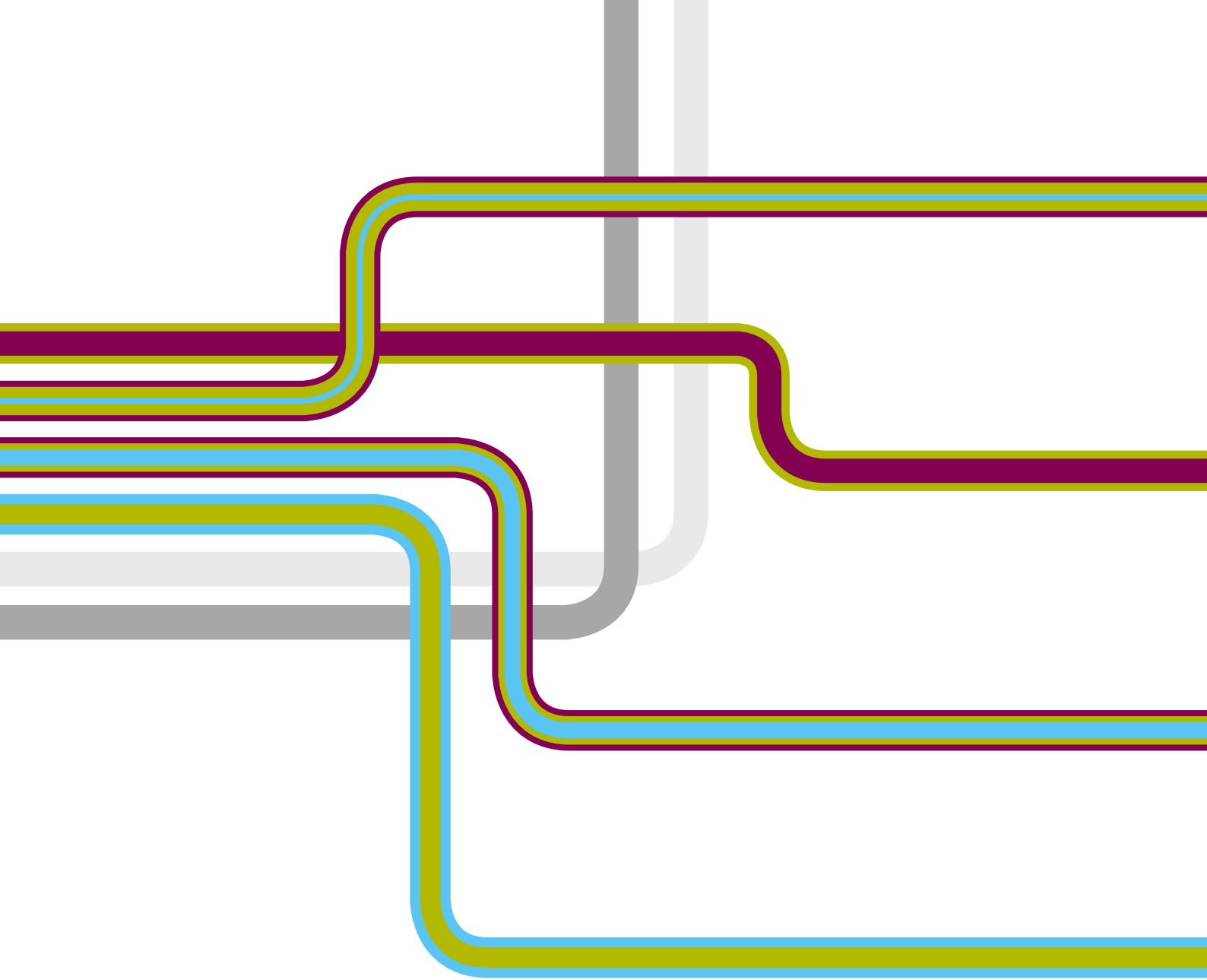
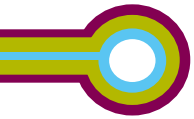
IASS
POTSDAM

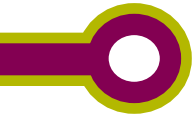
Science for Sustainability

Institute for Advanced Sustainability Studies (IASS)

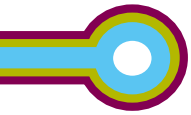




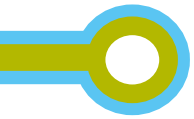
What are the governance options for a sustainable interaction with the environment and use of resources?



Which pathways and technologies can transform our polluting and wasteful energy systems and lifestyles into more sustainable ones?



How can we take responsibility for human-made changes in ecosystems and act according to future needs?



How can we co-generate and communicate knowledge between science and society?

At the beginning of the 21st century, our societies are facing an unparalleled situation as the accumulated impact of human activity is irreversibly shaping the face of the Earth. Since humanity is now acting as a quasi-geological force, many scientists have begun referring to our epoch as the "Anthropocene" era. The consequences of climate change and environmental degradation, as well as global economic crises and social inequalities, pose serious risks to the livelihoods of people around the world. These challenges call for significant transformations of our ways of life, with the goal of ensuring that each country can achieve economic development while preserving the environment.

In this context, science needs to reflect on its expanded role and responsibility. With information more easily accessible than ever before, new opportunities are arising for stakeholders and research communities to participate more actively in the co-generation and application of knowledge. The Institute for Advanced Sustainability Studies (IASS), a combination of a research centre and think tank, was created with the purpose of contributing to this effort and providing a platform for improved interaction between science and society.

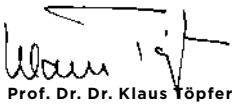
Sustainability should be used as a guiding principle for policies, ideas, processes and structures in the ecological, economic, technological and social realms. Acknowledging the complex interactions within and between these realms, we unite contributions from various scientific disciplines and stakeholders within society in order to better explore possible pathways towards sustainability.

Our research areas address a broad array of topics, from societal and political transformations to Earth system sciences and technological developments. We focus in particular on investigating a more sustainable use of natural resources, including improving governance of soils, oceans and the atmosphere, and transforming our energy systems to curb greenhouse gas emissions. In collaboration with research partners, we also explore the technological advancements that will enable sustainable development, such as technologies for carbon capture and use.

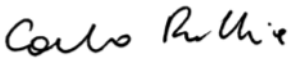
Given the complexity of the challenges ahead, it is important to critically appraise proposed solutions, especially controversial ideas like climate engineering. This requires not only risk assessments, but also an understanding of the political, social and ethical implications. We have adopted this holistic approach in our projects, such as our transdisciplinary work on the German Energiewende, our research addressing the currently unsustainable economic and financial systems, and our work on the cultural prerequisites of sustainable development.

The IASS actively weaves these topics together in its pioneering endeavour to develop and apply transdisciplinary research on sustainability.

Potsdam, 2013



Prof. Dr. Dr. Klaus Töpfer
Executive Director



Prof. Dr. Dr. Carlo Rubbia
Scientific Director

PD Dr. Mark Lawrence
Scientific Director

IASS Board of Directors

Prof. Dr. Dr. Klaus Töpfer
Executive Director

Prof. Dr. Dr. Klaus Töpfer studied Economics in Mainz, Frankfurt and Münster, and obtained his PhD in 1968 from the University of Münster. After working as a government official, professor and advisor on development policies, he became Minister for Environment and Health, Rhineland-Palatinate (1985–1987). In 1987, he was appointed Federal Minister for the Environment, Nature Conservation and Nuclear Safety (1987–1994) and subsequently Federal Minister for Regional Planning, Housing and Urban Development (1994–1998). He was also a member of the German Bundestag from 1990 to 1998. In the period 1998–2006, Prof. Töpfer served as Under-Secretary-General of the United Nations and Executive Director of the UN Environment Programme. In 2009, he was appointed Executive Director of the IASS.

Prof. Dr. Dr. Carlo Rubbia
Scientific Director

Prof. Dr. Dr. Carlo Rubbia graduated in Physics from Scuola Normale of Pisa (Italy), and obtained his PhD from Columbia University (USA) in 1959. From 1961 onwards, he worked at the European Organization for Nuclear Research (CERN) in Geneva, being its Director General from 1989–1994. In 1984, he was awarded the Nobel Prize in Physics for the discovery of the intermediate vector bosons using CERN's proton-antiproton collider. From 1972 to 1989, he also held the Higgins Professorship of Physics at Harvard University. He was President of the Italian Agency for New Technologies, Energy and Sustainable Development from 1999 to 2005, and Special Advisor to the UN Economic Commission for Latin America (2009–2010). In June 2010, he was appointed Scientific Director of the IASS.

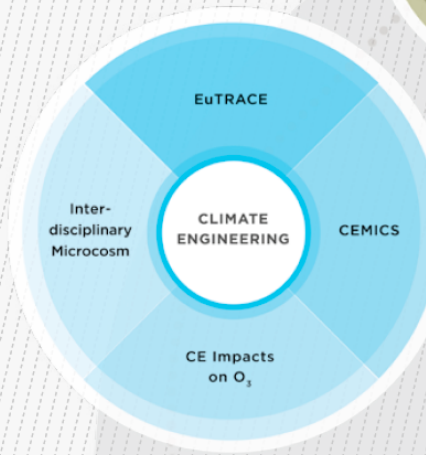
PD Dr. Mark Lawrence
Scientific Director

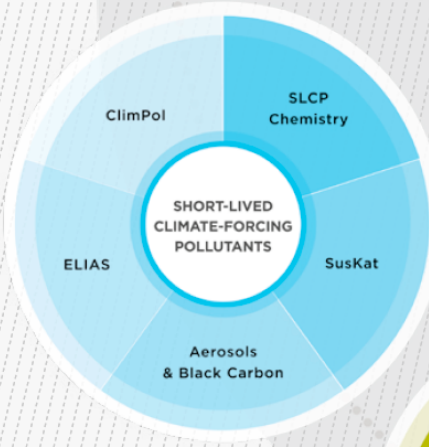
PD Dr. Mark Lawrence obtained his PhD in Earth and Atmospheric Science in 1996 from the Georgia Institute of Technology in Atlanta (USA). From 2000 onwards, he worked at the Max Planck Institute for Chemistry in Mainz, where he led the atmospheric modelling group, and later taught Meteorology at the University of Mainz (2009–2010). He coordinated the European Union Project MEGAPOLI (2008–2011), and served or serves on numerous international committees such as the International Global Atmospheric Chemistry project (IGAC), and the Commission on Atmospheric Chemistry and Global Pollution (CACGP). He currently coordinates the EU Project "European Transdisciplinary Assessment of Climate Engineering" (EuTRACE). Dr. Lawrence joined the IASS in October 2011 as Scientific Director.

IASS at a glance

The sustainability research programme at IASS is organised around three interlinked thematic clusters: *Global Contract for Sustainability* (GCS), led by Executive Director **Prof. Klaus Töpfer**; *Earth, Energy and Environment* (E^3), led by Scientific Director **Prof. Carlo Rubbia**; and *Sustainable Interactions with the Atmosphere* (SIWA), led by Scientific Director **PD Dr. Mark Lawrence**. They are complemented by the platform *Enabling Technologies for Sustainability* (ETS), under the direction of Secretary General **Dr. Mario Tobias**.

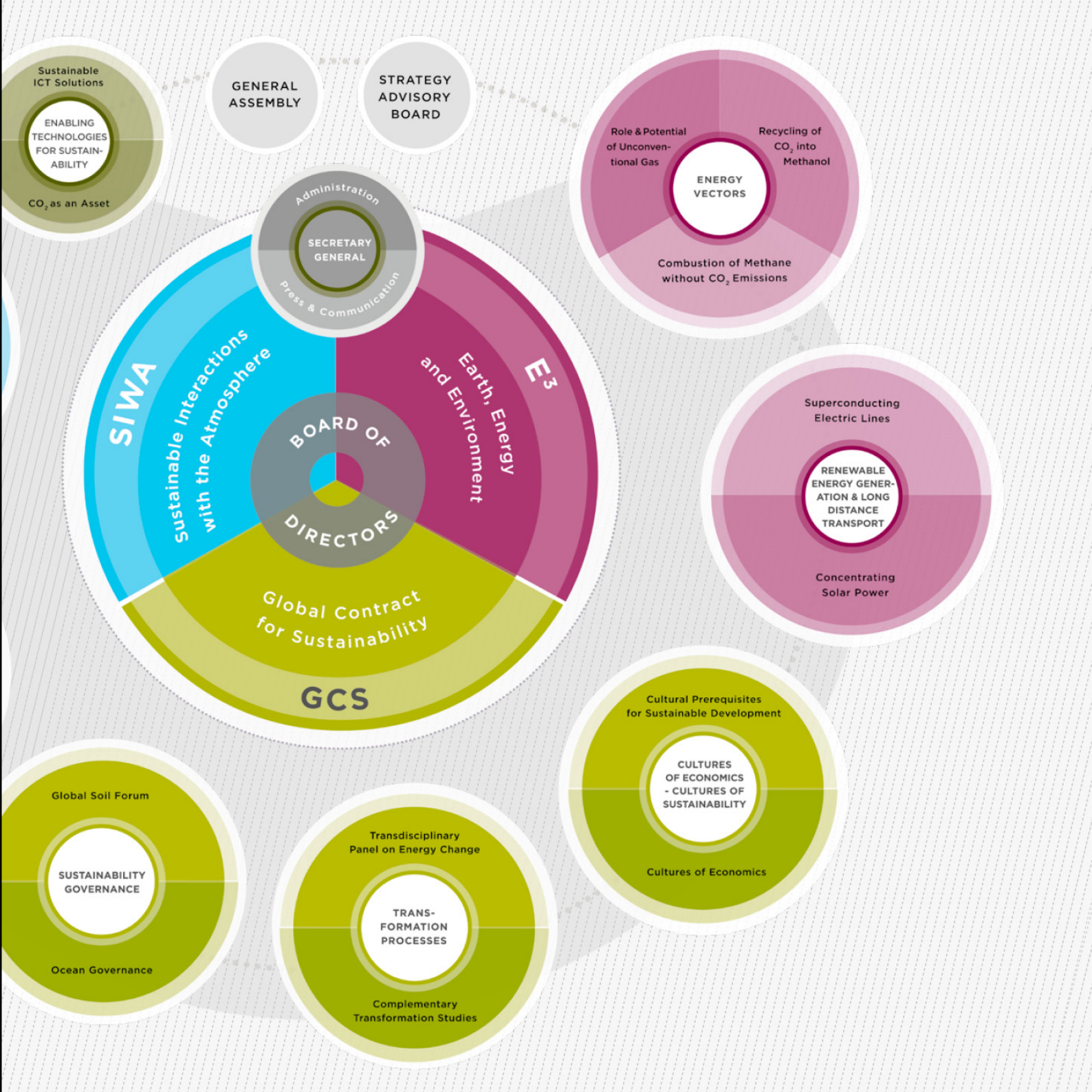
Our various research projects benefit from interdisciplinary teams and cross-cluster activities. To name only a few: In our *Anthropocene* project as well as in our *Sustainable Maritime Arctic Transformation* project, the SIWA and GCS cluster collaborate; SIWA and ETS teams cooperate for assessing *Carbon Capture and Utilisation*; and researchers from E^3 and GCS cooperate on investigating the transformation of our energy system.





Legend

- Board of Directors
- Secretary General
- Sustainable Interactions with the Atmosphere (SIWA)
- Earth, Energy and Environment (E3)
- Global Contract for Sustainability (GCS)
- Enabling Technologies for Sustainability (ETS)


Sustainable ICT Solutions
ENABLING TECHNOLOGIES FOR SUSTAIN-ABILITY
CO_2 as an Asset
GENERAL ASSEMBLY
STRATEGY ADVISORY BOARD
Role & Potential of Unconven-tional Gas
Recycling of CO_2 into Methanol
ENERGY VECTORS
Combustion of Methane without CO_2 Emissions
Administration
SECRETARY GENERAL
Press & Communication
SIWA
sustainable Interactions with the Atmosphere
E3
Earth, Energy and Environment
BOARD OF DIRECTORS
Global Contract for Sustainability
GCS
Superconducting Electric Lines
RENEWABLE ENERGY GENER-ATION & LONG DISTANCE TRANSPORT
Concentrating Solar Power
Cultural Prerequisites for Sustainable Development
CULTURES OF ECONOMICS - CULTURES OF SUSTAINABILITY
Cultures of Economics
Global Soil Forum
SUSTAINABILITY GOVERNANCE
Ocean Governance
Transdisciplinary Panel on Energy Change
TRANS-FORMATION PROCESSES
Complementary Transformation Studies

“Research plays an important role in the question of how sustainable development is possible”

How can we become a sustainable society? How can we make the leap from knowledge to change? A conversation with Federal Minister of Education and Research, Prof. Dr. Johanna Wanka, and Brandenburg’s Minister of Science, Research and Culture, Prof. Dr. Sabine Kunst, two promoters of our Institute for Advanced Sustainability Studies in Potsdam.

Ms Wanka, you campaigned for the IASS to be established when you were Brandenburg’s Research Minister and promoted the idea at the federal level. In 2009, the IASS could then be established as part of the promotion programme “Research for Sustainable Development” by the Ministry for which you are now responsible. What role does research play in the development of a sustainable society?

We are facing crucial global challenges: climate change, raw material shortages, loss of land and biodiversity, demographic change and the question of how sustainable development is possible. For me, sustainability policy is also innovation policy. For this reason, research plays an important role. Thanks to our early recognition of the importance of the environment in Germany as well as our excellent scientific and technological output, we are in a position to lead internationally in sustainable development. My Ministry intends to support this, that is, the creation and the passing on of knowledge for building a sustainable future.

Ms Wanka, how must science, research and education continue to change in order to surmount these future challenges you describe?

I support better integration of research within Germany and internationally. In light of current challenges, it is no longer enough to carry out top-level research and allow only experts access to the results. I therefore believe the approach we consistently apply at the IASS is truly trailblazing. Here, excellent researchers work together on a transdisciplinary basis. That means that scientists organise themselves and exchange ideas across all important social groups in order to make knowledge usable. Education is a central element for us, of course, so that we fulfil the requirements of a global knowledge society in the future as

Prof. Dr. Johanna Wanka was appointed Federal Minister of Education and Research in February 2013. Prior to her nomination she served as Minister of Science, Research and Culture in the states of Brandenburg (2000–2009) and Lower Saxony (2010–2013). She used to be professor in Engineering Mathematics at Merseburg University of Applied Sciences.

“Sustainability policy is also innovation policy”

Johanna Wanka, Federal Minister of Education and Research

“The intention was to bring together the world’s brightest and most creative minds in sustainability research”

Sabine Kunst, Brandenburg’s Minister of Science, Research and Culture

well as the recognisable need of civil society to actively shape its own future. We want to begin as early as possible in school by bringing together curious young people with scientists as part of our Science Year, for example.

Ms Kunst, the capital of Brandenburg, Potsdam, is believed to be the city with the highest relative density of scientists in Germany. From the perspective of the Brandenburg Research Ministry, why was it necessary to establish a new institute such as the IASS?

Indeed, Potsdam was already an excellent science location with the Potsdam Institute for Climate Impact Research, the Helmholtz Centre Potsdam and our many other renowned institutes. Yet with the establishment of the IASS, we intended to pursue a new concept. Here, the intention was to bring together the world’s brightest and most creative minds in sustainability research and, at the same time, to work with politicians and important representatives of society on the solutions to the big problems of the future. This happens in close collaboration with our other Potsdam-based institutes. Already today, the IASS is so well organised and integrated both globally and regionally that it is no longer possible to conceive of our knowledge landscape without it.

Ms Kunst, to what extent does the IASS support you in concrete matters affecting Brandenburg?

Take energy policy, for instance. Brandenburg is considered a model state for energy policy – for example, wind power – and for future technologies. The IASS closely follows energy policy scientifically and brings together all important actors to identify new approaches and recognise undesirable developments in good time.

Ms Wanka, after the first four years of the existence of the IASS, how would you sum up its achievements so far?

I find it wonderful to see how in such a short period of time a great idea has developed into a platform for top-level research with more than 100 employees from all over the world from rising student talents to Nobel Laureates. For the future, I look forward to seeing the new approaches developed by the IASS in order to bridge the gap between knowing how we protect our planet as the basis of our existence and acting in a way that means this knowledge doesn’t go to waste.

Prof. Dr. Sabine Kunst was appointed Minister of Science, Research and Culture of Brandenburg in 2011. Prior to her appointment she was President of the University of Potsdam (2007–2011). She holds one PhD in Engineering and one in Political Science.

GLOBAL CONTRACT FOR SUSTAINABILITY (GCS)

Making society more sustainable

What are the options for governing our interactions with the environment and our sustainable use of resources? Which political processes are suitable to initiate changes in how we treat these resources with regard to soils, oceans or energy policy? The *Global Contract for Sustainability* (GCS) cluster, under the direction of Prof. Klaus Töpfer, focuses on the societal and political transformations that must take place if we are to achieve greater sustainability.

GLOBAL SOIL FORUM

How do we save the ground beneath our feet? Most of us rarely think about dirt and soils, buried under concrete or far away in farming fields. However, we all rely on dirt for food, and also for much more. Nevertheless, the way we treat our soils leaves much to be desired.

Soils are essential to the production of over 90% of the world's food. They store over 4,000 billion tonnes of carbon – about 10 times more carbon than forests store. But soils are being lost globally: Erosion washes soil away, impacting rivers and forests as well as agriculture; buildings and road infrastructure cover up soils, and other factors have led to loss of soils.

In human terms, soils are a finite resource: It takes 2,000 years for 10 centimetres of soil to form. Around the world, the land that is available for cultivation is decreasing, as is the quality of the soils in some places. When our soils are degraded, they lose the capacity to support ecosystem functions.

Soils have become a desirable resource. Their value has been leading to increases in the practice of 'land grabbing': investments in land in which the rights of people living off the soil are ignored.

Our *Global Soil Forum* research group works jointly with its partners to find feasible solutions to these challenges. Our researchers look to improving land-use policies, as well as practices to enhance soil quality. For example, one research project called *Land and Soil Governance – A Focus on Implementation* investigates the role of organisations and civil society in fostering these shifts toward sustainable soil practices.

GLOBAL SOIL WEEK

As the initiators of the annual *Global Soil Week* event in autumn, we contribute to an increased public and political awareness of the importance of soil and promote knowledge exchange between scientists, policy-makers and society. In our research programme, we work with decision-makers on issues of sustainable land management and soil governance. Our goal is to avoid losing the ground beneath our feet, so to speak.

OCEAN GOVERNANCE

Planet Earth is blue. Water covers 71% of its surface. And for eons, the oceans have seemed to be a limitless source of food and prosperity. Now, billions of people depend on them. However, in this century we are hitting the limits of our oceans' wealth.

With partners from the scientific research community, international organisations, governments and civil society, IASS is focusing on ocean governance, rethinking how humankind interacts with the oceans and manages activities on – and under – the water that covers our planet.

The programme's focus is particularly on the high seas, which cover nearly two-thirds of the oceans. The high seas fall outside of national borders, and so are the common property of all humanity.

However, up until now, the high seas have often been managed poorly or not at all, allowing a few to prosper at the expense of many. Our work puts forward innovative ideas for a new approach to high-seas governance, as called for by world leaders at the Rio+20 Earth Summit.

CULTURES OF ECONOMICS – CULTURES OF SUSTAINABILITY

The fixation on economic growth symbolises the success of a specific 'culture of economics'. Although this 'culture' undoubtedly contributed to material and social progress in the past, it is also responsible for unsustainable lifestyles and policies, much to the detriment of the planet and future generations. In our project, we search for alternatives.

Our research is based on two assumptions. Firstly: In order to find feasible alternatives, one has to understand the processes by which the culture of growth has triumphed. Secondly: The dominant economic paradigm should not simply be replaced by another. The heterogeneity of the world calls for a variety of different local, regional and cultural approaches. What we look for is not a counter-culture to growth, but counter-cultures of economics and sustainability.

We analyse ideas (e.g. the political history of GDP), investigate the mechanisms by which they have travelled (e.g. the role of economic experts), and scrutinise alternative sustainable approaches in academia and practice (e.g. sustainability economics, buen vivir). A focus is also placed on alternatives to the current architecture of global finance. The reform of the financial system that postpones long-term risks for the sake of short-term financial gains is one of the most pressing tasks of our times. Any attempt to transform our societies to achieve a more sustainable future would be incomplete if this issue is not addressed.

TRANSDISCIPLINARY PANEL ON ENERGY CHANGE (TPEC)

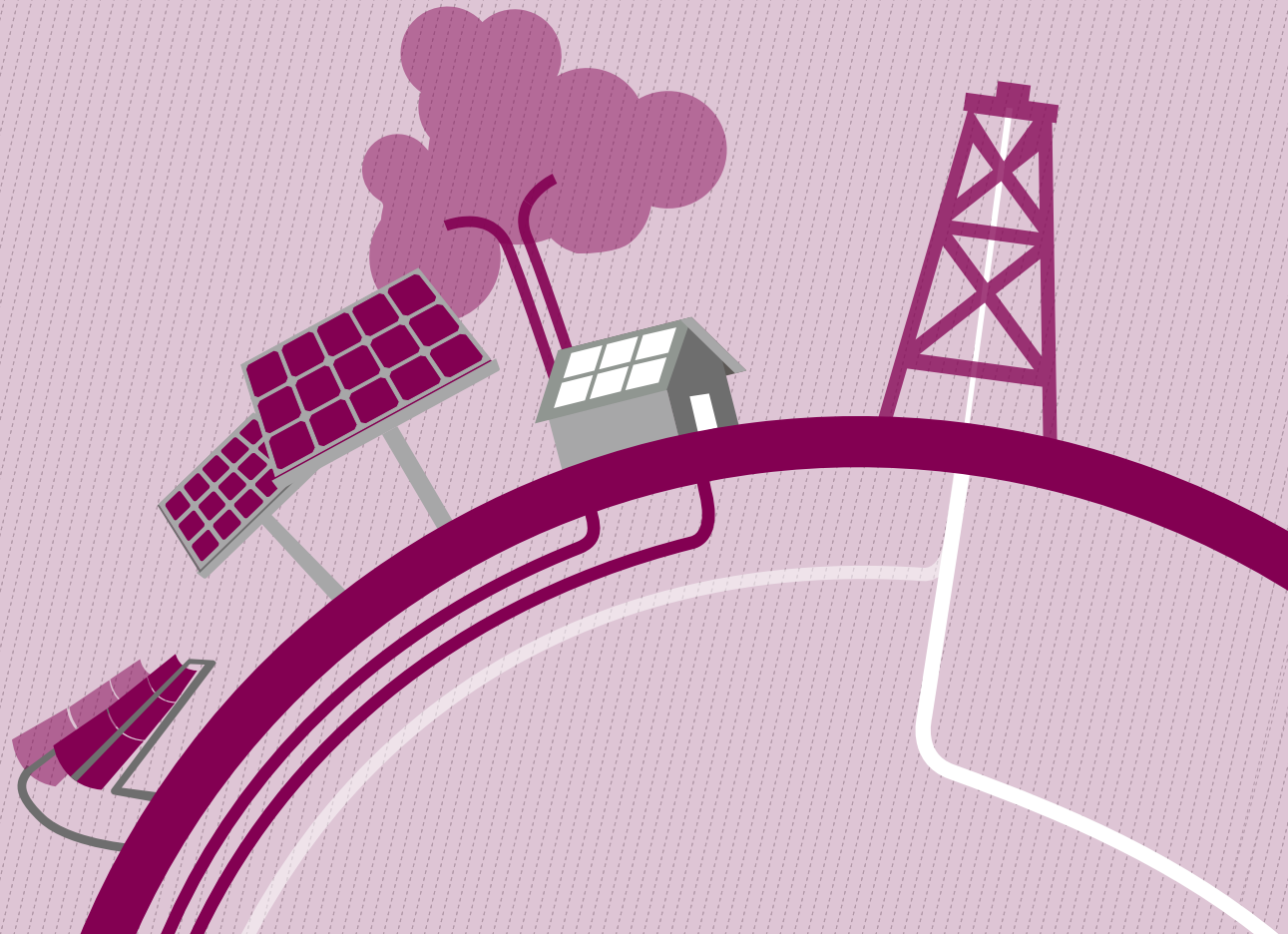
Germany has taken on the ambitious task of transforming its entire energy infrastructure in the coming years. In order to be successful, the current energy transition, or Energiewende, must be far more than simply an exit from nuclear power. The transition is also an entry into a completely new energy system, based largely on renewable energy sources and energy efficiency. An effort of this magnitude involves the whole nation and comes with many challenges, but it also holds significant potential for Germany and the rest of the world. If Germany, as a leading industrial country, can set an example of reducing greenhouse gas emissions while maintaining its competitiveness, the Energiewende model could become a global success story.

The Transdisciplinary Panel on Energy Change (TPEC) at the IASS focuses on the major issues of this energy transition in various formats: position papers, public hearings and thematic working groups, as well as bilateral workshops with experts from neighbouring countries. In doing so, TPEC supports transitions towards sustainability.

EARTH, ENERGY AND ENVIRONMENT (E^3)

The future of energy

The *Earth, Energy and Environment* (E^3) cluster, led by Prof. Carlo Rubbia, explores new scientific and technological approaches to transform today's polluting, highly wasteful and oligopolistic energy system which is based on the use of inexpensive, plentiful fossil fuels into a more sustainable one with less impact on the climate. Key aspects of this endeavour include improving the reliability of renewable energy sources, developing more efficient electricity transportation technologies and implementing low carbon uses of fossil fuels.



Advanced concepts of concentrating solar power

In the context of enhancing the energy efficiency and cost-effectiveness of renewable energy sources, this research programme explores the potential of concentrating solar power (CSP) for electricity generation. Our research group investigates and prioritises technological alternatives according to technical criteria, improvements in cost, reliability and economic viability, taking into account the state of the art both in research and in industrial applications. Particular attention is given to thermal energy storage to make daytime energy available at night.

Combustion of methane without CO_2 emission

Methane is an abundant fossil fuel that will play a growing role in the world's energy mix. However, methane combustion for electricity generation releases carbon dioxide (CO_2) into the atmosphere. This programme explores an alternative approach with less impact on climate: the thermal dissociation of methane for the production of hydrogen without CO_2 emissions.

Our research group investigates the scientific and technical aspects of 'methane cracking', a simple principle based on an appropriate thermodynamic cycle. Ultimately, sophisticated industrial methods can be developed from the programme's research, making a complete and effective 'decarbonisation' of natural gas possible. The liberated hydrogen can be further used for electricity generation via fuel cells, or combined with captured CO_2 to produce methanol.

Recovery of CO_2 for the production of methanol

This programme aims to address greenhouse gas emissions by investigating how to recycle captured CO_2 for the production of methanol, a convenient alternative fuel and chemical feedstock.

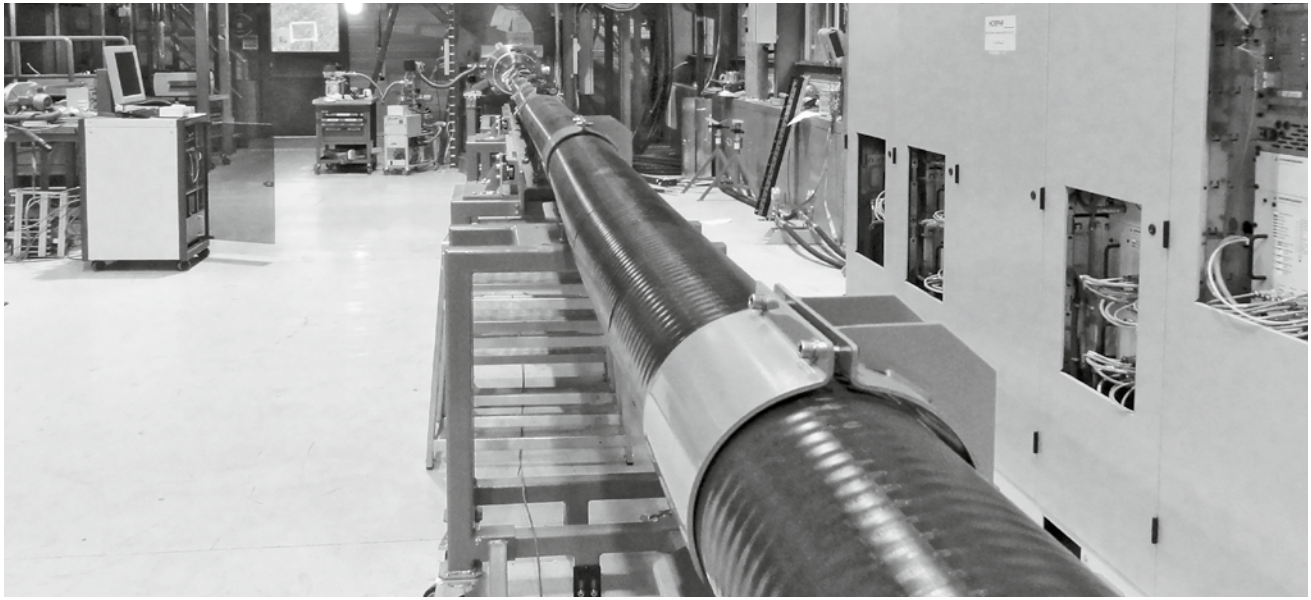
Our programme takes into account the scientific, technical and economic aspects of this approach, and compares the net carbon footprint of this process to carbon sequestration. Our research activities include a risk assessment of amine scrubbing technologies for CO_2 capture from power plants.

Role and potential of unconventional gas

In recent years, the energy potential of unconventional gas reservoirs has prompted strong interest from the government, business and research sectors, leading to growing investments in exploration and development of these resources.

However, concerns have also been raised regarding the possible environmental consequences of technologies necessary for mining and using these reserves, such as hydraulic fracturing.

In this context, our team carries out a scientific assessment of both the risks and opportunities associated with unconventional natural gas reservoirs. Various aspects of gas production from shale gas, methane hydrates and coal-bed methane will be explored, taking into account costs, energy requirements and environmental impacts.



IASS-CERN test station: experimental measurement of 20m-long MgB_2 cables, with a 20kA capacity and over a range of temperatures (from 5 K to 70 K)

Long-distance energy transport through superconducting electric lines

Transporting the energy produced from remotely located renewable resources to the densely populated areas where it is needed has become a strategic and relevant priority in many regions of the world and particularly in Germany. Current technologies are ill-suited for this task due to prohibitive energy losses, significant capital costs and lack of public acceptance for invasive overhead lines. New solutions have to be found to develop high-power electric lines capable of carrying energy over long distances with optimised efficiency.

Our programme investigates the possibility of replacing standard high-voltage direct-current (HVDC) cables with DC superconducting cables which, due to their inherent characteristics, permit the transport of large amounts of power without ohmic losses. The cable design developed by IASS researchers is based on magnesium diboride (MgB_2) – a relatively cheap and easy-to-manufacture superconducting material. A closed-loop cryogenic system maintains the very low operating temperatures (20 degrees Kelvin) needed for this material.

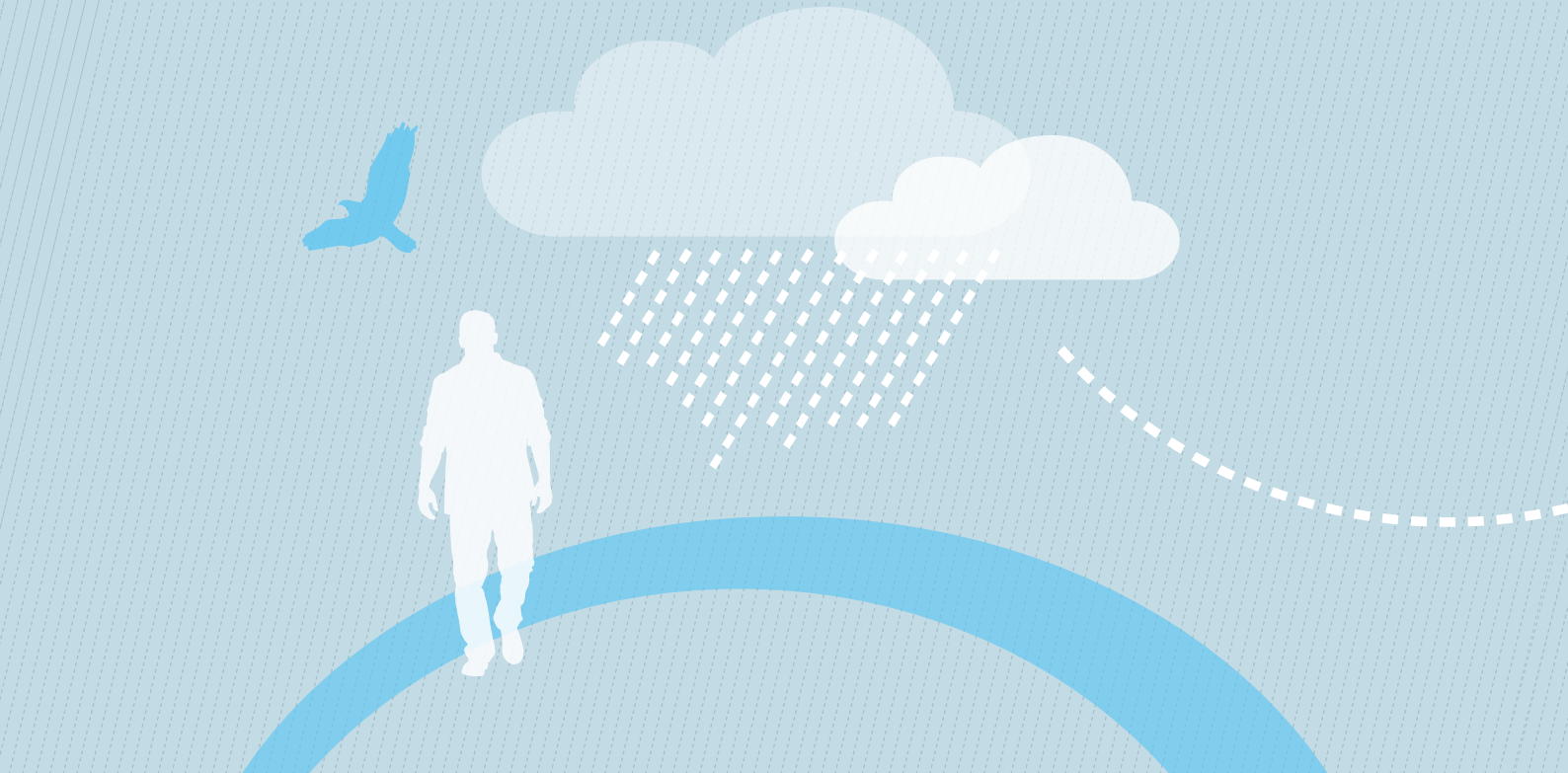
Our research group aims to carry out a comprehensive evaluation of the subject, including its socio-economic aspects, and to delineate the comparative advantages of superconducting lines in terms of efficiency, cost and environmental footprint. In the framework of a collaboration established in 2012, the IASS and CERN, the European Organization for Nuclear Research, are implementing a roadmap for experimental testing, starting with a simple MgB_2 wire and proceeding to a prototype 20-metre-long cable.

The IASS research group maintains extensive contacts with policy makers, industries and public utilities in order to present the case for superconducting electric lines and generate concrete proposals for industrial application.

SUSTAINABLE INTERACTIONS WITH THE ATMOSPHERE (SIWA)

What connects us all: a sustainable interaction with the atmosphere

Humanity's emissions of greenhouse gases and air pollutants are causing global warming and harmful conditions for humans and ecosystems. These alterations to the atmosphere on a global scale are one reason we have entered the Anthropocene – a new geological epoch in which human activities will leave a discernible footprint on the planet for millennia. The *Sustainable Interactions with the Atmosphere* (SIWA) cluster, led by PD Dr. Mark Lawrence, works to develop a sustainability-driven approach to managing human influence on the atmosphere.



Addressing the 'dirty' half of global warming: short-lived climate-forcing pollutants

Climate change and air pollution are two sides of the same coin. Many substances that warm the Earth also simultaneously impact human health and ecosystems. In particular, the so-called short-lived climate-forcing pollutants (SLCPs) are often powerful greenhouse gases that impair human health and damage the environment. In Europe, for instance, such pollutants shorten life expectancy, and losses due to crop damage are estimated at several billion euros annually. In addition to these impacts on health and agriculture, SLCPs are responsible for about half of the global warming. Without mitigating SLCPs, internationally agreed-on climate targets will not be achievable.

SIWA thus strives to integrate climate and air quality policies, as tackling these challenges together may reap co-benefits that are unattainable if these issues are addressed separately. To achieve this goal, we organise our work on SLCPs around three pillars. Firstly, we conduct basic research using computer model simulations based on sources of SLCP emissions, their chemical reactions and deposition. Secondly, we engage in field measurement campaigns and monitoring to evaluate our models. The combination of modelling and observations also allows us to better identify the sources of SLCPs and their precursors, which leads to the third pillar: effectively communicating about SLCPs, and jointly developing, demonstrating and implementing mitigation measures with stakeholders from all parts of society. To this end, we involve partners early on and co-design our research agenda with them, thus linking all three pillars to allow for mutual learning.

We concentrate our work on SLCPs on three regions: the Arctic, Europe and the Himalayas (see picture). We have teamed up with partners in these regions, from the level of local communities like Potsdam and Berlin, up to international initiatives such as the Climate and Clean Air Coalition.

Kathmandu is one of the most polluted cities in Asia. Our *Sustainable Atmosphere for the Kathmandu Valley* project analyses mitigation measures to reduce air pollution. Nepal is one of several regional case studies of SIWA, the others being Europe and the Arctic.

Managing the climate? The risks and uncertainties of climate engineering

While there is still hope that climate change can be addressed by mitigation and adaptation efforts, time is running out: Global emissions are increasing, whereas climate negotiations and transformations of societal systems such as energy infrastructure remain slow-paced. The perception of a looming watershed has given rise to calls for research on intentional interventions in the climate system, referred to as either 'climate engineering' (CE) or 'geoengineering'.

To be effective, such technologies would need to be applied at an enormous scale, altering the entire Earth system. And they raise many questions beyond natural science and engineering: How can we make sure that emission-reduction efforts are not abandoned in the face of promised results – often based on misinformation – of climate engineering solutions? Who would have the right to control the proverbial 'global thermostat?' How can we ensure that the voices of those who are most vulnerable to climate changes will be heard?

Our *Interdisciplinary Microcosm* brings together researchers with expertise from a range of disciplines, including physics, social sciences, international law and philosophy. Our research focuses on impacts, risks and uncertainties, as well as questions of governance, regulation and ethics. We also engage in public dialogue with civic and policy communities. We do not advocate CE, but we see the need for research and dialogue in order to enhance society's capacity to make informed and responsible decisions.

"A daunting task lies ahead for scientists and engineers to guide society towards environmentally sustainable management during the era of the Anthropocene."

Paul Crutzen, Nobel Laureate

Various climate engineering measures

Concepts for closing life cycles and sustainable technology use

How do new technologies contribute to sustainable management? What kind of role does society have and, moreover, what are the implications of such technological innovations? A truly sustainable use of resources calls for a fundamental change. It demands not only miniaturisation of products and energy efficiency, it also requires transforming waste into new material.

Our *Enabling Technologies for Sustainability* (ETS) platform studies technologies and applications that enable the transformation of waste into resources. We aim to redefine material life-cycle concepts from a scientific, political and economic perspective and present innovative communication solutions. However, a move towards sustainability cannot be achieved with innovative technologies alone. A systematic approach and practical applications are also required. Therefore, all ETS projects involve different stakeholders in the research process: We cooperate with partners from industry, other scientific organisations and the public at large in order to recognise, evaluate and communicate the potential of promising technologies.

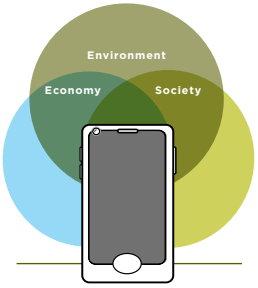
Sustainability in information and communication technology

Information and communication technology (ICT) is a key factor for a sustainable society. We use online applications (apps) to save power, pool cars or collect information about sustainable products. In the future, smartphones will be used more intelligently, for example to optimise power and heat consumption at home or to enable telecommuting jobs. However, the sustainability potential of ICT will only be tapped fully if we solve the many ecological and social challenges that accompany the production and use of ICT gadgets and applications. Our *Sustainable ICT Solutions* project team therefore works on the 'closed-loop' system of resources. The team also aims to raise awareness in order to trigger behaviour conducive for the transition towards sustainability, e.g. by informing young people about resources used in mobile phones.

CO_2 as an asset – Carbon Capture and Utilisation (CCU)

In our project *CO_2 as an Asset – Potentials and Challenges for Society* we collaborate with partners from industry and the scientific community. We carry out transdisciplinary research on CCU technologies from different perspectives. An important basis for the project is the life-cycle analysis of CCU technologies.

Our focus is on evaluating the economic potential of CCU technologies. We also work on establishing appropriate communication strategies, as a fundamental shift in our thinking is necessary in order to reposition CO_2 from being a waste product to an asset.



Hands-On Resources
The resource intensity of our lifestyle is an important but rather abstract issue – especially for younger people. To sensitise students to the resources we use in daily life, we held workshops at schools. Our team developed an interactive *Mobile Phone Resource Box*, demonstrating the resource intensity of a mobile phone. The box includes nine raw materials in the form of minerals and ores which are the basic building blocks for mobile phone production. This *Mobile Phone Resource Box* is a 'youthful' device to draw students' attention to important topics such as recycling and sustainable consumption.

Our global and high-level network for sustainability

The IASS builds a platform for bringing together visiting scientists, providing a setting in which cutting-edge science can take place. We draw on the expertise and innovation potential of qualified Fellows – ranging from outstanding young scientists at the beginning of their careers to Nobel Laureates – and strive for scientific exchange at the highest international level. We have established networks and partnerships with high-level national and international research institutions and run research projects (some are highlighted on the map) all over the world.

IASS in Potsdam

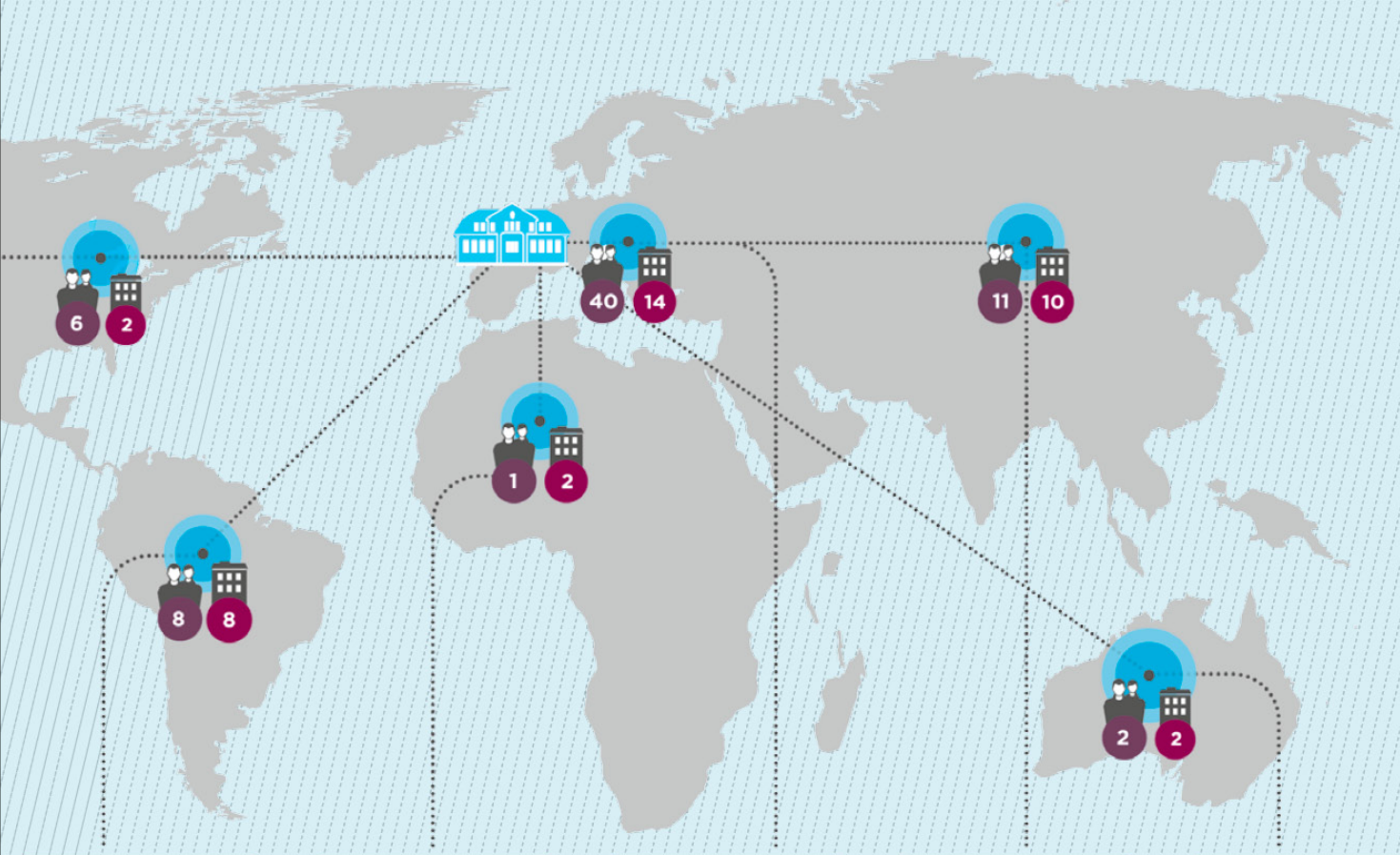
More scientists per capita are working in Potsdam, where the IASS is located, than in any other German city. A quarter of them are Fellows coming from all over the world. The IASS is an integral part of the Potsdam scientific community, collaborating for example with the renowned Potsdam Institute for Climate Impact Research (PIK), the German Research Centre for Geosciences (GFZ) and the University of Potsdam. We are only 30 kilometres away from Berlin, the capital of Germany.

North America

Transparency in Climate Engineering Research

Increasing transparency of CE research by understanding process mechanisms and necessary frameworks.

Legend



South America

Sustainable Development Goals (SDGs)

Exploring the relevance of SDGs for local realities, e.g. at the place of their political origin (Bogotá).

Africa

Pro-poor Resource Governance under Changing Climates

The project analyses pro-poor adaptation to climate change focusing on resource governance.

Europe

IASS - CERN collaboration

Experimental testing of a prototype MgB_2 superconducting cable.

TPEC

The Transdisciplinary Panel on Energy Change provides scientific guidance for the Energiewende.

Asia

SusKat

An end-to-end project aimed at understanding and addressing air pollution in Nepal.

Australia | Oceania

Pacific Perspectives on Climate Engineering

Open discussion workshop on CE with participants from twelve Pacific small island states.

IASS

Highlighted projects per continent

68

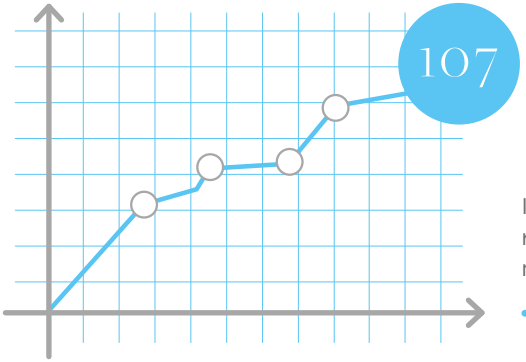
68 Fellows from 27 countries work at IASS

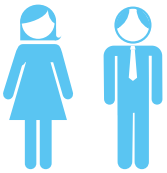
38

Collaborations with partner institutions in 38 countries

* up until mid-2013

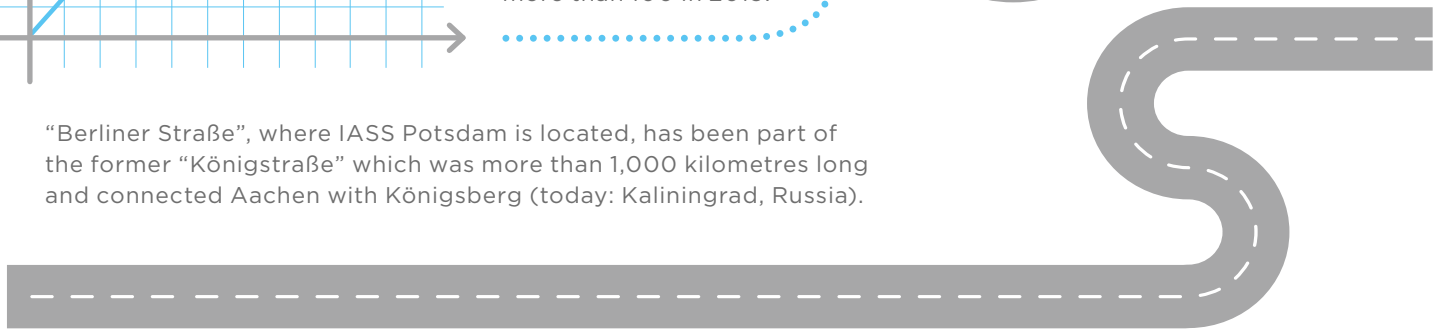
Did you know ....
Facts and Figures about the IASS





IASS staff increased rapidly from 5 in 2009 to more than 100 in 2013.

68 visiting scientists from 27 countries work at the IASS by mid-2013. The IASS collaborates with partner institutions from 38 different countries.



"Berliner Straße", where IASS Potsdam is located, has been part of the former "Königstraße" which was more than 1,000 kilometres long and connected Aachen with Königsberg (today: Kaliningrad, Russia).

Short history of IASS

October 2007
The Noble Laureate Symposium "Global Sustainability – a Noble Cause" in Potsdam provides the basic idea for founding an institute for sustainability studies.

February 2009
Foundation of the IASS: Prof. Klaus Töpfer becomes Executive Director and starts with a handful of colleagues to build up the institute.

June 2010
Prof. Carlo Rubbia is appointed Scientific Director. In October 2011, the Management Board is completed with Scientific Director PD Dr. Mark Lawrence.

Since 2012
The IASS grows rapidly with a staff of more than 100 people from 27 countries. Its interlinked research clusters and platforms work in full swing.

Institute for Advanced Sustainability Studies (IASS) e.V.

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