Mercator Research Institute on
Global Commons and Climate Change
(MCC) gemeinnützige GmbH

MCC EVALUATION REPORT

Imprint

Evaluation report submitted to the evaluation committee by the institute's management

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PIK Potsdam Institute for Climate Impact Research

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Executive Summary

About MCC

MCC is a scientific think tank addressing the grand challenges of climate change and of governing the global commons. Our research is rooted primarily in economics and other social sciences. We provide scientific policy advice and aim to identify policy-relevant solutions.

MCC's Vision: We envision a world of deliberative democracies taking well-informed decisions for the sustainable management of global commons. This ensures that current and future generations are provided with an equitable access to the global commons.

MCC's Mission: MCC's mission is to provide solution oriented policy pathways for governing the global commons to enhance sustainable development and human well-being. Our approach is based on high-quality research to inform policy making in an iterative societal learning process. We call this assessment-making.

MCC was founded in 2012 by Stiftung Mercator and the Potsdam Institute for Climate Impact Research PIK. Based on high-level research, MCC develops and discusses solutions that address the long-term governance of global commons. The aim is to enhance sustainable development and to mitigate climate change. MCC gives non-policy prescriptive advice to target audiences that include decision makers in international organisations, parliaments, public administration and other stakeholders from business and NGOs. MCC actively engages in the public policy discussion via media contributions.

At the end of its inception phase (which ran from 2012 to 2015), MCC supported 28 full-time-equivalent positions, distributed across 47 total staff members. Research is carried out in seven working groups and one task force. Research group leaders stem from a large variety of backgrounds, which enables a truly transdisciplinary approach. In 2015, three group leaders had been appointed as professors, demonstrating the success of MCC's strategy to promote young and promising researchers.

Our research focuses on the over-use of natural commons and the under-provision of public goods. We assess the extent to which natural assets such as atmosphere, land, forest and social assets, such as public infrastructure, have characteristics of common pool resources requiring management as global or local commons. These elements are complex and often entangled in different aspects of society. This calls for scientific expertise in the political process to adequately synthesise the available knowledge.

The focus of governments and other stakeholders is often short-term and nationally orientated. As a result, there is a strong need for the scientific community to promote the discourse on global and very long-term problems, such as climate change. MCC analyses these multiple-objective, multi-level commons governance problems together, assessing trade-offs as well as synergies between them and taking distributional challenges into account.

Our research is guided by three key questions:

- Which processes drive the dynamics underlying the provision and use of global commons?
- What are the policy options for governing the global commons? How can a fair, equitable and efficient access to global commons be achieved?
- How should the science-policy interface be designed to achieve a sustainable governance of the global commons?

Our approach is guided by a model of the science-policy interface that was developed at MCC. This model, the pragmatic-enlightened model, explores alternative policy options and their implications in integrated scientific assessments, thereby identifying viable policy options and making social conflicts, synergies and uncertainties transparent. These scientific assessments are iterative processes in which relevant knowledge is discussed with stakeholders of diverse values, expertise and interests.

Our approach to assessment-making distinguishes us from others in the German and international research communities that also deal with climate change and sustainable development. We contribute to assessments in three ways:

1. MCC publishes its research on policy-relevant research gaps and on specific policy pathways in high-level, interdisciplinary journals such as *Science*, *Nature* or *PNAS* and in disciplinary journals, e.g. in economics or environmental sciences.
2. MCC is directly and actively involved in large-scale, international and formalised assessment processes such as those carried out by the Intergovernmental Panel on Climate Change (IPCC) and the International Panel on Social Progress (IPSP). MCC staff also initiated a pilot assessment on the reform of the European Emissions Trading Scheme and participates in informal science-policy processes via interactions with high-level stakeholders and institutions.
3. MCC reflects on existing processes and formats of scientific policy advice (particularly on assessment-making) and advises relevant institutions on improving assessment processes.

MCC has successfully finalised its start-up phase. In its three year inception period, MCC has established itself as an important player in the research community and the policy arena:

- Excellent, high-level publications are the backbone of our work. MCC staff published 175 papers between 2013 and 2015, an equivalent of 3.3 publications per scientist in 2015. Seventy percent of publications are in peer-reviewed journals - 50% are in journals listed in the ISI Web of Science.
- By means of its publications, its contribution to international assessment-making processes (e.g. the IPCC) and by organising workshops, MCC has stimulated an ongoing debate on assessment-making, sustainable bioenergy use and on global commons.
- There is international recognition for MCC's output: in 2015, the *International Center for Climate Governance* (ICCG) ranked the MCC second out of 244 non-university scientific think tanks in the field of climate change on a per capita basis. The combination of its scientific excellence and its engagement at the science-policy interface was a decisive factor in obtaining this high ranking. MCC's research has been presented on over 300 occasions, half of which being outside Germany. This underlines its international outreach.
- MCC provides high-level scientific policy advice to policy makers at the national, international and global level, covering informal and formal science-policy dialogues.
- MCC influences the economic debate: Ottmar Edenhofer was listed among the top-15 most important German economists in the ranking of the nationwide newspaper *Frankfurter Allgemeine Zeitung* in 2014 and 2015. In addition, MCC has been successful in introducing climate change into the economics sections of mainstream media.
- MCC has organised a number of high-level, influential workshops and conferences. Its staff are engaged in editorial boards of scientific journals, and also actively participate in networking activities, collaborating with other research institutes. This interaction broadens and enhances the impact of MCC's scientific findings.

Rooted in scientific excellence, we have laid the foundation for the establishment of MCC within the German scientific system and the international research community. The next step will comprise a consolidation phase to deepen MCC's engagement and impact in shaping debates on the global commons and advancing theory and practice of assessment-making.

1. General Concept and Profile

The Mercator Research Institute on Global Commons and Climate Change (MCC) gGmbH was co-founded in 2012 by Stiftung Mercator and the Potsdam-Institute for Climate Impact Research (PIK). In 2013 it began with 20 staff members (15 full-time-equivalent (FTE) employees) and by the beginning of 2016 it had grown to 47 staff members (28 FTE).

MCC is a scientific think tank addressing the grand challenges of climate change and of governing the global commons. Our research is primarily rooted in economics and other social sciences. We provide scientific policy advice and aim to identify policy-relevant solutions.

We envision a world where everyone, today and in the future, is provided with a fair and equitable access to the global commons: in deliberative democracies societies take well-informed decisions for the sustainable management of global commons. MCC's mission is to provide solution-oriented policy pathways for governing the global commons to enhance sustainable development and human well-being. Our approach is based on high-quality research to inform policy making in an iterative societal learning process.

1.1. Our mission

The 21st century challenge of managing the global commons is twofold: first, avoiding the over-use of global commons where no effective governance mechanisms regulating access and use are yet in place; second, overcoming the under-provision of public goods, such as infrastructure, that are essential for human well-being.

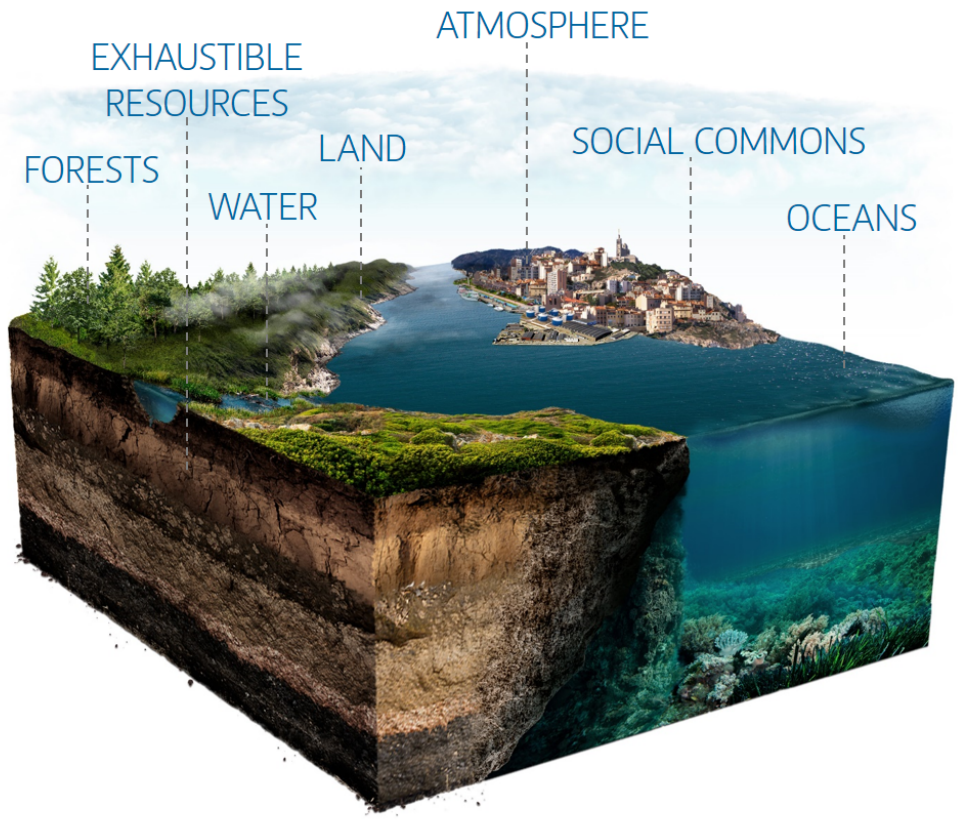

Figure 1: Illustration of the global commons.

Global Commons

Global commons are assets requiring global cooperation for their sustainable use and provision (Figure 1). We assess the extent to which natural assets such as the atmosphere, land, forest and social assets, such as public infrastructure, have characteristics of common pool resources requiring management as global commons. This involves the evaluation of different property rights and governance regimes.

Global economic growth has resulted in the intensified use of the world's resources, which has in turn created **new scarcities.** Economic growth – coupled with the abundance of fossil fuels – has overburdened the **atmosphere as a global common-pool resource** in its function as a disposal space for greenhouse gases (GHG) (Edenhofer et al., 2015d). MCC's research has shown that most of the global coal reserves and resources would need to remain underground if the target to limit global temperature increase to 2°C is to be achieved (see Figure 2). This has significant distributional implications.

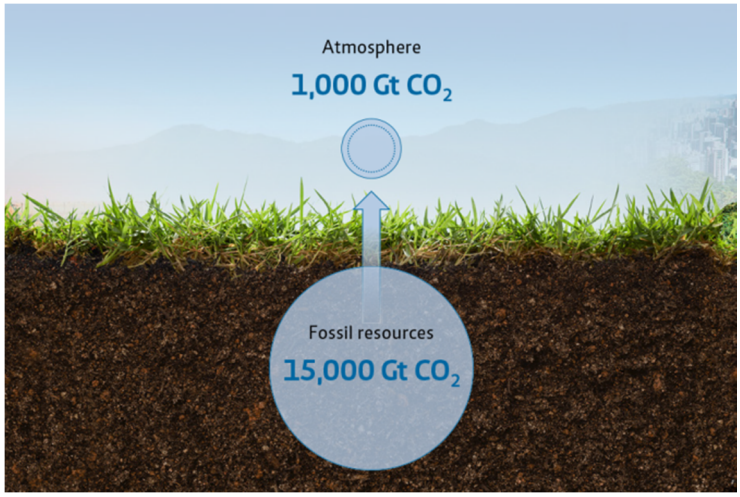

Figure 2: The fundamental challenge of climate policy: there are still plenty of fossil resources in the ground, but the disposal space in the atmosphere is limited.

Other commons are connected to the atmosphere through the carbon cycle. Forests, for example, are one of the most important carbon sinks. MCC's research agenda also focuses on the multiple pressures on **land as a common.** This may be for carbon storage, production of food, cultivation of feedstock for bioenergy, urban expansion and/or habitat for biodiversity. We explore which aspects of land have global commons properties. One particular example is an investigation into whether tropical **forests have the character of a global commons**, even as they fall within the sovereign jurisdiction of states. Their resource as a global commons lies, for example, in their status as a potentially untapped pool of genetic resources with value for future medicine or as an important sink for GHGs.

Globally, there is also an under-provision of social commons essential for human well-being due to dysfunctional property rights and collective action challenges. Social commons are impure or pure public goods providing access to health services, education, clean water, sanitation, universal access to energy, or transport and communication infrastructure. Therefore, our understanding of global commons **extends beyond natural resources to include social commons.** The level of provision of these goods has significant effects on both growth and inequality; analysing these effects is one focus of MCC's research. The role of cities and the infrastructures provided therein is another focus of MCC's research in this domain.

To maintain global prosperity and human well-being in the 21st century and beyond, a technological, social and political transformation that establishes sustainable governance of global commons is required. There are three aspects that make governance of the commons inherently difficult: first, they are either outside national jurisdiction or their conservation and sustainable use conflicts with national sovereignty and regulation. Their use may affect different levels of governance in distinct ways, often requiring global cooperation. Second, global commons also interact with one another, i.e. management of one common will most likely impact the use of others, thereby making effective governance a complex task. Third, the implementation of policies to govern global commons will conflict significantly with existing patterns of resource use, sovereignty rights and related well-established interests.

While Nobel Laureate Elinor Ostrom and others have made great progress towards understanding the management of *local* common pool resources, Ostrom pointed out the need for more research into the governance of *global* commons in order to face the challenge of establishing global institutions to manage biodiversity, climate change, and other ecosystem services.

MCC addresses these multiple-objective, multi-level commons governance problems jointly. It aims to assess trade-offs, to exploit synergies and to address the distributional dimension of the challenge. One policy option analysed at MCC is the use of revenues from carbon pricing to finance minimal access levels to critical infrastructures. This addresses the joint overuse of the commons and the under-provision of infrastructure. Our aim is to provide the scientific basis for solutions related to global commons problems and to initiate and play an active role in the intellectual debate on global commons.

MCC's research is guided by three key questions. These focus on the causalities and processes related to global commons, on policy options to govern global commons, and on the design of the science-policy interface. In the following: (a) the motivation for these research questions is briefly described, (b) more specific research topics are outlined and (c) examples of MCC's work on these questions are provided. All references and examples cited here and hereafter refer to publications by MCC staff members listed in the Appendix.

1. Which processes drive the dynamics underlying the provision and use of global commons?

a) *Motivation:* A sound understanding of drivers and causalities is a prerequisite for developing effective policy options. Therefore, part of our research focuses on analysing socio-economic and physical processes that influence the provision, use and over-use of global commons.

b) *Specific research topics* in this area include the role of economic growth, globalization, and urbanization in shaping the dynamics of the global commons. Starting from an analysis of historical transformation processes, the objective is to examine examples and conditions for a successful future in which economic growth is decoupled from GHG emissions. Understanding resource dynamics in a globalised world requires further analysis of the geographical and trade patterns related to production and consumption, and the impacts of those patterns on the global commons resulting from resource use and pollution. One example is the increasing importance of land as a production factor – a feature that has long been neglected; the dynamics of urbanization, land scarcity, and alternative land-use options are intertwined and affect resource utilization patterns, especially in developing countries.

c) *Work at MCC* argues for the expansion and refinement of the debate around growth and degrowth by searching for new definitions of welfare and prosperity. Economic growth in its own right is not a sensible ultimate objective, however, simply foregoing growth is unlikely to foster improvements to the environment (Jakob and Edenhofer, 2014). Research on the renaissance of coal (Steckel et al., 2015; Edenhofer, 2015, see Figure 3) shows that the growing demand for cheap energy in developing and emerging countries has driven the global consumption of coal. Building new coal power plants causes problematic path dependencies making future decarbonization more costly. In a similar vein, MCC's research highlights the importance of land in climate change mitigation. Negative emission technologies, such as bioenergy in combination with carbon capture and storage (BECCS) and afforestation, currently prevalent in 2°C integrated assessment modelling scenarios, are limited by their high demand for land (Smith et al., 2015). The global community therefore needs to cut down on carbon emissions as soon as possible (Fuss et al., 2014, see Figure 4) and assess the trade-offs of using negative emissions that might be required to reach mitigation targets. Land also plays a role in the provision of public goods. Urban planning and transport policies can limit the future increase in the energy use and carbon emissions of cities, if the particular policy is adjusted to the type of city (Creutzig et al., 2015a).

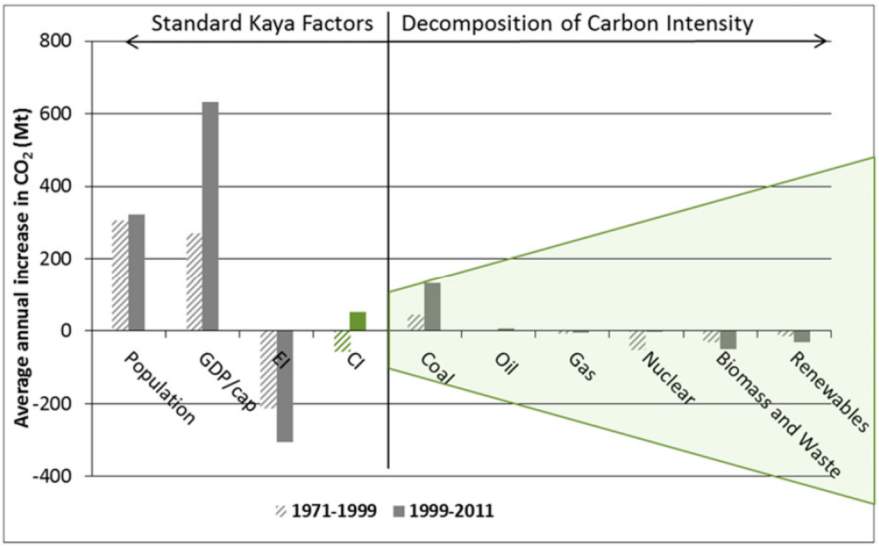

Figure 3: Decomposition of average annual emission changes in Mt CO_2 for standard Kaya decomposition factors (left: population, GDP per capita, energy intensity (EI) and carbon intensity (CI)) and in detail for carbon intensity (in green, right) showing the effects of particular energy carriers (coal, oil, natural gas, nuclear energy, biomass and renewable energy) on emission changes. While the global energy system decarbonised prior to 1999 (see green striped column), it has carbonised from 1999-2011 (green column). In this period, the increase in global coal consumption has caused an increase in annual emissions of more than 100 Mt CO_2 per year. This is mainly driven by fast growing developing countries. Source: Steckel et al. (2015).

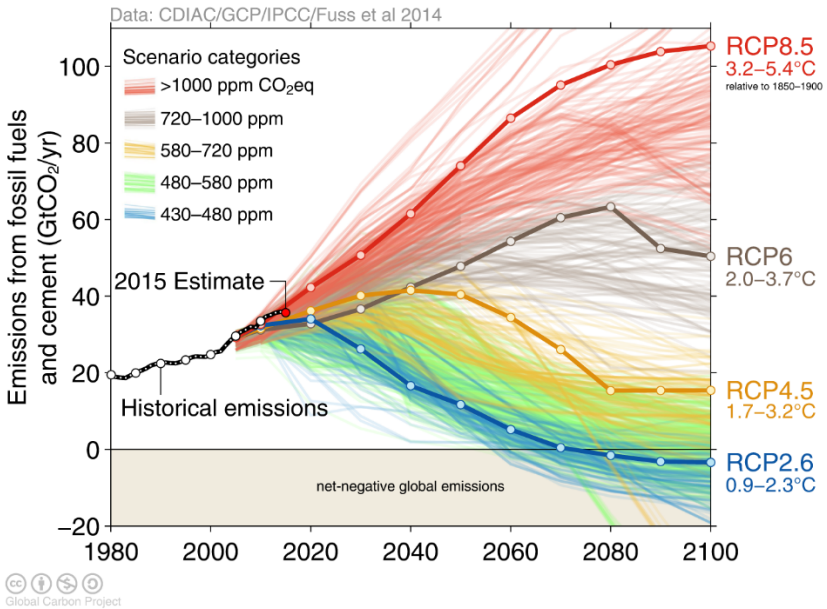

Figure 4: Carbon dioxide emission pathways up until 2100: Historical emissions from fossil fuel combustion and industry (black) are primarily from the Carbon Dioxide Information Analysis Center. They are compared to the IPCC Fifth Assessment report (AR5) Working Group 3 emissions scenarios (pale colours) and to the four representative concentration pathways (RCPs) used to project climate change in the IPCC Working Group 1 contribution to AR5 (dark colours). The temperature increase refers to the warming in the late twenty-first century (2081–2100 average) relative to the 1850–1900 average. Only scenarios assigned to climate categories are shown (1,089 of 1,184). Most scenarios that keep climate warming below 2 °C above pre-industrial levels use BECCS, offsetting some of the residual fossil fuel emissions earlier in the century and generating net negative emissions in the second half of the century. Source: Fuss et al. (2014).

2. What are the policy options for governing global commons? How can fair, equitable and efficient access to global commons be achieved?

a) *Motivation:* The analysis of causalities and processes driving the use of global commons reveals options for how societies can actively intervene in socio-economic and biophysical processes to achieve preferred outcomes. The design of the interventions (policies) depends, however, on societies' values and goals for human well-being and development. Research related to policy design therefore needs to take normative considerations explicitly into account.

b) *Specific research topics* in this domain include the design of policy instruments for the effective governance of commons and for the provision of public goods. Additionally, we analyse the role of natural and social commons in enhancing human well-being and enabling sustainable development. This in turn, determines the optimal level of conservation and provision of the commons. They are governed by multiple actors at different institutional levels, which have multiple and often conflicting policy objectives. Our research aims to identify the extent to which policies at different scales reinforce or neutralise one another, for example in the context of European climate and energy policy (polycentric governance). We also investigate how local and demand-side action, e.g in the transport sector and in cities, can systematically contribute to the governance of the global commons. In addition, we analyse the distributional consequences of policy instruments and the implications for achieving other social goals such as those outlined in the Sustainable Development Goals (SDGs). Synergies range from fiscal revenues generated from taxing resource use, to local co-benefits of climate change mitigation such as local air quality.

c) *Work at MCC* shows that the abolition of subsidies for fossil fuels and the pricing of carbon emissions would help policymakers reach ambitious environmental goals (Edenhofer et al., 2015b). Importantly, it also illustrates that slashing fossil fuel subsidies or using revenues from carbon pricing can enable countries to reduce poverty by financing infrastructure investments. Such investments could provide the poorest people with water, electricity and sanitation in many parts of the world (Jakob et al., 2015a, Jakob et al., 2016, see Figure 5). In the context of potential geopolitical implications of food production shortages, Bren d'Amour et al. (2016) investigate which countries are most vulnerable to tele-connected supply-shocks, i.e. where diets strongly rely on the import of wheat, maize, or rice, and where a large share of their population lives in poverty. They find that the Middle East is most sensitive to tele-connected supply shocks in wheat, Central America to supply shocks in maize, and Western Africa to supply shocks in rice (see Figure 6). MCC's research in economic theory analyses the distributional effects of both pricing carbon and public investment. Recycling the revenue from environmental taxes is shown to influence aggregate efficiency through mitigating wealth inequality (Edenhofer et al., 2015c, Siegmeier et al., 2015). In particular, carbon tax reforms can be made progressive if revenues are returned to citizens as uniform cash-transfers (Klenert and Mattauch, 2015). The distributional effects of public investment into infrastructure crucially depend on how they are financed (Klenert et al., 2016). The interplay between sustainable land use, forest conservation and land taxes with structural change in developing countries was analysed by Kalkuhl and Edenhofer (2015), who found that taxes on agricultural land can be effective as an instrument to reduce deforestation, but can also cause a structural change to the more productive industrial sector, increasing overall wealth.

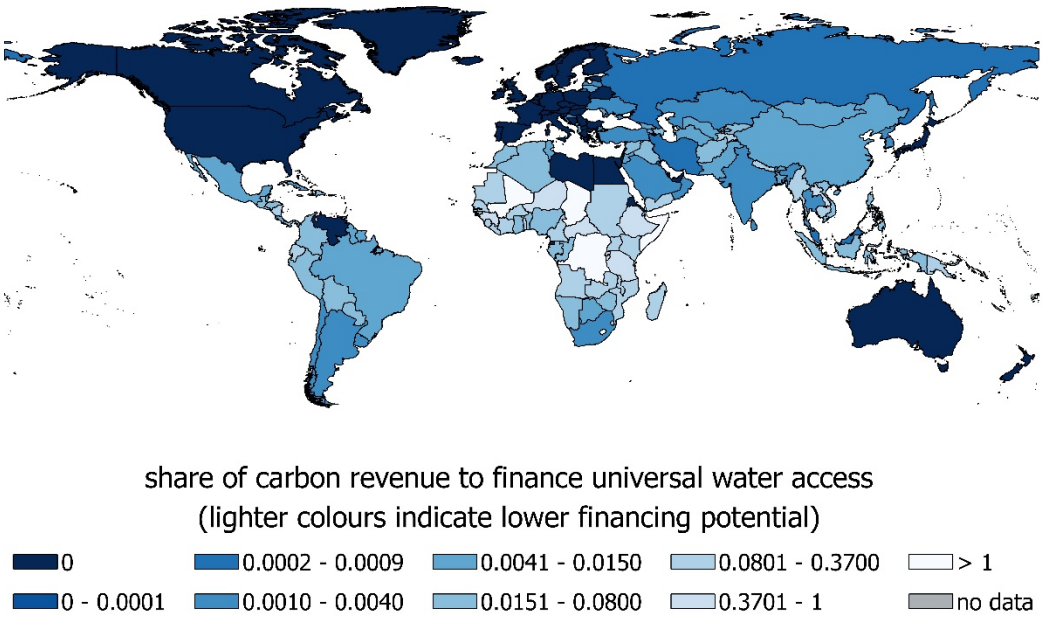

Figure 5: Share of carbon revenues needed to provide universal access to water (measured by the ratio of costs of closing the infrastructure gap over carbon revenues): a ratio exceeding 1 (white) implies that carbon revenues are not sufficient to cover the cost of closing the gap. The darker the colour shading, the lower the share of carbon revenues needed to finance universal access. The darkest shade includes countries that are already close to or have universal access. Data sources: own calculations, see Jakob et al. (2016) for sources of raw data; carbon revenues based on 450ppm scenario with full availability of technologies, no redistribution.

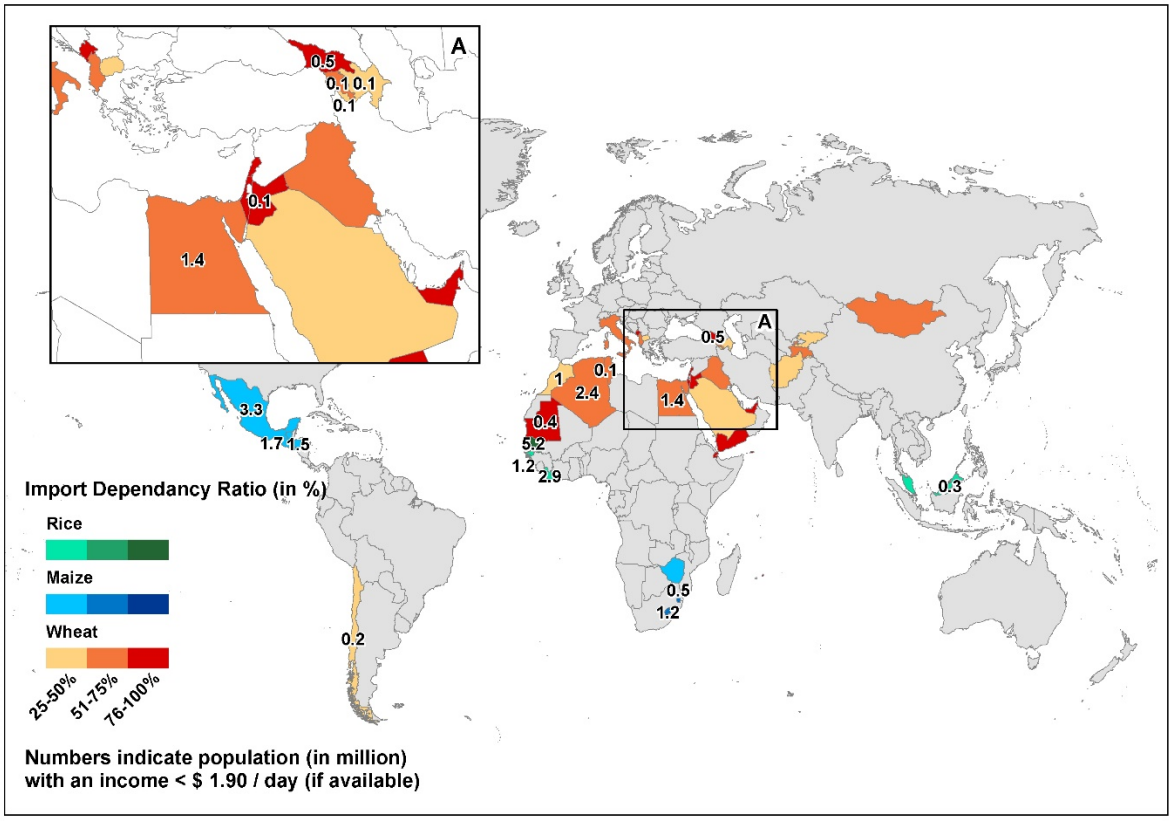

Figure 6: Caloric trade deficits and poverty levels. Countries with an Import Dependency Ratio and dietary reliance on wheat, maize, or rice of at least 25%, respectively, are highlighted. Dietary reliance indicates how much of daily total per capita calorie intake is derived from the respective crop. Black numbers indicate the number of people (in million) living on less than US $1.90 a day. Panel A provides a close up of the Middle Eastern region. Source: Bren d'Amour (2016).

3. How should the science-policy interface be designed to achieve a sustainable governance of the global commons?

a) *Motivation:* There is substantial complexity and uncertainty associated with the aforementioned processes, which calls for scientific expertise in the political process to adequately synthesise available knowledge. Climate policies are multidimensional, simultaneously affecting different and highly interdependent fields. They often involve numerous conflicts of interest and controversial normative assumptions, for example on how to weigh the rights of future generations with today's generations.

b) *Specific research topics* include how the science-policy interface can be designed to enable legitimate, deliberative discourse between decision-makers, society and scientific experts. In our research, we critically reflect on the process of scientific policy advice, with a particular focus on the analysis and improvement of large-scale scientific assessments.

c) *Work at MCC* includes the development of the pragmatic-enlightened model (Edenhofer and Kowarsch, 2015). The model advocates that scientific assessments on climate change should focus more on the practical consequences of different policy options. It was applied within the Intergovernmental Panel on Climate Change (IPCC) under Edenhofer's Chairmanship of Working Group III (WGIII). Together with leading figures of the community, MCC scientists argued that in future, the IPCC should increase its focus on analysing policy options for climate change mitigation and adaptation by systematically comparing the costs, benefits and risks of alternative policy pathways (Carraro et al., 2015). Beyond the IPCC, Kowarsch (2015) applied this framework to the new EU science advice mechanism and stressed that comprehensive assessments are needed to analyse different solutions and their practical consequences for society.

1.2. Our approach

The "grand challenges" of climate change and global commons management need to be addressed to achieve sustainable development and human well-being. To do this, we follow a transdisciplinary and thematically broad approach to assemble the required expertise in different complex and interrelated systems. Although our research is mainly rooted in economics, we also draw on disciplinary knowledge from philosophy, political science and other social sciences. We apply a broad range of methods, including empirical and theoretical analyses.

Our research and policy advice focuses on long-term, global issues. Only a few institutions address global commons management; as governments and other stakeholders often have a short-term and national focus, the scientific community has a special role to play in promoting the discourse on global and long-term problems such as climate change. **We provide insights for the development and discussion of solutions for long-term, global issues that require government of global commons such as sustainable development and climate change.**

Our scientific policy advice is guided by a specifically developed science-policy model that regards the transformation towards sustainability as an iterative learning process between scientific experts, decision makers and society (Edenhofer and Kowarsch, 2015). This pragmatic-enlightened model (PEM) claims that a joint exploration of alternative policy options and their implications in integrated scientific assessments is required to make social conflicts, synergies and uncertainties transparent and to identify viable policy solutions (see Figure 7). Such scientific assessments are sophisticated, formalised learning processes for synthesizing knowledge in a policy-relevant manner. According to the PEM, researchers, along with stakeholders, act as the "cartographers" of different, viable policy pathways and their practical consequences and thus are "mapmakers" of the political solution space. They provide alternative options for policymakers (i.e., the "navigators") and the public.

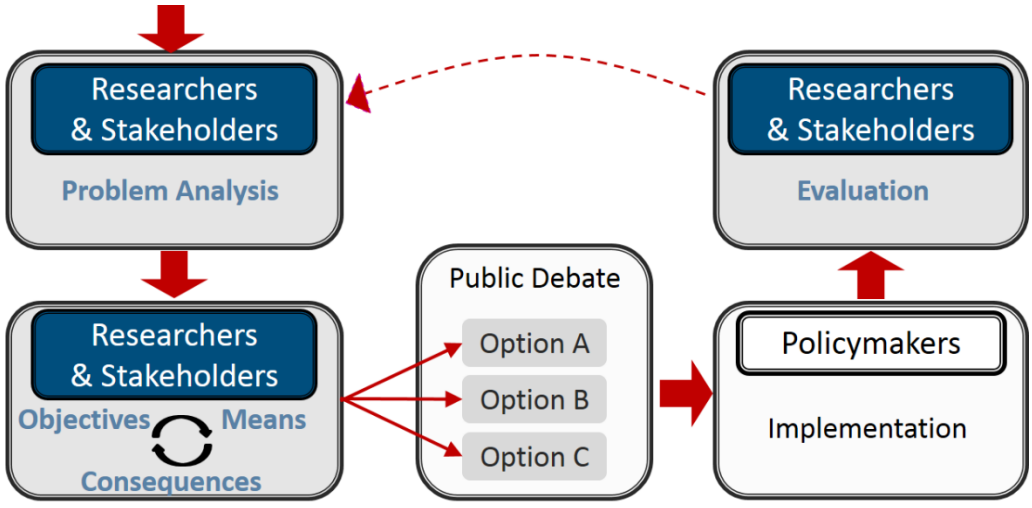

Figure 7: The pragmatic-enlightened model (PEM) as a representation of scientific policy advice. The PEM as a model for solution-oriented assessments suggests that after researchers and stakeholders have jointly framed the problem (upper left), they explore the objectives, means and consequences (lower left). The two white boxes (middle, lower right) indicate steps in the policy process that are outside the assessment-process per se, such as public debate on alternative policy pathways, as well as policy decisions and implementation by policymakers. Finally, there is a scientific ex-post evaluation of the actual means-consequences (upper right), which is also the starting point for a new assessment cycle. Source: Edenhofer and Kowarsch (2015).

What are scientific assessments?

Scientific assessments are sophisticated, formalised processes for synthesizing knowledge to inform policy. Ideally, they have the following characteristics (Kowarsch, 2015, see Figure 8):

- Integration of knowledge across different disciplines, assumptions and policy aspects.
- Engagement of policymakers and other stakeholders to explore the diversity of values, concerns, viewpoints and expertise in a transparent and iterative manner at various stages of the assessment process. This allows a critical discussion of the scientists' normative assumptions.
- Presentation of pathways of policy alternatives ("map-making"). These pathways should be publicly available and present different policy options or measures, together with their various implications in terms of risks, costs and opportunities.

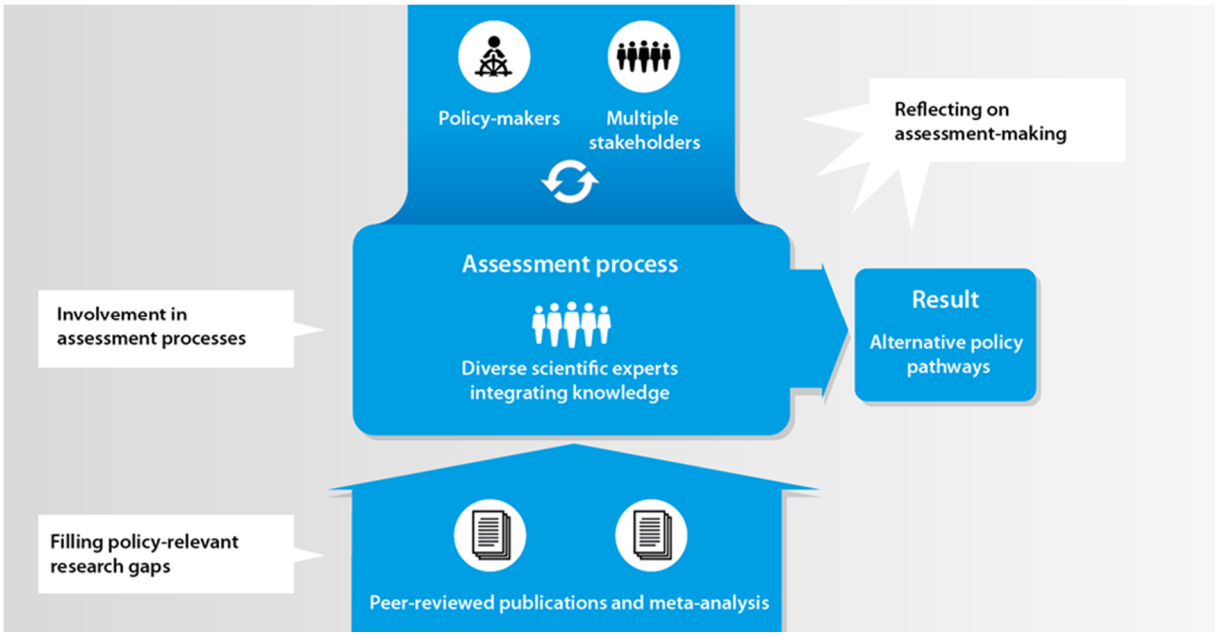

Figure 8: Key characteristics of integrated policy assessments and MCC's contribution. Bottom: peer-reviewed publications and meta-analysis are the basis of large-scale assessments. Top: assessments require transparent inclusion and exploration of divergent, value-laden viewpoints. Middle: in an iterative process scientists, policymakers and other stakeholders deliberate alternative policy options and pathways and their various implications, making controversies and uncertainty transparent. MCC contributes by (1) producing publications which fill policy-relevant research gaps, (2) being involved in assessment processes, (3) reflecting on the overall assessment process. Source: Based on Kowarsch (2015).

We understand assessment-making to be a process and not (solely) a product. MCC contributes to assessment-making by (i) providing relevant high-level publications, (ii) leading and contributing to formal assessment processes, and (iii) reflecting on assessment-making (see Figure 8):

1. **Peer-reviewed scientific publications and meta-analyses form the basis of our work.** Our publications aim to combine excellence and relevance. By publishing in peer-reviewed journals, we are able to participate in high-level assessments, such as the IPCC, that mainly rely on peer-reviewed literature. We also aim to initiate and be present in debates whose outcomes are of high practical relevance in global commons management. We publish in high-ranking interdisciplinary journals such as *Science*, *Nature*, *Nature Climate Change* and also in important disciplinary journals, such as *Economic Letters* or *Environmental Research Letters* (see details in Section 2.1.1). With our research, we provide the best available scientific knowledge for society. In addition, we aim to fill policy-relevant research gaps and provide examinations of relevant policy pathways. To do this, we develop larger MCC **assessment streams** that all have a strong relevance for decision-making and are hubs for our collaborative research. The three streams focus on i) ex-post analysis and future reform options for the European Emissions Trading Scheme (EU-ETS) as the world's largest carbon pricing system; ii) putting the management of land as a global common onto the agenda of international governance; and iii) exploring public finance options for carbon and resource rent taxation, enabling the investments into public goods that are required to achieve the Sustainable Development Goals (details in Section 2.1.2). These assessment streams feed into existing international assessment processes and build the nucleus for a possible initiation of new assessment processes with partners in larger consortia.
2. **We are directly involved in formalised assessment processes by leadership and authorship, and are engaged in science-policy dialogue via various formal and informal channels.** The most prominent example of our involvement is within the IPCC; Ottmar Edenhofer (MCC Director) served as WGIII Co-Chair, Jan Minx (MCC group leader) served as head of WGIII TSU and six MCC staff members served as authors, with Felix Creutzig (MCC group leader) as Lead Author of WGIII's Transport Chapter. Ottmar Edenhofer and Michael Jakob are lead authors in the ongoing assessment of the "International Panel on Social Progress (IPSP)" that addresses social change, wealth and income distribution and the future of capitalism. MCC staff have also initiated smaller-scale pilot assessments, such as our analysis of reform options for the EU ETS, in the context of a mandate by the European Council of Academies of Applied Sciences, Technologies and Engineering Euro-CASE (Euro-CASE, 2014; Knopf et al., 2014b). In addition, MCC provides space for deliberation between scientists and policymakers. This has been achieved through several major workshops in which options for the design of the new global climate regime were discussed, together with potential synergies between public finance and climate policy, and ideas for improving policy assessment within the IPCC (more details in section 2.3.1). We are engaged in providing scientific policy advice and advancing the science-policy dialogue through various channels such as institutionalised advice for international organizations, or informal interaction with high-level politicians and other stakeholders, see details in Section 2.2.5.
3. **We systematically reflect on the design, formats and content of scientific policy advice and assessment-making.** This is crucial to improve assessment processes at the science-policy interface. This reflection process is mainly presented in scientific publications and strongly benefits from our practical experiences. Edenhofer and Minx (2014), for example, reflect on experiences made in the 5th Assessment cycle of the IPCC. Such a reflection process can provide helpful input for other science-policy formats, for example within the EU (Kowarsch, 2015). MCC also initiates and contributes to discourses within the scientific community. For example, Fuss et al. (2014) and Smith et al. (2015), discuss the requirements for negative emissions while Creutzig (2015a) and Creutzig et al. (2015b) analyse options for decarbonising the transport sector. Both cases cover conflicting viewpoints based on different normative assumptions that arose within the IPCC Fifths Assessment Report. See more details in section 2.1.3.

Combining these three contributions to assessment-making distinguishes MCC in both the German and international research communities that address climate change and sustainable development. Other institutes usually focus on a sub-set of these assessment contributions, but very few on their combination.

1.3. Our target audience

As a scientific think tank, MCC aims to provide decision makers and stakeholders with the best available scientific knowledge, supporting the decision making process. We follow a long-term strategy to shape debates both in scientific arenas (e.g. within economics and social science research) and public policy discussions (e.g. in the reform process of the EU ETS or in combining rent taxation and public finance reform). Although our research is driven by real-world problems, day-to-day politics are not our primary focus. Our research focuses on the conceptual design of policies with a long-term perspective.

MCC's non-prescriptive approach to policy advice and assessment processes is addressed towards a broad spectrum of decision makers at national, European and global levels, as well as international organizations and stakeholders from business or non-governmental organisations (NGOs). While listening carefully to the existing demand for policy assessments, our core funding by Stiftung Mercator ensures we are independent in our choice of topics and provide expertise for highly relevant societal problems without being constrained by sectional interests or predetermined outcomes. MCC also engages in the public debate via publications in major media outlets (see Section 2.2.6).

1.4. Our structure

Director Prof. Dr. Ottmar Edenhofer and Secretary General Dr. Brigitte Knopf lead the management of MCC. Ottmar Edenhofer, who acted as IPCC Co-Chair of Working Group III between 2007 and 2015, is professor at the TU Berlin, Vice Director at PIK and Co-Chair of PIK's research domain Sustainable Solutions. Brigitte Knopf was former deputy head of this research domain at PIK and has been holding the position as MCC Secretary General since January 2015.

Day-to-day work at MCC is organised within seven working groups (WG), one of which is jointly financed by the Technische Universität Berlin (TU Berlin). In addition, there is a task force on public economics. Each working group is led by a senior researcher, three of which are already professors (see Section 2.2.3) with two more appointments ongoing:

- Economic Growth and Human Development (Head: Prof. Dr. Matthias Kalkuhl)
- Land Use, Infrastructure and Transport (Head: Dr. Felix Creutzig)
- Sustainable Resource Management and Global Change (Head: Dr. Sabine Fuss)
- Governance (Head: Prof. Dr. Christian Flachsland)
- Scientific Assessments, Ethics, and Public Policy (Head: Dr. Martin Kowarsch)
- Applied Sustainability Science (Head: Prof. Jan Minx, PhD)
- Climate and Development (Head: Dr. Jan Steckel)
- Task Force Public Economics (Representative: Dr. Michael Jakob)

The disciplinary backgrounds of the group leaders range widely and include economists, physicists, social scientists and philosophers, underlining MCC's transdisciplinary approach to bolster the transdisciplinary community (CVs can be found in the Appendix).

The working groups are typically comprised of two to four researchers. This small size allows research priorities to be adjusted dynamically, with the flexibility to handle new and timely topics. Besides the qualification of experienced researchers towards professorships, MCC is actively involved in the education of young researchers towards gaining a PhD (see Section 0).

The organizational chart and details of MCC's working groups are presented in Section 3.

2. Key Results and Achievements

As MCC independently develops and communicates its research, there is a deliberate focus on ensuring that: (a) MCC's research is transferred well to decision makers; and (b) MCC is well connected to policy makers and other stakeholders allowing an iterative feedback loop in the assessment of policy options. In this chapter we provide indicators for **assessing our performance measured in four dimensions related to excellence and societal relevance:**

1. **Output** as measured by the number of publications and impact factor of the journals in which our work is published (excellence); by the contributions made by MCC staff to assessment activities; and by contributions made to the debate on assessments.
2. **Outgrowth** describes the recognition of our output and is measured by citations; awards; quotations; joint professorships with universities; visibility in public policy processes and media appearance (relevance).
3. **Conditions** enabling impact, such as convening workshops; membership of editorial boards or networking activities; and collaborations with other research institutes and universities.
4. **Anecdotes** of impact, which measure the policy impact of our work, will be provided in the external evaluator's report based on structured interviews.

2.1. Output

MCC staff published a considerable number of papers in high-ranking journals. By means of its publications and its contribution to international assessment-making processes (e.g. the IPCC), **MCC has stimulated an ongoing debate on assessment-making, sustainable bioenergy use with respect to the demand for negative emissions, and on the global commons.** MCC staff have also initiated a pilot assessment on the reform of the European Emissions Trading Scheme. Details are given in the following sub-sections.

2.1.1. Publications

Publications are a corner stone of MCC's work; the large majority have been published in peer-reviewed journals, see Figure 9. **Nearly two thirds of our peer-reviewed publications have been published in ISI Journals. In 2015, 11 out of 41 peer-reviewed publications were published in *Science*, *Nature*, *Nature Climate Change* or *PNAS*. These are all journals with a citation index higher than 9.** The respective numbers for 2014 and 2013 are 6 and 3, showing a clear increasing trend towards high-ranking publications. In addition, MCC publications have also appeared in important economic journals, such as *Economic Letters*, and in high-level interdisciplinary outlets such as *Global Environmental Change* and *Environmental Research Letters*.

This successful publication output is particularly relevant given that parts of the MCC research agenda are explorative, aiming to address and chart new fields of research. For this purpose, MCC researchers sometimes have to create their own scientific communities and academic discourses. One such example is the systematic research on policy-oriented assessment-making that aims to improve the science-policy interface. Another is the effort to advance the economic discourse (often centered around neoclassical concepts) by analysing natural resource and commons problems in models that combine heterogeneous households and overlapping generations. This allows for the analysis of inter- and intra-generational inequality in global commons management. Our high-level commentaries, for example on "King coal and the queen of subsidies" (Edenhofer, 2015) in *Science* or "Science and religion in dialogue over the global

commons" (Edenhofer et al., 2015a) in *Nature Climate Change*, foster debates within the scientific community. Furthermore, it should be noted that all PhD candidates contribute to peer-reviewed publications as their doctoral theses are structured as cumulative dissertations.

MCC staff released 3.3 publications per scientific FTE in 2015 - similar to the publication record of PIK with 3.3 in 2012 and 3.9 in 2013, and higher than other comparable German economic institutes[1].

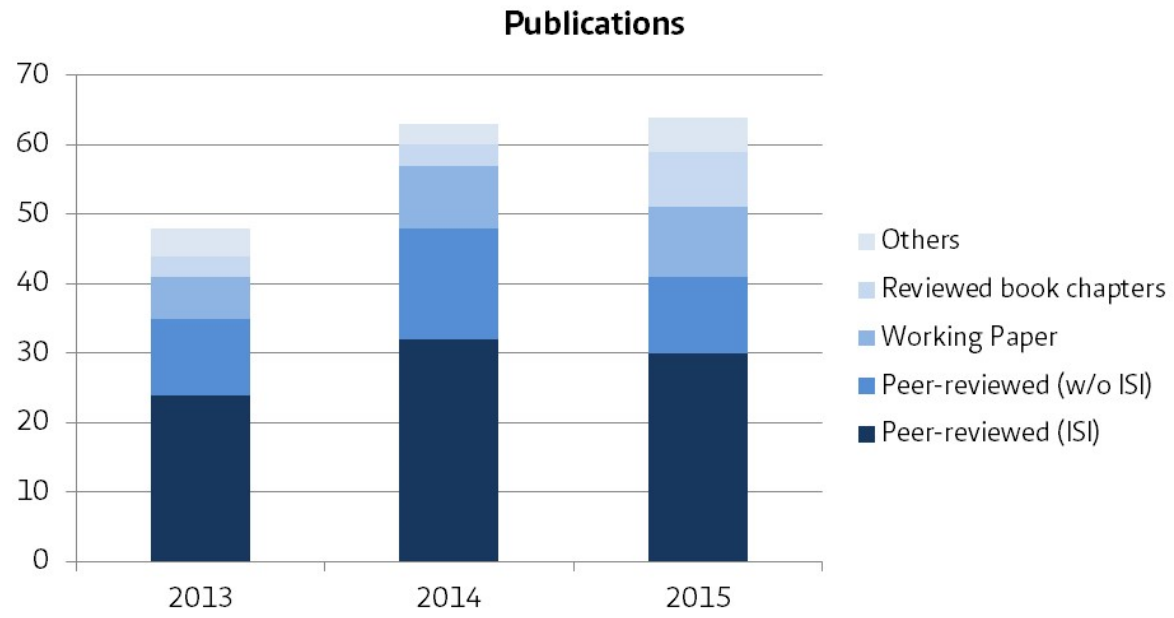

Figure 9: Number of publications by MCC in the different categories. Number of FTE scientific staff: 10; 15; and 19 for 2013; 2014; and 2015, see Figure 16.

[1] In 2014 and 2013, MCC staff recorded even higher numbers (4.3 and 4.7 publications per scientific FTE respectively). This was somewhat biased in 2013 due to the finalization of papers by new staff members that were initiated at their former institutions, and in 2014 due to eight publications linked to the IPCC.

Our Top-10 publication list shows the wide range of journals and topics which we are active in:

Top 10 publications

MCC authors are highlighted in bold letters

MCC initiates and plays leading roles in community-wide debates of high political relevance on negative emissions and bioenergy use:

Creutzig, F., Ravindranath, N. H., Berndes, G., Bolwig, S., Bright, R., Cherubini, F., H. Chum, E. Corbera, M. Delucchi, A. Faaij, J. Fargione, H. Haberl, G. Heath, O. Lucon, R. Plevin, A. Popp, C. Robledo-Abad, S. Rose, P. Smith, A. Stromman, S. Suh, O. Masera (2015). Bioenergy and climate change mitigation: an assessment. GCB Bioenergy, 7(5), 916-944.

Fuss, S., Canadell, J. G., Peters, G. P., Tavoni, M., Andrew, R. M., Ciais, P., Jackson, R.B., Jones, C.D., Kraxner, F., Nakicenovic, N., Le Quéré, C., Raupach, M.R., Sharifi, A., Smith, P., Yamagata, Y. (2014). Betting on negative emissions. Nature Climate Change, 4(10), 850-853.

MCC conceptualises assessment-making:

Edenhofer, O., Kowarsch, M. (2015): Cartography of pathways: A new model for environmental policy assessments, Environmental Science & Policy, Volume 51, 56-64.

MCC is present in economic journals:

Klenert; D., Mattauch, L. (2016): How to make a carbon tax reform progressive: The role of subsistence consumption. Economics Letters. Volume 138, January 2016, Pages 100–103

Klenert, D., Mattauch, L., Edenhofer, O., Lessmann, K. (2016): Infrastructure and Inequality: Insights from Incorporating Key Economic Facts about Household Heterogeneity, Macroeconomic Dynamics (in press).

MCC provides policy-relevant research, e.g. on cities and the renaissance of coal:

Creutzig, F., Baiocchi, G.; Bierkandt, R.; Pichler, P.-P.; Seto, K. (2015): A Global Typology of Urban Energy Use and Potentials for an Urbanization Mitigation Wedge, Proceedings of the National Academy of Sciences, 112 (20), 6283–6288.

Steckel, J. C., Edenhofer, O., Jakob, M. (2015). Drivers for the renaissance of coal. Proceedings of the National Academy of Sciences, 112(29), E3775-E3781.

MCC uses publications to set agendas and stimulate debates:

Edenhofer, O., Jakob, M., Creutzig, F., Flachsland, C., Fuss, S., Kowarsch, M., Lessmann, K**., Mattauch, L., Siegmeier, J., Steckel, J. C.** (2015): Closing the emission price gap, Global Environmental Change, Vol. 31, 132-143.

Jakob, M., Chen, C., Fuss, S., Marxen, A., Rao, N., **Edenhofer, O.** (2016). Using Carbon Pricing Revenues to Finance Infrastructure Access. World Development, in press

PhD candidates at MCC contribute to important publications in leading roles:

Von Stechow, C., McCollum, D., Riahi, K., **Minx, J. C.,** Kriegler, E., Van Vuuren, D. P., Jewell, J., Robledo-Abad, C., Hertwich, E., Tavoni, M., Mirasgedis, S., Lah, O., Roy, J., Mulugetta, Y., Dubash, N.K., Bollen, J., Ürge-Vorsatz, D., **Edenhofer, O**., (2015). Integrating global climate change mitigation goals with other sustainability objectives: a synthesis. Annual Review of Environment and Resources, 40, 363-394.

2.1.2. Involvement in assessment processes

In this section we provide a description of our contribution to the IPCC Assessment, to other formal international assessments and to our internal assessment streams that could serve as hubs for future assessment processes.

2.1.2.1. MCC's contribution to IPCC assessments

Countries worldwide have just committed to a new international climate agreement in Paris at the 21st Conference of the Parties (COP21). This is a big achievement for the IPCC, whose assessments provided key scientific input into the negotiations. The text of the Paris Agreement and decision aligns remarkably well with the current science of climate change outlined by the IPCC. This pertains, for example, to statements about the long-term goal, pathways to a full decarbonization, and near-term emission reductions and carbon pricing. Key research gaps, for example concerning the 1.5°C target, are acknowledged in the Paris Agreement.

MCC staff made a significant contribution to the Fifth Assessment Report (AR5). Ottmar Edenhofer led and guided the assessment process as Co-Chair of Working Group III (WGIII). This was supported by Jan Minx who was a full-time MCC employee in his final year as Head of the Technical Support Unit in 2015. In addition to these lead positions, eight other MCC staff members contributed to the AR5 assessment in various roles:

- Two members of the Technical Support Unit (Jan Minx, Christoph von Stechow)
- Three editors of the WGIII report (Ottmar Edenhofer, Jan Minx, Christoph von Stechow)
- Four authors of the WGIII Summary for Policymakers (Ottmar Edenhofer, Jan Minx, Felix Creutzig, Christoph von Stechow)
- Two WGIII Coordinating Lead Authors (Ottmar Edenhofer, Jan Minx)
- Two WGIII Lead Authors (Felix Creutzig, Christoph von Stechow)
- Two Core-Writing Team Members of the Synthesis Report (Ottmar Edenhofer, Jan Minx)
- Six WGIII Contributing Authors (Felix Creutzig, Christoph von Stechow, Jan Steckel, Alexander Radebach, Christian Flachsland, Michael Jakob, Brigitte Knopf[2])
- One WGIII Glossary editor (Christoph von Stechow)

Many other MCC scientists contributed to the process as expert reviewers, commenting on gaps and weaknesses of the drafts. MCC also contributed as an organization to the IPCC process, particularly in the later stages of the assessment cycle, by means of:

- **Quality assurance:** MCC staff contributed to in-depth quality control activities in the AR5 that could not be provided through expert review. These were crucial to securing high-quality standards. For example, all historic emissions data contained in AR5 WGIII were double-checked and corrected by a team of MCC researchers led by Jan Steckel.
- **Development of an assessment philosophy:** MCC was involved in laying important conceptual foundations for the AR5. The contribution of WGIII to the AR5 is the first comprehensive attempt to implement the assessment model, continuously developed over the last five years by Ottmar Edenhofer in collaboration with Martin Kowarsch (Edenhofer and Minx, 2014, and Edenhofer and Kowarsch, 2015).
- **Facilitating coordinating activities:** MCC contributed indirectly to WGIII AR5 by facilitating cross-chapter coordinating activities. For example, in April 2014, MCC hosted a two-day cross-chapter author meeting to improve consistency and achieve a deeper integration between the assessment of mitigation costs and mitigation potentials in Chapters 6-12 of the report.

[2] In her capacity as member of PIK.

- **Temporarily hosting the TSU:** Due to space limitations at its home institution, PIK, the main part of the Technical Support Unit was hosted in MCC facilities in 2015. During this time two important expert meetings were organised and a structured termination and knowledge transfer of TSU activities was conducted.
- **Paving the road toward AR6:** The time between assessment cycles is of great importance for reflections and preparations. MCC staff (Ottmar Edenhofer, Jan Minx, Sabine Fuss) participated in and contributed to the organization of three major IPCC expert meetings: "Potential Studies of the IPCC Process", "Climate Change, Food, and Agriculture" as well as "Scenarios", leading the organization of the latter. Group leader Martin Kowarsch provided input to the debate on potential future social-science studies of the IPCC process at another IPCC expert meeting in 2015. MCC staff also contributed to a series of articles reflecting on the IPCC assessment experience (e.g. Edenhofer and Minx, 2014; Chan et al., 2015; Carraro et al., 2015).

2.1.2.2. MCC's contribution to other formalised assessment processes

In addition to the IPCC, MCC has initiated an assessment of its own, and also contributes to other international assessment processes.

MCC initiated its own „pilot-assessment" on the reform of the European Emissions Trading Scheme (EU-ETS), mandated by the European Council of Academies of Applied Sciences, Technologies and Engineering (Euro-CASE) in 2014. Ottmar Edenhofer, in his capacity as Co-Chair of the Euro-CASE Energy Platform (see Section 2.3.2), and Brigitte Knopf (at that time at PIK) coordinated an analysis of the EU ETS and possible pathways for reform, together with the members of the Euro-CASE Energy Platform and a core writing team of authors from MCC and PIK. Members of the Euro-CASE Energy Platform comprised researchers from all over Europe, nominated by their respective academies. This resulted in the Euro-CASE Policy Position Paper on "Reform Options for the European Emissions Trading System" (Euro-CASE 2014) and also advanced the debate in the scientific community through publications and presentations at conferences and workshops. Besides a thorough analysis of the problems of the EU ETS, care was given to explore different alternative reform options, including the proposal of a Market Stability Reserve by the European Commission.

Instead of a Market Stability Reserve the Euro-CASE reform proposal suggests the implementation of a price floor (minimum price) or price corridor for the CO_2 allowance price to solve the problems of the long-term performance of the EU ETS. Moreover, a price floor would allow national preferences to be addressed at the EU level without undermining the overall efficiency of the instrument. A number of peer-reviewed articles and working papers by MCC staff (Koch et al., 2014; Knopf et al., 2014b; Edenhofer, 2014; Grosjean et al., 2014) formed the scientific basis of the pilot-assessment. They were presented in a workshop with international scientific experts and stakeholders in Brussels. In addition, the drafts of the Position Paper were discussed with German stakeholders from industry and energy associations (BDI and BDEW), politics (Federal Ministry for the Environment), and the scientific community. The final Euro-CASE Policy Position Paper was officially handed over to Jos Delbeke (Director General for Climate Action of the European Commission) and Ivo Belet (rapporteur of the ETS reform for the European Parliament) in September 2014. The Position Paper was also widely disseminated by email and hardcopy to stakeholders in Brussels through acatech, the German National Academy of Science and Engineering. The paper was the basis for further informing policymakers on reform options, e.g. through contributions by MCC to public consultations by the European Commission. The results were also disseminated and discussed in the academic community and in the media. The EU has adopted a Market Stability Reserve (MSR) to enhance the robustness of the EU ETS price signal. However criticisms over the effectiveness of the MSR in addressing the core problems of the EU ETS have been underpinned by the recent collapse in the EU ETS allowance price and post-Paris discussions over unilateral Member States' policies such as a German coal phaseout. This has led to an intensified discussion over the introduction of a price collar in the EU ETS. For example, France has recently been circulating a non-paper proposing an ETS price collar.

Since 2015, MCC researchers have been contributing to the International Panel on Social Progress (IPSP). The IPSP will address, *inter alia*, the profound and unequal transformations in health and education and the rising inequalities of wealth and income within and between countries. The IPSP harnesses the expertise of hundreds of worldwide experts on social issues. It will deliver a report in 2017, addressed to all social actors, movements, organizations, politicians and decision-makers, providing them with the best expertise on questions that have a bearing on social change. MCC is an official partner of the IPSP; Ottmar Edenhofer is a coordinating lead author for the chapter on „Growth, Human Development and Planetary Welfare"; MCC task force leader Michael Jakob is a lead author, MCC group leaders Christian Flachsland and Jan Steckel and PhD candidate Marcel Dorsch are contributing authors.

Ottmar Edenhofer is a member of the "National Expert Advisory Council on Climate Change" for Ireland that was set up in 2015 in the framework of the "Climate Action and Low-Carbon Development Bill 2015". The Council advises and makes recommendations to the Minister for the Environment, Community and Local Government as a National Mitigation Plan is prepared.

Group leader Felix Creutzig and Blanca Fernandez (MCC PhD student) were lead and contributing authors of the 2nd Urban Climate Change Research Network (UCCRN) Assessment Report on Climate Change and Cities for the chapter „Equity and Environmental Justice". Group leader Sabine Fuss was an expert reviewer in the Assessment Report „Geoengineering in Relation to the Convention on Biological Diversity: Technical and Regulatory Matters".

2.1.2.3. MCC's internal assessment streams

MCC's internal assessment streams strengthen the collaborative research at MCC as cross-working group activities. The main idea of these streams is to cluster part of our research in a "fluid matrix" traversing the working groups and thereby facilitating internal cooperation. This structure allows MCC to take up current topics or topics of MCC-wide interest. These internal assessment streams may initiate larger-scale assessments and/or may feed into new assessments, for example of the IPCC in its next Assessment Report or other international assessments.

REFORM OPTIONS FOR THE EUROPEAN EMISSIONS TRADING SCHEME (COORDINATOR: SABINE FUSS)

Main idea: The Emissions Trading System is the European Union's flagship carbon pricing instrument and, as a pioneer for the world in this approach, it offers unique opportunities to distill lessons for the operation of existing, and the design of emerging, cap-and-trade schemes all around the globe. However, the performance of the EU ETS has been under great scrutiny, as it has been unsuccessful in creating a stable carbon price. Although short-term emissions caps were met, the carbon prices declined sharply to barely economically significant levels, which raised questions of its ability to achieve long-term climate policy goals at least costs. This assessment stream includes an ex post evaluation of EU ETS price formation, in which careful research is performed on the reform space given insights from the empirical work. To complement this, transfer mechanisms within the EU ETS and revenue recycling are also being investigated.

Process: This assessment stream builds on the work done within the Euro-CASE pilot-assessment. The next stage of the research will look further into design options and questions of dynamic efficiency, and will focus on companies' behaviour in the EU ETS to better understand competitiveness effects and distributional implications of the policy. Providing evidence on these matters is particularly useful given the, often intense, political and lobbying pressures governments face when formulating climate policy. The research will also benefit from an enhanced knowledge exchange on lessons-learned in the EU ETS and emissions trading in California, which is envisaged in the AHEAD Project. This project, being a joint effort with PIK and Resources for the Future RFF, will present lessons-learned, future challenges and options for ambitious climate policy in Germany and California. Exchange with China via MCC's

contribution to the Energy Policy Forum of the Hertie School of Governance, Tsinghua University and University of Southern California in 2015, will expand its impact further.

Product: Peer-reviewed publications are expected as the main output of this assessment stream. Those released thus far include Koch et al. (subm.) on attributing the impact of regulatory news on price variability, the integration of offsets from reduced deforestation and forest degradation (REDD+) and its impact on clean energy investment pathways (Koch et al., subm.), the expansion of the EU ETS to the agricultural sector (Grosjean et al., subm.), and Edenhofer et al. (subm.) analysing the role of an EU ETS price floor in the federal EU setting with members states featuring heterogeneous preferences over climate policy. Regular exchange with the external community working on these research questions is an important part of this assessment stream. Exchange is achieved, for example, through MCC's research seminars and presentations at international conferences. The work of this assessment stream could also feed into a larger-scale international assessment on carbon pricing (e.g. within the IPCC).

LAND AS A GLOBAL COMMON (COORDINATOR: FELIX CREUTZIG)

Main idea: This assessment stream aims to put the management of land as a global common on the agenda of international governance. To do so, it aims to: (a) provide a working definition of the global land commons; (b) elucidate the normative underpinnings of treating land as a global common; (c) empirically estimate the dynamics that make land a globally interconnected resource and, by this, a global common good; and (d) explore some causal mechanisms that influence the distribution of the global land commons. Based on the findings, further research on the interconnection of different regimes governing land might be initiated. Such research could also hint at options to comprehensively integrate land governance on global commons.

Process: MCC is working on a few papers that explore normative positions and the empirical foundations of the concept of "land as a global common". Prospectively, this is the foundation for economic studies of the distribution of the global land commons.

Product: Peer-reviewed papers intended for journals that would further academic discourse are expected as the main output of this assessment stream. It is planned to bind the results of the individual papers into a book.

PUBLIC FINANCE: CARBON PRICING FOR FINANCING OF THE SDGS (COORDINATOR: BRIGITTE KNOPF)

Main idea: The idea is to initiate an assessment on carbon pricing and sustainable development supported by a large consortium of players. The assessment will examine a possible shift in focus towards rent taxation and a reinvestment of revenues to promote the SDGs. Combining climate change with the development agenda is especially important after COP21 in Paris. Innovations in the project include: (a) an examination of the potential of carbon pricing to induce technological change towards low-carbon or carbon-free technologies, including the reduction of fossil fuel subsidies; (b) a focus on the possibility of reinvestment of the revenues generated to promote sustainable development, decrease inequality, increase investment in infrastructure and/or reduce public debt and linking carbon pricing to finance the UN's SDGs; and (c) an evaluation of case studies of carbon pricing including a direct interaction with stakeholders from politics, business and NGOs.

Process: This assessment stream has just started and is meant as a long-term endeavour. It depends on an official mandate as well as on funding for workshop activities and partners. The process will include researchers and other stakeholders right from the beginning. One of the most promising options is incorporating the assessment into the G20 Process - MCC is in discussions with relevant ministries (Federal Foreign Office, Federal Ministry of Finance, Federal Ministry of Economic Affairs and Energy, Federal Ministry for the Environment, and the Federal Ministry of Economic Cooperation and

Development), with a major business association and with an NGO on the narrative and how it may stimulate the G20 process.

Product: The focus of this assessment stream is on the process and its innovations therein. Different products are conceivable, ranging from a report, to a commissioned study for a ministry, to a workshop or larger conference. The cornerstones of the idea have been outlined in several articles to date (Jakob et al., 2015a; Jakob et al., 2016; Edenhofer et al., 2015b; Knopf, 2016).

2.1.3. Reflection on assessment-making

MCC contributed to the (further) development of various large-scale environmental policy assessments. The main output of the reflection process are peer-reviewed publications, based on our practical experience in assessment processes. In part due to its high-level involvement in the last IPCC assessment cycle, MCC was well prepared to substantially contribute to the debate about IPCC reform in multiple ways. In particular, MCC has influenced this debate by developing the PEM science-policy model, which also guides the MCC assessment strategy (see Edenhofer and Kowarsch, 2015) and which was employed by the IPCC WGIII. Furthermore, MCC has reflected on the future challenges of IPCC in the light of the heated WGIII approval session (Edenhofer and Minx, 2014). Additionally, it has discussed the future role of social sciences in IPCC assessments at a high-level expert workshop organised in 2015 and in the resulting *Science* article (Carraro et al., 2015), and has been involved in developing proposals for future climate-related research in Germany (report by Deutsches Klima Konsortium 2015).

The research initiative jointly led by MCC and the United Nations Environment Programme (UNEP) on the "*Future of Global Environmental Assessment-making*" (coordinated by Martin Kowarsch) analysed and evaluated several global environmental assessment processes and systematically drew practical conclusions for the improvement of future assessment processes. The results of this innovative research were extensively discussed with the most senior, distinguished experts in the field and will soon be published in high-ranking journals. They are likely to influence future debates on the design of global environmental assessments. By invitation from UNEP, MCC staff produced a report and policy brief with specific recommendations for the design of its next Global Environment Outlook assessment (GEO-6) as high-level input for a UNEP governmental and multi-stakeholder plenary on GEO-6 in 2014. Following on from that, UNEP asked Christian Flachsland to lead the policy analysis expert group for GEO-6.

MCC's expertise in analysing and designing scientific assessments has been acknowledged by other institutions that focus on the science-policy interface. In addition to the request by UNEP, further examples include: (a) an invitation for Martin Kowarsch to participate as an expert reviewer of the scoping documents for the assessments by the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) in 2015; (b) a request for Ottmar Edenhofer and Martin Kowarsch to give advice on the design of the envisaged global assessment of food and nutrition (IPFN) in 2015; (c) several contributions by MCC staff to a widely recognised report by OECD on scientific policy advice in 2014; (d) an invitation for Martin Kowarsch to contribute to the development of guidelines for German energy scenarios together with acatech and other German academies of science in 2015.

MCC's work on specific content also effectively contributed to the improvement of future assessments. This includes for example the debate on sustainable bioenergy potential – a question that was highly disputed within the IPCC. MCC researcher Felix Creutzig presented a summary of existing divergent viewpoints and provided an overview of why different approaches produce different results (Creutzig et al. 2015b). After the IPCC was criticised for relying too heavily on carbon dioxide removal technologies, Sabine Fuss et al. (2014) outlined an idea for a future assessment on negative emissions, a paper published in *Nature Climate Change* that is widely recognised and cited. Finally, two MCC-led consortia sketched the applied assessment challenges related to embedding climate change research in a broader sustainable development framework (von Stechow et al., 2015; von Stechow et al., 2016). Such a sustainable development framing is expected to play a key role in the IPCC Sixths Assessment Report.

2.2. Outgrowth

Outgrowth describes recognition of MCC's output through citations of papers, rankings and awards, and also through joint professorships between MCC and universities. **MCC as an institution, and Director Ottmar Edenhofer in person, have been listed at high positions in important rankings. Three appointments of MCC group leaders as professors have been successfully completed.** Active participation in policy dialogues beyond assessments and media recognition are additional indicators for outgrowth. **MCC has given high-level scientific policy advice to policy makers in the EU, the UN and at national scale,** covering informal and formal science-policy dialogues. The achievements are outlined in detail in the following sub-sections.

2.2.1. Citations

MCC's publication citation record is growing steadily with 125 ISI citations in 2014 and over 320 citations in 2015. As most publications were completed in 2014 and 2015, more citations are to be expected in the coming years. Some highlights are the Bioenergy-Assessment Paper by Creutzig et al. (2015), which is among the 15 most-downloaded papers of *Global Change Biology Bioenergy* in 2015. The papers by Koch et al. (2014) on the allowance price drop in the EU-ETS and by Creutzig et al. (2014a) on addressing the mitigation of climate change jointly with the Eurozone crisis by means of an energy transition were both among the top 10 most downloaded Energy & Earth Science articles published by German authors since 1 January 2014.

MCC's work reflecting on assessment processes is positively acknowledged in the scientific community. In his recent paper in *Nature Climate Change*, Mike Hulme, founding director of the Tyndall Centre in UK, explicitly highlighted the pragmatic-enlightened model (Edenhofer and Kowarsch, 2015) and also referred to the papers by Edenhofer and Minx (2014) on the IPCC process and the paper by Smith et al. (2015) on the analysis of negative emissions.

Based on his recommendations for the newly proposed Scientific Advice Mechanism by the European Commission, several EU officials approached MCC group leader Martin Kowarsch to discuss his ideas with him. This contact was initiated based on his article in *Nature Climate Change* (Kowarsch, 2015), several expert workshops, and dissemination in mass media.

2.2.2. Rankings and awards

In 2015, MCC was designated by the International Center for Climate Governance (ICCG) as the second best scientific think tank in the field of climate change in its standardised ranking[3]. The ICCG ranking measures output with respect to institute size. A total of 244 non-university think tanks were assessed for the ranking. In 2014, MCC was ranked as number nine. Unlike many other rankings, the ICCG's Standardised Ranking is based on a solid quantitative method and on solid analytical data. The distinction was given to MCC namely for its substantial number of scientific publications and professional events as well as its intensive participation in international institutions such as the IPCC, considering the relatively small size of the institution.

MCC Director, Ottmar Edenhofer was listed in the ranking by the German national daily newspaper "Frankfurter Allgemeine Zeitung" (FAZ) among the top 15 German economic researchers in 2014 and 2015. For this ranking the FAZ analysed the impact of economic researchers in the subcategories of media, policy advice and research. Citations in science and quotes in the most important media were counted, together with a survey among policy makers on the state and the federal

[3] http://www.thinktankmap.org/NewsDetails.aspx?ID=63

level (e.g. members of parliaments and high ministry officials). Edenhofer was listed 11th in 2014 and 14th in 2015.

In recognition of his outstanding scientific achievements, Ottmar Edenhofer was elected a member of the German National Academy for Science and Engineering, acatech. Acatech, with more than 400 members, advises policymakers and the public on future technology issues based on best-in-breed research. It provides a platform for exchanging excellence between the sciences and business.

The paper "What motivates Vietnam to strive for a low-carbon economy? – On the drivers of climate policy in a developing country" by Anne Zimmer from PIK and Michael Jakob and Jan Steckel from MCC won the first prize paper in the Elsevier journal "Energy for Sustainable Development" in 2014. Based on this paper, Jan Steckel was appointed as a member of an advisory board that consults the Vietnamese government on how to increase their share of wind power.

The paper "A systematic framework of location value taxes reveals dismal policy design in most European countries" by Fernandez et al. (2015) won 2nd prize of the Bengt Turner Award for PhD students. The paper combines literature on public finance, urban economics and value capture with sustainable urban planning. It develops a framework to assess the design characteristics of location value taxes from a sustainability perspective, and applies this framework to current practices in Europe.

2.2.3. Joint professorships

In addition to MCC Director Ottmar Edenhofer's appointment as Professor of the Economics of Climate Change at the TU Berlin, appointments of MCC group leaders as professors at universities are an integral component of the Institute's strategy. The joint professorships provide young and promising researchers who explore policy-relevant research questions with a transdisciplinary approach a perspective in academia. In addition, their teaching educates future decision makers about sustainable management of the global commons and assessment-making, having a potentially long-term impact.

Three working group leaders of MCC were appointed as professors in 2015: MCC's cooperation with the Hertie School of Governance on the "Governance of the Global Commons" began with the appointment of **Jan Minx, aged 38, as Professor for Science Policy and Sustainable Development** in 2014. This cooperation was strengthened by the appointment of **Christian Flachsland, aged 35, as Junior Professor for Climate & Energy Governance** in 2015. **Matthias Kalkuhl, aged 33, was appointed Professor for Climate Change, Development and Economic Growth** at the University of Potsdam in 2015. Two more professorial appointment processes are currently ongoing.

MCC is officially affiliated with the TU Berlin and cooperation with other universities is presently being forged. A cooperation agreement with the Humboldt University Berlin was signed at the end of 2015.

2.2.4. The impact of assessments on policy processes

The direct impact of complex integrated scientific assessment of alternative policy pathways - as claimed by MCC's assessment philosophy – is hard to measure. MCC's own assessment activities are still too novel and young to as yet be evaluated in terms of their impact on policy processes. However, one can illustrate the meaningfulness of contributions to assessments by discussing, for instance, the case of the IPCC assessments in which MCC staff were heavily involved (Sect. 2.1.2).

A conceptual framework focusing on the contribution of such assessments to "policy discourses" may more appropriately grasp the actual influence of such assessments on policy processes than the search for direct and very strong impacts of assessments on particular policy decisions as such. This is suggested by our own studies on the policy impacts of large-scale environmental assessments (*inter alia* based on more than 100 expert interviews and document analysis). The framework used may help to better appreciate the surprisingly various and often concealed types of influence these assessments exert, largely due to the

co-production of knowledge with various stakeholders. Examples include agenda setting and programmatic policy ideas. These impacts take place on longer time horizons than just three years, but can be very fundamental for policy processes in terms of a broader and deliberative societal learning process. The future will show whether MCC is able to fulfil this promise and deliver impact. A first indication will be given by the interviews with stakeholders conducted by an external evaluator.

2.2.5. Beyond assessments: Dialogue at the science-policy interface

MCC has given high-level scientific policy advice to policy makers in the EU, the UN and at the national scale. MCC is in dialogue with various stakeholders in a number of formal and less formal processes at the science-policy interface. These informal interactions range from a few meetings (e.g. with State Secretaries in Ministries) to frequent exchanges (e.g. with OECD or World Bank staff) and provide important opportunities for mutual learning.

Figure 10: Scientific policy dialogue with political actors and institutions by MCC at different governance levels (national/Germany, international and global) and for different degrees of formalization, ranging from informal to formal processes. Only those institutions with which MCC has had at least three contacts at the leadership level are indicated.

Figure 10 shows the interaction with political actors and institutions at different governance levels and with different degrees of formalization. Climate change policy is global, but implementation of relevant policies is happening at the national level. Therefore, grounding at national level is of crucial importance for MCC's work.

Sections 2.1.2 and 2.1.3 highlight MCC's role in the formal process of scientific policy advice, such as for the IPCC and UNEP. Some exemplary highlights of the ***informal*** interaction at the science-policy interface include:

Scientific policy advice for the Vatican. Since 2014, Ottmar Edenhofer and Christian Flachsland have been advising different high-level representatives of the Vatican on questions related to climate change,

sustainability and the global commons. In July 2015, the Pontifical Council for Justice and Peace invited Ottmar Edenhofer to discuss the Papal Encyclical 'Laudato Si' with Cardinal Turkson and Naomi Klein in a public event. In 2015, Ottmar Edenhofer, Christian Flachsland and Brigitte Knopf published several commentaries on the encyclical, most prominently in a Nature Climate Change special section "Focus: Society and the Pope's encyclical" (Edenhofer et al., 2015a).

In a workshop at the German Foreign ministry, MCC researchers explored options for a climate friendly model for the global economy with State Secretary Steinlein and his team. MCC researchers presented the idea of recycling the revenues from carbon pricing for financing infrastructure based on the paper by Jakob et al. (2015a).

MCC group leader Jan Steckel met with policymakers in Nigeria in part to discuss the results of the study "Drivers for the renaissance of coal" in a lecture tour organised by the German State Department. He discussed the possible contribution of developing countries to the international fight on climate change and feasible pathways to mitigation with members of the COP21 delegation and representatives of the climate ministry.

Exchange with the Organisation for Economic Co-operation and Development (OECD) took place on several occasions, e.g. with high-level input by Ottmar Edenhofer to OECD's environmental tax conference in 2015 and with Edenhofer's participation as a panelist at the OECD side event during COP21 in Paris. The environment director at the OECD also visited MCC in 2014**.**

2.2.5.1. Presentations and policy dialogue

MCC staff held more than 300 presentations between 2013 and 2015 both nationally (within Germany) and internationally to scientific audiences and to stakeholders. The number of presentations held has grown considerably between 2014 and 2015 (see Figure 11). Presentations were given by many MCC staff - in 2015 more than two thirds of all presentations were given by staff members besides the director. MCC presents research largely to the scientific community (59%), but also to policy makers and other stakeholders (33%), see Figure 12 (left). Nearly half of our presentations are held internationally (Figure 12, right). Only about 30% of those are within Europe (excluding Germany), which underlines our international outreach.

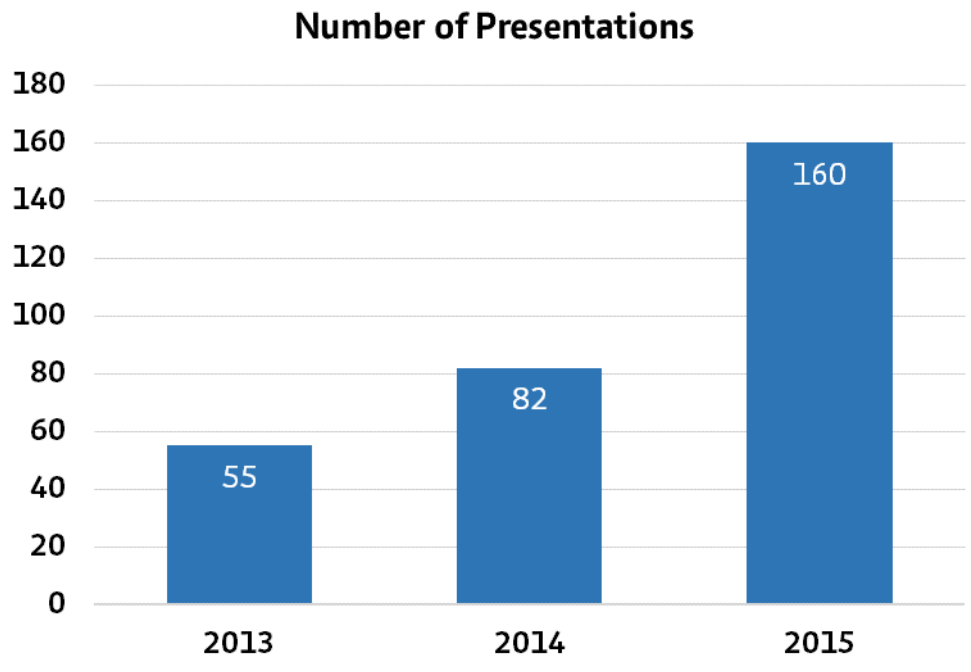

Figure 11: Overall number of presentations.

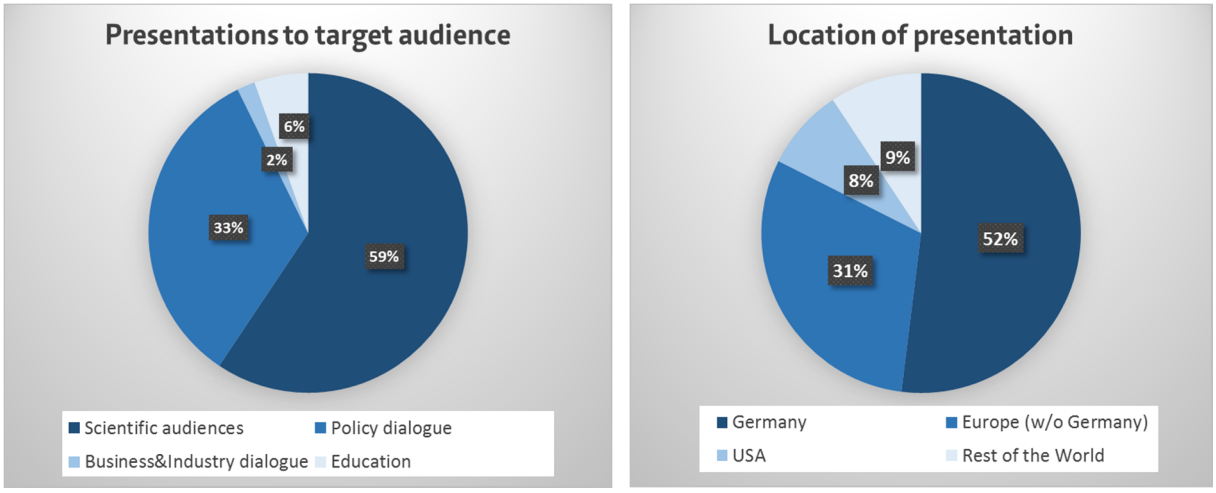

Figure 12: Presentations to target audience (left) and location of presentations (right).

Many presentations held by MCC staff were high-level, often with prominent roles and key notes. The following examples show the variety of engagements of these high-level talks.

Many MCC scientists gave high-level input at the conference "Our common future under climate change" in Paris in 2015. In preparation of the COP21, MCC staff members presented their work on carbon taxes, negative emissions and sustainable development: Ottmar Edenhofer presented as a member of the conference's scientific committee; Sabine Fuss, Jan Steckel and Michael Jakob were session conveners and junior researchers presented their work as well.

At a high-level conference "International Tax Dialogue" in Paris in 2015, initiated by the OECD, the IMF and others, MCC staff highlighted carbon pricing as a strategy for simultaneously protecting the environment and economic growth. Ottmar Edenhofer (as keynote speaker) and Brigitte Knopf (as session chair) contributed to this conference in Paris in which 300 senior tax and environmental policymakers, tax administrators and experts from more than 90 countries participated. They highlighted that revenues from carbon pricing could be a crucial element for financing sustainable infrastructure.

In their capacity as experts on scientific assessment-making, MCC researchers were invited to the **"Global Intergovernmental and Multi-Stakeholder Consultation on the Sixth Global Environment Outlook" of the United Nations Environment Programme (UNEP) in 2014 in Berlin.** In addition to providing background documents on lessons-learned in "Global Environmental Assessment-making", they discussed with government representatives, stakeholders and other experts from 102 countries on the scope and process of the next UNEP GEO-6 assessment.

MCC group leader Sabine Fuss and Johanna Wehkamp (MCC PhD student) presented their work on forest and ecosystem services conservation and co-convened a session on REDD+ and the sustainable use of biomass **at the International Union of Forestry Research Organizations (IUFRO) in 2014 in Salt Lake City at the IUFRO World Congress.** IUFRO unites more than 15,000 scientists in almost 700 member organizations in over 110 countries.

Ottmar Edenhofer presented his understanding of the relationship between science and politics in his keynote at the conference "The Interfaces of Science and Policy and the Role of Foundations", organised by Stiftung Mercator in Berlin in 2014. In this conference, scientists and directors of research institutions from Germany, Great Britain, New Zealand, Switzerland and the United States examined successes and advances but also the obstacles and misunderstandings in the relationship between science and policy.

2.2.6. Media contributions

In communicating with decision-makers, MCC interacts directly and also makes use of mass media. It is MCC's aim to convey reliable and relevant messages about its policy-relevant scientific findings in a transparent and "easy to digest" way in order to foster rational and democratic decision-making based on the current state of scientific knowledge. No matter which channel is used, MCC always bases its communication with decision-makers on its peer-reviewed publications.

Public relations can help to maximise the impact of research. Decision-makers in politics (governments, institutions), business (companies, associations), science (universities, think tanks) and civil society multipliers (NGOs, churches) are our key audience - our media strategy aims to engage with them through quality media pieces.

The institute's press and public relations office started its work in 2013 at which time it built its media strategy and relaunched the website, which now includes a broad range of items about MCC's newsworthy developments. The number of such developments increased from 9 in both 2012 and 2013 to 34 in 2014 and 38 in 2015.

As a reflection of MCC's growth, the number of press releases increased from one in 2012 to two in 2013, to nine in 2014 and to twelve in 2015. This resulted in increasingly greater media coverage - MCC quintupled its coverage between 2014 and 2015 to around 100 individual pieces.[4] A cross check with a monitoring service has estimated that these 100 pieces resulted in around 1000 online listings.

MCC targets its audience of opinion leaders through the major media outlets instead of striving for a maximum of quotations that may appear in any media outlet. **As a result, almost one third of MCC's media appearance was in the German "Leitmedien" (major media outlets),** such as *Frankfurter Allgemeine Zeitung*, *WirtschaftsWoche* or Der *SPIEGEL*, see Figure 13 for the details.

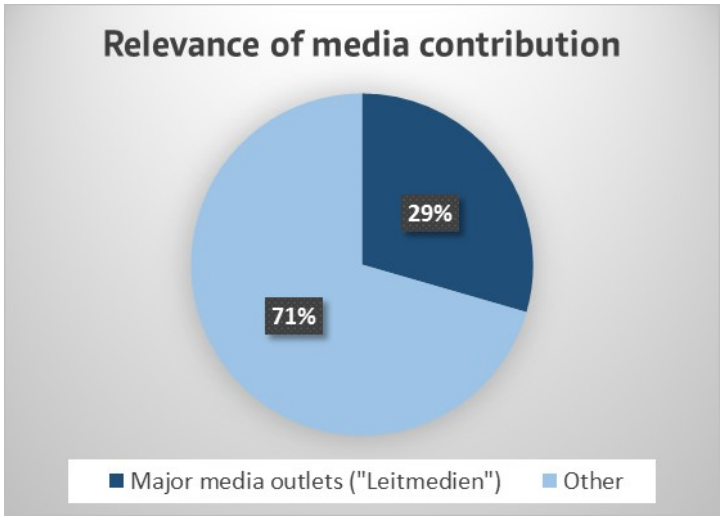

Figure 13: Relevance of MCC's media contribution. Major media outlets ("Leitmedien") where MCC has been covered are: Frankfurter Allgemeine Zeitung, Süddeutsche Zeitung, WirtschaftsWoche, Der SPIEGEL, SPIEGEL online, Tagesspiegel, dpa, ap, Deutschlandradio, BBC.

One of the most prominent examples of MCC's media coverage in 2015 was the DER SPIEGEL interview with Ottmar Edenhofer. In no less than four pages, it focused on one of MCC's major scientific publications in 2015: the *PNAS* paper "Drivers of the renaissance of coal". The interview ran in the magazine's business section and touched upon the economical aspect of climate change including carbon pricing and divestment. Edenhofer was also quoted in three other stories of DER SPIEGEL in 2015 and the German

[4] It is important to note that MCC does not yet have a media monitoring service so the values presented here are only those for which the press office personally accounted. On the other hand, multipliers (such as news agencies like dpa or the Associated Press) are also included in these values.

business weekly *WirtschaftsWoche* invited him for a debate with the growth critic Nico Paech. Again, the basis of this piece was an MCC peer-reviewed publication: "Green growth, degrowth, and the commons", published in the *Oxford Review of Economic Policy*. Some months later - in the aftermath of the G7 summit in Elmau in which world leaders committed to a full decarbonisation of the global economy - the *WirtschaftsWoche* asked MCC to deliver an exclusive report for the media outlet highlighting the solution space of decarbonisation. Over seven pages, this report presented the multiple pathways on which the world can embark to find an "escape from the climate trap" while at the same time ensuring human well-being. In preparation for the UN climate summit in Paris, the weekly *Die ZEIT* ran a full-page profile of Ottmar Edenhofer in its business section.

These examples illustrate MCC's ability to perpetuate the business media with a topic such as climate change. This is important as it highlights the notion that climate change is no longer "only" an environmental topic but also an economic one. By extending the media's climate change coverage to its business sections, the institute actively re-shapes the debate around climate change.

While the main media interest focussed on the institute's director, MCC's outreach increasingly promotes the work of its other scientists. At the inception of the press office in 2013, Edenhofer and one other MCC group leader alone were covered by the media. In 2015, every single MCC group leader was mentioned at least once in the media, as well as many senior researchers and a number of PhD students. MCC's reputation as climate experts also extends to TV media: Christian Flachsland was invited by *3sat nano* to talk about the Kyoto Protocol and Brigitte Knopf was interviewed by *3sat nano* on the Petersberg Climate Dialogue. In addition, Brigitte Knopf wrote op-eds for the *Huffington Post* blogosphere. On the national level she – as well as Jan Minx and Felix Creutzig – wrote op-eds for *WirtschaftsWoche Green*, *Frankfurter Rundschau* and *Der Tagesspiegel*.

Several pieces were of outstanding quality and/or impact. For example, MCC researcher Nicolas Koch's research on how financial investors contribute to extreme price changes in the energy commodity markets was highlighted in the *Handelsblatt's* online edition in 2014. The German Ministry for Agriculture subsequently invited him for an exchange of ideas that resulted in a follow-up paper explaining the effects of extreme events on the finances of agricultural markets.

The MCC press office also publishes a monthly newsletter that compiles content from its website and has established accounts on YouTube and Twitter. After more than a year, MCC's Twitter account has more than 400 followers. Individual MCC staff members Brigitte Knopf, Felix Creutzig and PhD student Linus Mattauch also actively promote MCC's research on Twitter.

In preparation for the G7 summit in Elmau, together with PIK, MCC organised a media briefing that was attended by almost 20 journalists. Most attending journalists reported for major media outlets such as *Handelsblatt* and *Süddeutsche Zeitung*, and correspondents for large Chinese dailies were also present.

MCC has specifically aimed to root itself in the German media landscape (as it is much more accessible for a German-based institute) before taking the next step of global outreach. Nonetheless, **by 2014, several articles about MCC were published in Greek and French, and by 2015, almost one third of all articles covering MCC were foreign (29 out of 96).** These included the *BBC*, *Guardian*, *PBS*, *LeMonde* and major media outlets in Italy, Australia and India. Besides Ottmar Edenhofer, **several MCC group leaders have also been recognised by the international media.** Jan Minx was quoted by the *Associated Press* in a story on negative emissions, Sabine Fuss in a *PBS online* story on BECCS, Jan Steckel in an *ABC online* story on the renaissance of coal and Felix Creutzig in a *Haaretz* story on the mitigation potential of cities. The PR office plans to continue approaching non-German media. The US and other countries, which are crucial in raising global awareness of climate problems and in finding solutions, will be particularly targeted.

2.3. Conditions enabling impact: collaboration and networking

MCC's impact has been enhanced through workshops and conferences, membership of boards and networks and collaboration with other research institutes**. It is noteworthy that a number of high-level international scientists have participated in MCC events and that renowned institutions have co-organised MCC's conferences. In addition, MCC staff have received invitations to participate at a number of editorial boards in scientific journals.** Details are given in the following sub-sections.

2.3.1. Workshops and conferences (co-) organised by MCC

In the spirit of reflection on scientific policy advice and assessment-making and in order to facilitate an iterative learning process, MCC provides a platform for exchange at the science-policy interface. Five high-level, two-day workshops were organised (roughly one each year as listed below), in which researchers and policy makers and other stakeholders met in an intense and confidential setting to exchange ideas. All workshops gave an important impetus for follow-up activities, such as policy briefs, or further events.

In collaboration with the Harvard Project on Climate Agreements, **MCC hosted a workshop on "Options for a new international climate regime arising from the Durban Platform for Enhanced Action**" in 2013 at its Berlin location. The workshop convened a group of 30 leading international researchers, UNFCCC country negotiators from both developed and developing countries, and members of the UNFCCC secretariat including Robert Keohane (Princeton University), Halldór Thorgeirsson (UNFCCC secretariat) and Karsten Sach (Germany's Chief Climate Negotiator). The participants identified and discussed options for the new international climate regime in preparation for COP-21 in Paris. The workshop culminated in a policy brief (Edenhofer et al., 2013) that was presented in a side event and distributed among delegates at UNFCCC COP19 in Warsaw.

Within MCC's assessment activities on the Reform of the European Emissions Trading Scheme (EU-ETS), a one day workshop was organised in Brussels in 2014 **together with the Euro-CASE Energy Platform** on **"The European Emissions Trading System (EU ETS) - Taking stock, looking forward: Options for reform", chaired by Ottmar Edenhofer.** Recognised international researchers and policy experts, e.g. Robert Stavins (Harvard Kennedy School), Frank Jotzo (Australia National University) and Denny Ellerman (MIT Sloan School of Management) and individuals from the European Commission met to identify new paths to reform. The discussions from this event formed the basis for the Euro-CASE Policy Position Paper on "Reform Options for the European Emissions Trading System", which was officially handed to Jos Delbeke (Director General for Climate Action of the European Commission) and Ivo Belet (rapporteur of the ETS reform for the European Parliament) in September 2014.

In collaboration with Tufts University, MCC hosted the Public Finance Workshop "Closing the Carbon Price Gap: Public Finance and Climate Policy" in May 2014. MCC brought together top international researchers including Gilbert Metcalf (Tufts University), Lawrence Goulder (Stanford University) and Martin Weitzman (Harvard University) for the workshop, which advanced the academic discussion and explored options for policymakers seeking to reconcile management of long-term climate risks with short-term concerns over economic growth, competitiveness, and other politically relevant factors. **This workshop spurred the initiation of MCC's task force on public economics**, coordinating its research in this field. Conference discussions were fed into the paper by Edenhofer et al. (2015), which provides a conceptual analysis of how the emissions price gap could be closed (see Figure 14).

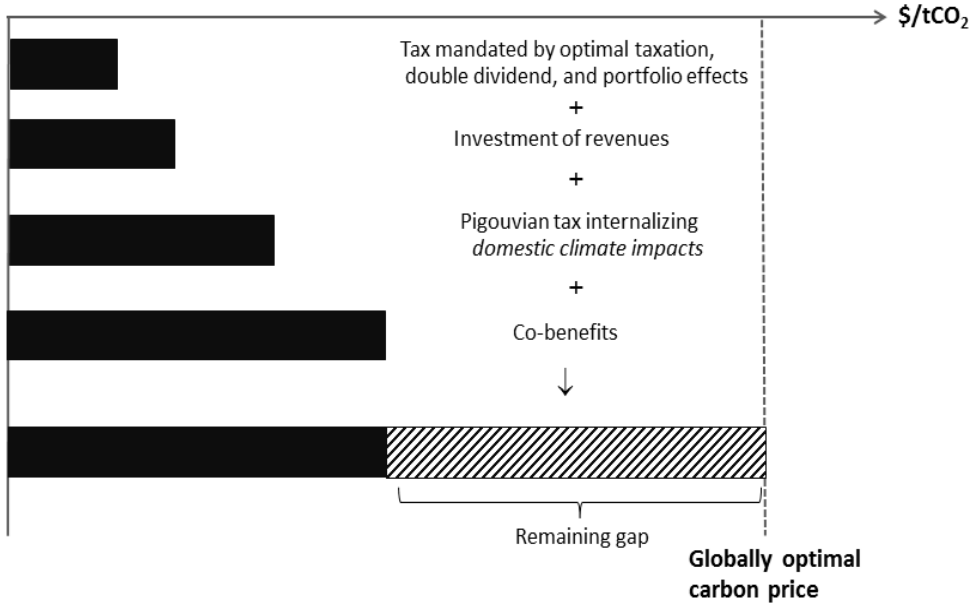

Figure 14: Closing the emissions price gap (conceptual presentation). Unilateral incentives could form the basis for incremental progress in international climate negotiations toward a realistic climate treaty based on national interest and differentiated emission pricing. Source: Edenhofer et al. (2015b).

In February 2015, **together with the Harvard Project on Climate Agreements, FEEM and Stanford University, MCC organised a high-level workshop on "Assessment and Communication of the Social Science of Climate Change: Bridging Research and Policy".** This workshop identified options for improving the IPCC and other future climate policy assessments. Participants included representatives of social scientists from developed and developing countries who contributed to the IPCC's Fifth Assessment Report. Users of IPCC reports (national governments and intergovernmental organizations such as the UNFCCC and the World Bank), and members of other stakeholder groups also took part. Outputs included a memorandum to the subsequent IPCC plenary session on the future of the IPCC, an article in *Science* (Carraro et al., 2015) that was presented at a side event during COP21 in Paris, and a longer paper in Climate Economics (Chan et al., 2016).

In collaboration with UNEP, MCC organised a workshop in October 2015 on Global Environmental Assessments (GEA): "GEAs at a crossroads: Lessons-learned, emerging challenges, and future options". The workshop was attended by senior assessment practitioners, policy representatives and distinguished scholars in the field, e.g. Peter Haas (University of Massachusetts) and Clark Miller (Arizona State University), and was part of the MCC-UNEP research initiative on the "Future of Global Environmental Assessment-making" (FOGEAM). A high-ranking, peer-reviewed special issue bringing together the papers presented at the workshop is envisaged for 2016.

In addition, MCC organised and contributed workshops on "Reconceiving Forest Governance", "Low-Carbon, Co-Benefits and Land Taxation in European Cities", and the "Energy Policy Exchange Forum" at Beijing (the latter in collaboration with the Hertie School of Governance, Tsinghua University and the Sol Price School of Public Policy).

While most of the aforementioned workshops were by invitation-only and under Chatham House Rules to ensure a confidential atmosphere enabling candid discussions, MCC also organised a number public events, which include the following: **In a panel discussion held at MCC in 2015, "Scientific policy advice in Europe, lessons-learned and future perspectives", the Former EU Chief Scientific Advisor Anne Glover discussed the newly proposed Science Advice Mechanism of the European Commission with MCC Researcher Martin Kowarsch.**

In the run-up to the Paris climate conference, MCC organised a panel discussion between Hildegard Müller (BDEW) and MCC Director Ottmar Edenhofer. They discussed the potential implications of the Paris Agreement for Germany. Nearly 100 participants from business and NGOs were present.

2.3.2. Membership of boards and networks

2.3.2.1. Board and other memberships

Since 2016, MCC Director **Ottmar Edenhofer has been one of the co-editors of the influential economic journal "Review of Environmental Economics and Policy" (REEP).** REEP aims to fill the gap between traditional academic journals and the general interest press. REEP is ranked 5th in Environmental Studies and 17th in Economics according to the 2015 Journal Citation Reports. It provides a widely accessible, yet scholarly source for the latest thinking on environmental economics and related policy. Carlo Carraro (University of Venice and Fondazione Eni Enrico Mattei (FEEM)) is the editor. Edenhofer's co-editors are Charles D. Kolstad (Stanford University) and Richard G. Newell (Duke University).

MCC group leaders also participate as members of editorial boards: **Felix Creutzig is in the Advisory Board for Environmental Research Letters (ERL) and Jan Minx is in the Editorial Board for Economic Systems Research.** In addition, **Christoph von Stechow (PhD student) is a member of Scientific Advisory Board for the EU-Horizon 2020 research program (call EE-12)**.

Ottmar Edenhofer co-chairs the Energy Platform of the European Council of Academies of Applied Sciences, Technologies and Engineering (Euro-CASE), a non-profit organisation of national academies from 21 European countries. Bringing together the combined expertise of the academies, the Euro-CASE Energy Platform provides independent science-based policy advice with a European focus for policymakers. Between 2013-2014, under Edenhofer's leadership, and with strong participation of MCC researchers, the Platform assessed the performance of the EU ETS and proposed implementing a floor price (Euro-CASE 2014, see Section 2.1.2.2).

Group leader Martin Kowarsch and Ottmar Edenhofer are members of the strategic Development Group of the "International Network for Government Science Advice" (INGSA). INGSA has become the world's most influential and high-level network to globally promote the involvement of scientific expertise in public policymaking. Representatives of major scientific academies, governmental institutions (EU, national ministries, etc.), UN organizations, science-policy institutions, and science-policy practitioners from all over the world are part of the INGSA network.

Group leader Sabine Fuss is a member of the Global Carbon Project (GCP) Scientific Steering Committee, in which she leads a research initiative called Managing Global Negative Emissions (MaGNET). Jan Minx and Felix Creutzig are also engaged in the GCP activity on urbanization.

Secretary General Brigitte Knopf is participant in the "Energiepolitischer Dialog" organised by the German Association of Energy and Water Industries (Bundesverband der Energie- und Wasserwirtschaft - BDEW). In this discussion group NGOs, churches, and think tanks meet regularly every three months to exchange views about the German Energiewende and European and international climate and energy policy. **She is also member of a project group within the larger project "Energiesysteme der Zukunft (ESYS)** (Energy Systems of the Future)" of all German academies.

MCC Group leader Felix Creutzig is on the Advisory Board of klimafakten.de and **Matthias Kalkuhl is a member of the advisory council "Global economy and social ethics" of the German Bishops' Conference (DBK**).

2.3.2.2. Networks

Since 2015, MCC has been a partner of the Green Growth Knowledge Platform (GGKP). The GGKP is a global partnership of leading international organizations, research institutes and think tanks focused on identifying major knowledge gaps in green growth theory and practice and addressing those gaps by promoting collaboration and coordinated research to support policy making. Members of its Steering Committee come from the Global Green Growth Institute (GGGI), the Organisation for Economic Co-

operation and Development (OECD), the United Nations Environment Programme (UNEP) and the World Bank.

MCC is closely connected to and actively participates in the Global Carbon Project (GCP). The GCP was formed to assist the international science community in establishing a common, mutually agreed knowledge base that can support the policy debate, and generate action to slow the rate greenhouse gas accumulation in the atmosphere. It focuses on improving the scientific understanding of the carbon cycle by bringing together interdisciplinary and international researchers.

MCC is an active member of the "Research Seminar on Environment, Resource and Climate Economics (RSERC)" jointly with TU Berlin, PIK, the German Institute for Economic Research (DIW Berlin), and the Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI). It supports exchange among Berlin-based economic institutes and takes place weekly during academic semesters. Speakers are both internal and external.

MCC participates in Future Earth - a major international research platform that provides the knowledge and support for transformations to a sustainable world. Sabine Fuss actively participated as a panellist in the Second German Future Earth Summit in February 2015 in Berlin.

2.3.3. Collaboration with universities and other research institutes

2.3.3.1. Cooperation with universities

MCC has signed cooperation agreements with Technische Universität Berlin (focused on advancing practical policy advice in climate economics), Hertie School of Governance, University of Potsdam and Humboldt Universität zu Berlin. As mentioned in Section 2.2.3, two professorships are jointly appointed with the Hertie School of Governance and one with University of Potsdam. This is the basis of establishment of MCC within the German academic system. In addition, due to this close connection to universities, MCC post-docs can try out their teaching skills: 11 MCC senior researchers have teaching experience at Universities in Berlin and Potsdam (including the TU Berlin and the Hertie School of Governance) and a number of group leaders supervise masters and PhD students.

2.3.3.2. Research visits

Exchange with other international, scientific institutes is facilitated through MCC research visits and through visiting scientists at MCC. Between 2012-2015, eight MCC researchers visited other research institutes, including a three month visit as research fellow at Princeton (Felix Creutzig), a three month visit as guest scientist at IIASA (Johanna Wehkamp, PhD student) and a 1-month visit at MIT (Alexander Radebach, PhD student). More than eight guest researchers have visited MCC, two of whom stayed for more than one year (Sohail Ahmad, Alexander-von-Humboldt-Fellow, and Gregory Nemet from the University Maddison-Wisconsin).

Cooperation with other institutions is also fostered by extending invitations for guest talks at MCC's internal seminars. More than 20 external guests have contributed to a lively academic discussion at MCC, including Martin Weitzman (Harvard University), Thomas Pogge (Yale University), Daniel Kammen (University of California, Berkeley), John Roemer (Yale University), and other international stakeholders such as FAO Assistant Director-General for Forestry, Eduardo Rojas Briales.

2.3.3.3. Third party funding

Collaboration also takes place via third-party funded projects. Due to the generous institutional support by Stiftung Mercator, MCC is in the comfortable position of only needing to apply for those third party funded projects promising particularly attractive content and interesting collaborating partners. **Overall, between 2013 and 2015 third party funding amounted to about 10% of the institutional funding.**

Our most important third party funded projects and collaborations include:

i) The Collaborative Research Center (Sonderforschungsbereich 1026) on "Sustainable Manufacturing – Shaping Global Value Creation" together with the TU Berlin. This project co-funds two PhD positions in the working group on "Climate and Development" (total €370,000).

ii) The project "Options Market and Risk-Reduction Tools for REDD+" on Reduced Emissions from Deforestation and Degradation (REDD+) research and collaboration with US researchers is funded by the Norwegian Agency for Development Cooperation (NORAD) under the leadership of the Environmental Defence Fund (EDF) (total 150,000 €). Partners in this project also include the London School of Economics and the International Institute for Applied Systems Analysis. It also provides a platform for exchange on carbon market design and investment under uncertainty.

iii) The joint research initiative on the Future of Global Environmental Assessment-making (FOGEAM) was mandated and funded by UNEP with €50,000 for MCC as the lead institute. This project explicitly informs the design of and conducts the next generation of large-scale integrated assessment processes, such as UNEP's Global Environmental Outlooks (GEOs). This collaboration connected MCC with various UN institutions, governmental bureaucrats and other stakeholders involved in large-scale scientific assessment processes. More than 100 semi-structured expert interviews were facilitated through the project, and several workshops with senior experts in the field were organised.

Collaboration with PIK is also important. The two institutes have engaged in a very dynamic cooperation that has both institutionalised and less formal dimensions. Examples include the project 'Global GHG emission reduction pathways up until 2050' (financed through the Bureau for Environment, UBA), which started in early 2015. It generates new climate change mitigation scenarios that focus on energy and land-use transformations, as well as socioeconomic developments. Another example is the joint project on 'Carbon Pricing and Sustainable Development', that began at the end of 2015. A second phase is envisaged to start in October 2016, subject to funding approval by the Federal Ministry of Economic Cooperation and Development and the Deutsche Gesellschaft für internationale Zusammenarbeit (GIZ). The project "Unilateral Action to Make a Global Difference: Towards Horizontal Leadership and Vertical Latitude for Germany & California (AHEAD)", began in January 2016 and is set to run for three years. It is led by PIK in collaboration with MCC's Christian Flachsland and Ottmar Edenhofer, and examines lessons-learned, future challenges and options for ambitious climate policy in Germany and California.

In a less formalised way, PIK and MCC scientists frequently cooperate and are engaged in discussions on a variety of topics. PIK scientists who work in the field of public economics cooperate with MCC's "Task Force Public Economics." A jointly organised research seminar takes place once a month. In addition, a new PIK-MCC cooperation aims at better understanding the dynamics of fossil fuel markets in the context of climate change mitigation.

3. Organisation of MCC

MCC was founded in 2012 by Stiftung Mercator and PIK as a limited-liability, non-profit organization. Its overall budget is €16.4 million for eight years until the end of 2018. This finances salaries, rental fees, workshop expenses, etc..

3.1. Organisational chart

Leadership and principal responsibility for scientific, public and administrative affairs lie with the Director (see Figure 15). The institute's management consists of Director Ottmar Edenhofer and Secretary General Brigitte Knopf. Knopf is responsible for internal management, cooperation with universities and stakeholders from government, business and civil society and representing the Director when he is physically absent from the institute. The Director meets once a week with the management team (consisting of the Secretary General, all group leaders, the Head of Administration and the Head of Press & PR) to manage the institute's day-to-day affairs.

Research at MCC is carried out by seven working groups, each headed by a group leader. One working group is a joint effort with the TU Berlin. The task force on public economics is directly linked to the Director. Our key research questions are outlined in section 1.1 and define our long-term topics. The assessment streams are the building blocks of our collaborative research and the working groups are the organizational units of our day-to-day work.

An internal seminar is held weekly and provides the opportunity for staff members to present their work, or for invited external guests to exchange views and research approaches. Once a year, a 2-day retreat is held outside of Berlin, during which staff members take stock and discuss future work at MCC.

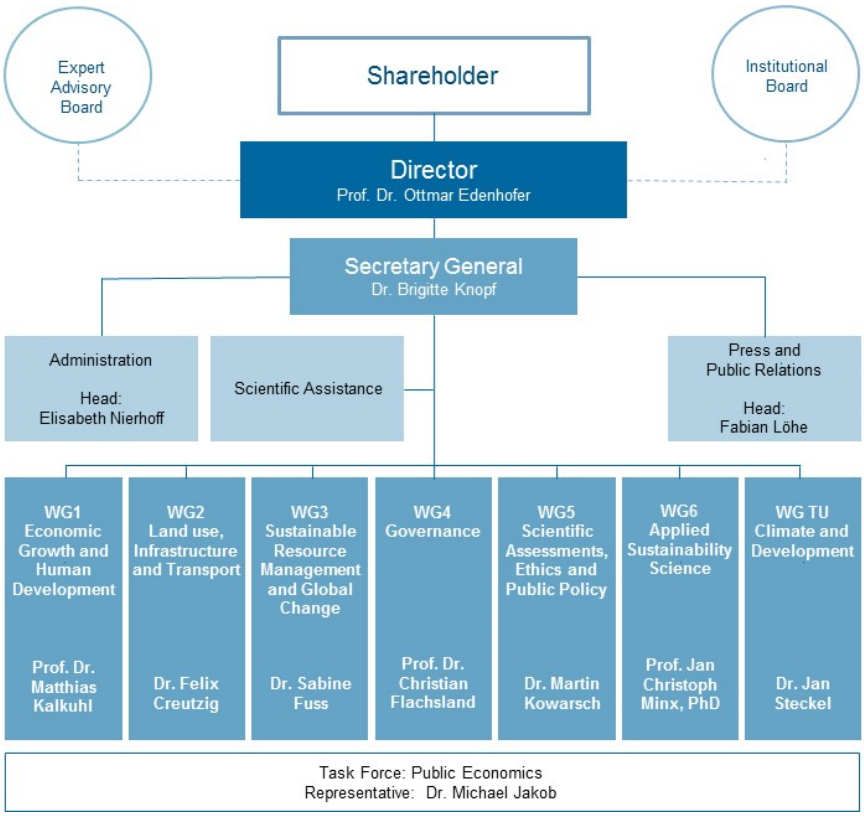

Figure 15: Organisational chart of MCC.

3.2. Staff development and personnel structure

MCC's initial phase began in 2012 with only limited staff. Since that time, the institute has been growing steadily. All positions have been filled since 2015 - further growth in the immediate future would only be anticipated with third-party funding. MCC currently has 47 staff members, corresponding to 28 FTE overall, with 21 FTE scientific staff, see Figure 16. Nearly half of the staff are senior scientists (post-docs and group leaders). The administration, PhD candidates and students account for roughly 17% each.

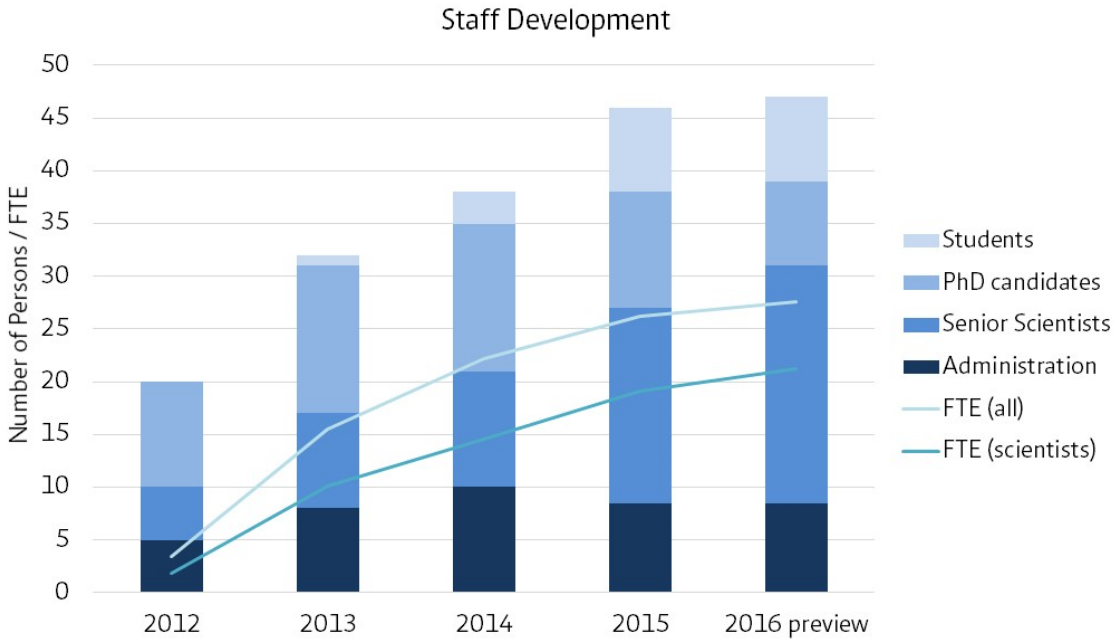

Figure 16: Staff development (persons) for the end of December of each year and a preview for 2016. Numbers for FTE are given for all persons (FTE all) and for the scientific staff (FTE scientists).

3.3. Boards of the institute

MCC has shareholder's board meetings twice a year, and there are two additional boards with an advisory role; the Expert Advisory Board and the Institutional Board.

The **Expert Advisory Board** advises the management, the owners and the Institutional Board. Its members are mainly drawn from academia, but also from business, politics and political consultancies. Representatives of the owners take part in board meetings as guests. The first meeting of the Expert Advisory Board was held in February 2015. Members gave very positive feedback on the overall work of MCC and stated that "the progress achieved within the first two years was perceived as impressive". The board recommended that the strategy be sharpened with regard to the science-policy interface and to the assessment idea and that networks to different communities be established. Both recommendations were pursued throughout 2015 (see Section 2.3.2). EAB Members are listed in the Annex.

The function of the **Institutional Board** is to develop cooperation with local universities and research institutions. It advises on forms of cooperation with the universities concerned (Technische Universität Berlin, Humboldt Universität zu Berlin, University of Potsdam, Hertie School of Governance). The first meeting took place in June 2015. Members discussed different perspectives on sustainability science and a concrete proposal for collaboration. Based on this initiative, the partnership with the Green Growth Knowledge Platform was established (see 2.3.2). Institutional Board Members are listed in the Annex.

3.4. Working groups

WG1: Economic growth and human development

Head of working group: Prof. Dr. Matthias Kalkuhl

We explore the relationship between economic growth, climate change and sustainable development with limited natural resources.

This working group was established during October 2015 and January 2016, consisting of four members: Prof. Dr. Matthias Kalkuhl (head), Andri Brenner (PhD student from Switzerland), Barbora Sedova (PhD student from Slovakia) and Athene Cook (student assistant from USA).

The group focuses on the role of environmental goods and services in economic development, which includes, for example, theoretical work in multi-sector growth models on climate change impacts that analyse implications on economic production, structural change and labour markets (wages). Empirical work will focus on the relevance of environmental factors and resource rents for economic growth, for example by building a comprehensive panel dataset on socio-economic and environmental data with sub-national spatial resolution. The research will help to improve our understanding of the value of nature for economic processes and inform policy makers on synergies and trade-offs between specific economic, social and environmental objectives to enhance sustainable development.

Research outlook: Future research will include human capital (health), inequality and poverty aspects as crucial outcome dimension of development processes. Additionally, the group aims to include environmental and macro-economic uncertainty and risks explicitly in the modelling work.

Project outlook: A workshop on "Inequality, Growth and the Environment" is planned in late 2016 to establish research exchange with leading scholars.

Major achievements

Matthias Kalkuhl was appointed Professor (W2) on Climate Change, Development and Economic Growth at the Faculty of Economic and Social Sciences at the University of Potsdam in October 2015

Key publications

- **Kalkuhl**, M., Edenhofer, O., Lessmann, K., 2015. The role of carbon capture and sequestration policies for climate change mitigation. Environmental and Resource Economics 60, 55–80.
- **Kalkuhl**, M., Edenhofer, O. 2015. Deforestation, Land Taxes and Development. Conference paper for 21st Annual Conference of the European Association of Environmental and Resource Economists, Helsinki, Finland.
- Bren d'Amour, C., Wenz, L., **Kalkuhl**, M., Steckel, J.C., Creutzig, F., 2016. Teleconnected food supply shocks. Environmental Research Letters 11, 035007.

WG2: Land use, infrastructure and transport

Head of working group: Dr. Felix Creutzig

We assess the contribution of cities and land use to climate change mitigation.

The working group land use, infrastructure and transport was established in 2012 consisting of six group members (Dr. Felix Creutzig, two post-docs: Dr. Sohail Ahmad and Dr. Peter Agoston, two PhD students: Blanca Fernandez and Christopher Bren d'Amour, and one student assistant: Ulf Weddige). Dr. Tiziana Susca and Steffen Lohrey have also been previous members of the group.

As climate change and mitigation solutions in cities are deeply entangled with life styles and quality of life, we embed climate solutions with local co-objectives, such as air pollution. We are interested in comprehensive assessment and hence adjust methods according to research question. Methods applied range from sophisticated econometric (meta-) analysis, to geospatialised land use modelling and urban economic analysis. We also investigate urban land rent taxation in the context of urban planning and municipal finances.

Research outlook: We are developing a dynamic model of urban structure formation to evaluate the long-term potential of urban form modification for climate change mitigation.

Project outlook: We will organise a workshop and publish a special issue (in Environmental Research Letters) on building a coherent theoretical and empiric framework for urban climate and sustainability sciences.

Major achievements

The group has so far published 38 peer-reviewed journal articles (2016: 5 publications so far; 2015: 14; 2014: 9; 2013: 6; 2012: 4).

Key publications:

- **Creutzig**, F., Jochem, P., Edelenbosch, O.Y., Mattauch, L., van Vuuren, D.P., McCollum, D., Minx, J.C., 2015. Transport: A roadblock to climate change mitigation? Science 350, 911–912.
- **Creutzig**, F., Baiocchi, G., Bierkandt, R., Pichler, P.-P., Seto, K.C., 2015. Global typology of urban energy use and potentials for an urbanization mitigation wedge. Proceedings of the National Academy of Sciences 112, 6283–6288.
- **Creutzig**, F., Ravindranath, N.H., Berndes, G., Bolwig, S., Bright, R., Cherubini, F., Chum, H., Corbera, E., Delucchi, M., Faaij, A., 2015. Bioenergy and climate change mitigation: an assessment. GCB Bioenergy 7, 916–944.

In 2012/2013, Felix Creutzig shared the Dahrendorf Working Group on Infrastructures and Climate Change, contributing to the Dahrendorf Symposium 2013 and the resulting special issue in Global Policy.

Blanca Fernandez and Christopher Bren d'Amour will obtain a PhD in 2016/2017.

WG3: Sustainable resource management and global change

Head of working group: Dr. Sabine Fuss

We explore the functioning and design of instruments for sustainable resource management and the provision of public goods. The research focuses on optimal policy portfolios to address problems affecting the commons by emphasizing climate change.

The working group on Sustainable Resource Management & Global Change was established in 2013 and currently consists of 5 group members: Dr. Nicolas Koch (post-doc, economist), Johanna Wehkamp (PhD student, political scientist), Annika Marxen (research assistant, industrial engineer), Anne Gläser (MSc student, environmental scientist), Godefroy Grosjean (PhD student from PIK, political scientist). The group is involved in ex post assessment of policy instruments with a focus on the EU Emissions Trading System and investigates governance aspects and improvements in forest modelling for fostering Reduced Emissions from Deforestation and Degradation (REDD+), also considering uncertainty. The latter is part of a broader agenda of examining trade-offs and opportunities in land use competition, where the focus for the last two years has been on the sustainability of increased demand for biomass in low-stabilization scenarios, mostly for reaching negative emissions. A research initiative on this has been established under the Global Carbon Project, reaching out to other core projects under Future Earth.

Outlook: While the research in the past has been centred on the trade-offs, more emphasis will now be given to identifying opportunities and synergies with sustainable development goals, for example in a project concerned with closing basic infrastructure gaps through the taxation of resource rents or revenues from carbon pricing.

Major achievements

The group has so far published (by the end of 2015) 26 peer-reviewed articles, three book chapters and six reports in working papers series. Three publications highlight that all group members contribute to ongoing debates (cf. citations: 60 citations for the first and 37 for the second), where the last article, recently published by a PhD student, has already been cited twice and been the basis for an invitation to a high-level discussion panel at the World Forestry Congress 2015:

- **Fuss**, S., Canadell, J.G., Peters, G.P., Tavoni, M., Andrew, R.M., Ciais, P., Jackson, R.B., Jones, C.D., Kraxner, F., Nakicenovic, N., Le Quéré, C., Raupach, M.R., Sharifi, A., Smith, P., Yamagata, Y., 2014. Betting on negative emissions. Nature Clim. Change 4, 850–853.
- **Koch**, N., **Fuss**, S., **Grosjean**, G., **Edenhofer**, O., 2014. Causes of the EU ETS price drop: Recession, CDM, renewable policies or a bit of everything? - New evidence. Energy Policy 73, 676–685.
- **Wehkamp**, J., Aquino, A., **Fuss**, S., Reed, E.W., 2015. Analyzing the perception of deforestation drivers by African policy makers in light of possible REDD+ policy responses. Forest Policy and Economics 59, 7–18.

The group is furthermore managing the assessment stream on the EU ETS, which is a cross-group effort at the institute both doing research and operating at the science-policy interface. It also has a number of collaborations with external partners from the international community (on negative emissions, sustainability aspects of climate mitigation scenarios, REDD+), supported by outside funding.

WG4: Governance

Head of working group: Prof. Dr. Christian Flachsland

We explore polycentric governance of the global commons with a focus on ambitious climate change mitigation.

The governance group was established in 2015 and has four members: group leader Prof. Dr. Christian Flachsland, Dr. Ulrike Kornek (post-doc), and PhD students Marcel Dorsch and Anna Leipprand (the latter funded by scholarship). Christian Flachsland previously co-led the MCC working group "Assessments and Scientific Policy Advice" (2012-2015).

We analyse challenges in global commons management arising from the interaction of actor groups holding multiple objectives, and investigate policy options for addressing them. We are interested both in the international and domestic level of governance and seek to identify politically feasible short-term entry points and policy packages to enable sustainable long-term pathways. Methods employed include institutional analysis, analytical and numerical game theory, case studies, as well as interpretive and discourse analysis. Our collaboration partners include researchers at PIK, FEEM, Harvard, Resources for the Future, and University of California at Berkeley.

Research outlook: We are currently developing political economy analyses of federal climate policy in the EU and Germany, including a comparative perspective on California and the US. We are preparing several studies that look into the strategic use of transfer payments for enhancing the level of ambition in climate change mitigation.

Major achievements

The group organised the MCC workshop "Assessment and Communication of the Social Science of Climate Change: Bridging Research and Policy" in February 2015. The workshop brought together IPCC social scientists, IPCC country delegates, and representatives from international organizations including UNFCCC and World Bank to discuss the future of climate policy assessment. Related publications:

- Carraro, C., Edenhofer, O., **Flachsland**, C., Kolstad, C., Stavins, R., Stowe, R., 2015. The IPCC at a crossroads: Opportunities for reform. Science 350, 34–35.

Since 2014 Christian Flachsland has been involved in advising high-level representatives from the Vatican on climate change, sustainability and global commons. Related publication:

- Edenhofer, O., **Flachsland**, C., Knopf, B., 2015. Science and religion in dialogue over the global commons. Nature Clim. Change 5, 907–909.

Transdisciplinary study of how international coalitions form via networks:

- Auer, S., Heitzig, J., **Kornek, U.**, Schöll, E., Kurths, J. 2015. The Dynamics of Coalition Formation on Complex Networks. Nature Scientific Reports 5: 13386.

Christian Flachsland was appointed Junior Professor for Climate and Energy Governance at the Hertie School of Governance in 2015 and successfully completed the first term of teaching.

Anna Leipprand and Marcel Dorsch will finish their PhD theses in 2017.

WG5: Scientific assessments, ethics, and public policy

Head of working group: Dr. Martin Kowarsch

We analyse scientific assessments at the science-policy interface and aim to improve their practice and design. Our research focuses particularly on the appropriate treatment of ethical issues and multiple stakes in integrated, environment-related policy assessments.

Current group members: Dr. Dominic Lenzi (Australia; post-doctoral researcher), and Jennifer Garard (Canada; PhD student). Our research is both critical and constructive and largely interdisciplinary in nature, primarily integrating philosophy, empirical social-science methodology, and political theory. The group structure was changed in late 2014 because of the split of former group "Assessments and Scientific Policy Advice" into this new working group and the governance group.

Our major project in collaboration with UNEP is the research initiative on "The Future of Global Environmental Assessment-making" (since 2013), resulting in several expert workshops; reports for UNEP; a forthcoming journal special issue guest-edited by us; and a forthcoming multi-authored perspective paper under our leadership. Given the exceptionally explorative and interdisciplinary nature of SEP research, this project helped us establish our own academic community.

Research outlook: We will *inter alia* do research on particular ethical issues and property rights regarding the management of natural global commons, particularly forests. We will discuss how best to treat these highly policy-relevant ethical aspects in integrated scientific assessments.

Major achievements

Our science-policy model, employed e.g. by the IPCC Working Group III (Fifth Assessment Report):

- Edenhofer, O., **Kowarsch**, M., 2015. Cartography of pathways: A new model for environmental policy assessments. Environmental Science & Policy 51, 56–64.

Advice on the EU's new science advice mechanism, also echoed in mass media (e.g., taz and FAZ):

- **Kowarsch**, M., 2015. Policy assessments to enhance EU scientific advice. Nature Climate change 6, 15–17.

Framework for identifying and appropriately treating value judgments in economic studies:

- Biewald, A., **Kowarsch**, M., Lotze-Campen, H., Gerten, D., 2015. Ethical aspects in the economic modeling of water policy options. Global Environmental Change 30, 80–91.

Further highlights of our expert advice for various scientific assessment processes include:

(1) Influence on the design of UNEP's sixth Global Environment Outlook assessment through our report and briefing document for the UNEP plenary (2014); (2) co-development of assessment guidelines for the United Nations' disaster risk management (UNISDR, 2016); and (3) advice on the design of the envisaged global assessment of food and nutrition (IPFN, 2015).

The former group member Pauline Riousset (France, PhD student) has just submitted her PhD thesis.

WG6: Applied sustainability science

Head of working group: Prof. Dr. Jan Christoph Minx

We analyse climate change mitigation in the broader context of sustainable development.

The working group "Applied Sustainability Science" was established in 2015. Initially, the group consisted of Prof. Jan Minx and PhD student Christoph von Stechow – both former members of the Technical Support Unit of the IPCC WGIII. In 2016, Dr. Jérôme Hilaire (formerly PIK) and William Lamb (formerly University of Manchester, Tyndall Center) joined the team.

Many of the most heated discussions around feasible pathways to ambitious climate change mitigation crystallise in other sustainability dimensions, such as other detrimental impacts on the environment, poverty and inequality, or access to clean and affordable energy. We use a multitude of quantitative methods including econometrics, environmentally-extended input-output analysis, life-cycle analysis or integrated assessment modelling to shed light on such wider sustainability implications and root them more firmly in the science of climate change mitigation. The research portfolio involves both the analysis of historic emission trends and drivers as well as future scenarios. Motivated by our IPCC experience and the recent explosion of literature, we have a particular passion for using meta-analytical tools that help to transform individual pieces of information into a more coherent map of decision-relevant knowledge.

Research outlook: i) building a typology for carbon development, ii) 1.5°C and its sustainability implications; iii) climate change mitigation and SDGs; iv) developing a comprehensive concept of committed carbon.

Major achievements

Key publications:

- **von Stechow**, C., McCollum, D., Riahi, K., **Minx**, J.C., Kriegler, E., van Vuuren, D.P., Jewell, J., Robledo-Abad, C., Hertwich, E., Tavoni, M., Mirasgedis, S., Lah, O., Roy, J., Mulugetta, Y., Dubash, N.K., Bollen, J., Ürge-Vorsatz, D., Edenhofer, O., 2015. Integrating Global Climate Change Mitigation Goals with Other Sustainability Objectives: A Synthesis. Annual Review of Environment and Resources 40.
- **von Stechow**, C., **Minx**, J.C., Riahi, K., Jewell, J., McCollum, D.L., Callaghan, M.W., Bertram, C., Luderer, G., Baiocchi, G., 2016. 2°C and SDGs: United they stand, divided they fall? Environmental Research Letters.
- Smith, P., Davis, S.J., Creutzig, F., Fuss, S., **Minx**, J.C., Gabrielle, B., Kato, E., Jackson, R.B., Cowie, A., Kriegler, E., 2015. Biophysical and economic limits to negative CO_2 emissions. Nature Climate Change 6, 42–50.

Assessment-making: Jan Minx and Christoph von Stechow contributed in leading capacity to the Fifth Assessment of the Intergovernmental Panel on Climate Change Working Group 3 on climate change mitigation. During 2015 three IPCC expert meetings were co-organised and in September an ordered closure of the Technical Support Unit of Working Group 3 was completed.

Education and Teaching: 1) Jan Minx became Professor for Science-Policy and Sustainable Development at the Hertie School of Governance and successfully completed the first year of teaching; 2) Christoph von Stechow has completed all five peer-reviewed journal papers that will be the basis for his PhD thesis. Completion is scheduled during the first half of 2016.

WG-TU: Climate and development

Head of working group: Dr. Jan Christoph Steckel

We assess development pathways consistent with climate change mitigation targets.

The working group "Climate and Development" was established at MCC in 2014. It is co-funded by the DFG's Collaborative Research Center (Sonderforschungsbereich) 1026 on "Sustainable Manufacturing – Shaping Global Value Creation" together with the TU Berlin. Group members are: Dr. Jan Steckel and three PhD students Alexander Radebach, Hauke Ward, Leonie Wenz (also at PIK). The group supervises three Master students, Ira Dorband, Lisa-Marie Bischer and Tom Schulze. Dr. Michael Jakob and Prof. Dr. Gregory Nemet (University Maddison-Wisconsin, guest researcher in the academic year 2015/2016) are affiliated with the group.

In the context of developing countries, climate change mitigation aims to reduce, but primarily avoid future emissions. This challenge is connected to "lock-ins" in energy- and emission-intensive infrastructure and to development and growth patterns. The WG combines empirical analyses of drivers of past emissions with sophisticated econometric and network analyses of economic development patterns, particularly economic structural change. This partly builds on data generated from multi-regional input output tables.

Research outlook: First, we will continue empirical research with highly disaggregated data and will increasingly build on analytical and numerical models to analyse causal interrelations between structural changes, economic sectors and societal development. Second, we will study further issues of inequality and climate policy based on household data in developing countries. Two project proposals to finance this research are currently under review, one with BMBF (€1.5 million) and the other with BMZ (€350,000).

Major achievements

Key publications:

- **Jakob**, M., **Steckel**, J.C., Klasen, S., Lay, J., Grunewald, N., Martínez-Zarzoso, I., Renner, S., Edenhofer, O., 2014. Feasible mitigation actions in developing countries. Nature Climate Change 4, 961–968.
- **Steckel**, J.C., Edenhofer, O., **Jakob**, M., 2015. Drivers for the renaissance of coal. Proceedings of the National Academy of Sciences of the United States of America (PNAS) 112, E3775–E3781.
- **Wenz**, L., Willner, S.N., **Radebach**, A., Bierkandt, R., **Steckel**, J.C., Levermann, A., 2015. Regional and Sectoral Disaggregation of Multi-Regional Input-Output Tables - A flexible Algorithm. Economic Systems Research 27, 194–212.

Assessment-making: Jan Steckel and Alexander Radebach were Contributing Authors (CAs) to the IPCC AR 5. Jan Steckel is CA in the IPSP. In 2015, the German government invited Jan Steckel for a lecture series in Nigeria. Jan Steckel is invited to advise the Vietnamese government on increasing their share of Renewable Energy.

Education and Teaching: Alexander Radebach, Hauke Ward and Leonie Wenz will obtain a PhD title in 2016/2017. Jan Steckel has offered the seminar "Climate Change and Development – Challenges for Poverty Eradication and Climate Change Mitigation" at TU Berlin in the winter semester 2014/15 and 2015/16.

Task Force: Public economics for the global commons

Representative: Dr. Michael Jakob, led by Prof. Dr. Ottmar Edenhofer

This cross-cutting task force employs the tools of public economics with the objective of identifying government policies which provide efficient and fair access to the global commons. With the emphasis on fairness we aim to make efficient solutions practically feasible.

The task force was established in 2012 and currently consists of a senior researcher, four post-doctoral researchers and two PhD students in the very last stages of their dissertations. The group works in close cooperation with director Ottmar Edenhofer at the intersection of environmental economics and public finance. These two sub-fields of public economics largely employ analytical models to gain a conceptual understanding. In addition, we use numerical methods to obtain a better quantitative understanding.

One major focus of the group is dynamic modelling to analyse the intergenerational distribution effects of managing the global commons. A second focus is on economic rents which arise due to the scarcity of the global commons. Their imposition by the government (through taxes in particular) could improve both the efficiency and the fairness of managing the commons. A third focus is on the interactions of commons-related taxation with the revenue (tax system) and spending (infrastructure) of the government.

Within MCC, the task force collaborates closely with almost all other working groups on research and assessment activities, as indicated by jointly authored publications. Outside MCC, the most important cooperation is with colleagues at PIK. Other collaborations are based on the connections of individual group members (for example with the University of Oxford, the Dallas Fed and the University of Cologne).

The three foci identified above will continue to guide the work of the task force. An explicit aim for the near future is to further engage with the community of public finance economists to draw more attention to the management of the commons.

Major achievements

Key publications:

- **Klenert**, D., **Mattauch**, L., 2015. How to make a carbon tax reform progressive: the role of subsistence consumption. Economics Letters 138, 100–103.
- **Edenhofer**, O., **Mattauch**, L., **Siegmeier**, J., 2015. Hypergeorgism: When rent taxation is socially optimal. FinanzArchiv / Public Finance Analysis 71, 474–505.
- **Dao**, N.T., 2015. From agriculture to manufacturing: How does geography matter? Cliometrica 1–33.

Other:

- MCC Workshop "Closing the Carbon Price Gap: Public Finance and Climate Policy", May 2014, Berlin, with L.H. Goulder, G. Metcalf, I. Parry, M. Weitzman and other leading international experts, to assess research on interactions between climate- and public economics and its policy relevance.
- Teaching by Gregor Schwerhoff and Jan Steckel in winter term 2015/16 at TU Berlin: "Climate and Development - Challenges of Climate Change Mitigation and Poverty Eradication".

3.5. Promotion of diversity, gender equality and work-family balance

The institute's management and staff alike are committed to a working environment that promotes gender equality, diversity, and tolerance. This is stressed in every job vacancy description and is also an important aspect in the selection process for both interviews and hiring. 14% of MCC's scientists are from outside Germany. MCC has three women in leading positions (27%): the Secretary General, the Head of Administration, and one group leader. At post-doctorate level there are two women (22%), and at the PhD student level the proportion of female staff members is roughly 50%.

Due to the institutional funding by Stiftung Mercator, it is possible to promote and support work-family balance of staff members, which cannot be taken for granted in the world of scientific research. While third-party funded project work often comes with demanding and inflexible deadlines for project deliverables, MCC is able to provide group leaders, post-docs and PhD candidates in the early phases of their family lives a supportive environment to embark on parental leave ("Elternzeit"). Between 2013 and 2015, five staff members took the opportunity for parental leave (totalling 17 months), all of them male and two of them group leaders. In 2016, five (male) staff members will take this opportunity.

MCC does not have an employees council, but elects three facilitators each year that take on the role of mediators in case of conflicts.

3.6. Promotion of junior scientists

MCC has an internal PhD programme to support young scientists in their scientific and educational work in a targeted and efficient way. PhD candidates have regular meetings (at least every three weeks) with their group leader, who is in most cases the internal PhD supervisor. Twice a year they present their work to the whole institute in a PhD Seminar. This is followed by a meeting with MCC Director Ottmar Edenhofer (the official supervisor) to track, document and plan their progress.

New PhD candidates are encouraged to visit Ottmar Edenhofer's introductory lecture at the TU Berlin in the winter semester. PhD candidates also participate in international conferences and workshops in which they present their work to a broader audience.

The institute aims to finance all PhD students for a minimum of three years and third-party projects are designed accordingly. Students with scholarships are completely integrated within MCC, having full access to the institutional resources.

MCC's first PhD candidate, Linus Mattauch, completed his thesis (*summa cum laude*) in 2015. Roughly five others are expected to follow this year.

3.7. Quality assurance

The institute is committed to upholding guidelines on ensuring good scientific practice. The "**Rules to ensure good scientific practice and to avoid scientific misconduct at MCC**", are based on guidelines provided by the German Research Foundation (DFG) and are an integral part of the employment contract. Two scientific **ombudspersons** are elected once a year by the scientific staff. This position's role is to mediate in cases of possible scientific misconduct.

MCC also aims to efficiently and sustainably secure its data. The administrative management is currently focusing on assuring **scientific data management,** developing a concept in accordance with scientific and data protection requirements.

4. Summary and Outlook

MCC has successfully finalised its three year inception period. In this time it has become an important player in the international research community and the policy arena:

MCC has published high-level publications as the backbone of its work. A considerable number of these are in high-ranking journals such as *Nature*, *Science* or *PNAS*. By means of its publications, its contribution to international assessment-making processes (e.g. the IPCC) and by organising workshops, MCC has stimulated an ongoing debate on assessment-making and on the sustainable governance of global commons (e.g. sustainable management of biomass for bioenergy use).

In addition, MCC has proven that it is in a position of influence, for example through the organization of a number of important workshops and conferences. Based on publications and assessments, MCC has given high-level scientific policy advice to policy makers at the global, international and national level, covering informal and formal science-policy dialogues. Its staff serve as members in editorial boards of scientific journals, and actively participate in networking activities and collaborations with other research institutes. This interaction enables the development of excellent research and enhances the impact of scientific findings.

With these achievements, MCC has laid the foundation for establishing itself within the German scientific system and the international research community in the coming years. The next step will include a consolidation phase to deepen MCC's engagement and impact in shaping debates on the global commons and advancing theory and practice of assessment-making.

While we will continue with our research topics outlined in Section 1.1 and specifically by the working groups in Section 3.4, **we have identified two thematic strands** which will determine MCC's research agenda in the upcoming years: The post-Paris process and the relationship between global commons, inequality, and development.

1. **Post-Paris process:** COP21 in Paris has provided an important impetus for global climate change policy over the next decade. However, while ambitious policy targets were formulated in Paris, identifying and harnessing specific entry points for effective and ambitious climate policy at the domestic level remains a challenge. MCC will continue to work on options for pricing carbon and removing fossil subsidies and other policy options to change the prevailing incentive structures favoring fossil fuels worldwide. This will include theoretical and empirical analyses on the pricing of carbon, spending the related revenues, and using international financial transfers to foster international climate policy cooperation.
2. **Global commons, inequality and development.** This research is motivated by the recent developments in food security, political conflicts and increasing migration flows that constitute a global challenge. Environmental change and adverse weather events that affect food security and internal conflicts, as well as missing economic perspectives due to poor economic policy, can be considered as key factors affecting migration flows. This stream of research includes:
    a) **Research on inequality and its relationship with (global) commons:** While existing studies typically focus on country-aggregates in resource ownership or infrastructure supply, data at household-level are needed to assess the distributional implications of the over-use of environmental commons and the under-supply of social commons.
    b) **Research on the impacts of climate change, adaptation to climate change and limits of adaptation** (e.g. with respect to migration), as envisaged in the newly established WG1. This topic will require empirical, conceptual and theoretical analyses and could inform future assessments on climate impacts and adaptation. Additional research on the governance of adaptation is envisioned. In this, MCC could focus on adaptation measures that require global cooperation, e.g. using game-theoretic analysis.

Concerning the organization of our work, we identified three areas, which need to be addressed by MCC in the future: the international dimension, formats for the science-policy dialogue and a communication tool.

1. **Enhancing our international dimension:** Our research clearly has an international focus, so we will work on establishing more intense cooperation with international organizations. This fits alongside a greater international media presence. We will also aim to further internationalise MCC staff, for example by providing fellowships or more guest research visitors.
2. **Development of innovative formats for the science-policy dialogue:** In addition to further participation in ongoing assessment processes, new formats, especially for our approach of "laying out the options", will be developed. Ideas include summer schools for students or for international decision makers; workshops together with (national) ministries (similar to a recent workshop with the foreign ministry) to enable mutual learning; a topical dialogue forum at MCC; or a standing conference for example on carbon pricing. We also aim to widen our portfolio and establish outlets to make our research and assessment results accessible to a broader audience. Initial ideas include an MCC Policy Brief format, or a format called "MCC on the topic" which provides background information on ongoing political and societal debates based on research that is already available at MCC.
3. **Providing a communication tool:** One idea is to spell out our concept of assessment-making and mapmaking in an online tool. This could include a platform that combines various formats, i.e. policy briefs, video commentaries, iconic figures and educational material on specific aspects. Another idea is to provide a visualization tool for some of our data, for example on wealth distribution or on global energy and emission stocks and flows.

These are initial ideas for the direction of our research and communication tools and will be discussed with our Expert Advisory Board in autumn this year. A detailed report will be provided by the end of this year to give a consolidated view of our future plan for a second funding period after 2018.

In this document we have outlined our approach, our work of the first three years and our vision for MCC. In the years ahead until 2018, it is our intention to carry out our work striving for a balance between exciting new research and a consolidation of successful processes and research from the first three years.

Annex

A.1. Names of Board members

Expert Advisory Board (as of 2015)

Name	Function	Affiliation
Barrett, Scott	Lenfest-Earth Institute Professor of Natural Resource Economics	Columbia University
Beinhocker, Eric	Executive Director of the Institute for New Economic Thinking at the Oxford Martin School	University of Oxford
Carraro, Carlo	Director of the Climate Change and Sustainable Development Program	Fondazione Eni Enrico Mattei
Faber, Joachim	Chairman of the Supervisory Board	Deutsche Börse AG
Field, Christopher B.	Melvin and Joan Lane Professor for Interdisciplinary Environmental Studies, founding director of the Carnegie Institution's Department of Global Ecology	Stanford University
Foley, Duncan	Leo Model Professor of Economics and Director of Graduate Studies	The New School
Harvey, Hal	CEO	Energy Innovation: Policy and Technology LLC
Heal, Geoffrey	Donald C. Waite III Professor of Social Enterprise	Columbia Business School
Morgan, Jennifer	Global Director of the Climate Program	World Resources Institute
Renn, Ortwin	Professor and Chair of Environmental Sociology and Technology Assessment	Universität Stuttgart
Runkel, Marco	Professor of Economics, Executive Director of the Institute of Economics and Law, School of Economics and Management	Technische Universität Berlin
Schlacke, Sabine	Director of the Institute for Environmental Law and Planning Law	Westfälische Wilhelms-Universität Münster
Schöb, Ronnie	Professor for International Public Economics, Dean, School of Business & Economics	Freie Universität Berlin
Sinn, Hans-Werner	(former) President	ifo Institut
Weyant, John	Professor of Management Science and Engineering, Director of the Energy Modeling Forum (EMF) and Deputy Director of the Precourt Institute for Energy Efficiency	Stanford University

Institutional Board (as of 2015)

Name	Function	Affiliation
Anheier, Helmut K.	President, Dean & Professor of Sociology	Hertie School of Governance
Frensch, Peter A.	Vice President for Research	Humboldt-Universität zu Berlin
Herken, Anna Sophie	Managing Director	Hertie School of Governance
Hostert, Patrick	Chair of Geomatics Lab, Director of IRI THESys	Humboldt-Universität zu Berlin
Köppel, Johann	Dean of the Faculty VI – Planning, Building and Environment	Technische Universität Berlin
Runkel, Marco	Professor of Economics, Executive Director of the Institute of Economics and Law, School of Economics and Management	Technische Universität Berlin
Seckler, Robert	Vice President for Research and Junior Academics	University of Potsdam
Thomsen, Christian	President	Technische Universität Berlin

A.2. Names of MCC staff members

MCC staff members (as of May 2016)

Name	Function	Working Group
Executive Staff		
Edenhofer, Ottmar	Director	
Knopf, Brigitte	Secretary General	
Kalkuhl, Matthias	Group leader	WG1
Creutzig, Felix	Group leader	WG2
Fuss, Sabine	Group leader	WG3
Flachsland, Christian	Group leader	WG4
Kowarsch, Martin	Group leader	WG5
Minx, Jan	Group leader	WG6
Steckel, Jan	Group leader	WG TU
Scientific Staff		
Agoston, Péter	Post-Doc	WG2
Bren d'Amour, Christopher	PhD student	WG2
Brenner, Andri	PhD student	WG1
Burghaus, Kerstin	Post-Doc	Task Force
Dao Nguyen, Thang	Post-Doc	Task Force
Dorsch, Marcel	PhD student	WG4
Fernandez, Blanca	PhD student	WG2
Garard, Jennifer	PhD student	WG5
Hilaire, Jérôme	Post-Doc	WG6
Hirth, Lion	Scientific Support TU	Directorate
Jakob, Michael	Post-Doc	Task Force
Klenert, David	PhD student	Task Force
Koch, Nicolas	Post-Doc	WG3
Kornek, Ulrike	Post-Doc	WG4
Lamb, William	Post-Doc	WG6
Lenzi, Dominic	Post-Doc	WG5
Radebach, Alexander	PhD student	WG TU
Schwerhoff, Gregor	Post-Doc	Task Force
Sedova, Barbora	PhD student	WG1

Siegmeier, Jan	PhD student	Task Force
Ward, Hauke	PhD student	WG TU
Weddige, Ulf	Scientific Support	WG2
Wehkamp, Johanna	PhD student	WG3
Wenz, Leonie	PhD student	WG TU
Administration		
Bruns, Jan	Head of Press & PR (Parental represent.)	
Fritzsch, Martin	Back office	
Löhe, Fabian	Head of Press and PR	
Nierhoff, Elisabeth	Head of Administration	
Otto, Liane	Assistant to the Director	
Reinsch, Susann	Assistant Research & Events	
Wal, Annelie	Human Resources and Accounting	
Guests		
Ahmad, Sohail	Fellow	WG2
Bischer, Lisa-Marie	Master Student	WG TU
Dorband, Ira	Master Student	WG TU
Gläser, Anne	Master Student	WG3
Grosjean, Godefroy	PhD student	WG3
Leipprand, Anna	PhD student	WG4
Nemet, Gregory	Fellow	WG TU
Mattauch, Linus	Fellow	Task Force
Pilger, Daffne	Master Student	WG6
von Stechow, Christoph	PhD student	WG6
Student Assistants		
Bauer, Julian	Student Assistant	Administration
Callaghan, Max	Student Assistant	WG6
Cook, Athene	Student Assistant	WG1
Harrs, Jan	Student Assistant	WG5
Lübbers, Sebastian	Student Assistant	Administration
Marxen, Annika	Student Assistant	WG3
Römer, Julia	Student Assistant	WG2
Schulze, Tom	Student Assistant	WG TU

A.3. CVs of executive staff

Prof. Dr. Matthias Kalkuhl (*1982)

Head of Working Group 1

Economic Growth and Human Development

Professional experience	
Since Oct 2015	**MCC Berlin** Head of Working Group Economic Growth and Human Development **University of Potsdam** Professor on Climate Change, Development and Economic Growth
2012-2015	**Center for Development Research, University of Bonn** Group leader: Commodity Price Volatility and the Poor
2008-2012	**Potsdam Institute for Climate Impact Research** Research associate: Climate change economics and policy instruments
Education	
2008-2012	TU Berlin, Germany PhD in Economics (Dr. rer. oec.): „The Calculus of Climate Policy: Carbon Pricing and Technology Policies for Climate Change Mitigation"
2002-2008	University of Osnabrück, School of Mathematics and Computer Science Diplom in Applied System Science
Publications	16 peer-reviewed journal articles, 2 books, 10 book chapters, and 14 further publications (reports, policy papers etc.)
3 key publications	**Kalkuhl**, M., von Braun, J., Torero, M. (eds) 2016. Food Price Volatility and its Implications for Food Security and Policy. Springer. ISBN 978-3-319-28199-5, 650 pp. Haile, M.G., **Kalkuhl**, M., von Braun, J. 2016. Worldwide acreage and yield response to international price change and volatility: A dynamic panel data analysis for wheat, rice, maize and soybean. American Journal of Agricultural Economics 98 (1): 172-190. **Kalkuhl, M.**, Edenhofer, O., Lessmann, K. 2012. Learning or lock-in: optimal technology policies to support mitigation. Resource and Energy Economics, 34(1), 1-23.
h-factor	11 (Google scholar); 5 (ISI-Web of Science)
Projects & Grants	Project management and coordination of five third-party funded international research projects, including field research in developing countries (ministry, private sector, European Commission; totaling approx. €2 million)
Awards	Prize for outstanding dissertation by the *Friends of the Potsdam Institute for Climate Impact Research e.V.* Scholarship of the Cusanuswerk for outstanding students
Teaching & Supervision	Tutoring of 6 PhD students (completed) and supervision of 2 PhD students; supervision of 2 master's theses; three university lectures and two courses for graduates.

Dr. Felix Creutzig (*1979)

Head of Working Group 2

Land Use, Infrastructure and Transport

Professional experience

Since Sept 2012	**MCC Berlin** Head of Working Group Land Use, Infrastructure and Transport
2012/2013	**Princeton Institute for International and Regional Studies** Visiting Associate Research Scholar
2009-2012	**Economics of Climate Change, Technical University Berlin** Group leader: Sustainable Human Settlements and Infrastructures
2008-2009	**Berkeley Institute of the Environment, University of California, Berkeley** Postdoctoral Fellow: Climate Change Mitigation in the Transportation Sector
2008	**Energy Foundation China, Beijing.** Consultant: Urban Transport and Land Use in Chinese Cities

Education

2003-2007	Humboldt Universität zu Berlin, Berlin, Germany PhD in Biophysics (Dr. rer. nat.): Sufficient Encoding of Dynamical Systems
2005	Hebrew University, Jerusalem, Israel Project: Dynamical Systems and Information Theory
2003-2004	Studienkolleg zu Berlin, Berlin, Germany
2002-2003	Cambridge University, Cambridge, UK Advanced Mathematics and Theoretical Physics, Master of Advanced Study
2000-2002	Albert-Ludwigs-Universität Freiburg, Germany Medical Studies, Physikum, bachelor equivalent
1999-2002	Albert-Ludwigs-Universität Freiburg, Germany Physics, Vordiplom, bachelor equivalent

Publications

46 peer-reviewed publications, including Science, PNAS and Nature Climate Change, 2 books, 17 book chapters and reports

3 key publications

Creutzig, F., He, D. 2009. Climate change mitigation and co-benefits of feasible transport demand policies in Beijing. Transportation Research D 14: 120-131.

Creutzig, F., Popp, A., Plevin, R., Luderer, G., Minx, J., Edenhofer, O. 2012. Reconciling top-down and bottom-up modeling on future bioenergy deployment. Nature Climate Change 2: 320-327.

Creutzig, F., 2014. How fuel prices determine public transport infrastructure, modal shares and urban form. Urban Climate 10, 63–76.

h-factor

20 (Google scholar); 11 (ISI-Web of Science)

Grants

2 third party funded projects, and 2 PhD scholarships, totaling ca. €300.000

Awards

German National Merit Foundation, ERP-Scholarship, Boehringer Ingelheim Fonds Scholarship, Cambridge European Trust Scholarship

Teaching

Lecture "Land use, Infrastructures and Climate Change" at TU Berlin (2009-2013);
2 Summer Schools of the German National Merit Foundation;
Supervision of 3 PhD and 2 Master students.

Dr. Sabine Fuss (*1979)

Head of Working Group 3

Sustainable Resource Management and Global Change

Professional experience

04/2013-current	**MCC Berlin, Germany** Group leader: Sustainable Resource Management and Global Change
09/2007-03/2013	**International Institute for Applied Systems Analysis, Laxenburg, Austria** Research scholar: Ecosystems Services and Management
11/2006-12/2006	**International Institute for Applied Systems Analysis, Laxenburg, Austria** Research Scholar at the Forestry Program
09/2003-08/2007	**Faculty of Economics, University of Maastricht, the Netherlands** Junior Researcher (Assistant in Onderzoek) 20% Teaching Position (undergraduate and graduate classes in economics)

Education

09/2003-09/2007	Faculty of Economics, University of Maastricht, the Netherlands PhD in Economics (Defense April 2008)
06/2006-09/2006	International Institute for Applied Systems Analysis, Laxenburg, Austria Young Scientist Program: Forestry
Fall/winter 2002	University of California, Santa Barbara, USA Education Abroad Program
10/1999-08/2003	Faculty of Economics, University of Maastricht, the Netherlands M.Sc. in Economics

Publications

37 peer-reviewed publications, including Nature Climate Change and PNAS, 10 book chapters and 12 reports and working papers, 15 conference papers/proceedings

3 key publications

Smith, P., Davis, S.J., Creutzig, F., **Fuss**, S., Minx, J.C., Gabrielle, B., Kato, E., Jackson, R.B., Cowie, A., Kriegler, E., 2015. Biophysical and economic limits to negative CO_2 emissions. Nature Climate Change 6, 42–50.

Fuss, S., Havlík, P., Szolgayová, J., Schmid, E., Reuter, W.H., Khabarov, N., Obersteiner, M., Ermoliev, Y., Ermolieva, T., Kraxner, F., 2015. Global food security & adaptation under crop yield volatility. Technological Forecasting and Social Change 98, 223–233.

Fuss, S., Canadell, J.G., Peters, G.P., Tavoni, M., Andrew, R.M., Ciais, P., Jackson, R.B., Jones, C.D., Kraxner, F., Nakicenovic, N., Le Quéré, C., Raupach, M.R., Sharifi, A., Smith, P., Yamagata, Y., 2014. Betting on negative emissions. Nature Clim. Change 4, 850–853.

h-factor

19 (Google scholar); 12 (ISI-Web of Science)

Grants

Principal Investigator in 11 third-party-funded projects, totalling ca. €3 million

Additional Positions

Guest research scholar at the International Institute for Applied Systems Analysis; Scientific Steering Committee of the Global Carbon Project

Prof. Dr. Christian Flachsland (*1980)

Head of Working Group 4

Governance

Professional experience

Since 2015	**Assistant Professor (S-Junior professor) for Climate & Energy Governance** Hertie School of Governance **Head of Working Group Governance** Mercator Research Institute on Global Commons and Climate Change
2012-2015	**Co-Head of Working Group 'Assessments and Scientific Policy Advice'** Mercator Research Institute on Global Commons and Climate Change
2011-2012	**Coordinator in founding phase** Mercator Research Institute on Global Commons and Climate Change
2010-2011	**Postdoctoral Researcher Potsdam Institute for Climate Impact Research (PIK)** Speaker flagship activity „Climate Policy" in Research Domain Sustainable Solutions

Education

2010	Dr. phil. Technical University Berlin
2009	Tsinghua University, Beijing, German-Chinese PhD student exchange
2001	Stockholm University, student exchange
2000-2006	Potsdam University. Magister Artium sociology, economics, philosophy

Publications

24 peer-reviewed publications, including Science and Nature Climate Change, 32 book chapters and reports

3 key publications

Carraro, C., Edenhofer, O., **Flachsland**, C., Kolstad, C., Stavins, R., Stowe, R., 2015. The IPCC at a crossroads: Opportunities for reform. Science 350, 34–35.

Edenhofer, O., **Flachsland**, C., Jakob, M., Lessmann, K., 2015. The atmosphere as a global commons : challenges for international cooperation and governance. In: The Oxford Handbook of the Macroeconomics of Global Warming, The Oxford Handbook of the Macroeconomics of Global Warming. - Oxford [u.a.] : Oxford Univ. Press, ISBN 978-0-19-985697-8. - 2015, S. 260-296.

Flachsland, C., Marschinski, R., Edenhofer, O. 2009: To link or not to link: Benefits and disadvantages of linking cap-and-trade systems. Climate Policy (9): 358–372.

h-factor

15 (Google scholar); 7 (ISI-Web of Science)

Grants

Project lead or management position in 8 projects totaling > € 1 million

Dr. Martin Kowarsch (*1981)

Head of Working Group 5

Scientific Assessments, Ethics, and Public Policy

Professional experience

Since 2015	**Head of Working Group Scientific Assessments, Ethics, & Public Policy** Mercator Research Institute on Global Commons and Climate Change
2012-2014	**Co-Head of Working Group** "Assessments and Scientific Policy Advice" Mercator Research Institute on Global Commons and Climate Change
2011-2012	**Coordinator of research domain** "Equitable World Economy and Sustainable Resource Use" at the Institute for Social & Development Studies at the Munich School of Philosophy, Germany (IGP)
2010-2012	IGP: PhD researcher for **research project** on "Sustainable Water Management in a Globalized World" (*PIK, HU, IGP; funded by BMBF*)
2007-2010	IGP: PhD researcher for **research project** on "Climate Change and Justice" (*PIK, IGP, Misereor, Munich Re foundation*); research stay in Niger

Education

2012	Munich School of Philosophy: doctorate in philosophy. Project: Pragmatist Philosophy of Economics in Climate Policy
2009-2012	Studying economics at Fernuniversität Hagen
2007	Munich School of Philosophy: M.A. in philosophy (top of class)
2002-2007	Studying philosophy (and theology) in Munich

Publications

31 academic publications (5 ISI). Since 2013, research on assessments has been accepted both in philosophy outlets (*Oxford Univ. Press, Springer Press*) and interdisciplinary journals (*Nature Climate Change, Global Environmenal Change, Environmental Res Letters, etc.*)

3 key publications

Edenhofer, O., **Kowarsch**, M., 2015. Cartography of pathways: A new model for environmental policy assessments. Environmental Science & Policy 51, 56–64.

Kowarsch, M., 2015. Policy assessments to enhance EU scientific advice. Nature Climate change 6, 15–17.

Biewald, A., **Kowarsch**, M., Lotze-Campen, H., Gerten, D., 2015. Ethical aspects in the economic modeling of water policy options. Global Environmental Change 30, 80–91.

h-factor

12 (Google scholar);3 (ISI-Web of Science)

Projects & Grants

Since 2013 leader of MCC-UNEP research initiative "Future of Global Environmental Assessment-making", co-funded by UNEP (50.000€)

Teaching

Academic teaching at the Munich School of Philosophy (2006-2011, Tutor 2007-2009); Hertie School of Governance (2012); TU Berlin (2013); KIT Karlsruhe (2014); University of Potsdam (2015). Co-supervision of several PhD students at MCC (since 2012).

Awards

Full doctoral scholarship from Furger Foundation (Switzerland); Alfred Delp Prize for Master's thesis; e-fellow student scholarship

Science-Policy Interface

Expert reviewer for various scientific assessments (since 2012); Member of **Network Development Group** (with O. Edenhofer) of the International Network of Government Science Advice (INGSA); co-organiser of 2nd INGSA science-policy conference (2016, Brussels)

Prof. Jan Christoph Minx, PhD (*1976)

Head of Working Group 6

Applied Sustainability Science

Professional experience

Since 2015	**Professor for Science Policy and Sustainable Development** Hertie School of Governance **Head of Working Group Applied Sustainability Science** Mercator Research Institute on Global Commons and Climate Change
2011-2015	**Head of Technical Support Unit**, Intergovernmental Panel on Climate Change Working Group III, Potsdam Institute of Climate Impact Research, Potsdam, Germany
2008-2011	**Leader Project Office Berlin**, Stockholm Environment Institute, Berlin, Germany
2006-2008	**Junior/Senior Research Fellow**, Stockholm Environment Institute, York, UK,

Education

2008	PhD in Environmental Economics and Management, University of York, York, UK.
2002	MSc in Environmental Economics, University of York, UK.
1998-2001	Economics and Political Science, University of Cologne, Cologne, Germany.
1994-1997	Orchestra Music (youth & full student), Universität für Musik und Darstellende Künste Frankfurt am Main, Germany.

Publications

30 peer-reviewed publications, including Science, Nature Climate Change, PNAS, 22 book chapters and reports

3 key publications

Minx, J.C., Baiocchi, G., Wiedmann, T., Barrett, J., Creutzig, F., Feng, K., Förster, M., Pichler, P.-P., Weisz, H., Hubacek, K., 2013. Carbon footprints of cities and other human settlements in the UK. Environmental Research Letters 8: 1-10. 035039.

Minx, J.C., Baiocchi, G., Peters, G. P., Weber, C. L., Guan, D., Hubacek, K. 2011. A Carbonizing Dragon: China's Growing CO_2 Emissions Revisited. Environmental Science & Technology 45: 9144-9153.

Peters, G. P., **Minx**, J.C., Weber, C. L.. Edenhofer, O. 2011. Emission transfers via international trade exceed emission reductions in the Kyoto Protocol. Proceedings of the National Academy of Sciences (PNAS) 108 (21): 8903-8908.

h-factor

24 (Google scholar); 11 (ISI-Web of Science)

Grants

Involved in 21 third party funded projects as project leader, manager of team member; totaling > €7 million

Awards

Heinrich Böll Scholarship; University of York PhD Scholarship

Assessments

Leading author roles in Fifth Assessment Report of Intergovernmental Panel on Climate Change: Coordinating Lead Author, Lead Author and Core Writing Team Member for the Synthesis Report.

Dr. Jan Christoph Steckel (*1982)

Head of Working Group TU

Climate and Development

Professional experience

Since 2014	**Mercator Research Institute on Global Commons and Climate Change** Head of Working Group "Climate and Development"
Since 2012	**Technical University Berlin, Economics of Climate Change** Principal Investigator: Macroeconomic Sustainability Assessment in DFG funded Collaborative Research Center 1026 "Sustainable Manufacturing"
2007-2013	**Potsdam Institute for Climate Impact Research** Last Position: Postdoctoral Fellow Policy Instruments Modeling Group
2006	**Help Germany e. V.** Emergency Relief, Indonesia
2005	**David Suzuki Foundation**, Canada

Education

2008-2012	Technische Universität Berlin, Germany and Potsdam Institute for Climate Impact Research PhD in Economics (Dr. rer. oec.): Developing Countries in the Context of Climate Change Mitigation and Energy System Transformation
2009	Tsinghua University, Beijing, German-Chinese PhD student exchange
2002-2008	Universität Flensburg, Syddansk Universitet and Ecole Superieure de Commerce Rennes Industrial Engineering, Diplom

Publications

18 peer-reviewed publications (ISI), including PNAS and Nature Climate Change, Lead author to the IPCC SRREN and contributing authors to the IPCC AR5, 13 other publications (book chapters, policy reports)

3 key publications

Steckel, J.C., Edenhofer, O., Jakob, M., 2015. Drivers for the renaissance of coal. Proceedings of the National Academy of Sciences of the United States of America (PNAS) 112, E3775–E3781.

Jakob, M., **Steckel**, J.C., Klasen, S., Lay, J., Grunewald, N., Martínez-Zarzoso, I., Renner, S., Edenhofer, O., 2014. Feasible mitigation actions in developing countries. Nature Climate Change 4, 961–968.

Steckel, J.C., Brecha, R.J., Jakob, M., Strefler, J., Luderer, G., 2013. Development without energy? Assessing future scenarios of energy consumption in developing countries. Ecological Economics 90, 53–67.

h-factor

16 (Google scholar); 8 (ISI-Web of Science)

Grants

2 third party funded projects (BMBF, DFG), total ca. € 1.5 million

Awards

AKN Reddy Prize, IfA Lecture Programme of the German Government, ASA Programme

Teaching

Academic teaching at TU Berlin in Economics of Climate Change (2010, 13, 14) and Climate and Development (2011, 14, 15, 16). Supervision of 4 Master and 3 PhD students.

Dr. Brigitte Knopf (*1973)

Secretary General

Professional experience

2/2015 – current	**Secretary General,** Mercator Research Institute on Global Commons and Climate Change
3/2012 – 2/2015	**Potsdam-Institute for Climate Impact Research (PIK); Deputy Head of Research Domain Sustainable Solutions**
9/2011 – 2/2015	**Head of working group Energy Strategies Europe and Germany** at PIK
1/2007 – 2/2015	Senior Scientist at PIK in the Research Domain *Sustainable Solutions* in different positions, inter alia: 11/2011 to 1/2014: Coordinator of the EMF28 model comparison on The Effects of Technology Choices on EU Climate Policy with 12 European modeling teams 1/2009 to 5/2011: Senior Advisor of the Technical Support Unit (TSU) of the IPCC Working Group III for the preparation of the Special Report on Renewable Energies (SRREN) 1/2007 to 7/2009: Scientific coordination of the model comparison on „Mitigation at the global level" of the EU Project ADAM (Adaptation and Mitigation Strategies).
3/2001 – 12/2006	PhD student at PIK, member of the department *Integrated Systems Analysis at PIK*
11/1999 – 2/2001	**Employee in the R&D department of the Phönix SonnenWärme AG,** Berlin, Germany. Responsible for the advancement of solar thermal plants

Education

11/2006	PhD in Physics, University of Potsdam, Germany. Supervised by Prof. John Schellnhuber
10/1993 - 7/1999	Graduate studies in Physics at the Philipps-University of Marburg, Germany. Specialisation: solar energy

Publications

35 peer-reviewed journal articles, 44 further publications (book chapters, reports, policy papers, blogs etc.)

3 key publications

Knopf, B., Chen, Y.-H. H., De Cian, E., Förster, H., Kanudia, A., Karkatsouli, I., Keppo, I., Koljonen, T., Schumacher, K., van Vuuren, D. P. 2013. Beyond 2020 - Strategies and costs for transforming the European energy system. Climate Change Economics, Vol 4, supp01.

Knopf, B., Koch, N., Grosjean, G., Fuss, S., Flachsland, C., Pahle, M., Jakob, M., Edenhofer, O., 2014. The European Emissions Trading System (EU ETS): Ex-Post Analysis, the Market Stability Reserve and Options for a Comprehensive Reform. Note di lavoro 79.2014.

Knopf, B., Pahle, M., Kondziella, H., Joas, F., Edenhofer, O., Bruckner, T., 2014. Germany's nuclear phase-out: Sensitivities and impacts on electricity prices and CO_2 emissions. Economics of Energy & Environmental Policy 3, 89–105.

h-factor

14 (Google Scholar); 7 (ISI-Web of Science)

Grants

Fund raising and/or project management and coordination of several third-party funded research projects (BMBF, EU FP7); total > € 1 million

Assessments

Senior Advisor of the Technical Support Unit (TSU) of the IPCC Working Group III for the preparation of the Special Report on Renewable Energies (SRREN); Contributing author in IPCC WGIII AR5

Academic Memberships

Member of the Ad-hoc Group „Europäische Integration" of the German Project Energiesysteme der Zukunft (ESYS) (Energy Systems of the Future) (2013-2015); Member of the Energy Platform of Euro-CASE (since 2013); Member of the acatech Group „Finanzierung der Energiewende" in 2012.

Prof. Dr. Ottmar Edenhofer (*1961)

Director

Professional experience	
Since 2012	**Director** of the Mercator Research Institute on Global Commons and Climate Change
2008-2015	**Co-Chair** of Working Group III of the IPCC
Since 2008	**Professor** for "Economics of Climate Change" at the Technische Universität Berlin, member of faculties VI and VII
Since 2007	**Deputy Director and Head of Research Domain Sustainable Solutions** of the Potsdam Institute for Climate Impact Research; this Research Domain was rated as "excellent" in the evaluation of the Leibniz Association in 2014.
2007-2009	**Advisor to the Federal Foreign Office** on questions of global climate change
2004-2007	**Lead Author, Working Group III** of the Intergovernmental Panel on Climate Change (IPCC), Chapters 1 und 11. In 2007, the IPCC received the Nobel Peace Prize.
Education	
1999	Doctor rer. pol. (summa cum laude), topic: Social Conflict and Technological Change. Evolutionary Models of Energy Use
1991	B.A. Philosophy, Munich School of Philosophy
1987	Diplomvolkswirt (Master Degree in Economics), University of Munich (with honors)
Publications	More than 100 peer-reviewed articles in interdisciplinary journals like Science, PNAS and Nature Climate Change and also in economic and social science journals. More than 150 publications in books, book chapters, and policy briefs.
3 key publications	Jakob, M., **Edenhofer**, O., 2014. Green growth, degrowth, and the commons. Oxford Review of Economic Policy 30, 447–468. **Edenhofer**, O., Flachsland, C., Jakob, M., Lessmann, K., 2015. The atmosphere as a global commons : challenges for international cooperation and governance. In: The Oxford Handbook of the Macroeconomics of Global Warming, The Oxford Handbook of the Macroeconomics of Global Warming. - Oxford [u.a.] : Oxford Univ. Press, ISBN 978-0-19-985697-8. - 2015, S. 260-296. Klenert, D., Mattauch, L., **Edenhofer**, O., Lessmann, K. 2016. Infrastructure and Inequality: Insights from Incorporating Key Economic Facts about Household Heterogeneity. Accepted for publication in Macroeconomic Dynamics (accepted).
h-factor	39 (Google scholar); 20 (ISI-Web of Science)
Projects & Grants	Since 2006, leadership for more than 50 national and international projects (i.a. EU, BMBF, private foundations) with total funding volume > € 18 million (PIK) and € 16 million (MCC)
Teaching & Supervision	Lectures in Economics of Climate Change at Technische Universität Berlin since 2008. Supervision of 61 PhD students (36 PhDs successfully awarded). Academic visits and lectures at renowned universities.
Science-Policy Interface (selection)	Co-Chair IPCC Working Group III from 2008 to 2015; Co-Chair of Energy Platform by the European Council of Academics of Applied Sciences, Technologies and Engineering (Euro-CASE); Advisor to national and international politicians, e.g. former German Minister of Foreign Affairs Frank-Walter Steinmeier.
Awards/Memberships	Member of the German National Academy of Science and Engineering, acatech; Member of the Akademie der Wissenschaften Hamburg; Co-Editor of "Review of Environmental Economics and Policy" (REEP);
Membership Advisory Boards	Scientific Advisory Board ifo Munich; Scientific Advisory Board Euro-Mediterranean Centre on Climate Change (CMCC S.c.a.r.l.); Board of Trustees Munich Re; Advisory Board of the Green Growth Knowledge Platform.

A.4. List of abbreviations

ABC ..... Australian Broadcasting Story

AR..... Assessment Report (of the IPCC)

BBC..... British Broadcasting Corporation

BDEW..... Bundesverband der Energie- und Wasserwirtschaft

BECCS..... Bio-energy with carbon capture and storage

BMZ ..... Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung

COP21 ..... Conference of Parties #21

DFG..... Deutsche Forschungsgesellschaft

DIW..... Deutsches Institut für Wirtschaftsforschung

EAB..... Expert Advisory Board (of MCC)

EDF ..... Environmental Defence Fund

ESYS..... Energy Systems of the Future

ETS..... Emissions Trading System

FAO ..... Food and Agriculture Organization of the United Nations

FAZ..... Frankfurter Allgemeine Zeitung

FEEM ..... Fondazione Eni Enrico Mattei

FOGEAM..... Future on Global Environmental Assessment Models

FTE..... Full-time Equivalent

FU..... Freie Universität Berlin

GCP..... Global Carbon Project

GDP..... Gross Domestic Product

GEA..... Global Environmental Assessments

GEO5 ..... Global Environmental Outlook 5

GGGI..... Global Green Growth Institute

GGKP..... Green Growth Knowledge Platform

GHG ..... Greenhouse gases

GIZ..... Deutsche Gesellschaft für Internationale Zusammenarbeit

HU ..... Humboldt-Universität zu Berlin

ICCG..... International Center for Climate Governance

IIASA ..... International Institute for Applied Systems Analysis

INGSA..... International Network for Government Science Advice

IPBES ..... Intergovernmental Platform on Biodiversity and Ecosystem Services

IPCC..... International Panel on Climate Change

IPFN..... International Panel on Food and Nutrition

IPSP ..... International Panel on Social Progress

ISI..... Institute for Scientific Information

IUFRO ..... International Union of Forestry Research Organizations

MaGNET..... Managing Global Negative Emissions

MCC..... Mercator Research Institute on Global Commons and Climate Change gGmbH

NGO..... Non-governmental organisation

NORAD ..... Norwegian Agency for Development Cooperation

OECD ..... Organisation for Economic Co-operation and Development

PBS ..... Public Broadcasting Service

PEM..... Pragmatic Enlightened Model

PhD..... Philosophical Doctorate

PIK..... Potsdam Institute for Climate Impact Research

PNAS..... Proceedings of the National Academy of Sciences

PR..... Public Relations

REDD+..... Reduced Emissions from Deforestation and Degradation

REEP..... Review of Environmental Economics and Policy

RFF..... Resources for the Future

RSERC..... Research Seminar on Environment, Resource and Climate Economics

RWI..... Rheinisch Westfälisches Institut für Wirtschaftsforschung

SDG..... Sustainable Development Goals

TSU ..... Technical Support Unit

TU..... Technische Universität Berlin

UBA..... Umweltbundesamt

UCCRN..... Urban Climate Change Research Network

UNEP ..... United Nations Environment Programme

UNFCCC..... United Nations Framework Convention on Climate Change

WG..... Working Group

A.5. List of publications

PEER REVIEWED PUBLICATIONS (SINCE 2013)

MCC authors are highlighted in bold letters

Ahmad, S., **Baiocchi**, G., **Creutzig**, F., 2015. CO_2 Emissions from Direct Energy Use of Urban Households in India. Environmental Science & Technology 49, 11312–11320.

Allwood, J.M., Bosetti, V., Dubash, N.K., Gómez-Echeverri, L., **von Stechow**, C., 2014. Glossary, Acronomys and Chemical Symbols. In: Climate Change 2014: Mitigation of Climate Change: Working Group III Contribution to the IPCC Fifth Assessment Report. Cambridge University Press.

Andersson, A.M., Elverhøi, M., Fleten, S.-E., **Fuss**, S., Szolgayová, J., Troland, O.C., 2013. Upgrading hydropower plants with storage: timing and capacity choice. Energy Syst 5, 233–252.

Baiocchi, G., **Creutzig**, F., **Minx**, J.C., Pichler, P.-P., 2015. A spatial typology of human settlements and their CO_2 emissions in England. Global Environmental Change 34, 13–21.

Basse-Mama, H., **Koch**, N., Bassen, A., Bank, T., 2013. Valuation effects of corporate strategic transactions in the cleantech industry. J Bus Econ 83, 605–630.

Bauer, N., Mouratiadou, I., Luderer, G., Baumstark, L., **Brecha**, R. J., **Edenhofer**, O., Kriegler, E., 2013. Global fossil energy markets and climate change mitigation: an analysis with REMIND. Climatic Change.

Baur, A.H., Thess, M., Kleinschmit, B., **Creutzig**, F., 2013. Urban climate change mitigation in Europe: looking at and beyond the role of population density. Journal of Urban Planning and Development 140, 04013003.

Bertram, C., Luderer, G., Pietzcker, R. C., Schmid, E., Kriegler, E., **Edenhofer,** O., 2015. Complementing carbon prices with technology policies to keep climate targets within reach. Nature Climate Change 5, 235–239.

Biewald, A., **Kowarsch**, M., Lotze-Campen, H., Gerten, D., 2015. Ethical aspects in the economic modeling of water policy options. Global Environmental Change 30, 80–91.

Bren d'Amour, C., **Wenz**, L., **Kalkuhl**, M., **Steckel**, J.C., **Creutzig**, F., 2016. Teleconnected food supply shocks. Environmental Research Letters 11, 035007.

Carraro, C., **Edenhofer**, O., **Flachsland**, C., Kolstad, C., Stavins, R., Stowe, R., 2015. The IPCC at a crossroads: Opportunities for reform. Science 350, 34–35.

Chen, C.M., Gütschow, J., Vieweg, M., Macey, K., Schaeffer, M., 2013. Impact of the Doha outcome on surplus emission allowances and their effect on developed country emissions. Climatic Change 120, 845–857.

Creutzig, F., 2014a. Economic and ecological views on climate change mitigation with bioenergy and negative emissions. GCB Bioenergy.

Creutzig, F., 2014b. How fuel prices determine public transport infrastructure, modal shares and urban form. Urban Climate 10, 63–76.

Creutzig, F., 2015a. Evolving Narratives of Low-Carbon Futures in Transportation. Transport Reviews 1–20.

Creutzig, F., 2015b. Towards typologies of urban climate and global environmental change. Environmental Research Letters 10.

Creutzig, F., **Baiocchi**, G., Bierkandt, R., Pichler, P.-P., Seto, K.C., 2015a. Global typology of urban energy use and potentials for an urbanization mitigation wedge. Proceedings of the National Academy of Sciences 112, 6283–6288.

Creutzig, F., Corbera, E., Bolwig, S., Hunsberger, C., 2013. Integrating place-specific livelihood and equity outcomes into global assessments of bioenergy deployment. Environmental Research Letters 8, 035047.

Creutzig, F., Goldschmidt, J.C., Lehmann, P., Schmid, E., von Blücher, F., Breyer, C., **Fernandez-Milan**, B., **Jakob**, M., **Knopf**, B., **Lohrey,** S., 2014a. Catching two European birds with one renewable stone: Mitigating climate change and Eurozone crisis by an energy transition. Renewable and Sustainable Energy Reviews 38, 1015–1028.

Creutzig, F., Hedahl, M., Rydge, J., Szulecki, K., 2014b. Challenging the European Climate Debate: Can Universal Climate Justice and Economics be Reconciled with Particularistic Politics? Global Policy 5, 6–14.

Creutzig, F., Jochem, P., Edelenbosch, O.Y., **Mattauch**, L., van Vuuren, D.P., McCollum, D., **Minx**, J.C., 2015b. Transport: A roadblock to climate change mitigation? Science 350, 911–912.

Creutzig, F., **Mattauch**, L., 2013. Fleurbaey, M., D. Blanchet: Beyond GDP. Measuring Welfare and Assessing Sustainability. Ecological Economics 94, 164–165.

Creutzig, F., Ravindranath, N.H., Berndes, G., Bolwig, S., Bright, R., Cherubini, F., Chum, H., Corbera, E., Delucchi, M., Faaij, A., 2015c. Bioenergy and climate change mitigation: an assessment. GCB Bioenergy 7, 916–944.

Dao, N.T., Dávila, J., 2014. Implementing Steady State Efficiency in Overlapping Generations Economies with Environmental Externalities. Journal of Public Economic Theory 16, 620–649.

Deuber, O., Luderer, G., **Edenhofer**, O., 2013. Physico-economic evaluation of climate metrics: A conceptual framework. Environmental Science & Policy 29, 37–45.

Edenhofer et al, 2014. Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. In: Climate Change 2014: Mitigation of Climate Change. Cambridge, United Kingdom and New York, USA.

Edenhofer, O., 2014. Reforming emissions trading. Nature Clim. Change 4, 663–664.

Edenhofer, O., 2015. King Coal and the queen of subsidies. Science 349, 1286–1287.

Edenhofer, O., **Flachsland**, C., **Knopf**, B., 2015a. Science and religion in dialogue over the global commons. Nature Clim. Change 5, 907–909.

Edenhofer, O., **Hirth**, L., **Knopf**, B., Pahle, M., Schlömer, S., Schmid, E., Ueckerdt, F., 2013. On the economics of renewable energy sources. Energy Economics, Supplement Issue: Fifth Atlantic Workshop in Energy and Environmental Economics 40, Supplement 1, S12–S23.

Edenhofer, O., **Jakob**, M., **Creutzig**, F., **Flachsland**, C., **Fuss**, S., **Kowarsch**, M., Lessmann, K., **Mattauch**, L., **Siegmeier**, J., **Steckel**, J.C., 2015b. Closing the emission price gap. Global environmental change 31, 132–143.

Edenhofer, O., Kadner, S., **von Stechow**, C., **Schwerhoff**, G., Luderer, G., 2013. Linking climate change mitigation research to sustainable development. In: Handbook of Sustainable Development: Second Edition. Edward Elgar Publishing, pp. 476 – 499.

Edenhofer, O., **Knopf**, B., Luderer, G., 2013a. Reaping the benefits of renewables in a nonoptimal world. Proceedings of the National Academy of Sciences of the United States of America (PNAS) 110, 11666–11667.

Edenhofer, O., **Kowarsch**, M., 2015. Cartography of pathways: A new model for environmental policy assessments. Environmental Science & Policy 51, 56–64.

Edenhofer, O., **Mattauch**, L., **Siegmeier**, J., 2015c. Hypergeorgism: When rent taxation is socially optimal. FinanzArchiv / Public Finance Analysis 71, 474–505.

Edenhofer, O., **Minx**, J.C., 2014. Mapmakers and navigators, facts and values. Science 345, 37–38.

Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Farahani, E., Kadner, S., Seyboth, K., 2014. IPCC 2014: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Transport.

Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Kadner, S., **Minx**, J.C., Brunner, S., **Creutzig**, F., **von Stechow**, C., 2014a. IPCC 2014: Technical Summary. IPCC WGIII Fifth Assessment Report - Mitigation of Climate Change 2014.

Edenhofer, O., Seyboth, K., 2013. Intergovernmental Panel on Climate Change (IPCC) A2 - Shogren, Jason F. In: Encyclopedia of Energy, Natural Resource, and Environmental Economics. Elsevier, Waltham, pp. 48–56.

Edenhofer, O., Seyboth, K., **Creutzig**, F., Schloemer, S., 2013b. On the sustainability of renewable energy sources. Annual Review of Environment and Resources 38, 169–200.

Edenhofer, O., **Steckel**, J.C., **Jakob**, M., 2014. Does environmental sustainability contradict prosperity? Global Policy 5, 15–20.

Fernandez-Milan, B., 2015. How participatory planning processes for transit-oriented development contribute to social sustainability. Journal of Environmental Studies and Sciences 1–5.

Fernandez Milan, B., **Creutzig**, F., 2015. Reducing urban heat wave risk in the 21st century. Current Opinion in Environmental Sustainability 14, 221–231.

Fernandez Milan, B., **Creutzig**, F., 2016. Municipal policies accelerated urban sprawl and public debts in Spain. Land Use Policy.

Fernandez Milan, B., **Kapfer**, D., **Creutzig**, F., 2015. A systematic framework of location value taxes reveals dismal policy design in most European countries. Land Use Policy 51, 335–349.

Franks, M., **Edenhofer**, O., Lessmann, K., 2015. Why Finance Ministers Favor Carbon Taxes, Even if They Do Not Take Climate Change into Account. Harvard Project on Climate Agreements, Discussion Paper 2015-67.

Fuss, S., Canadell, J.G., Peters, G.P., Tavoni, M., Andrew, R.M., Ciais, P., Jackson, R.B., Jones, C.D., Kraxner, F., Nakicenovic, N., Le Quéré, C., Raupach, M.R., Sharifi, A., Smith, P., Yamagata, Y., 2014. Betting on negative emissions. Nature Clim. Change 4, 850–853.

Fuss, S., Havlík, P., Szolgayová, J., Schmid, E., Reuter, W.H., Khabarov, N., Obersteiner, M., Ermoliev, Y., Ermolieva, T., Kraxner, F., 2015. Global food security & adaptation under crop yield volatility. Technological Forecasting and Social Change 98, 223–233.

Fuss, S., Reuter, W.H., Szolgayová, J., Obersteiner, M., 2013. Optimal mitigation strategies with negative emission technologies and carbon sinks under uncertainty. Climatic Change 118, 73–87.

Gerten, D., Lucht, W., Oestberg, S., Heinke, J., **Kowarsch**, M., Kreft, H., Kundzewicz, Z., Rastgooy, J., Warren, R., Schnellnhuber, H., 2013. Asynchronous exposure to global warming: freshwater resources and terrestrial ecosystems. Environmental Research Letters Volume 8, Nr. 3.

Grosjean, G., Acworth, W., **Flachsland**, C., Marschinski, R., 2014. After monetary policy, climate policy: is delegation the key to EU ETS reform? Climate Policy 16, 1–25.

Grunewald, N., **Jakob**, M., Mouratiadou, I., 2014. Decomposing inequality in CO_2 emissions: The role of primary energy carriers and economic sectors. Ecological Economics 100, 183–194.

Gschwind, B., Lefevre, M., Blanc, I., Ranchin, T., Wyrwa, A., Drebszok, K., Cofala, J., **Fuss**, S., 2015. Including the temporal change in PM2.5 concentration in the assessment of human health impact: Illustration with renewable energy scenarios to 2050. Environmental Impact Assessment Review, Information technology and renewable energy - Modelling, simulation, decision support and environmental assessment 52, 62–68.

Havlík, P., Valin, H., Herrero, M., Obersteiner, M., Schmid, E., Rufino, M.C., Mosnier, A., Thornton, P.K., Böttcher, H., Conant, R.T., Frank, S., Fritz, S., **Fuss**, S., Kraxner, F., Notenbaert, A., 2014. Climate change mitigation through livestock system transitions. PNAS 111, 3709–3714.

Hirth, L., Ueckerdt, F., **Edenhofer**, O., 2014. Why Wind Is Not Coal: On the Economics of Electricity. The Energy Journal 37.

Hirth, L., Ueckerdt, F., **Edenhofer**, O., 2015. Integration costs revisited - An economic framework for wind and solar variability. Renewable Energy 74, 925–939.

Hubacek, K., Feng, K., **Minx**, J.C., Pfister, S., Zhou, N., 2014. Teleconnecting Consumption to Environmental Impacts at Multiple Spatial Scales. Journal of Industrial Ecology 18, 7–9.

Hunsberger, C., Bolwig, S., Corbera, E., **Creutzig**, F., 2014. Livelihood impacts of biofuel crop production: Implications for governance. Geoforum 54, 248–260.

Jäger, J., Nakicenovic, N., **Fuss**, S., K.C., S., Rovenskaya, E., Wagner, F., 2015. Special Issue based on IIASA's 40th Anniversary Conference Guest Editorial. Technological Forecasting and Social Change 98, 211–212.

Jakob, M., Brunner, S., 2014. Optimal Commitment Under Uncertainty: Adjustment Rules for Climate Policy. SBE 4, 291–310.

Jakob, M., **Chen**, C., **Fuss**, S., **Marxen**, A., **Edenhofer**, O., 2015a. Development incentives for fossil fuel subsidy reform. Nature Clim. Change 5, 709–712.

Jakob, M., **Edenhofer**, O., 2014. Green growth, degrowth, and the commons. Oxford Review of Economic Policy 30, 447–468.

Jakob, M., **Edenhofer**, O., 2015. Welfare with or without growth? Do we need to reduce economic activity to protect the environment and increase the quality of life? GAiA - Ecological Perspectives for Science and Society 24, 240–242.

Jakob, M., **Hilaire**, J., 2015a. Climate science: Unburnable fossil-fuel reserves. Nature 517, 150–152.

Jakob, M., **Hilaire**, J., 2015b. Using importers' windfall savings from oil subsidy reform to enhance international cooperation on climate policies. Climatic Change 131, 465–472.

Jakob, M., Lessmann, K., Wildgrube, T., 2014. The Role of Emissions Trading and Permit Allocation in International Climate Agreements with Asymmetric Countries. SBE 4, 361–392.

Jakob, M., Marschinski, R., Hübler, M., 2013. Between a Rock and a Hard Place: A Trade-Theory Analysis of Leakage Under Production- and Consumption-Based Policies. Environ Resource Econ 56, 47–72.

Jakob, M., **Steckel**, J.C., 2014. How climate change mitigation could harm development in poor countries. WIREs Climate Change 5, 161–168.

Jakob, M., **Steckel**, J.C., **Edenhofer**, O., 2014a. Consumption- versus production-based emission policies. Annual Review of Resource Economics 6, 297–318.

Jakob, M., **Steckel**, J.C., **Flachsland**, C., Baumstark, L., 2015b. Climate finance for developing country mitigation: blessing or curse? Climate and Development 7, 1–15.

Jakob, M., **Steckel**, J.C., Klasen, S., Lay, J., Grunewald, N., Martínez-Zarzoso, I., Renner, S., **Edenhofer**, O., 2014b. Feasible mitigation actions in developing countries. Nature Climate Change 4, 961–968.

Jakob, M., **Chen**, C., **Fuss**, S., **Marxen**, A., Rao, N., **Edenhofer**, O., 2016. Carbon pricing revenues could close infrastructure access gaps, World Development, in press

Joas, F., **Flachsland**, C., 2016. The (ir)relevance of transaction costs in climate policy instrument choice: an analysis of the EU and the US. Climate Policy 16, 26–49.

Kagawa, S., Suh, S., Hubacek, K., Wiedmann, T., Nansai, K., **Minx**, J.C., 2015. CO_2 emission clusters within global supply chain networks: Implications for climate change mitigation. Global Environmental Change 35, 486–496.

Kalkuhl, M., **Edenhofer**, O., 2014. Managing the climate rent: How can regulators implement intertemporally efficient mitigation policies? Natural Resource Modeling 27, 25–60.

Kalkuhl, M., **Edenhofer**, O., Lessmann, K., 2013. Renewable energy subsidies: Second-best policy or fatal aberration for mitigation? Resource and Energy Economics 35, 217–234.

Kalkuhl, M., **Edenhofer**, O., Lessmann, K., 2015. The role of carbon capture and sequestration policies for climate change mitigation. Environmental and Resource Economics 60, 55–80.

Klein, D., Luderer, G., Kriegler, E., Strefler, J., Bauer, N., Leimbach, M., Popp, A., Dietrich, J.P., Humpenöder, F., Lotze-Campen, H., **Edenhofer**, O., 2014. The value of bioenergy in low stabilization scenarios: an assessment using REMIND-MAgPIE. Climatic Change 123, 705–718.

Klenert, D., **Mattauch**, L., 2015. How to make a carbon tax reform progressive: the role of subsistence consumption. Economics Letters 138, 100–103.

Klenert, D., **Mattauch**, L., **Edenhofer**, O., Lessmann, K. (2016) Infrastructure and Inequality: Insights from Incorporating Key Economic Facts about Household Heterogeneity. Accepted for publication in Macroeconomic Dynamics.

Knopf, B., Nahmmacher, P., Schmid, E., 2015. The European renewable energy target for 2030 – An impact assessment of the electricity sector. Energy Policy 85, 50–60.

Knopf, B., Pahle, M., Kondziella, H., Joas, F., **Edenhofer**, O., Bruckner, T., 2014a. Germany's nuclear phase-out: Sensitivities and impacts on electricity prices and CO_2 emissions. Economics of Energy & Environmental Policy 3, 89–105.

Koch, N., 2014a. Dynamic linkages among carbon, energy and financial markets: a smooth transition approach. Applied Economics 46, 715–729.

Koch, N., 2014b. Tail events: A new approach to understanding extreme energy commodity prices. Energy Economics 43, 195–205.

Koch, N., **Fuss**, S., **Grosjean**, G., **Edenhofer**, O., 2014. Causes of the EU ETS price drop: Recession, CDM, renewable policies or a bit of everything? - New evidence. Energy Policy 73, 676–685.

Kowarsch, M., 2015. Policy assessments to enhance EU scientific advice. Nature Climate change 6, 15–17.

Kraxner, F., Aoki, K., Leduc, S., Kindermann, G., **Fuss**, S., Yang, J., Yamagata, Y., Tak, K.-I., Obersteiner, M., 2014. BECCS in South Korea - Analyzing the negative emissions potential of bioenergy as a mitigation tool. Renewable Energy, World Renewable Energy Congress – Sweden, 8–13 May, 2011, Linköping, Sweden 61, 102–108.

Kraxner, F., Nordström, E.-M., Havlík, P., Gusti, M., Mosnier, A., Frank, S., Valin, H., Fritz, S., **Fuss**, S., Kindermann, G., McCallum, I., Khabarov, N., Böttcher, H., See, L., Aoki, K., Schmid, E., Máthé, L., Obersteiner, M., 2013. Global bioenergy scenarios – Future forest development, land-use implications, and trade-offs. Biomass and Bioenergy 57, 86–96.

Kriegler, E., **Edenhofer**, O., Reuster, L., Luderer, G., Klein, D., 2013. Is atmospheric carbon dioxide removal a game changer for climate change mitigation? Climatic Change 118, 45–57.

Kriegler, E., Riahi, K., Bauer, N., Schwanitz, V.J., Petermann, N., Bosetti, V., Marcucci, A., Otto, S., Paroussos, L., Rao, S., Arroyo Currás, T., Ashina, S., Bollen, J., Eom, J., Hamdi-Cherif, M., Longden, T., Kitous, A., Méjean, A., Sano, F., Schaeffer, M., Wada, K., Capros, P., P. van Vuuren, D., **Edenhofer**, O., 2015. Making or breaking climate targets: The AMPERE study on staged accession scenarios for climate policy. Technological Forecasting and Social Change 90, Part A, 24–44.

Kriegler, E., Riahi, K., Bauer, N., Schwanitz, V.J., Petermann, N., Bosetti, V., Marcucci, A., Otto, S., Paroussos, L., Rao-Skirbekk, S., Currás, T.A., Ashina, S., Bollen, J., Eom, J., Hamdi-Cherif, M., Longden, T., Kitous, A., Méjean, A., Sano, F., Schaeffer, M., Wada, K., Capros, P., van Vuuren, D.P., **Edenhofer**, O., Bertram, C., Bibas, R., Edmonds, J., Johnson, N., Krey, V., Luderer, G., McCollum, D., Jiang, K., 2015a. A short note on integrated assessment modeling approaches: Rejoinder to the review of 'Making or breaking climate targets - The AMPERE study on staged accession scenarios for climate policy'. Technological Forecasting & Social Change 99, 273–276.

Kriegler, E., Riahi, K., Bosetti, V., Capros, P., Petermann, N., van Vuuren, D.P., Weyant, J.P., **Edenhofer**, O., 2015b. Introduction to the AMPERE model intercomparison studies on the economics of climate stabilization. Technological Forecasting and Social Change 90, 1–7.

Kunreuther, H., Heal, G., Allen, M., **Edenhofer**, O., Field, C.B., Yohe, G., 2013. Risk management and climate change. Nature Climate Change 3, 447–450.

Leclère, D., Havlík, P., **Fuss**, S., Schmid, E., Mosnier, A., Walsh, B., Valin, H., Herrero, M., Khabarov, N., Obersteiner, M., 2014. Climate change induced transformations of agricultural systems: insights from a global model. Environ. Res. Lett. 9, 124018.

Lessmann, K., Marschinski, R., Finus, M., **Kornek**, U., **Edenhofer**, O., 2014. Emissions Trading with Non-signatories in a Climate Agreement - an Analysis of Coalition Stability. The Manchester School 82, 82–109.

Linkov, I., Bridges, T., **Creutzig**, F., Decker, J., Fox-Lent, C., Kröger, W., Lambert, J.H., Levermann, A., Montreuil, B., Nathwani, J., 2014. Changing the resilience paradigm. Nature Climate Change 4, 407–409.

Hirth, L., Ziegenhagen, I., 2015. Balancing power and variable renewables: Three links. Renewable and Sustainable Energy Reviews 50, 1035–1051.

Lohrey, S., **Creutzig**, F., 2015. A "sustainability window" of urban form. Transportation Research Part D: Transport and Environment.

Luderer, G., Pietzcker, R.C., Bertram, C., Kriegler, E., Meinshausen, M., **Edenhofer**, O., 2013. Economic mitigation challenges: how further delay closes the door for achieving climate targets. Environmental Research Letters 8.

Mach, K. J., Planton, S., **von Stechow**, C., 2014. IPCC 2014: Annex II: Glossary. IPCC, 2014: Climate Change 2014: Synthesis Report, Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R. K. Pachauri and L. A. Meyer (eds.)]. IPCC, Geneva, Switzerland, pp. 117-129. 117–129.

Mattauch, L., **Creutzig**, F., 2013. Beyond GDP: Measuring Welfare and Assessing Sustainability. In: Beyond GDP: Measuring Welfare and Assessing Sustainability.

Mattauch, L., **Creutzig**, F., **Edenhofer**, O., 2015a. Avoiding Carbon Lock-In: Policy Options for Advancing Structural Change. Economic Modelling 50, 49–63.

Mattauch, L., **Edenhofer**, O., **Klenert**, D., Bénard S., 2016. Distributional effects of public investment when wealth and classes are back. Metroeconomica.

Mattauch, L., Ridgway, M., **Creutzig**, F., 2015b. Happy or liberal? Making sense of behavior in transport policy design. Transportation Research Part D: Transport and Environment.

Minx, J.C., **Baiocchi**, G., Wiedmann, T., Barrett, J., **Creutzig**, F., Feng, K., Förster, M., Pichler, P.-P., Weisz, H., Hubacek, K., 2013. Carbon footprints of cities and other human settlements in the UK. Environmental Research Letters 8, 035039.

Nemet, G.F., Grubler, A., Kammen, D.M., 2016. Countercyclical energy and climate policy for the U.S. WIREs Clim Change 7, 5–12.

Pachauri, R. K. (Chair), **Edenhofer**, O., **Minx**, J.C., 2014. IPCC 2014: Climate Change 2014: Synthesis Report. IPCC, 2014: Climate Change 2014: Synthesis Report, Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Pahle, M., Lessmann, K., **Edenhofer**, O., Bauer, N., 2013. Investments in imperfect power markets under carbon pricing: A case study based analysis. The Energy Journal 34, 199–227.

Plevin, R., Delucchi, M., **Creutzig**, F., 2014. Response to Comments on "Using Attributional Life Cycle Assessment to Estimate Climate-Change Mitigation...." Journal of Industrial Ecology 18, 468–470.

Plevin, R.J., Delucchi, M.A., **Creutzig**, F., 2014a. Response to "On the uncanny capabilities of consequential LCA" by Sangwon Suh and Yi Yang (Int J Life Cycle Assess, doi: 10.1007/s11367-014-0739-9). The International Journal of Life Cycle Assessment 19, 1559.

Plevin, R.J., Delucchi, M.A., **Creutzig**, F., 2014b. Using attributional life cycle assessment to estimate climate-change mitigation benefits misleads policy makers. Journal of Industrial Ecology 18, 73–83.

Radebach, A., Donner, R.V., Runge, J., Donges, J.F., Kurths, J., 2013. Disentangling different types of El Niño episodes by evolving climate network analysis. Physical Review E 88.

Riahi, K., Kriegler, E., Johnson, N., Bertram, C., den Elzen, M., Eom, J., Schaeffer, M., Edmonds, J., Isaac, M., Krey, V., Longden, T., Luderer, G., Méjean, A., McCollum, D., Mima, S., Turton, H., van Vuuren, D.P., Wada, K., Bosetti, V., Capros, P., Criqui, P., Hamdi-Cherif, M., Kainuma, M., **Edenhofer**, O., 2015. Locked into Copenhagen pledges - Implications of short-term emission targets for the cost and feasibility of long-term climate goals. Technological Forecasting and Social Change 90, Part A, 8–23.

Robledo-Abad, C., Althaus, H.J., Berndes, G., Bolwig, S., Corbera, E., **Creutzig**, F., Garcia-Ulloa, J., Geddes, A., Gregg, J.S., Haberl, H., 2016. Bioenergy production and sustainable development: science base for policy-making remains limited. GCB Bioenergy.

Sanders, M., **Fuss**, S., Engelen, P.-J., 2013. Mobilizing private funds for carbon capture and storage: An exploratory field study in the Netherlands. International Journal of Greenhouse Gas Control 19, 595–605.

Schmid, E., **Knopf**, B., 2015. Quantifying the long-term economic benefits of European electricity system integration. Energy Policy 87, 260–269.

Schmid, E., **Knopf**, B., Pechan, A., 2016. Putting an energy system transformation into practice: The case of the German Energiewende. Energy Research & Social Science 11, 263–275.

Schwerhoff, G., 2016a. Review: Llavador, Humberto G., Roemer, John E. and Silvestre, Joaquim: Sustainability for a warming planet. Journal of Economics 117, 85–88.

Schwerhoff, G., 2016b. The economics of leadership in climate change mitigation. Climate Policy 16, 196–214.

Sims, R., Schaeffer, R., **Creutzig**, F., Cruz-Núñez, X., D'agosto, M., Dimitriu, D., Figueroa Meza, M.J., Fulton, L., Kobayashi, S., Lah, O., 2014. Chapter 8: transport. Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Smith, P., Davis, S.J., **Creutzig**, F., **Fuss**, S., **Minx**, J.C., Gabrielle, B., Kato, E., Jackson, R.B., Cowie, A., Kriegler, E., 2015. Biophysical and economic limits to negative CO_2 emissions. Nature Climate Change 6, 42–50.

Solecki, W., Seto, K.C., Balk, D., Bigio, A., Boone, C.G., **Creutzig**, F., Fragkias, M., Lwasa, S., Marcotullio, P., Romero-Lankao, P., 2015. A conceptual framework for an urban areas typology to integrate climate change mitigation and adaptation. Urban Climate 14, 116–137.

Steckel, J.C., **Brecha**, R.J., **Jakob**, M., Strefler, J., Luderer, G., 2013. Development without energy? Assessing future scenarios of energy consumption in developing countries. Ecological Economics 90, 53–67.

Steckel, J.C., **Edenhofer**, O., **Jakob**, M., 2015. Drivers for the renaissance of coal. Proceedings of the National Academy of Sciences of the United States of America (PNAS) 112, E3775–E3781.

Swart, R., **Fuss**, S., Obersteiner, M., Ruti, P., Teichmann, C., Vautard, R., 2013. Beyond vulnerability assessment. Nature Clim. Change 3, 942–943.

Szolgayová, J., Golub, A., **Fuss**, S., 2014. Innovation and risk-averse firms: Options on carbon allowances as a hedging tool. Energy Policy 70, 227–235.

Ueckerdt, F., **Hirth**, L., Luderer, G., **Edenhofer**, O., 2013. System LCOE: What are the costs of variable renewables? Energy 63, 61–75.

von Stechow, C., McCollum, D., Riahi, K., **Minx**, J.C., Kriegler, E., van Vuuren, D.P., Jewell, J., Robledo-Abad, C., Hertwich, E., Tavoni, M., Mirasgedis, S., Lah, O., Roy, J., Mulugetta, Y., Dubash, N.K., Bollen, J., Ürge-Vorsatz, D., **Edenhofer**, O., 2015. Integrating Global Climate Change Mitigation Goals with Other Sustainability Objectives: A Synthesis. Annual Review of Environment and Resources 40.

von Stechow, C., **Minx**, J.C., Riahi, K., Jewell, J., McCollum, D.L., Callaghan, M.W., Bertram, C., Luderer, G., **Baiocchi**, G., 2016. 2°C and SDGs: United they stand, divided they fall? Environmental Research Letters.

Ward, H., **Burger**, M., Chang, Y.-J., Fürstmann, P., Neugebauer, S., **Radebach**, A., Sproesser, G., Pittner, A., Rethmeier, M., Uhlmann, E., **Steckel**, J.C., 2016. Assessing carbon dioxide emission reduction potentials of improved manufacturing processes using multiregional input output frameworks. Journal of Cleaner Production.

Wehkamp, J., Aquino, A., **Fuss**, S., Reed, E.W., 2015. Analyzing the perception of deforestation drivers by African policy makers in light of possible REDD+ policy responses. Forest Policy and Economics 59, 7–18.

Wenz, L., Willner, S.N., **Radebach**, A., Bierkandt, R., **Steckel**, J.C., Levermann, A., 2015. Regional and Sectoral Disaggregation of Multi-Regional Input-Output Tables - A flexible Algorithm. Economic Systems Research 27, 194–212.

Zimmer, A., **Jakob**, M., **Steckel**, J.C., 2015. What motivates Vietnam to strive for a low-carbon economy? - On the drivers of climate policy in a developing country. Energy for Sustainable Development 24, 19–32.

OTHER PUBLICATIONS (SINCE 2013)

Bongardt, D., **Creutzig**, F., Hüging, H., Sakamoto, K., Bakker, S., Gota, S., Böhler-Baedeker, S., 2013. Low-carbon land transport: policy handbook. Routledge.

Dao, N.T., 2015. From agriculture to manufacturing: How does geography matter? Cliometrica 1–33.

Dao, N.T., Dávila, J., 2015. Gender inequality, technological progress, and the demographic transition (No. 2015/38), CORE Discussion Paper. Université catholique de Louvain.

Dao, N.T., **Edenhofer**, O., 2014. On the fiscal strategies of escaping poverty-environment traps towards sustainable growth (No. No. 4865), CESifo Working Paper.

Schepaschenko, D., Kraxner, F., See, L., **Fuss**, S., McCallum, I., Fritz, S., Perger, C., Shvidenko, A., Kindermann, G., Frank, S., Tum, M., Schmid, E., Balkovič, J., Gunther, K., 2015. Global Biomass Information: From Data Generation to Application. In: Handbook of Clean Energy Systems - Volume 1 Renewable Energy, Edition: 2015, Chapter: 2, Publisher: John Wiley & Sons, Ltd., Editors: Jinyue Yan, pp.11-33. John Wiley & Sons, Ltd, Chichester, UK.

Edenhofer, O., 2014a. Globale Klima- und Energiepolitik nach Durban. In: Wettstreit Um Ressourcen Konflikte Um Klima, Wasser Und Boden. oekom, München, pp. 61–74.

Edenhofer, O., 2014b. Navigationshilfe im Wettlauf gegen die Uhr - Fünfter Sachstandsbericht des Weltklimarats IPCC. Politische Ökologie 32, 27–31.

Edenhofer, O., Fischedick, M., Löschel, A., 2015a. Eine andere globale Klimapolitik? Energiewirtschaftliche Tagesfragen 65, 28–31.

Edenhofer, O., **Flachsland**, C., 2013. Globale Energiewende - Wege zu einer nachhaltigen Energieversorgung 275–295.

Edenhofer, O., **Flachsland**, C., 2014. Globale Energiewende. Dekarbonisierung der Wirtschaft.

Edenhofer, O., **Flachsland**, C., 2015. Laudato si'. Stimmen der Zeit 233, 579–591.

Edenhofer, O., **Flachsland**, C., **Jakob**, M., Lessmann, K., 2015d. The atmosphere as a global commons : challenges for international cooperation and governance. In: The Oxford Handbook of the Macroeconomics of Global Warming, The Oxford Handbook of the Macroeconomics of Global Warming. - Oxford [u.a.] : Oxford Univ. Press, ISBN 978-0-19-985697-8. - 2015, S. 260-296.

Edenhofer, O., **Flachsland**, C., Stavins, R., Stowe, R., 2013a. Identifying Options for a New International Climate Regime Arising from the Durban Platform for Enhanced Action.

Edenhofer, O., **Jakob**, M., **Steckel**, J., 2013b. Wohlstand und ökologische Nachhaltigkeit - ein Widerspruch? ifo Schnelldienst 66, 22–25.

Edenhofer, O., Kadner, S., **Minx**, J.C., 2015e. Ist das Zwei-Grad-Ziel wünschenswert und ist es noch erreichbar? Der Beitrag der Wissenschaft zu einer politischen Debatte. In: Stratmann, M., Marotzke, J. (eds): Die Zukunft Des Klimas - Neue Erkenntnisse, Neue Herausforderungen, Verlag C.H. Beck. pp. 69–92.

Edenhofer, O., Kadner, S., **von Stechow**, C., **Minx**, J.C., 2015f. Au-delà de la limite de 2°C 49–68.

Edenhofer, O., Kadner, S., **von Stechow**, C., **Minx**, J.C., 2015g. Beyond the 2°C limit: Facing the economic and institutional challenges. In: Barrett, S., Carraro, C., de Melo, J. (eds.), Towards a Workable and Effective Climate Regime, A VoxEU.org eBook. CEPR Press, London, UK, pp. 49–68.

Edenhofer, O., **Kowarsch**, M., 2015. Ausbruch aus dem stahlharten Gehäuse der Hörigkeit: ein neues Modell wissenschaftlicher Politikberatung 83–106.

Edenhofer, O., **Mattauch**, L., **Siegmeier**, J., 2013c. Hypergeorgism: When is Rent Taxation as a Remedy for Insufficient Capital Accumulation Socially Optimal?

Edenhofer, O., Normark, B., Tardieu, B., 2014. Euro-CASE Policy Position Paper: Reform Options for the European Emissions Trading System (EU ETS). European Council of Academies of Applied Sciences, Technologies and Engineering.

Edenhofer, O., Seyboth K., 2013. Intergovernmental Panel on Climate Change (IPCC) 48–56.

Edenhofer, O., **Flachsland**, C., 2013. Auf mehreren Ebenen agieren. In: Baustelle Zukunft - Die Große Transformation von Wirtschaft Und Gesellschaft. oekom, pp. 108–117.

Flachsland, C., **Edenhofer**, O., 2013. Auf mehreren Ebenen agieren. Klimaschutz und Transformation. Politische Ökologie 31, 108–116.

Franks, M., **Edenhofer**, O., Lessmann K., 2015. Why Finance Ministers Favor Carbon Taxes, Even if They Do Not Take Climate Change into Account. Harvard Project on Climate Agreements, Discussion Paper 2015-67.

Franks, M., **Klenert**, D., Schultes, A., Lessmann, K., **Edenhofer**, O., 2015. Bequest heterogeneity and wealth distribution in an overlapping generations economy (mimeo).

Fuss, S., **Edenhofer**, O., **Chen**, C., **Jakob**, M., **Marxen**, A., 2015. Could Resource Rents Finance Universal Access to Infrastructure? A First Exploration of Needs and Rents. FEEM - Fondazione Eni Enrico Mattei - Publication.

Garard, J., Chodorowska, D., Range, C., Hagemann, N., 2015. Research Gaps on Stakeholder Participation in EIA, RIA and GEA. In: LIAISE Innovation Report, S. 23–39.

Gobbi, P.E., Parys, J., **Schwerhoff**, G., 2015. Intra-Household Allocation of Parental Leave (No. 2015-20), IRES Discussion Papers.

Grosjean, G., Acworth, W., **Flachsland**, C., Marschinski, R., 2014. After monetary policy, climate policy: is delegation the key to EU ETS reform? Climate Policy 16, 1–25.

Grubler, A., **Fuss**, S., McCollum, D., Krey, V., Riahi, K., 2013. Technology Portfolios: Modelling Technological Uncertainty and Innovation Risks. In: Energy Technology Innovation. Cambridge University Press.

Heitzig, J., **Edenhofer**, O., 2013. Cap, Insure & Compensate: Domestic Policies and the Ratification of International Environmental Agreements.

Hirth, L., **Radebach**, A., 2016. The Market Value of Wind and Solar Power: An Analytical Approach.

Jakob, M., **Edenhofer**, O., 2014. Multiple Objectives for the Governance of the Global Commons. In: 4. Jahrbuch Nachhaltige Ökonomie - Im Brennpunkt: Die Energiewende Als Gesellschaftlicher Transformationsprozess. Metropolis, Marburg, pp. 139–172.

Jakob, M., **Hilaire**, J., 2015. Climate science: Unburnable fossil-fuel reserves. Nature 517, 150–152.

Kalkuhl, M., **Edenhofer**, O. 2015. Deforestation, Land Taxes and Development. Conference paper for 21st Annual Conference of the European Association of Environmental and Resource Economists, Helsinki, Finland.

Klenert, D., **Mattauch**, L., **Edenhofer**, O., Lessmann, K., 2014. Infrastructure and Inequality: Insights from Incorporating Key Economic Facts about Household Heterogeneity. CESIFO Working Paper NO. 4972

Klenert, D., **Schwerhoff**, G., **Edenhofer**, O., **Mattauch**, L., 2015. Carbon Taxation, Inequality and Engel's Law – The Double Dividend of Redistribution (mimeo).

Knopf, B., 2016. After the Paris Agreement, 2016 could become the year of carbon pricing. Green Growth Knowledge Platform.

Knopf, B., **Koch**, N., **Grosjean**, G., **Fuss**, S., **Flachsland**, C., Pahle, M., **Jakob**, M., **Edenhofer**, O., 2014b. The European Emissions Trading System (EU ETS): Ex-Post Analysis, the Market Stability Reserve and Options for a Comprehensive Reform. Note di lavoro 79.2014

Koch, N., **Grosjean**, G., **Fuss**, S., **Edenhofer**, O., 2015. Politics Matters: Regulatory Events as Catalysts for Price Formation Under Cap-and-Trade (SSRN Scholarly Paper No. ID 2603115). Social Science Research Network, Rochester, NY.

Kowarsch, M., 2014. What are scientific assessments? Working paper, 2014_Work_MCC4.

Kowarsch, M., **Edenhofer**, O., 2014. Vom Umgang mit Wertekonflikten in wissenschaftlichen Gutachten zur Klimapolitik. In: Bedroht Entscheidungsfreiheit Gesundheit Und Nachhaltigkeit? Zwischen Notwendigen Grenzen Und Bevormundung. Mentis, Münster, pp. 139–163.

Kowarsch, M., **Edenhofer**, O., 2015. Experts as Cartographers of Policy Pathways for Europe. In: Wilsdon, J., R. Doubleday (eds.): Future Directions for Scientific Advice in Europe.

Kraxner, F., **Fuss**, S., Krey, V., Best, D., Leduc, S., Kindermann, G., Yamagata, Y., Schepaschenko, D., Shvidenko, A., Aoki, K., Yan, J, 2015. The role of bioenergy with carbon capture and storage (BECCS) for climate policy. In: The Handbook of Clean Energy Systems, Edition: 1, Publisher: John Wiley & Sons, Ltd, Editors: Yan J, pp.1466-1483. John Wiley & Sons, Ltd, Chichester, UK.

Kraxner, F., Yoshikawa, K., Leduc, S., **Fuss**, S., Aoki, K., Yamagata, Y., 2014. Renewable Energy Production from Waste to Mitigate Climate Change and Counteract Soil Degradation - A Spatial Explicit Assessment for Japan. EGU General Assembly 16.

Kriegler, E., Mouratiadou, I., Luderer, G., Bauer, N., Calvin, K., De Cian, E., **Brecha**, R., Chen, W., Cherp, A., Edmonds, J., Jiang, K., Pachauri, S., Sferra, F., Tavoni, M., **Edenhofer**, O., 2013. Roadmaps towards Sustainable Energy futures and climate protection.

Kriegler, E., Riahi, K., Petermann, N., Bosetti, V., Capros, P., van Vuuren, D. P., Criqui, P., Egenhofer, C., Fragkos, P., Johnson, N., Paroussos, L., Behrens, A., **Edenhofer**, O., 2014. Assessing Pathways toward Ambitious Climate Targets at the Global and European Levels A synthesis of results from the AMPERE project.

Laing, T., Taschini, L., Palmer, C., **Wehkamp**, J., **Fuss**, S., Reuter, W. H., 2015. Understanding the demand for REDD+ credits | Grantham Research Institute on climate change and the environment. Grantham Research Institute on Climate Change and the Environment Working Paper Series.

Mattauch, L., 2015. Rent and Redistribution. The welfare implications of financing low-carbon public investment. Technische Universität Berlin.

Mattauch, L., **Edenhofer**, O., **Klenert**, D., Bénard, S., 2014. Public Investment when Capital is Back - Distributional Effects of Heterogeneous Saving Behavior.

Mattauch, L., **Siegmeier**, J., **Edenhofer**, O., **Creutzig**, F., 2013. Financing Public Capital through Land Rent Taxation: A Macroeconomic Henry George Theorem.

Radebach, A., 2014. "Methodologie und Metrik" des 5. Sachstandsberichts der Arbeitsgruppe III des Intergovernmental Panel on Climate Chance (IPCC) (Contributing Author des Annex). Annex IPCC.

Schwerhoff, G., **Edenhofer**, O., 2013a. Is Capital Mobility Good for Public Good Provision? CESifo Working Paper No. 4420.

Schwerhoff, G., **Edenhofer**, O., 2013b. Low-Carbon Development through International Specialization. Beiträge zur Jahrestagung des Vereins für Socialpolitik 2013: Wettbewerbspolitik und Regulierung in einer globalen Wirtschaftsordnung - Session: Growth and Environment, No. C04-V1

Schwerhoff, G., **Edenhofer**, O., 2014. The Globalization Paradox Revisited (No. 4878), CESifo Working Paper.

See, L., Kraxner, F., **Fuss**, S., Perger, C., Schill, C., Aoki, K., Leduc, S., McCallum, I., Forsell, N., Fritz, S., 2015. The Potential of Crowdsourcing for the Renewable Energy Sector. In: Handbook of Clean Energy Systems. John Wiley & Sons, Ltd.

Siegmeier, J., 2016. Keeping Pigou on tracks: second-best combinations of carbon pricing and infrastructure provision (No. 02/2016), MCC Working Paper.

Siegmeier, J., **Mattauch**, L., **Edenhofer**, O., 2015. Climate Policy Enhances Efficiency: A Macroeconomic Portfolio Effect (No. No. 5161), CESifo Working Papers.

Siegmeier, J., **Mattauch**, L., Franks, M., **Klenert**, D., Schultes, A., **Edenhofer**, O., 2015. A Public Finance Perspective on Climate Policy: Six Interactions That May Enhance Welfare.

Staub-Kaminski, I., Zimmer, A., **Jakob**, M., Marschinski, R., 2014. CLIMATE POLICY IN PRACTICE: A TYPOLOGY OF OBSTACLES AND IMPLICATIONS FOR INTEGRATED ASSESSMENT MODELING. Climate Change Economics (CCE) 05.

Stuermer, M., **Schwerhoff**, G., 2015. Non-renewable resources, extraction technology, and endogenous growth (No. 1506), Federal Reserve Bank of Dallas Working Paper.

Wallacher, J., **Kowarsch**, M., 2013. Klimaschutz und Armutsbekämpfung: Ein Dilemma? In: Wallacher, J., J. Müller, M. Reder (eds.): Weltprobleme, 7. Ausg. Bayerische Landeszentrale für politische Bildung, München, pp. 253–274.

Wehkamp, J., 2014. Carbon cowboys - Wie der Klimawandel Bäume fast in Goldgruben verwandelt hätte. Internationale Politik Sonderbeilage 2014 / 1-2: Mercator Kolleg 2013; Verantwortung weltweit, Erfahrungen, Engagement 40–41.

Wehkamp, J., Develin, S., Williams, C., 2014. Ownership models for sustainable natural resource governance. NEF working paper.