

The Working Group had the opportunity to make some key recommendations regarding significant changes in the way we organize and conduct our scientific and technical production and exchanges in the future.

The recommendations were as follows:

- Strengthening Industry-University-Research Interactions
- Strengthening the EU University Research Base
- Accelerating transfer from Horizon Research and Innovation to Industry & Business
- Developing fiscal incentives for cross-EU investments in technology start-ups
- A "Responsible Innovation principle" should be introduced to counterbalance the "Precautionary principle"

The recommendation paper has been to the Board by June 2022.




# Partnerships

**Euro-CASE and its member academies are very committed to their collaboration with SAPEA member networks but continue with great interest their partnership with the US National Academy of Engineering in the context of the Frontiers of Engineering programme which brings together the next generation of leaders in engineering and creates an early-career network, to facilitate transatlantic engineering/technology collaboration and the transfer of new techniques and methods across four topics of major societal interest.**

# Frontiers of Engineering

## 2019/2020 cycle

Since 2010, Euro-CASE and the US National Academy of Engineering (NAE) have jointly organised meetings under the umbrella of Frontiers of Engineering (FOE).

The objective of FOE Symposia is to bring together the next generation of leaders in engineering and create an early-career network, to facilitate transatlantic engineering/technology collaboration and the transfer of new techniques and methods across four topics of major societal interest. Invited participants comprised of engineers, scientists and technologists below 45 years old including 60 representatives from both Europe and the United States.

On behalf of Euro-CASE, The Royal Swedish Academy of Engineering Sciences (IVA) co-organised the successful EU US FOE cycle for 2019 / 2021.

The 2020 EU US FOE event has been postponed in 2021 and held in the United States in November hosted by Nokia Bell Labs. The General Co-Chairs will be Vahid Tarokh for the USA and Pontus Johnson (Royal Institute of Technology and IVA Fellow) for Europe.

A detailed programme and presentations from the symposium are available on the NAE website.

The selected topics for the 2021 are: Advances in Deep Learning for ICT Problems, Applications and Uses of Graphene, Modernizing the Electrical Grid and Technologies for the Detection and Treatment of Dementia and Alzheimer's Disease.

# CAETS

CAETS is an independent nonpolitical, non-governmental, international organization of engineering and technological sciences academies, one member academy per country, that advances the following objectives:

- Prepared to advise governments and international organizations on technical and policy issues related to its areas of expertise;
- Contribute to the strengthening of engineering and technological activities to promote sustainable economic growth and social welfare throughout the world;
- Foster a balanced understanding of the applications of engineering and technology by the public;
- Provide an international forum for discussion and communication of engineering and technological issues of common concern;
- Foster cooperative international engineering and technological efforts through meaningful contacts for development of programs of bilateral and multilateral interest;
- Encourage improvement of engineering education and practice internationally; and
- Foster establishment of additional engineering academies in countries where none exist.

CAETS 2020 annual meetings were hosted by the National Academy of Engineering of Korea from 12-15 October 2020. The technical symposium focused on opportunities and challenges of the Smart Society. Program sessions included Smart Energy Network, Hyper-connected Life, Education for Smart Society, and Climate Change Issues & Challenges in Urban Environment.

CAETS 2021 annual meetings were organized by the National Academy of Engineering of Argentine from 20-24 September 2021. The technical session focused on *The Future of Energy*, during which participants analyzed the changes in the energy matrix resulting from the technological advances and the increasing consideration of the environment.

# The SAPEA Consortium

Spanning the disciplines of engineering, humanities, medicine, natural sciences and social sciences, Science Advice for Policy by European Academies (SAPEA) brings together outstanding knowledge and expertise from over 100 academies, young academies, and learned societies in over 40 countries across Europe. SAPEA is part of the Scientific Advice Mechanism (SAM) of the European Commission.

Funded through the EC's Horizon 2020 programme, the SAPEA consortium comprises five European Academy networks:

Academia Europaea (AE),
All European Academies (ALLEA),
European Academies' Science Advisory Council (EASAC),
European Council of Academies of Applied Sciences, Technologies and Engineering (Euro-CASE), and
Federation of European Academies of Medicine (FEAM).

SAPEA was initially planned to end on 31 October 2020. Following discussions with the European Commission and an amendment on the grant agreement, it was decided in July 2019 to extend the project for 14 months until 31 December 2021.

In order to prepare for this next phase of SAPEA, a Sustainability Plan has been published on 8 June 2020. This Sustainability Plan sets out the strategy on how the SAPEA consortium can build on the achievements of the current project (2016–2021), as we continue to develop and apply our competencies in supporting outstanding science advice in Europe within the Scientific Advice Mechanism.

**Summary of SAPEA Evidence Review Reports submitted to the European Commission**

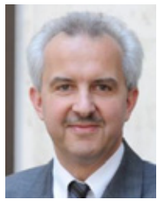
1. Cybersecurity in the European digital single market: Scientific Opinion delivered by GCSA to the European Commission on 24 March 2017, following a request by the Commission Vice President Ansip and Commissioner Oettinger.
   https://research-and-innovation.ec.europa.eu/strategy/support-policy-making/scientific-support-eu-policies/group-chief-scientific-advisors/cybersecurity_en
2. Food from the oceans: Request from Commissioner Vella, GCSA opinion and SAPEA Evidence Review Report published November 2017 in the presence of Commissioner Moedas.
   https://www.sapea.info/wp-content/uploads/FFOFINALREPORT.pdf
3. Novel carbon capture and utilisation technologies: Request from Commissioner Cañete, GCSA opinion and SAPEA Evidence Review Report published May 2018.
   https://www.sapea.info/wp-content/uploads/CCU-report-web-version.pdf
4. Authorisation for plant protection products in Europe: Request from Commissioners Andriukaitis and Moedas, GCSA opinion and SAPEA Evidence Review Report published June 2018.
   https://www.sapea.info/wp-content/uploads/SAPEA_PPP_ERR_Web.pdf
5. Microplastics in nature and society: This report has been proposed as a bottom-up topic by the Group of Chief Scientific Advisors and was published in January 2019.
   https://www.sapea.info/wp-content/uploads/report.pdf
6. Transforming the future of ageing: This report has been proposed as a bottom-up topic by SAPEA and in particular FEAM who was the Lead Network for this ERR published in June 2019.
   https://www.sapea.info/wp-content/uploads/tfa-report.pdf
7. Making sense of science for policy: This report has been proposed as a bottom-up topic by the Group of Chief Scientific Advisors and was published in July 2019.
   https://www.sapea.info/wp-content/uploads/MASOS-ERR-online.pdf
8. A sustainable food system for the EU: Request from DG SANTE, GCSA opinion and SAPEA Evidence Review Report published in April 2020.
   https://www.sapea.info/wp-content/uploads/sustainable-food-system-report.pdf
9. Biodegradability of plastics in the open environment: Request from Commissioner Karmenu Vella (Environment, Maritime Affairs and Fisheries) and Commissioner Carlos Moedas (Research, Innovation and Science). GCSA opinion and SAPEA Evidence Review Report published in December 2020.
   https://www.sapea.info/wp-content/uploads/bop-report.pdf
10. A Systemic Approach For the Energy Transition in Europe: There are many possible pathways towards a carbon-neutral future. Achieving it by 2050 is possible, but this requires urgent action.
    https://sapea.info/wp-content/uploads/energy-transition-report.pdf

## SAPEA Board members, Chairmen of Networks

Prof. Sierd Cloetingh
Utrecht (NL)
Chair of the Board of SAPEA

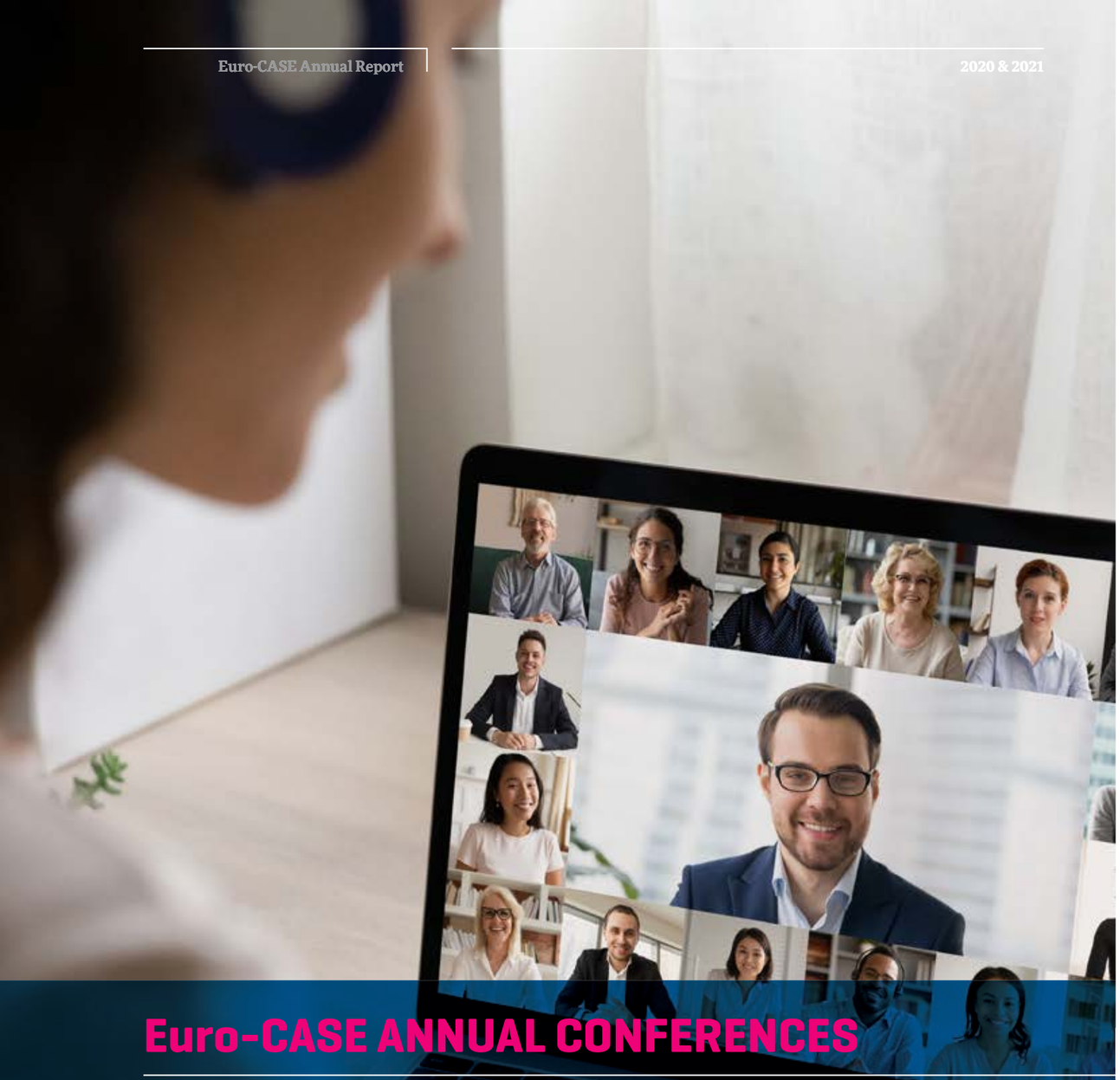
Prof. Antonio Loprieno
Basel (CH)

Christina Moberg
Sweden (SE)



Prof. Reinhard F.Hüttl
Potsdam (DE)

Prof. George Griffin
London (UK)



# Euro-CASE ANNUAL CONFERENCES

**Since 2008 Euro-CASE member Academies have organised a series of Annual Conferences. Through this, a tradition has been established which sees each member Academy host an event each year.**

**2008 London:** "How Can Europe Meet its 2020 Renewables Targets?" (RAEng)
**2009 Stockholm:** "Increasing the interest in Mathematics, Science and Technology" (IVA)
**2010 Berlin:** "Innovation - Best Practices" (acatech)
**2011 Madrid:** "Water and Food Security in Europe" (RAI)
**2012 Paris:** "Energy Independence for Europe" (NATF)
**2013 Lisbon:** "Boosting Innovation in Europe" (PAE)
**2014 Brussels:** "Evidence-based Policy Advice and Innovation Policy beyond Horizon 2020" (acatech, ARB, IVA)
**2015 Delft:** "Engineering Smart Cities of the Future" (AcTI)
**2016 Lyngby:** "Big Data – Smarter Products, Better Societies" (ATV)
**2017 Poznan:** "Cybersecurity" (PAN)
**2018 Zurich:** "How will Artificial Intelligence shape our Future" (SATW)
**2019 Oslo:** "The Future of Work – The Content of Jobs" (NTVA)

## 2020 Annual Conference, 20 November, HATZ (Croatia)

The Croatian Academy of Engineering (HATZ) organized the Euro-CASE Annual Conference 2020, focusing on the theme of "Dealing with challenges of the European Energy transition" and chaired by Prof. Vladimir Androcec, President of HATZ. A conference organization committee was appointed, who comprised: Prof. Nikola Čavlina, Prof. Vladimir Andročec, Prof. Slavko Krajcar, Prof. Zdravko Terze, Vice President of HATZ, Prof. Neven Duić, Secretary of the HATZ's Department of Energy Systems and Prof. Vladimir Mrša, Secretary General of HATZ.

Sustainable generation and use of energy are one of the most significant challenges of the 21st century. Providing secure supply of clean, competitive, and affordable energy for all raises complex technical, economic, social, and political issues that must be addressed to ensure sustainable growth and development. The Euro-CASE Annual Conference 2020 addressed the above energy transition-related issue and challenges with two sessions:

- Session 1: Energies Policies – Challenges and Opportunity for Transformation
- Session 2: Implementation, Economic Impact and Challenges

The usual one-day Euro-CASE conference was condensed into a three hour programme of lectures and discussions on energy-related topics. The conference was divided into four parts: introductory words, first lecture, second lecture and a virtual participant Q&A session. After the welcome speeches, four speakers provided lectures in the first session on "Energy Policies Challenges and Opportunity for Transformation" and five speakers in the second session on "Implementation, Economic Impact and Challenges". The conference closed with a questions and answers session. The conference received strong support from the Euro-CASE Board.

Exceeding the expectations of the Academy Management and the Committee, the conference was attended by 170 participants. Out of 23 national academies constituting Euro-CASE, the conference was attended by the presidents or secretaries of 21 academies.
The praise received after the conference was an indication that the meeting was well organized and that it covered topics of European interest. The conference program, presentations of selected lecturers, and recordings of the entire conference can be seen on the Euro-CASE website.

Main speakers by sessions were: V. Andročec, HATZ (HR); T. Teeri, Euro-CASE; R. Fuchs, Minister of Science and Education of the Republic of Croatia; S. Krajcar, HATZ (HR); Master of ceremony guidance to Conference; E. Álvarez Pelegry, RAI (ES); Y. Caristan, Euro-CASE; V. Berrutto DG Energy, European Commission; I. Milatić, Secretary General of Energy in the Ministry of Economy and Sustainable development (HR); M. Fichtner, Helmholtz-Institute Ulm for Electrochemical Energy Storage (DE); Ž. Tomšić, University of Zagreb (HR); Z. Marinšek, IAS (SI); A. Ćurković, Encro energy (HR); T. Radoš, Croatian Chamber of Economy (HR); M. Ćosić, Croatian utility HEP (HR).

A Euro-CASE Board meeting followed the conference.

## 2021 Annual Conference, 25-26 November, London (UK)

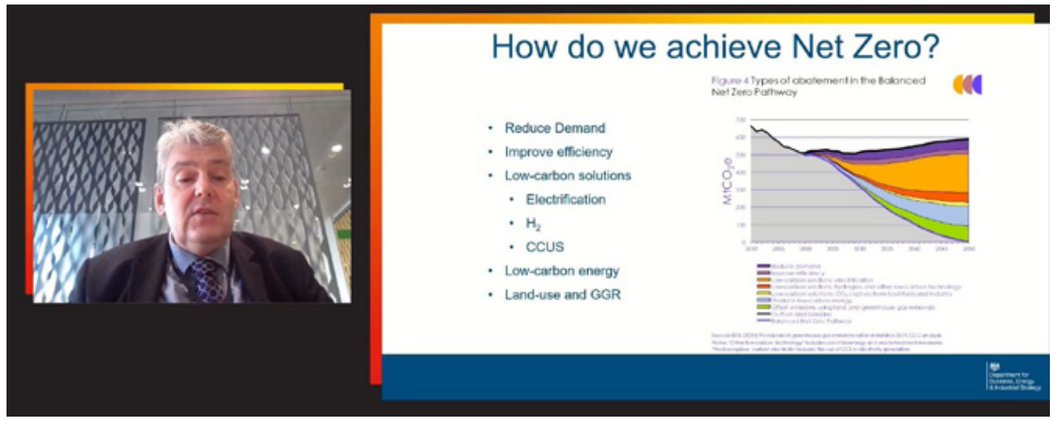
The Euro-CASE Annual Conference 2021 took place in London as a virtual event on 25-26 November. It has been hosted by the Royal Academy of Engineering (RAEng) co-chaired by Adisa Azapagic and Ric Parker on the theme: "Engineering Building Back Better".

The last 18 months have demonstrated the complex and systemic nature of many of the challenges Europe faces today, from health to the economy, from the climate crisis to social integration. As Europe recovers from the pandemic while targeting ambitious climate goals, we need to build a more resilient future, recognising the complex interconnection across the challenges we face. Engineers will be central to achieving these goals, from building more resilient infrastructure, to creating new digital solutions, and in orchestrating systems that work together to deliver change.

The 2021 Euro-CASE annual conference brought together Europe's engineering community with policy-makers and others, to share ideas, plans, expertise, and experience, equipping engineers to play their role in helping Europe to build back better.

The Conference was organised in three sessions:

- Session 1: Engineering for net zero (both general panel, and deep dive panel on the built environment)
- Session 2: Engineering a resilient future
- Session 3: Engineering an inclusive future




Prof. Paul Monks, Chief Scientific Adviser, UK Department for Business, Energy and Industrial Strategy

## 2022 Annual Conference, 19 September, Brussels (Belgium)

The Euro-CASE Annual Conference 2022 will take place in Brussels on 19 September. It will be organised in the prestigious Academies Palace by the Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique (ARB) and the Royal Flemish Academy of Belgium for Science and the Arts (KVAB).

The theme foreseen is: "From open science to Innovation, an engineering challenge for Europe"

The goal of this Euro-CASE conference is to learn good practices from Euro-CASE partners and to debate the challenges and opportunities created by opening science.

More information on all Euro-CASE conferences can be found on the Euro-CASE website.

# Euro-CASE Member Academies: Major Events and Achievements in 2020 and 2021

**During the years 2020 and 2021 Euro-CASE member academies continued their activities and particularly worked on the different aspects of the COVID-19 pandemic.**

## Austria
**(www.oeaw.ac.at)**

**Conferences:**

- Jan. 2020: "Rethinking Academia – Funding scientific research" a workshop to question the current system of research funding and to discuss modern ways in which knowledge and innovation can be promoted fairly and efficiently.
- Mar. 2020: "Science&Art@School - Cultural Collisions" at the interface between Arts and Physics pupils reflect on the scientific and the artistic approach to the topic of particle physics.
- Mar. 2020: The 12th NanoTrust conference "AdMats – Advanced Materials" brings into focus the question of how new materials might influence our social life and the environment.
- Oct. 2020: Conference "Artificial Intelligence and Human Enhancement. Affirmative and Critical Approaches in the Humanities from Both Sides of the Atlantic".

**Lectures:**

- Feb. 2020: Lecture "Predicting regulatory networks from first principles" given by Gašper Tkačik, Professor at IST Austria, at the award ceremony of the Ignaz L. Lieben-Prize of ÖAW.
- Sep. 2020: Lecture "The fairytale of E-Mobility without CO2 foot-print" given by Georg Brasseur, Professor at TU Graz and the ÖAW shows possible ways leaving the dilemma of transport economy behind.

**High Level Grants**

Researchers at the Institute of the Austrian Academy received ten new ERC-Grants in 2020:
2 Advanced Grants: Quantum Physics, Cell-Biology
2 Starting Grants: Particle Physics, History
1 Synergy Grant: Quantum Physics
5 Consolidator Grants: Demography, Molecular Medicine, Medieval Research, Molecular Biotechnology, Tibetology

## Belgium
**ARB (www.academieroyale.be)**

- In 2020, the ARB has published a report "On sharing knowledge and fostering 'open science'". The main theme of this report deals with the dissemination of knowledge through major international conferences, academic journals, and free and fast communication between researchers and innovators in the context of reducing climate footprints.
- For the "Chaire SFPI", a cooperation between the ARB and the Belgian Federal Holding and Investment Company (SFPI-FPIM), Max Krahé was appointed to study public investment in private enterprises, and in particular how such investments can be used to advance socially and environmentally sustainable development. The report From system-level to investment-level Sustainability. An epistemological one-way street was published in 2021 (https://www.academieroyale.be/Academie/documents/Opinio_SFPI_numerique31253.pdf). Besides this report, a series of public lectures and discussions were organised in 2020 and are available online.
- At the initiative of its "Classe Technologie et Société", the ARB organized in 2021 a joint session bringing together the other "Classes" (Sciences, Letters and Moral and Political Sciences, Arts) on the theme of « La transition vers un futur souhaitable » (The transition to a desirable future), available online. The proceedings have been published.https://lacademie.tv/conferences/seance-commune-des-classes-la-transition-vers-un-futur-souhaitable).
- In 2021 as well, the "Classe Technologie et Société" also organized a workshop on IA (« L'intelligence artificielle : avec ou sans vous ? »).

## Belgium
**KVAB (www.kvab.be)**

- The Class of Technical Sciences KTW has been a Euro-CASE member since mid-2018, KTW is one of four classes of the Royal Flemish Academy of Belgium for Science and the Arts (KVAB). KTW is represented by the former KVAB President, Joos Vandewalle, on the Euro-CASE Board.
- Two key achievements for KTW in 2020 include the release of two Position Papers:
  - "Societal values in digital innovation: who, what and how?": international experts bring a future-oriented message for society and policy.
  - "The role of gas in the Belgian energy transition": making gas-applications completely fossil-free by 2050 requires carbon-free technologies or the use of CCUS (Carbon Capture, Utilisation and Storage)?
- On top of that, the Thinkers' programme "Soils as Natural Capital", was rolled out, focusing on three themes: healthy soils for sustainable land management in the 21st century, the importance of soils in a changing climate and the appropriation of soils as a natural capital.

## Croatia
**(www.hatz.hr)**

- The Croatian Academy of Engineering brings together more than 280 renowned domestic and foreign experts in the field of technical and biotechnical sciences. In the past year, HATZ members invested a lot of effort and knowledge to increase the Croatian Academy's notability in Croatia and globally.
- Despite the COVID-19 pandemic the work of HATZ has been recognized by many domestic and foreign institutions, evidenced through an increased number of requests for cooperation, invitations to organise/co-organise meeting and conferences. As well as an increased in HATZ members attending meeting of pubic and media interest. More than 30 domestic and international events have been organized under the auspices of the Croatian Academy of Engineering.
- The Croatian Academy of Engineering has organised several conferences:
  - Croatian Engineer's Day, Zagreb, Faculty of Civil Engineering, University of Zagreb, March 2020;
  - International Scientific Conference "Printing & Design", May 2020;
  - Annual conference "Euro-CASE 2020 - Dealing with Challenges of the European Energy Transition", November 2020.
- In cooperation with the Croatian Engineering Association, the Croatian Academy of Engineering organized the Day of Engineers of the Republic of Croatia. The yearly meeting took place for the sixth time and was one of the most important gatherings of these two organizations. Held in March 2020 Engineers' Day of Republic of Croatia was dedicated to STEM and the insufficiently used educational and development potential of the Croatian society.
- An international conference called Printing & Design 2020 was held in June 2020, co-organized by the Centre for Graphic Engineering of the Croatian Academy of Engineering. The meeting was organised in a hybrid form due to the COVID-19 pandemic. A small number of participants followed the gathering live from the Faculty of Civil Engineering, University of Zagreb, while most of the participants joined the meeting using the Zoom platform.
- The Academy has been active in the field of international cooperation, in particular in the field of cooperation with CAETS and Euro-CASE through their membership in these organizations and regular participation in online meetings.
- The Croatian Academy of Engineering, as a long-term member of Euro-CASE, on November 20th 2020 held an international scientific-professional annual conference Euro-CASE 2020 on "Dealing with Challenges of the European Energy Transition".
- A conference organisation committee was appointed, who comprised: Prof. Nikola Čavlina, PhD, President of the Board; Prof. Vladimir Andročec, PhD, President of HATZ; Prof. Slavko Krajcar, PhD, Member of the HATZ's Board; Prof. Zdravko Terze, PhD, HATZ's Vice President; Prof. Neven Duić, PhD, Secretary of the HATZ's Department of Energy Systems and Prof. Vladimir Mrša, PhD, HATZ's Secretary General.

## Czech Republic
**(www.eacr.cz)**

- The Engineering Academy of the Czech Republic (EA CR) participated in international video conferences organized by the Royal Academy of Engineering to share information and co-ordinate the global engineering response to COVID-19.
- The EA CR presented the award for an outstanding implemented engineering project to the project „Protective Half-Mask CIIRC RP99-3D" to a team from CIIRC CTU led by PhDr.Mgr. Vít Dočkal, Ph.D. The sponsor of the prize Preciosa Group designed for the EA CR a work of art. The Crystal Trophy based on the symbol of the EA CR – Ressel´s propelller - will thus be a permanent symbol of the EA CR Prize.
- The EA CR participated in the project "Elimination of Noise Pollutions in Urban Tunnels". The main output is a certified methodology which serves project engineers and investors in designing anti-noise modifications of tunnel outlets.

## Denmark
**(www.atv.dk)**

**2020**

- Notable publications include 'State of the Nation 2020: Denmark as Science & Engineering Region', 'Whitepaper on the use of AI in Healthcare', 'Can the SDG's be used to evaluate technology?', and 'The future of sustainable production'.
- August, ATV launched its report on The World's Leading Tech Regions and welcomed its new Chairman Mr. Anders Bjarklev, President, Denmark's Technical University; At the Technology Summit in November, ATV gathered stakeholders from policy, industry and university to discuss a Technology Strategy for Denmark post-COVID-19 called Denmark 5.0.
- June: Professor Brian Vad Mathiesen, Aalborg University was admitted to the SAPEA working group on 'A systemic approach to the energy transition in Europe'. In addition, ATV Fellows have joined various European meetings and working groups on COVID-19 related topics, e.g. protective equipment, air circulation in buildings to prevent spreading of the decease and methods to trace chains of infection.
- In the Autumn, ATV received funding from the Danish Industry Foundation to establish Danish Center for Energy Storage which joins all key stakeholders in the field around the common goal of Danish research and innovation in the field.

**2021**

- January: ATV launched Danish Centre for Energy Storage, DaCES. A project to unite researchers, business developers, the corporate world, etc. Created for coordinating efforts in developing energy storage technologies.
- January: ATV published an executive summary in English of the report "The World's Leading Tech Regions – Testing Denmark's Capacity in Tech".
- April: ATV published the report "Sustainable Production of the Future, a Baseline". In cooperation with the Danish Industry Foundation, we have developed a baseline for measuring sustainability by way of five indicators that will make the transition concrete and operational. The five indicators are CO2 emissions, energy consumption, resource consumption, water consumption, and waste generation. The baseline enables businesses to go from speaking of sustainable transition to measuring it.
- May: at ATV's annual assembly, we discussed the importance of technology for gearing up Danish economy after the COVID-19 crisis. The government was involved at a high level by participation of the Danish Minister for Finance. Because of COVID-19 restrictions, the meeting was video-broadcasted with only the panelists and speakers present in the 'studio'. In connection with the meeting, ATV published our annual State of the Nation report on Denmark as a Science & Engineering region.
- June: ATV published a State of the Nation report for the digital business area.
- August: ATV had a study trip to regional growth areas in Denmark. We had dialogue with researchers, business developers, and investors about tech developments in Denmark.
- November: ATV held a tech summit where we summarized the results of ATV's 5-year project on Science & Engineering. The results are compiled in the report "Vision for Danmark 2030".

## Finland
**(www.academies.fi)**

**Major events:**

- Council of Finish Academies (CoFA) arranged two public events in 2020:
  - Webinar on "Current conditions for international activities" in October
  - "Great Nobel Debate" in October

- In 2021, CoFA arranged two public events:
  - "Great Nobel Debate" in October
  - Seminar "Mitigation of climate change and biodiversity loss - Finland and international cooperation" in November
- In May 2021, CoFA hosted ALLEA General Assembly. CoFA and ALLEA co-organised a virtual scientific symposium "Across boundaries in sciences". The symposium gathered leading academics, policymakers, and civil society from over 40 countries to discuss today's position of science in society and in relation to policy, including a particular focus on interdisciplinary research and a debate on the recently released ALLEA discussion paper "Fact or Fake? Tackling Science Disinformation'".

**Other activities:**

- CoFA nominated national representatives to several international science organizations and their workgroups, including IAP, ALLEA, EASAC, and Euro-CASE.
- CoFA shared several reports and publications published by science organizations to national decision-makers, science organizations and media.

**Executive Committee representatives of the Council of Finnish Academies::**

- Chair Professor Markku Leskelä
- Vice-Chair Professor Hannu Koskinen
- Members D.Sc. (Tech.) Leni von Bonsdorff
- Professor Kimmo Kaski

## France

**(www.academie-technologies.fr)**

- Besides its Fellows' active participation in Euro-CASE Platforms (Energy, Engineering Education) and in the SAPEA project, the National Academy of Technologies of France (NATF) published several reports on the main following topics:
  Feedback on the management of major projects
  - Attractiveness of the professions, attractiveness of the territories and challenges for industry
  - Position paper of the NATF on the National Low Carbon Strategy (NLCS) and on the Multiannual Energy programming (MEP)
  - For a virtuous circulation of digital data
  - Advisory note from the NATF on the presence and activity of the coronavirus sars-cov-2 in Wastewater
  - Archiving mega -data beyond 2040: the DNA track
  - COVID-19 crisis – Accelerating the digital transformation: for a more agile and less dependent France
  - The role of hydrogen in a decarbonised economy
  - Brain-Machine Interfaces: Medical Application Testing, Technology and Ethical Issues
  - Science and Technology at primary school: a decisive issue for the future of tomorrow's citizens
  - Inter-seasonal heat storage in the residential and tertiary sector: a way to reduce our carbon footprint
- The NATF Annual Seminars were dedicated to "Which technological transitions for which ecological transition" and "Achieving success in 2030 to reach the objectives of a societal transformation in 2050".
- CAETS: NATF participated to the annual meetings organised by:
  - the National Academy of Engineering of Korea (NAEK) which was devoted to "engineering a better world: smart society" in 2020
  - the by the Academia Nacional de Ingenieria of Argentina which devoted to the "Future of Energy" in 2021.
- Achieving success in 2030 to reach the objectives of a societal transformation in 2050.

## Germany

**(www.acatech.de)**

- In January 2020, the Third Innovation Dialogue took place with Chancellor Angela Merkel and her Ministers. At the event, Henning Kagermann, Chairman of the acatech Board of Trustees, together with representatives from industry and science, discussed the 'Innovation Potential of Second Generation Quantum Technologies'.
- Within the framework of the National Platform for the Future of Mobility, the Steering Committee, chaired by Henning Kagermann, launched the project RealLabHH, a real-world laboratory in Hamburg exploring the digital mobility of the future.
- In December 2020, the National Platform Artificial Intelligence, co-chaired by the federal Minister of Education and Research Anja Karliczek and acatech President Karl-Heinz Streibich, published a progress report summarising the main results of the past years in key areas of AI research such as intelligent mobility, machine and deep learning, man-machine interaction, and AI and discrimination. It presents examples of practical applications in everyday life and also makes its own contribution to the innovation and socio-political AI discourse.
- In March 2021, Johann-Dietrich (Jan) Wörner was elected as one of acatech's two Presidents, succeeding Dieter Spath. He is an engineer who has previously served as Director General of the European Space Agency (ESA), Chairman of the Executive Board of the German Aerospace Center (DLR) and President of the Technical University of Darmstadt.
- In May 2021, the "Circular Economy Roadmap for Germany" was officially handed over to the German Federal Ministry of Education and Research (BMBF). The roadmap is a framework for action that describes the necessary steps for Germany's transition to a Circular Economy. With funding from the BMBF, the Circular Economy Initiative Deutschland was carried out under the guidance of acatech in cooperation with SYSTEMIQ.
- In late 2021, the acatech IMPULSE "5G in Industry" was published. It discusses the potential of 5G technology and possible barriers to its implementation and proposes a series of policy options for science, industry and government.

## Greece

- Greece was invited and became associate member of Euro-CASE in June 2021. Three Organizations have been responsible for representing Greece in Euro-CASE, i.e., National Technical University of Athens (NTUA), Foundation for Research and Technology-Hellas (FORTH) and Center for Research and Technology-Hellas (CERTH). Participation of the three Organizations is governed by the NTUA Rector and the Chairmen of the Boards of Directors at FORTH and CERTH.
- Three members of the respective Organizations are representing them in Euro-CASE, i.e., Prof. Stefanos Kollias (NTUA), Prof. Nikolaos Pasadakis (FORTH) and Prof. Paris Voutetakis (CERTH). They participate in the Euro-CASE meetings, so as to get an understanding of Euro-CASE targets and developments and thereafter consult their Organizations' Leaders to prepare the related actions that need to be implemented within Greece.

## Hungary

**(www.mernokakademia.hu)**

- Despite the challenges faced by the COVID-19 pandemic, The Hungarian Academy of Engineering (HAE) continued implementing its basic mission, as established more than three decades ago. However it can be noted that there was a generational shift that was considered in updating the functioning of the HAE executive bodies. HaE has upgraded their management model including relevant professional expert activities yielding a set of recommendations. A major goal of the activities was to consolidate the participation of the Academy in relevant international bodies. A upcoming priority for the coming year is to rejuvenate the HAE membership.
- Three General Assemblies (GA) were held during 2020:
  On the 30th anniversary of the HAE, February 6th 2020 the 14th GA, was held. The GA focused on the emerging technological challenges and those related to the innovation capabilities. The new President and a new Vice-President were elected;
  Due to the restrictions posed by the pandemic the 15th GA was held online between July 14 and 20 with a view towards gathering and synthetizing the views and proposals of the members in order to ensure continuity in spite of the COVID-19 pandemic;
  The 16th GA was held again online between September 18 and 20 in order to modify, as foreseen, the Statutes of the Academy. The modifications were adopted by consensus.

## Ireland

**(www.iae.ie)**

**2020**

- Publications
  The Future of Electricity Transmission in Ireland
  Lessons from the COVID-19 Experience
- Activities
  None due to COVID-19 restrictions

**2021**

- Publications
  Academy 5-year Strategy
  Sustainable Electricity in 2030
  The Case for an Innovation Council
  Innovation Council Structure
  The Delivery of Major Capital Projects
- Activities
  Hosted First Official Visit to Ireland by President of Royal Academy of Engineering (Prof. Sir Jim McDonald) – October 2021

## Italy

## Netherlands

**(www.acti-nl.org)**

**Major activities 2020**

- Academic Startup Competition
  AcTI once again organised the Academic Startup Competition in 2020 in collaboration with VSNU and Techleap. In this way, AcTI, the VSNU and Techleap aim to build a long-term collaborative relationship. This pioneering Dutch competition for science-based innovations challenges universities and scientific institutions to nominate their best spin-out companies. The 20 finalists of the Academic Startup Competition 2020 were officially presented at the first digital European Entrepreneurship Summit. These Dutch startups - founded in the ecosystems of Dutch universities and university medical centres - have a chance to win, among other things, a digital trade mission to startuphalla Silicon Valley including training, coaching and introduction to networks of entrepreneurs and investors relevant to them. The winners were announced in November. Ten spin-out companies were selected and allowed to participate in the ASC - digital mission to States/ Sillicon Valley.
- Mini Symposium
  On 8 December 2020, the AcTI-KNAW mini symposium 'Agriculture of the Future' took place virtually via Zoom.
  Agriculture in the Netherlands is mostly a large-scale activity on uniform plots. It is characterised by high inputs and large yields. However, this form of agriculture is increasingly under discussion precisely because of the high inputs and the effects on biodiversity and the landscape. Is a transition possible to ecological cycle agriculture, based on the use of various crop species in a field, with fewer inputs and still high yields? And is such an alternative sustainable, resilient and productive enough to be economically viable?
  A different system means that changes are needed in operations for arable farmers. Is this also technically, logistically and organisationally feasible? The transition to a different agriculture has many questions and often leads to a vigorous debate. However, wouldn't a dialogue be more constructive to arrive at a jointly supported system that does justice to the interests of all stakeholders, from producer to consumer? This webinar Agriculture of the Future will cover a number of aspects: from an ecological basis to technological innovation and from practical experiences to the dialogue between stakeholders. This webinar aimed to initiate a dialogue on the agriculture of the future.
- Meeting Young Innovators
  In autumn 2017, the AcTI Board decided to launch a pilot to engage young innovative entrepreneurs with the Academy: the AcTI Young Innovators initiative. A selection process took place in late 2017 and early 2018, calling on both current AcTI members and external organisations to nominate young innovative entrepreneurs under the age of 40. The board mandated the Young Innovators working group to act as a selection committee on an ad hoc basis. Eventually, nine young entrepreneurs were selected and installed as Young

Innovators within AcTI with effect from 1 February 2018. The AcTI membership lists the nine Young Innovators.
Young members are regular members of AcTI with the same rights and obligations as any other AcTI member, but with a temporary membership for the duration of two years. Each Young Innovator has been assigned a so-called buddy within AcTI who can guide the young entrepreneur within AcTI and provide advice on the development of his/her business. The Young Innovators working group was converted by the board into Young Innovators Committee to further shape the initiative together with the Young Innovators.
In 2020, the members of the Young Innovators Committee were:
Hans Schikan, Jorrit Kuipers, Jos Nelissen and Dennis Schipper
During the Zoom Meeting with Young Innovators on 19 November 2020, the JI was asked to provide feedback on the experiences with the JI programme during an inspiring discussion. With all the input gathered during the meeting, a proposal was formulated and presented to the AcTI board for a further improved Young Innovators programme in 2021.

**Major activities 2021**

- Winners Academic Startup Competition learn about entrepreneurship in Silicon Valley
  Ten Dutch startups - founded by students and employees of Dutch universities and UMCs - took part in the Digital Mission West Coast USA, a digital mission to the west coast of the US, from 9 February to 5 March 2021. This is home to the top universities Stanford and Berkeley, as well as the startup mecca Silicon Valley. During this mission, startups are introduced to the latest developments in their field and learn from experienced entrepreneurs the tricks of the trade about doing business and pitching in the United States.
  The mission is one of the prizes of winning the Academic Startup Competition 2020. The 10 winners were announced in November 2020. The Digital Mission is made possible by the Ministry of Economic Affairs and Climate (EZK) and the Dutch consulate in San Francisco. State Secretary Mona Keijzer (EZK) announced the Digital Mission today at the online event Impact 2021.
- WEBINAR KNAW, ACTI AND ARC CBBC on Recyclable Plastic
  28 September 2021
  Society is facing a major sustainability challenge. The demand for energy and materials such as plastic, is increasing, but CO2 emissions and the amount of waste must be reduced. For this, we need to develop better production processes. The speakers in this webinar highlight the challenges and possible solutions to make more sustainable types of plastic.
  Future use of polymer-based materials calls for new approaches in the design and preparation of plastics such as smart plastics, alternative green raw materials and sustainable production processes. In this talk, some recent developments were illustrated using intrinsically recyclable and self-repairing polymers based on supramolecular and dynamically covalent chemistry. A bio-based coating from wood waste, based on a clean photochemical process, was presented as well as prospects for sustainable plastic design.
- NWO Spinoza and Stevin Prize
  Six scientists received the NWO Spinoza Prize and the -Stevin Prize from Minister Van Engelshoven of Education, Culture and Science at the Amare theatre in The Hague on 13 October 2021. The awards are the highest honours in Dutch science. In 2021, Prof Marc Koper, Prof José van Dijck, Prof Lieven Vandersypen and Prof Maria Yazdanbakhsh received the Spinoza Prize. Prof Bart Jacobs and Prof Judi Mesman will receive the Stevin Prize. The laureates will each receive 2.5 million euros to be spent on scientific research and activities related to knowledge utilisation.

**The selection process**

NWO invites a limited number of people to nominate scientists as candidates for a Spinoza or Stevin premium by virtue of their position. This year, NWO received around 25 nominations for each premium. The Spinoza and Stevin committees consist of 12 members from different countries and sciences. The Stevin committee also includes members from industry and civil society organisations. Based on the nominations, the committees shortlist up to eight candidates for the Spinoza Prize and six for the Stevin Prize. For each candidate, committee members then enter into discussions with several foreign experts. AcTI is asked annually to nominate candidates for these awards. Marc Koper and Lieven VanderSypen were nominated by AcTI, with Marc Koper also being an AcTI member.

## Norway
**(www.ntva.no)**

- In January 2020, a big meeting in Oslo: Technology Forum, Digital Sustainable Development for the Building Industry.
- A total of 10 meetings were arranged in Trondheim, Bergen, Stavanger and Tromsø before COVID-19 Shutdown.
- After March, transition from physical meetings to Webinars. A series of eight webinars about the pandemic, vaccine development, testing, tracking and mathematical modelling of spreading. Attendance from 100 to 497 participants, more than for normal physical meetings. Four other webinars were also arranged. NTVA used the limitations of the pandemic to increase our presence on social media.
- In 2020 and 2021, NTVA participated digitally in the board an annual meetings of Euro-CASE and CAETS.
- NTVA participated in the SAPEA Evidence review reports
  - Towards an EU sustainable food system
  - Biodegradability of plastics in the open environment
  - A systemic approach to the energy transition in Europe
- Early 2021 NTVA continued with webinars on topics like: Big data and AI in health, Sustainable industrial development, Natural disasters, Pharmaceutical production, Exploitation of minerals, and upgrading of existing hydropower plants.
- Later in 2021, gradual transition to physical meetings. The first was a ceremony for NTVAs Honorary award for technological development, given to the founders of Tandberg AS for the development of the world's first integrated video conferencing system, later sold to Cisco for a very substantial amount. Later meetings addressed CCS, Seafloor minerals, High temperature fuel cells for ships, managing big projects within budget, and microplastics in the oceans. NTVA and DNVA arranged a joint symposium in Oslo on Society, technology and innovation.
- In 2021, the last book in NTVAs trilogy on new and particularly digital technologies was published, focusing on the positive or negative influence on humans in their daily life from all kinds of digital solutions.

## Poland
**(www.pan.pl)**

- The Polish Academy of Sciences (PAS) was actively engaged both in monitoring and informing the society about the progress of the COVID-19 pandemic in various spheres of life. The Academy published numerous position statements concerning COVID-19. The President of the PAS gave valuable recommendations via TV and social media on how to combat the pandemic.
- Institute of Bioorganic Chemistry (PAS) invented a new molecular test for a quick evaluation of SARS-CoV-2 virus presence.
  Institute of Human Genetics (PAS) carried out professional RT-PCR tests enabling to distinguish COVID-19 from influenza.
  Institute of Biocybernetics and Biomedical Engineering (PAS) invented a device to ventilate two patients using single respirator.
- The President of the PAS appointed the Interdisciplinary Advisory Group for Climate Crisis.
  The Committee on Electrical Engineering of the PAS is also contributing towards the implementation of nuclear energy in Poland.

## Portugal
**(www.ordemengenheiros.pt)**

## Romania
**(www.astr.ro)**

- ZASTR 2020 - Academic Days of Technical Sciences Academy of Romania - International Conference was organized virtually on the 26-27 November, . The theme of the conference was – Circular Economy – a strategic model in tackling challenges on resources insufficiency, global warming and waste management.
  The papers have been published in both in Romanian and English languages.
- Journal of Engineering Sciences and Innovation (JESI): quarterly journal 2020-2021, Editor in chief: Valeriu V. Jinescu;
- Scientific electronic journals under the coordination by prof. Ion Boldea: www.jeee.ro and prof. Radu Munteanu: www.jeee.cj, which are periodicals.
  Published papers:
  - Geology and Geotechnologies, authors: Iulian Offenberg; Nicolae Iliaș; Sorin Mihai Radu,
  - Using signal and operator theory for wave analysis (WAVELET), authors: Dumitru Stanomir, Laurențiu Tincu;
  - Parallel worlds –The 2020 Pandemic versus the world economy, authors: Cezar Mereută and others - AGIR Publishing House;
  - Railways and high-speed lines, author: Octavian Udriste.

## Serbia
**(www.ains.rs)**

- March 2020 - Due to the C19 pandemic, the Annual General Assembly scheduled for March 25, where regular elections for the new leadership of AESS were to be held, was postponed.
- June 2020 - Round table organized by AESS and the Academy of Medical Sciences 'Medicine and Engineering - An Inexhaustible Source of Challenges for the Cooperation of Doctors and Engineers', Banquet Hall of the Serbian Medical Society.
- September 2020 - Scientific event organized by AESS - Departments of Technology, Metallurgy and Sciences, topic: 'New Materials and Nanotechnologies in Engineering Sciences'.
- October 2020 - AESS Position Paper on hydrogen and fuel cells adopted.
- October 2020 and further in continuity - AESS response on the JADAR project related to the exploitation of lithium in Western Serbia and related to this serious environmental threats, in contrast to the obvious economic benefits for Serbia (estimate: 10% of the world's lithium deposits are located in the territory of western Serbia); Communication with the Ministry of Mining and Energy of the Republic of Serbia regarding the position of AESS on this issue, which, in addition to economic, technological and ecological ones, gradually began to gain a broader political dimension; Meeting with Rio Tinto - Rio Sava Exploration d.o.o., and debate on technological and environmental issues of the JADAR project.
- December 2020 - Agreement on cooperation between AESS and the Ministry of Mining and Energy of the Republic of Serbia is signed.
- February 2021 - signed Protocol on cooperation and partnership between AESS and the Academy of Medical Sciences, which was recently established within the Serbian Medical Society.
- November 2021 - AESS co-organizer of the conference 'Research, Development and Innovations Aimed at Improving Agriculture and Forestry in Serbia', held in the Conference Hall of the Faculty of Forestry, University of Belgrade.
- November 2021 - participation of AESS in the organization of the scientific meeting 'Resilient and Sustainable Urban/Rural Partnership' held in Leipzig; AESS fellows delivered keynote lectures.

## Slovenia
**(www.ias.si)**

- Counselling to State Institutions": IAS was cooperating with the Ministry of Science and Education in the Law on Scientific Research and Innovation. IAS is annually producing an analysis on sustainable development, higher education and research and development, innovation, and entrepreneurship. From this annual analysis all comparisons drawn from previous years can be used for the prediction of futureprocesses.
- "Promotion of engineering": IAS has a new award presented to a journalist for excellence in promoting engineering and science in the last year. Additionally, two members of IAS have received the highest state award for important achievements in the field of scientific research and development. Another member of IAS has received the highest state award for inventions, technological development achievements and the use of scientific results of all scientific fields in the introduction of innovations into economic and social practice.
- "SEEIIST": IAS was coordinating the project with EU called 'Advancing the Design of the South-East European International Institute for Sustainable Technologies'. The project aims to become a large-scale international facility on medical care and research based on hadron radiation.

## Spain
(www.raing.es)

- The Royal Academy of Engineering of Spain has developed a considerable number of activities and events during the academic course 2020-2021. The following ones may be highlighted. A full account may be seen in the following link https://www.raing.es/memoria/memoria-de-actividades-2020-2021/
- Reception ceremony of the one new member Corresponding Academic.
- "Engineer Laureado" awards were officially granted.
- Joint scientific conferences with the Royal Academies of Exact, Physical and Natural Sciences, National Pharmacy and National Medicine on Challenges and solutions for COVID-19 from the fields of engineering, science, and health.
- In the 2020 Euro-CASE Annual Conference, on behalf of RAI, the academic Dr. Eloy Álvarez Pelegry intervened, who, among other aspects, discussed about the Euro-CASE Energy Platform.
- Several sessions have taken place during 2020-2021. With the Academy of Engineering of Mexico, a tree day conference took place. Sessions were held on the following topics: "The world of the future and engineering", "The engineer of the future: training and skills" and "Proposals for engineering education"
- Conferences "RAI on the Network". RAI on the Net is an initiative of the Royal Academy of Engineering, which is made up of conferences and seminars. It addresses solutions for society (post-covid), with focus on engineering. Speakers are of the highest institutional, business, academic or professional level.

  Conferences:
  - "The Iberian Peninsula in the recovery of Europe, 2021-26. Towards a joint Spanish-Portuguese Knowledge-based approach for the next decade", by Manuel Heitor, RAI Corresponding Academician and Minister of Science, Technology and Higher Education of Portugal
  - "A competitive and fair energy transition, based on our industrial and technological capabilities" by, Josu Jon Imaz, CEO of Repsol
  - Human Spaceflight – Past, Present and Future. A look at how we got here, where we are, and where we're going in space by Michael López-Alegría, RAI corresponding academic.
- Seminars have been also taking place on topics such as NASA third mission Mars 2020, and lectures were given by fellows of the RAI in the framework of collaboration with Caixa Forum in several Spanish towns. And seminar and lectures were organized and given on technological challenges for future Navy ships and the future of the defence and security industry.
- Several presentations of reports have been made such as "Greenhouse gas emissions in the Spanish agri-food system", and "Female digital entrepreneurship in Spain: Situation and prospects: Women, technology and digital society".
- Closing of the academic year by the academic. Avelino Corma with the title "Transfer of knowledge and technology from public centers to the industry. A personal experience".

## Sweden
(www.iva.se)

- In spring IVA kick-started the Sustainable New Start for Sweden project involving strong joint action where, in a limited amount of time, the academy was able to propose initiatives to stimulate economy during the pandemic in a way that is sustainable for the long term.
- In the autumn, IVA launched 'School in our time', a long-term IVA project for the purpose of promoting the development of Swedish school education to meet the long-term knowledge needs of students and society, and to secure Sweden's position as a knowledge nation. It is focusing on compulsory school and upper secondary education, with an emphasis on compulsory school.
- At the Nobel-day, 10 December, IVA hosted a Top Scientist Dialogue, in Stockholm and at the Swedish Embassy in Beijing, between Swedish and Chinese Researchers. Focus areas included transportation and industry.

## Switzerland
(www.satw.ch)

- Despite increasing demand, attractive jobs and above-average pay, many young women decide against a career in a STEM profession. Various studies show that young women are not often feeling confident about it. In order to increase girls' self-concept in relation to technology, they therefore need a sense of achievement and role models. Based on these findings, SATW launched the Swiss TecLadies program in 2018. The program is specially designed for girls between the ages of 13 and 16. It consists of workshops, a personal support from a mentor (an expert in the field) and an alumnae organization, the Swiss TecLadies Network.
- By 2050, more people must be able to be fed with less arable land. Switzerland is predestined to make its contribution to this – it has top-class universities, many highly qualified workers and companies with extensive experience in food technology. We at SATW make use of all this: We now advertise annual funding programmes for innovative projects in the food sector and thus help to make ideas fly. In addition, this year we held an awareness week for the population for the first time. We investigated the question of whether plant proteins can increase security of supply.
- Switzerland still occupies top positions in international rankings that assess the innovative capacity of countries. But this positive assessment is now being questioned by a number of studies. SATW's new report "Innovation Power Analysis of Swiss Industry: an Update" highlights the nuances and shows how heterogeneously the innovation power of Swiss companies is developing. Striking are the diverging trends between companies that conduct R&D and devote growing resources to it, and those that do without. The political framework conditions will be decisive for the future of Swiss industry. The report is available in German and French.

## United Kingdom
(www.raeng.org.uk)

- **COVID-19 response programme.** Set up in light of the COVID-19 pandemic, this programme engaged in a variety of activities including policy advice to government; rapid evidence reviews; online webinars to promote lessons from rapid innovation; launch of Project CARE supplying PPE to sub-Saharan Africa; the President's Special Awards for Pandemic Service; support for global innovators via the Engineering X Pandemic Preparedness programme.
- **NEPC net zero project**. In 2020 RAEng launched a major policy initiative exploring the challenges, opportunities, and realities of the UK's commitment to achieve net zero emissions by 2050, including by taking an engineering systems approach. The National Engineering Policy Centre (NEPC) provides a unified voice for all engineering disciplines in the UK.
- **The Hamilton Commission:** in partnership with Sir Lewis Hamilton MBE HonFREng, this research project will work to identify the key barriers to recruitment and progression of black people in UK motorsport and wider science, technology, engineering and mathematics (STEM) sector.
- RAEng's **National Engineering Policy Centre (NEPC)** seeks to bring engineering thinking to the heart of policymaking, in 2021 the NEPC published two key reports on net zero and decarbonisation. The "**Rapid low regrets decision making for net zero policy report**" is a low-regrets framework that is intended to help identify priority actions to take in the short-term—avoiding technological 'lock-in' whilst long-term decarbonisation strategies are developed in parallel. The NEPC also published a report on **decarbonising construction** which sets out 20 recommendations across four missions to transform and decarbonise the construction sector.
- RAEng and partners at the NEPC published a report in July 2021 on **Infection Resilient Environments – Buildings that keep us healthy and safe**. The report was commissioned by the UK Government Chief Scientific Adviser, Sir Patrick Vallance and highlighted the urgent need to improve guidance and plug skills gaps as COVID-19 restrictions lift. The report shared the voices of leading engineers who say the importance of ventilation is too often neglected, and that the COVID-19 crisis has revealed flaws in the way in which we design, manage, and operate buildings.
- In January 2021 RAEng launched 10 new **UK-Germany collaborative projects on energy transition**. These projects followed a UK-Germany energy symposium jointly organised in October 2020 by RAEng in partnership with the German Academy of Science and Engineering (acatech). Each project features a newly formed UK-Germany coalition that will seek to address a specific transition challenge common to both countries, such as the deployment of energy storage solutions, approaches to public interaction, the use of peatlands for carbon storage.

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