

## GUIVARCH Céline

Senior researcher at CIRED, Ecole des Ponts ParisTech



Sex Female | [Date of birth](#) 23/06/1980 | [Nationality](#) French | married, two children

[Location](#) CIRED, 45bis avenue de la Belle Gabrielle, 94736 Nogent-sur-Marne, France

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### Areas of Expertise

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- ▶ Impacts and mitigation of climate change
- ▶ Modelling, scenarios and decision making under uncertainty
- ▶ Economics and interdisciplinarity

### Current position and responsibilities

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Research Director at CIRED, Ecole des Ponts ParisTech

French Climate Change Committee ([Haut conseil pour le climat](#)) member

Member of the Scientific Steering Committee of the [Integrated Assessment Modelling Consortium](#)

Member of the Scientific Committee of [Institut des Mathématiques pour la Planète Terre](#)

### Work Experience

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- (2011-present) [Senior Researcher](#)  
Ecole des Ponts ParisTech, CIRED, Nogent-sur-Marne, France
- Research: climate change economics, modelling, impacts, mitigation, climate policies analysis.
  - Teaching: courses in climate economics and modelling in several top-level engineering schools.
  - Management: Leading the Imaclim-R world modelling team. PhD supervisor.
- (2010-2011) [Climate Change Expert](#)  
International Energy Agency
- Expertise on various climate change topics (coal power plants and climate change mitigation, adaptation of the energy sector to climate change...).
- (2006-2010) [PhD student](#)  
Ecole des Ponts ParisTech, CIRED, Nogent-sur-Marne, France
- PhD in climate change economics
- (2004-2005) [Project Coordinator](#)  
Sofreco, Kazakhstan
- Regional Coordinator of a technical assistance European project: TACIS project “Technical Assistance to Central Asian countries with respect to their climate change commitments” – Bottom-Up modelling (MARKAL) ; analysis of GHG reduction strategies ; implementing CDM projects.

## Education

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- (2017) [Habilitation \(HDR\)](#)  
Université Paris-Est, France
- HDR thesis « Uncertainty and inertia at the heart the climate issue : numerical explorations in climate change economics »
- (2010) [PhD](#)  
Université Paris-Est, France
- PhD thesis « Climate change mitigation costs in a second-best world » (supervisor: J.-C. Hourcade)
- (2006) [Master](#)  
Ecole des Ponts ParisTech, France
- Public economy, environmental policies and economy, development assistance and aid.
- (2005) [Engineering degree, master](#)  
Ecole des Ponts ParisTech, France
- Environmental sciences (sustainable development, risks, climate change, water and sanitation) and GIS (Geographic Information Systems).
- (2004) [Engineering degree](#)  
Ecole Polytechnique, France
- Physics, Mechanics, Sciences of planet Earth (meteorology, seismology, physics and chemistry of the atmosphere) and Applied Mathematics.

## Academic honors, awards and recognition

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- Irene Joliot-Curie award, Young woman scientist 2020, National Academy of Sciences and Ministry of Research
- 1st year Inaugural Lesson, Ecole des Ponts ParisTech, 2017. [Climate Change – challenges for the economy](#).
- Selected participant to [DISCCRS VIII Symposium](#). Dissertations Initiative for the Advancement of Climate Change Research, October 12-19, 2013, Colorado, USA. DISCCRS brings together cohorts of competitively selected early career scientists interested in working across traditional disciplinary boundaries. The goal was to develop international, interdisciplinary collegial networks among scholars likely to become leaders in their chosen fields.
- L.E. Rivot Award of the National Academy of Sciences for my rank at Ecole Polytechnique (2003).

## Publications (selection)

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**h-index : 36 (googlescholar)**

### *Peer-reviewed articles (selection)*

- **Guivarch**, C., T. Le Gallic, N. Bauer et al. 2022. [Using large ensembles of climate change mitigation scenarios for robust insights](#). Nat. Clim. Chang. 12, 428–435.
- Köberle, A.C., T. Vandyck, C. **Guivarch** et al. 2021. [The cost of mitigation revisited](#). Nat. Clim. Chang. 11, 1035–1045.
- Taconet, N., C. **Guivarch**, A. Pottier. 2021. [Social Cost of Carbon Under Stochastic Tipping Points](#). Environ Resource Econ 78, 709–737.
- Diniz Oliveira, T., T. Brunelle, B. Guenet, P. Ciais, F. Leblanc, C. **Guivarch**. 2021. [A Mixed Effect Model Approach for Assessing Land-Based Mitigation in Integrated Assessment Models: A Regional Perspective](#). Global Change Biology.
- Harmsen, M., E. Kriegler, D. P. van Vuuren, K. van der Wijst, G.Luderer, et al. 2021. [Integrated Assessment Model Diagnostics: Key Indicators and Model Evolution](#). Environmental Research Letters 16 (5): 054046.
- Wilson, C., C. **Guivarch**, E. Kriegler et al. 2021. [Evaluating process-based integrated assessment models of climate change mitigation](#). Climatic Change 166, 3.

- Keppo, I., I. Butnar, N. Bauer, M. Caspani, O. Edelenbosch, J. Emmerling, P. Fragkos, et al. 2021. Exploring the Possibility Space: Taking Stock of the Diverse Capabilities and Gaps in Integrated Assessment Models. *Environmental Research Letters* 16 (5): 053006.
- Taconet, N., A. Méjean, C. **Guivarch**. 2020. Influence of climate change impacts and mitigation costs on inequality between countries. *Climatic Change* 160, 15-34.
- Elsawah, S., S. H. Hamilton, A. J. Jakeman, D. Rothman, V. Schweizer, E. Trutnevyte, H. Carlsen, C. Drakes, B. Frame, B. Fu, C. **Guivarch**, M. Haasnoot, E. Kemp-Benedict, K. Kok, H. Kosow, M. Ryan, H. van Delden, Scenario processes for socio-environmental systems analysis of futures: A review of recent efforts and a salient research agenda for supporting decision making, *Science of The Total Environment* 729, 138393.
- Méjean, A., C. **Guivarch**, J. Lefèvre, M. Hamdi-Cherif. 2019. "The transition in energy demand sectors to limit global warming to 1.5°C". *Energy Efficiency* 12, 441-462.
- Bataille, C., C. **Guivarch**, S. Hallegatte, J. Rogelj, H. Waisman. 2018. "Carbon prices across countries". *Nature Climate Change* 8, 648-650.
- McCollum, D. L., C. Wilson, M. Bevione, S. Carrara, O. Y. Edelenbosch, J. Emmerling, C. **Guivarch**, et al. 2018. "Interaction of Consumer Preferences and Climate Policies in the Global Transition to Low-Carbon Vehicles". *Nature Energy* 3, 664-673.
- Vrontisi, Z., G. Luderer, B. Saveyn, K. Keramidis, L. Aleluia Reis, L. Baumstark, C. Bertram, H. Sytze de Boer, L. Drouet, K. Fragkiadakis, O. Fricko, S. Fujimori, C. **Guivarch**, A. Kitous, V. Krey, E. Kriegler, E. O Broin, L. Paroussos, D. van Vuuren. 2018. "Enhancing Global Climate Policy Ambition towards a 1.5 °C Stabilization: A Short-Term Multi-Model Assessment". *Environmental Research Letters* 13 (4): 044039.
- Séférian, R., M. Rocher, C. **Guivarch**, J. Colin. 2018. "Constraints on biomass energy deployment in mitigation pathways: the case of water scarcity". *Environmental Research Letters* 13(5), 054011.
- Benveniste, H., O. Boucher, C. **Guivarch**, H. Le Treut, P. Criqui. 2018. "Impacts of nationally determined contributions on 2030 global greenhouse gas emissions: uncertainty analysis and distribution of emissions". *Environmental Research Letters* 13(1), 014022.
- **Guivarch**, C., R. Lempert, E. Trutnevyte. 2017. « Scenario techniques for energy and environmental research: An overview of recent developments to broaden the capacity to deal with complexity and uncertainty ». *Environmental Modelling & Software* 97 : 201-210. [Guest editor for the Special Issue]
- Marangoni, G., M. Tavoni, V. Bosetti, E. Borgonovo, P. Capros, O. Fricko, D. E. H. J. Gernaat, C. **Guivarch**, P. Havlik, D. Huppmann, N. Johnson, P. Karkatsoulis, I. Keppo, V. Krey, E. Ó Broin, J. Price, D. P. van Vuuren. 2017. « Sensitivity of projected long-term CO2 emissions across the Shared Socioeconomic Pathways ». *Nature Clim. Change* 7 (2) : 113-117.
- **Guivarch**, C., S. Monjon. 2016. « Identifying the main uncertainty drivers of energy security in a low-carbon world: The case of Europe ». *Energy Economics* 64 : 530-541.
- **Guivarch**, C., J. Rozenberg, V. Schweizer. 2016. « The diversity of socio-economic pathways and CO2 emissions scenarios: Insights from the investigation of a scenarios database ». *Environmental Modelling & Software* 80 : 336-353.
- Trutnevyte, E., C. **Guivarch**, R. Lempert, N. Strachan. 2016. « Reinvigorating the scenario technique to expand uncertainty consideration ». *Climatic Change* 135 (3) : 373-379.
- Gasser, T., C. **Guivarch**, K. Tashiiri, C. D. Jones, P. Ciais. 2015. « Negative emissions physically needed to keep global warming below 2°C. ». *Nature Communications* 6 : 7958.
- Branger, F., L.-G. Giraudet, C. **Guivarch**, P. Quirion. 2015. « Global sensitivity analysis of an energy-economy model of the residential building sector. » *Environmental Modelling & Software* 70, 45-54.
- Rozenberg, J., C. **Guivarch**, R. Lempert, S. Hallegatte. 2014. « Building SSPs for climate policy analysis: a scenario elicitation methodology to map the space of possible future challenges to mitigation and adaptation. » *Climatic Change* 122(3) : 509-522.
- Rozenberg, J., Hallegatte, S., Vogt-Schilb, A., Sassi, O., **Guivarch**, C., Waisman, H., Hourcade, J.-C. 2010. « Climate change and energy security: climate policies as a hedge against the uncertainty on future oil supply ». *Climatic Change* 101(3-4) : 663-668.

### Chapters in books

- **Guivarch**, C., Taconet, N. 2020. 'Global Inequalities and climate change', in (Eds) E. Laurent and K. Zwickl, *The Routledge Handbook of the Political Economy of the Environment*, Routledge, London, UK.
- Achakulwisut, P., Erickson, P., **Guivarch**, C., Pye, S., Schaeffer, R. Chapter 2. The Production Gap Report 2020.
- **Guivarch**, C., Rozenberg, J., Cassen, C. and Hourcade, J.C. 2014. 'Energy, Environment and Sustainable Globalisation', in (Eds) J. Eatwell, T. McKinley and P. Petit, *Challenges for Europe in the World, 2030*, Ashgate, UK.

## *IPCC reports*

- 6<sup>th</sup> Assessment Report: Climate change 2022, Mitigation of climate change. Summary for Policy Makers, Technical Summary, Chapter 3 “Mitigation pathways compatible with long-term goals”, Annex III “Scenarios and modelling methods”, Synthesis Report 2023.

## **Research projects (selection)**

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- PRISMA Net Zero Pathways Research through Integrated Assessment Models Advancements (2023-2027) (coordinator for CIRED) Horizon Europe project.
- NAVIGATE Next generation of AdVanced InteGrated Assessment modelling to support climaTE policy making (coordinator for CIRED) (2019-2023) H2020 project.
- JUIJCE JUstice In Climate Change Exposure (co-PI) (2019-2021)
- French Interdisciplinary Group on Nationally Determined Contributions (co-PI) (2015 – 2021) financed under an ADEME grant and MTEES Climate Services Convention
- DEEDS DialoguE on European Decarbonisation Strategies (contributor) (2017 - 2020) European project H2020
- Investment needs for transport infrastructure along low-carbon pathways (2016-2017) (PI) World Bank project
- ADVANCE Advanced Model Development and Validation for the Improved Analysis of Costs and Impacts of Mitigation Policies (2013 – 2016) (coordinator for Cired) European project FP7

## **Conferences and research visits**

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### *Invited presentations (selection)*

- Environmental Research Conference, talk ‘Linking Mitigation Pathways and global inequality’, November 2021.
- Integrated Assessment Modelling Consortium conference, talk “Joint Assessment of impacts and mitigation and implications for scenario work”, November 2021.
- The role of lifestyle changes in pathways compatible with climate change mitigation goals and development goals, keynote presentation at Towards low-carbon lifestyles, ICTA-UAB International Virtual Conference, 6-8 May 2020.
- « Modeling Climate Impact on Economic Growth: More Harm, More Uncertainty or None of the Above? Numerical Experiments and Implications for Mitigation Policy », Princeton, Climate Futures Initiative, Spring 2015 seminar series, April 22, 2015.
- Invited speaker at the Alliance Summer School in Science and Policy 2014, « Climate Change Research: The Nexus of Natural and Social Science », Paris, July 2014.

### *Research visits*

- Princeton, Princeton Environmental Institute (Robert Socolow and Marc Fleurbaey) (2015) (10 days)
- National Center for Atmospheric Research, Boulder (V. Schweizer and B. O’Neill), Advanced Study Program (2012) (2 weeks)

### *Organization of conferences and sessions*

- Co-organizer of two sessions, “Analyzing uncertainties in scenario ensembles” and “Integrated scenarios of impacts, mitigation and adaptation”, at the Scenarios Forum, Laxemburg, Austria, 20-22 June 2022.
- Preparatory workshop to COP21 on INDC evaluation: Boucher, O., H. Benveniste, and C. Guivarch (2016), Nations’ pledges to reduce emissions and the 2°C objective, Eos, 97.
- Session « Scenarios, public deliberations and decisions », Our common future under climate change conference, Paris, July 7-10, 2015. co-convener of the session.
- Co-organizer (with E. Trutnevyte) of the UCL-Cired workshop IQ SCENE: Innovative techniques for Quantitative SCenarios in ENergy and Environmental research, London, 26-27 March 2014.

## Expertise

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- Member of the French Climate Change Committee (Haut conseil pour le climat) (2018 - ...)
- Member of the scientific advisory committee for the Ministry of public service and the Ministry of Research for the training of public servants on the climate-biodiversity and resources crises.
- Member of the French Sustainable Development Economic Council (CEDD).
- Expertise for the creation of an investment fund “Objectif Climat”, Caisse des Dépôts et Consignations (2020).
- Member of the French delegation to the 31<sup>st</sup> (Bali, 2009) and 39<sup>th</sup> (Berlin, 2014) IPCC General Assembly.
- Expert for the « Climate change modelling information » project, European Commission DG Climate Action (2014-2016).

## Teaching (selection)

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- Coordination (with J. Lefèvre) of a master program on integrated assessment modelling (2015 - ...).
- Organizer and faculty of CIRED-NAVIGATE International Summer School on “Climate change and just transitions”, Paris, 2022 July 4-8.
- Organizer and faculty of Cired 2nd International Summer School in Economic modelling of Environment, Energy and Climate, Topic "The role of demand and lifestyles in low carbon pathways", Paris, 2018 July 2-6.
- Organizer and faculty of Cired 1st International Summer School in Economic modelling of Environment, Energy and Climate, Topic "Modelling approaches to assess NDCs and mid-century strategies", Paris, 2017 July 4-8.
- Conferences on Climate Change and solutions in the Executive Education program LEAD Academy (Learn, Experience, Adapt, Disrupt), Ecole Polytechnique – PwC– Google (2017, 2018, 2019, 2022)
- Courses and conferences for the training of Engineers civil servants (Corps des Ponts, Eaux et Forêts).
- Courses on scenarios for climate change research and decisions, ENS Ulm and Ecole Nationale de la Météorologie.
- Courses for the training of secondary school teachers (Académie de Créteil, Académie de Versailles).

## PhD supervision

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- Romain Fillon (2021 - ...) – Incertitudes climatiques et préférences sociales (co-supervision with Vincent Martinet)
- Elisa Ndiaye (2021 - ...) – Quantification de l'impact des risques climatiques sur le risque de crédit (co-supervision with Emmanuel Gobet)
- Mehdi Mikou (2021 - ...) – Justice Climatique : Analyse spatiale des inégalités d'exposition aux événements climatiques extrêmes (co-supervision with Améline Vallet)
- Louis Daumas (2020 - ...) – Climate change transition risk and fragilities in the financial system (co-supervision with Emmanuele Campiglio)
- Nicolas Taconet (2017-2021) – Dynamics and distribution of climate change impacts: insights for assessing mitigation pathways
- Vivien Fisch Romito (2017-2021) - 'Bridging' human needs and carbon dioxide emissions reduction : the infrastructure dynamics at the core of the climate-development interplay
- Juan Vera Molina (2015-2019) - Technology choices under emissions policy and technology diffusion constraints: the case of passenger vehicles (co-supervision with Franck Lecocq)
- Audrey Berry (2014-2018) – Essays on fuel poverty: multidimensional measures and the impact of carbon taxation (co-supervision with Philippe Quirion)
- Manon Solignac (2012-2018) - Electric vehicle and urban form: a prospective evaluation (co-supervision with Franck Lecocq)

## Outreach and media (mostly in French)

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### Médiation scientifique (selection)

- Chronique « Climat » mensuelle avec Christophe Cassou pour Sciences&Avenir (2020-...).
- Conférence « Climat et Développement » pour l'Académie des Sciences (2022).

- Invitée au festival des Utopiales de Nantes (2022)
- Podcast « Demain c'est pas loin ! » avec l'ADEME (2022)
- Colloque du Forum International de la Météo 2022
- Nocturne de l'économie 2022
- Conversation sur le Climat (2021)
- Journées de l'économie, Inégalités et climat, novembre 2021 (avec Julie Rozenberg, Marc Fleurbaey, Lucas Chancel)
- Encyclopedia Universalis, « Changement anthropique du climat » (avec Jean-Louis Dufresne)
- Conférence-débat sur le climat, idées au plateau avec Jean Jouzel, Lutter contre le réchauffement climatique - scénarios et solutions d'atténuation. Carreau du Temple, 4 mars 2020, Paris.
- Festival l'Economie aux rendez-vous de l'Histoire de Blois. Membre du conseil scientifique (2017-2021). Organisation d'une table ronde "Égales par nature ? Inégalités et environnement d'hier à demain" (2018).
- Participation au train du climat, événement national de la fête de la science 2015. EMS Outreach & Communication Award 2017.

### Médias (selection)

- La matinale de France Inter, l'Invité du week-end, dimanche 7 février 2021.
- Podcast Le Climat en Questions (2021).
- Climat, chaud devant ! une journée spéciale sur France Inter, samedi 12 décembre 2020, Le Temps d'un bivouac, Le monde face au changement climatique: il est encore temps d'agir !
- L'Equipe, Le sport face au défi écologique, un chemin encore long.
- Mouv', Debattle, Réchauffement climatique : comment va-t-on s'en sortir ?
- Le mouvement pour le climat analysé par 6 jeunes économistes, Les Echos. 2020.
- La Terre au carré, France Inter. Bilan de l'accord de Paris et COP25.
- Ideas for development ID4D. Climate change impacts the fight against inequalities.
- The Conversation. France and Britain in a race for carbon neutrality by 2050. With C. Le Quéré.

### Présentations du rapport du GIEC sur l'atténuation et du rapport de synthèse (2022 et 2023)

- **TV/vidéos** : BFM Business, Blast, Mash Up, Arte 28 minutes, France Info TV, décryptage pour Ministère Ecologie, Energie, Territoires, IPCC video (version française),...
- **Radios** : France culture, La Méthode Scientifique, Le journal des Sciences, France Bleu, Europe 1, RFI, C'est pas du vent, France Inter, La Terre au carré...
- **Podcasts** : Le Monde Chaleur humaine, IPSL, c3D...
- **Ecrits** : The Conversation, sur Twitter, Usine Nouvelle, France Info, L'ADN, tribune du Monde, Live chat Le Monde, Polytechnique Insights, Le Télégramme, CNRS Le Journal...
- **Conférences et formations** : Parlement (formation organisée par la Présidence du Parlement), Agence des participations de l'Etat, comité de direction de la Banque de France, Préfecture de l'Ain, France Télévision, BPI, Académie de Paris, Université Pierre et Marie Curie, ESPCI, lycées en transition, médiathèques...

### Academic service

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- Associate Editor for Climatic Change.
- Member of the scientific board of the interdisciplinary center Energy for Climate, IPP-ENPC (2019 – 2022)
- Reviewer for Nature Energy, Nature Communications, Climate Change Economics, Climate Policy, Climatic Change, Comptes rendus Geoscience, Ecological Economics, Economie et Prévision, Energy Policy, Global Environmental Change, WIRES Climate Change.
- Grant reviewer for ANR (the French National Research Agency), ADEME (the French Environment and Energy Management Agency) and MSH Paris-Saclay
- Participation to Allenvi Alliance Working Group on Climate change mitigation and adaptation (2020).
- Member of Integrated Assessment Modelling Consortium Scientific Steering Committee, representing CIRED (2019-...)
- Referee for Heleen van Soest PhD thesis (2022) "Mind the Gap - Applying Integrated Assessment Models to Inform International and National Climate Policy on Bridging the Emissions Gap" (Utrecht University)

- Referee for Emmanuel Bovari PhD thesis (2020) “Economic growth, energy use and climate change - A historical and prospective approach”
- Referee and President of jury for Aurélien Bigo PhD thesis (2020) “ Les transports face au défi de la transition énergétique. Explorations entre passé et avenir, technologie et sobriété, accélération et ralentissement ”
- Member of the recruiting committee for a Professor in Energy Governance at Lausanne University (2023)
- Member of the recruiting committee for a Professor in environmental inequality studies at SciencesPo Paris (2022)
- Member of the recruiting committee for a Professor in Environmental Economics at Paris Nanterre University (2020)
- Referee for Fanny Henriet Habilitation (HDR) (2019) “Pollution, fossil resources and optimal taxation - Impacts of the heterogeneity of actors”
- Examiner for Roland Séférian Habilitation (HDR) (2019) “Global carbon cycle - Variability, feedbacks and couplings at interfaces”
- Examiner for Fatma Rostom PhD thesis (2019) “Sustainable metal extraction, steady-state good production and cooperative wealth allocation among nations and generations: a transdisciplinary approach”
- Examiner and President of jury for Olfa Tlili PhD thesis (2019) “Hydrogen systems: what contribution to the energy system? - Findings from multiple modelling approaches”
- Examiner for Yann Quilcaille PhD thesis (2018) “Revisiting emissions and climate scenarios with a compact Earth system model”
- Referee for Thomas Le Gallic PhD thesis (2017) « Thinking our future lifestyles in energy foresight approaches: proposal for a modelling approach ».
- Examiner for Roberto Feirera da Cunha PhD thesis (2017) “Unconventional Oil and Natural Gas Supplies and the Mitigation of Climate Change”

## **Affiliations**

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- French Association of Environmental and Resources Economists
- European Association of Environmental and Resources Economists
- Météo et Climat