

Sabine Fuss

Curriculum Vitae



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Employment History

Professor for “Nachhaltiges Ressourcenmanagement und Globaler Wandel”

Humboldt-Universität zu Berlin, Mathematisch-Naturwissenschaftliche Fakultät,
Geographisches Institut

July 2018 – current

Head of working group "Sustainable Resource Management & Global Change"

Mercator Research Institute on Global Commons and Climate Change, Berlin

April 2013 – current

Jubilee Professor 2019

Chalmers University of Technology, Physical Resource Theory, Gothenburg,
Sweden.

2019

Research Scholar at the Ecosystems Services and Management Program

International Institute for Applied Systems Analysis, Laxenburg, Austria

September 2007 – April 2013

Research Scholar at the Forestry Program

International Institute for Applied Systems Analysis, Laxenburg, Austria

November 2006 – December 2006

Junior Researcher (Assistant in Onderzoek) at the Economics Faculty

University of Maastricht, Maastricht, The Netherlands

September 2003 – September 2007

Education

PhD Defense

University of Maastricht, Maastricht, The Netherlands
April 2008

Young Scientist Summer Program

International Institute for Applied Systems Analysis, Laxenburg, Austria
June – August 2006

Ph.D. candidate

Thesis topic: 'Sustainable Energy Development under Uncertainty'
University of Maastricht /UNU-MERIT, The Netherlands
September 2003 – September 2007

M.Sc. in Economics

Thesis topic: 'Technical Change in the Electricity Sector: Optimum Portfolios in a Vintage Framework'
University of Maastricht, The Netherlands
August 2003

Education Abroad Program

University of California, Santa Barbara
Fall/winter 2002

Doctoral Education

- 09/2003-09/2007 - NAKE diploma (Network of General and Quantitative Economics, see www.nake.nl)
- 08/2005 - METEOR (Maastricht Research School of Economics of Technology and Organizations) PhD training with macroeconomics, microeconomics and econometrics courses (special courses in Bayesian modeling, overlapping generations models, economic growth, environmental economics and evolutionary economics).

Abitur: 1999 (grade: "sehr gut")

Languages

- German (native)
- English (fluent)
- Dutch (good)
- French (good)
- Spanish (good)

Research Interests

- Carbon Dioxide Removal, net-zero strategies
- Natural resource management, energy and agricultural economics (bioenergy, land use implications, water-food-GHG nexus, policy assessment and tradeoffs)
- Decision-making under uncertainty: portfolio selection, real options theory, stochastic optimization, robustness.
- Integrated assessment with focus on climate change mitigation (focus on the role of negative emission and interaction with other policy goals)
- Reconciling top-down and bottom-up assessments
- Mechanisms for carbon management, climate-compatible development, policy instruments (focus on emissions trading)
- Sustainable development (focus so far on infrastructure investments and food security)

Additional positions

- Member of the European Academy of Sciences (EURASC), Earth and Environmental Sciences Division
- Guest research scholar at the [Biodiversity and Natural Resources Program](#)

at the [International Institute for Applied Systems Analysis](#).

- Contributing author for IPCC AR6 WG1, chapter 5.
- Contributing author for IPCC AR6 WG2, chapter 16.
- Scientific Steering Committee member of the [Global Carbon Project](#) (until 2020)
- Lead author for [IPCC Special Report on Impacts of Global Warming of 1.5°C above Pre-industrial Levels and related Global Greenhouse Gas Emission Pathways](#).
- Editorial Board Member *Environmental Research Communications* (IOP)
- Associate Editor for Negative Emission Technologies at *Frontiers in Climate*
- Scientific Council Member of Carbon Management Chair at IFP School, Paris.
- Advisory Board C180
- Guest Editor for [Focus issue on tropical landscape restoration](#) at *Environmental Research Letters*
- [Austrian Panel on Climate Change](#)
- Contributing author for the [Emissions Gap Report 2017](#), UN Environment.
- Member of the UNOSD Expert Group on Achieving the SDGs with Water-Food-Ecosystem Resilience in the Mid-Latitude Region (since 2016).

Current PhD student supervision

- Since 2017 Sebastian Kraus (TU Berlin, MCC)
- Since 2019 Valentin Guye (co-supervision HU-Berlin and INRA, France)
- Since 2019 Ingrid Schulte (HU Berlin, MCC)
- Since 2020 Marina Andrijevic (HU Berlin)

Recent teaching

- Stadtwirtschaft, WiSe 2018/2019, 2019/2020, 2020/2021, 2021/2022 HU-Berlin, Geographical Institute (Masters level)
- Lecturer for the ENSYSTR 2019 PhD Student Workshop at Chalmers University, Gothenburg
- Urbanisierung und Nachhaltigkeit – die Stadt im Spannungsfeld des globalen Wandels, SoSe 2019, 2020 HU-Berlin, Geographical Institute (Masters level)
- Urban agriculture in Nairobi, Dar es Salaam and Berlin, SoSe 2021, HU Berlin, Geographical Institute (Masters level)
- Lecturer for the 18th Swiss Climate Summer School organized by Prof. Gruber et al.
- Lecturer for the EAERE Summer School 2021.
- Seminar leader at European Forum Alpbach: The “How” and “Who” of Europe’s Future of Energy, August 2021.
- Guest lectures (e.g. Stanford University 2021, ETH 2019, University Bern 2019, University Salzburg 2019, etc.)

Reviewing (selected)

- Expert for H2020, Horizon Europe and ERC grants (proposals and projects)
- Reviewer for journals such as ERL, Climatic Change, Nature Climate Change, Nature Energy, Science, Energy Economics, Journal of Environmental Economics and Management, Renewable and Sustainable Energy Reviews, Energy Policy, Applied Energy, Climate Policy, Journal of Environmental Management
- Reviewer for national projects and evaluations (e.g. UKERC, EPA Ireland, Research Council Norway)
- Review Editor Austrian Panel on Climate Change (APCC) 2014

Projects (ongoing)

- [Reviewer for the Convention on Biological Diversity \(CBD\)](#)
- Delivering Incentives to End Deforestation: Global Ambition, Private/Public Finance and Zero-Deforestation Supply Chains (funding: NORAD, Norway; partners: Environmental Defense Fund (lead), IIASA, London School of Economics) [until 2021]
- RESTORE+: Addressing Landscape Restoration on Degraded Land in Indonesia and Brazil (funding: International Climate Initiative 2016, Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB); partners: IIASA (lead), International Centre for Research in Agroforestry; SELPER Brazil; UNEP-WCMC; WRI Indonesia; WWF Indonesia; LANDMAPP; EDF; LSE; Ministry of National Development Planning/National Development Planning Agency; Ministry of Energy and Mineral Resources; Ministry of Environment and Forestry, Agência Brasileira de Cooperação, Ministerio de Relaciones Exteriores; Ministério do Meio Ambiente). [until 2021]
- Comparative assessment and region-specific optimisation of GGR (funding NERC, UK; partners: Imperial College (lead), Oxford University, LSE, IIASA) [until 2021]
- CDR SynTra (funding: German Ministry of Education and Research; partners: LMU (lead), MCC, SWP, IASS, GEOMAR, PIK, [until 2024])
- PROVIDE (funding: H2020, HU (lead), Climate Analytics, CERFACS, ETH, ICL, CEA-LSCE, UBC, NRI, UEA, UIBK, UBERN, WCS, CICERO, [until 2024])
- Nationale und europäische Instrumente für die Regulierung von Negativemissionstechnologien (NETs) unter Einbeziehung der Sektoren Landwirtschaft, Forstwirtschaft und andere Landnutzung (funding: German Ministry of Education and Research, partners: MCC (lead), PIK), [until 2021]

Past projects

- Energy observation for monitoring and assessment of the environmental impact of energy use, Acronym: EnerGEO (funding: FP7, Grant number: 226364), <http://www.energeo-project.eu/>
- Operational Global Carbon Observing System, Acronym: GEOCARBON (funding: FP7, Grant number: 283080), <http://www.geocarbon.net/>
- Impacts Quantification of global changes, Acronym: GLOBAL-IQ (funding: FP7, Grant number: 266992), <http://www.global-iq.eu/>
- Quantifying projected impacts under 2°C warming, Acronym: IMPACT2C (funding: FP7, Grant number: 282746), <http://www.hzg.de/mw/impact2c/>
- Low climate IMPact scenarios and the Implications of required Tight emission control Strategies, Acronym: LIMITS (funding: FP7, Grant number: 282846), <http://www.feem-project.net/limits/>
- PARadigm SHifts Modelling and INnovative Approaches, Acronym: PASHMINA (funding: FP7, Grant number: 244766), <http://www.pashmina-project.eu/>
- Development and application of a standardized methodology for the Prospective Sustainability assessment of Technologies, Acronym: PROSUITE (funding: FP7, Grant number: 227078), <http://www.prosuite.org/>
- Investment in renewable electricity under climate policy uncertainty, Acronym: PURELEC (funding: Norwegian)
- The economics of climate change adaptation, Acronym: ECONADAPT (funding: FP7), <http://www.econadapt.eu>
- Options Market and Risk-Reduction Tools for REDD+ (funding: NORAD partners: Environmental Defense Fund, IIASA, London School of Economics)
- Globale Treibhausgasemissionspfade bis 2050 (Finanzierung: Umweltbundesamt UFOPLAN FKZ 3714 41 1670, partners: PIK)

Publications

- Gruner, F., Fuss, S., Kalkuhl, M., Minx, J., Strefler, J., Merfort, A. (2022). Wie CO₂-Entnahmen helfen können, die Klimaziele zu erreichen. *Klima und Recht* 1/2022, S. 18-21.
- Schulte, I., Eggers, J., Østergaard Nielsen, J., Fuss, S. (2021). What influences the implementation of natural climate solutions? A systematic map and review of the evidence. *Environmental Research Letters*. doi: 10.1088/1748-9326/ac4071.
- Fuss, S. & Johnsson, F. (2021). The BECCS Implementation Gap—A Swedish Case Study. *Front. Energy Res.* 8:553400. doi: 10.3389/fenrg.2020.553400
- Fuss, S., Golub, A., & Lubowski, R. (2021). The economic value of tropical forests in meeting global climate stabilization goals. *Global Sustainability*, 4, E1. doi:10.1017/sus.2020.34
- Jackson, R.B., Abernethy, S., Canadell, J.G., Cargnello, M., Davis, S.J., Féron, S., Fuss, S., Heyer, A.J., Hong, C., Jones, C.D., Damon, Matthews, H., O'Connor, F.M., Pisciotta, M., Rhoda, H.M., de Richter, R., Solomon, E.I., Wilcox, J.L., Zickfeld, K. (2021). Atmospheric methane removal: a research agenda. *Phil. Trans. R. Soc. A*.3792020045420200454, <http://doi.org/10.1098/rsta.2020.0454>.
- Kraus, S., Liu, J., Koch, N., Fuss, S. (2021). No aggregate deforestation reductions from rollout of community land titles in Indonesia yet. *Proceedings of the National Academy of Sciences* 118(43):e2100741118; <http://doi.org/10.1073/pnas.2100741118>.
- Martin, M., Sendra, O., Bastos, A., Bauer, N., Bertram, C., Blenckner, T., Fuss, S., ... Woodcock, J. (2021). Ten new insights in climate science 2021: A horizon scan. *Global Sustainability* 4:E25. <http://doi:10.1017/sus.2021.25>.
- Andrijevic, M., Byers, E., Mastrucci, A., Smits, J., Fuss, S. (2021). Future cooling gap in shared socioeconomic pathways. *Environ. Res. Lett.* 16:094053.
- Fuss, S., Canadell, J.G., Ciais, P., Jackson, R.B., Jones, C.D., Lyngfelt, A., Peters, G.P., van Vuuren, D.P. (2020). Moving toward Net-Zero Emissions Requires New Alliances for Carbon Dioxide Removal. *One Earth* 3(2):145-149.
- Ley, D., Corsair, H.J., Fuss, S., Singh, C. (2020). Evaluating the use of renewable energy and communal governance systems for climate change adaptation, *Central European Review of Economics and Management* 4(1):53-69.
- Hepburn, C., Adlen, E., Beddington, J., Carter, E.A., Fuss, S., MacDowell, N., Minx, J.C., Smith, P. and Williams, C.K. (2019). The technological and economic prospects for CO₂ utilization and removal, *Nature* 575 87–97 Online: <https://doi.org/10.1038/s41586-019-1681-6>
- Smith, P., Adams, J., Beerling, D.J., Beringer, T., Calvin, K.V., Fuss, S., Griscom, B., Hagemann, N., Kammann, C., Kraxner, F., Minx, J.C., Popp, A., Renforth, P., Vicente-Vicente, J.L. and Keesstra, S. (2019). Land-Management Options for Greenhouse Gas Removal and Their Impacts on Ecosystem Services and the Sustainable Development Goals. *Annu. Rev. Environ. Resour.* 44 255–86 Online: <https://doi.org/10.1146/annurev-environ-101718-033129>
- Vicente-Vicente, J.L.; Fuss, S.; Song, C.; Lee, J.; Kim, M.; Lee, W.-K.; Son, Y. (2019). A Holistic View of Soils in Delivering Ecosystem Services in Forests: A Case Study in South Korea. *Forests* 10, 487.
- Creutzig, F., Bren d'Amour, C., Weddige, U., Fuss, S., Beringer, T., Gläser, A., . .

- . Edenhofer, O. (2019). Assessing human and environmental pressures of global land-use change 2000–2010. *Global Sustainability* 2, E1. doi:10.1017/sus.2018.15
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- Fuss, S., Flachsland, C., Koch, N., Kornek, U., Knopf, B., Edenhofer, O. (2018). An assessment framework for intertemporal economic performance of cap-and-trade systems: lessons from the EU-ETS, *Review of Environmental Economics and Policy* 12(2): 220–241.
- Minx, J.C. et al. (2017). Negative emissions: Part 1 – research landscape and synthesis. *Environmental Research Letters* 13 063001.
- Fuss, S. et al. (2018): Negative emissions - Part 2: Costs, potentials and side effects. *Environmental Research Letters* 13 063002.
- Nemet, G.F. et al. (2018). Negative emissions -Part 3: Innovation and upscaling. *Environmental Research Letters* 13 063003.
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- Jackson, R.B., Canadell, J.G., Fuss, S., Milne, J.L., Nakicenovic, N., Tavoni, M. (2017). Focus on negative emissions. *Environmental Research Letters* 12(11):110201; DOI10.1088/1748-9326/aa94ff
- Koch, N., Reuter, W., Fuss, S., Grosjean, G. (2017): Permits vs. offsets under investment uncertainty, *Resource and Energy Economics*, 49, 33-47.
- Kraxner, F., Schepaschenko, D., Fuss, S., Lunnan, A., Kindermann, G., Aoki, K., Dürauer, M., Shvidenko, A. See, L. (2017). Mapping certified forests for sustainable management - A global tool for information improvement through participatory and collaborative mapping. *Forest Policy and Economics* 83:10–18, doi:10.1016/j.forpol.2017.04.014.
- Wehkamp, J., Koch, N., Lübbbers, S., Fuss, S., (2017). Governance and deforestation - A meta-analysis in economics, *Ecological Economics*, 144, 214-227.
- Fuss, S. (2017). *The 1.5°C Target, Political Implications, and the Role of BECCS*. Oxford University Press, <http://climatescience.oxfordre.com/view/10.1093/acrefore/9780190228620.001.0001/acrefore-9780190228620-e-585> (Accessed September 4, 2017).
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- Knopf, B., Fuss, S., Hansen, G., Creutzig, F., Minx, J., Edenhofer, O. (2017). From Targets to Action: Rolling up our Sleeves after Paris. *Global Challenges* 1(2), <https://doi.org/10.1002/gch2.201600007>.
- Minx, J., Lamb, W.F., Callaghan, M.W., Bornmann, L., Fuss, S. (2017). Fast growing research on negative emissions. *Environmental Research Letters* at press: <https://doi.org/10.1088/1748-9326/aa5ee5>.
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- Szolgayová, J., Fuss, S., Kaminski, T., Scholze, M., Gusti, M., Heimann, M., Tavoni, M. (2016). The benefits of investing into improved carbon flux monitoring. *Cogent Economics & Finance* 4: 1239672 <http://dx.doi.org/10.1080/23322039.2016.1239672>
- Tietjen, O., Pahle, M., Fuss, S. (2016). Investment risks in power generation: A comparison of fossil fuel and renewable energy dominated markets. *Energy Economics* 58: 174–185.
- Schueler, V., Fuss, S., Steckel, J.C., Weddige, U., Beringer, T. (2016). Productivity ranges of sustainable biomass potentials from non-agricultural land. *Environmental Research Letters* 11:074026.
- Fuss, S., Chen, C., Jakob, M., Marxen, A., Rao, N.D., Edenhofer, O. (2016). Could resource rents finance universal access to infrastructure? A first exploration of needs and rents. *Environment and Development Economics* 21(6): 691-712.
- Koch, N., Grosjean, G., Fuss, S., Edenhofer, O. (2016). Politics matters: Regulatory events as catalysts for price formation under cap-and-trade. *Journal of Environmental Economics and Management* 8: 121–139.
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- Fuss, S. (2016). Climate economics: Substantial risk for financial assets. *Nature Climate Change*, DOI: 10.1038/nclimate2989.
- Smith, P., Davis, S., Creutzig, F., Fuss, S. et al. (2016). Biophysical and economic limits to negative CO₂ emissions. *Nature Climate Change* doi:10.1038/nclimate2870.
- Moreira, J.R.; Romeiro, V.; Fuss, S.; Kraxner, F.; Pacca, S.A. (2016). BECCS potential in Brazil: Achieving negative emissions in ethanol and electricity production based on sugar cane bagasse and other residues. *Applied Energy* 179: 55–63.
- Jakob, M., Chen, C., Fuss, S., Marxen, A., Edenhofer, O. (2015). Development incentives for fossil fuel subsidy reform. *Nature Climate Change* 5: 709–712.
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- 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.
- Jäger, J., Nakicenovic, N., Fuss, S., KC, 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.
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- 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* 850–853 (2014) doi:10.1038/nclimate2392.
- Leclère, D., Havlík, P., Fuss, S., Schmid, E., Mosnier, A., Walsh, B., Valin, H.,

- Hererro, M., Khabarov, N., Obersteiner, M. (2014). Climate change induced transformations of agricultural systems: insights from a global model. *Environmental Research Letters* 12/2014; 9(12). DOI:10.1088/1748-9326/9/12/124018
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- Koch, N.T., 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.
- Szolgayová, J., Golub, A., Fuss, S. (2014). Innovation & risk-averse firms: options on carbon allowances as a hedging tool. *Energy Policy* 70: 227-235.
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- Andersson, A.M., Elverhøi, M., Fleten, S.E., Fuss, S., Szolgayová, J., Troland, O.C. (2014). Upgrading hydropower plants with storage: timing and capacity choice. *Energy Systems* 5(2): 233-252.
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- 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.
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- Svadlenak-Gomez, K., Walzer, C., Badura, M., Kraxner, F., Fuss, S. (2013). Valuing Alpine ecosystems: the recharge.green project will help decision-makers to reconcile renewable energy production and biodiversity conservation in the Alps; *Journal on Protected Mountain Areas Research* 05/2013; DOI:10.1553/ecomont-5-1s59.
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