

## **Elena Verdolini**

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RFF-CMCC European Institute on Economics and the Environment,  
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### **Research Interest**

Economics of Innovation, Environmental Economics, Energy Economics, Industrial Organization,  
Development Economics, Expert Elicitations, Policy Analysis

### **Professional and Academic Positions**

11/2020 – present Full Professor, Political Economy, Law Department, Università degli Studi di Brescia  
04/2018 – present Lead Author, WGIII, 6<sup>th</sup> Assessment Report of the IPCC (Chapter 16 and SPM)  
01/2012 – present Senior Scientist, RFF-CMCC European Institute on Economics and the Environment, Euro-Mediterranean Center on Climate Change (CMCC), Italy

### **Past Professional and Academic Positions**

12/2018 – 10/2020 Assistant Professor (RTD-B), Political Economy, Law Department, UNIBS  
03/2008 – 12/2019 Affiliate Researcher, FEEM - Fondazione Eni Enrico Mattei, Italy  
03/2017 – 12/2018 Contract Lecturer, Università degli Studi di Milano, Italy. Masters in Environmental and Food Economics, course: Statistics and Econometrics  
08/2015 Visiting Researcher, Resources for the Future, Washington DC, USA  
09/2008 – 12/2008 Visiting Fellow, OECD Directorate for the Environment, Paris, France

### **Education**

10/2006 – 03/2011 PhD - Economics and Finance of the Public Administration (DEFAP), Catholic University of Milan, Italy. Supervisor: Prof. M. Galeotti. (Grade: Very Good)  
09/2000 – 09/2003 Master of Public Administration (MPA), Master of Arts in International Studies (MAIS), Certificate in International Development and Management. University of Washington, Seattle, WA, USA. Supervisor: Prof. Leigh Anderson.  
09/1995 – 09/2000 Laurea in Scienze Politiche, *Magna cum Laude*, Università di Pavia, Italy. Supervisor: Prof. Enrica Costa Bona

### **Teaching**

09/2019 – present Markets and Competition Law (Theory of the Firm), Law Department, Università degli Studi di Brescia  
03/2019 – present Political Economy, Law Department, Università degli Studi di Brescia  
2018, 2017, 2015 Statistics and Econometrics, Econometrics Module, Masters in Environmental and Food Economics. Lecturer, Università degli Studi di Milano, Milano, Italy  
09/2009 – 06/2013 Microeconomics (Bachelor and Masters Classes). Teaching Assistant, Università degli Studi di Milano, Milano, Italy. Prof. M. Galeotti and Prof. F. Donzelli.  
09/2007 – 12/2009 Labour economics. Teaching Assistant, CRELI, Università Cattolica del Sacro Cuore, Milan, Italy. Prof. L. Cappellari  
12/2001 – 06/2002 Italian, Environmental Policy, Statistics. Teaching Assistant, University of Washington, Seattle, USA. Prof. C. L. Anderson

### **Fundraising and Project Management**

10/2020 – 09/2025 2D4D “Disruptive Digitalization for Decarbonization” (EU H2020 European Research Council Starting Grant). *Role: Principal Investigator*  
11/2020 – 03/2022 EDITS “Energy Demand changes Induced by Technological and Social innovations - Energy demand digital and social trends: understanding and modeling” (RITE - Research Institute of Innovative Technology for the Earth) *Role: Data Scientist*

- 12/2016 – 07/2021 INNOPATHS “Innovation pathways, strategies and policies for the Low-Carbon Transition in Europe (EU H2020)”. *Role: Scientific Coordinator for CMCC; Work Package Leader*
- 10/2017 – 09/2020 DEEDS “DialoguE on European Decarbonisation Strategies” (EU H2020)”. *Role: Researcher; lead of the writing team for Chapter 8 of the report of the European Commission’s High Level Panel on Decarbonization Pathways*
- 12/2016 – 12/2017 Member of the T20 Task force
- 01/2015 – 12/2015 DDPP - Deep Decarbonization Pathways Project - Italy - DDPP-Italy. (FEEM Ricerca di base). *Role: Researcher*
- 06/2015 – 03/2016 The Political Economy of Clean Energy Transition (United Nations University - UNU-WIDER). *Role: Co-author*
- 01/2013 – 12/2016 ADVANCE (EU FP7). *Role: Researcher*
- 09/2012 – 09/2015 ENTRACTE (EU FP7). *Role: FEEM Scientific Leader*
- 10/2011 – 09/2014 LIMITS Low climate IMPact scenarios and the Implications of required Tight emission control Strategies (EU FP7). *Role: Researcher*
- 09/2011 – 08/2012 TEAM Technology Elicitations and Modeling Project (FEEM Ricerca di base). *Role: Researcher*
- 04/2011 – 09/2012 CLIMTECH Diffusion of Climate-Friendly Technologies. The Role of Intellectual Property Rights, Human Capital and Environmental Policy (State of Baden Wuttenberg). *Role: Co-Investigator*
- 01/2010 – 09/2013 ICARUS Innovation for Climate chAnge mitigation: a study of energy R&d, its Uncertain effectiveness and Spillovers (ERC Starting Grant). *Role: Researcher*
- 2008 – 2010 TECH-CHANG (FEEM ricerca di base). *Role: Researcher*

### **Profile (as of July 15<sup>th</sup>, 2021)**

Google Scholar: H-Index:21 (i10-index: 23) Citations: 2127  
 Scopus: H-Index:16 Citations: 1136

### **Publications under review:**

- Nesta L., **Verdolini E.**, Vona F. (under review) “Threshold Policy Effects and Directed Technical Change in Energy Innovation”, GREDEG WP No. 2018-01
- Schaeffer R., Pahle, M., Pachauri, S., Eom, J., Awasthy, A. Chen, W. Di Maria, C., Jiang, K., He, C., Portugal-Pereira J., Safonov, G., **Verdolini E.** (under review) “The crucial role of complementarity, transparency and adaptability for designing energy policies for sustainable development”

### **Publications:**

- Meng J., R. Way, **Verdolini E.**, Anadon Diaz L. (2021) “Comparing expert elicitation and model-based probabilistic technology cost forecasts for the energy transition” Proceedings of the National Academy of Sciences 118 (27)
- Verdolini E.**, Sovacool B., Drummond P. (2021) “Channeling diverse innovation pressures to support European sustainability transitions”, *Environmental Research Letters* 16 061001
- Verdolini, E.** (2021) “Looking forward and back”. *Nature Energy* 6:454–455
- Peñasco, C., Anadón, L.D., **Verdolini, E.** (2021) “Systematic review of the outcomes and trade-offs of ten types of decarbonization policy instruments”. *Nature Climate Change* (doi: <https://doi.org/10.1038/s41558-020-00971-x>)
- Grané A., Salini S., **Verdolini E.** (2021) “Robust multivariate analysis for mixed-type data: novel algorithm and its practical application in socio-economic research”, *Socio-Economic Planning Science* 73 (doi: <https://doi.org/10.1016/j.seps.2020.100907>)
- Skoczkowski T., **Verdolini E.**, Bielecki S., Kochański M., Korczak K., Węglarz A. (2020). “Technology innovation system analysis of decarbonisation options in the EU steel industry”, *Energy* 212:1, 118688
- Galeotti M., Salini S., **Verdolini E.** (2020) “Measuring Environmental Policy Stringency: Approaches, Validity, and Impact on Environmental Innovation and Energy Efficiency”, *Energy Policy* 136 (doi: <https://doi.org/10.1016/j.enpol.2019.111052>)

- Conti C., Mancusi M.L., Sanna-Randaccio F., Sestini R., **Verdolini E.** (2018) "Transition Towards a Green Economy in Europe: Innovation and Knowledge Integration in the Renewable Energy Sector", *Research Policy* 47(10):1996-2009
- Verdolini, E.**, Vona F., Popp D. (2018) "Bridging the gap: do fast reacting fossil technologies facilitate renewable energy diffusion?", *Energy Policy* 116:242–256
- Verdolini, E.**, Anadón L. D., Baker E., Bosetti V., Aleluia Reis L. (2018) "The Future Prospects of Energy Technologies: Insights from Expert Elicitations", *Review of Environmental Economics and Policy* 12(1):133-153
- Galeotti M., Rubashkina Y., Salini S., **Verdolini E.** (2018) "Environmental Policy Performance and its Determinants: Application of a Three-level Random Intercept Model", *Energy Policy* 114:134–144
- Verdolini, E.**, Bak C., Ruet J., Venkatachalam A. (2018). "Innovative green-technology SMEs as an opportunity to promote financial de-risking," *Economics Discussion Papers* 2018-8, Kiel Institute for the World Economy (IfW).
- Verdolini, E.** (2018). "Environmental policy and innovation: A sectoral analysis," *Papeles de Energía FUNCAS*, nr. 5 Junio 2018.
- Witajewki J, **Verdolini E.**, Tavoni M. (2017) "Directed Technological Change and Energy Efficiency Improvements", *Energy Economics* 68(S1):1-168
- Verdolini, E.**, Bak C, Ruet J., Anbumozhi V. (2017) "Innovative green-technology SMEs as an opportunity to promote financial de-risking", G20 Insights. [http://www.g20-insights.org/policy\\_briefs/innovative-green-technology-smes-opportunity-promote-financial-de-risking/](http://www.g20-insights.org/policy_briefs/innovative-green-technology-smes-opportunity-promote-financial-de-risking/)
- Verdolini E.** and Bosetti V. (2017) "Environmental Policy and the International Diffusion of Green and Brown Technologies" *Environmental and Resource Economics* 66: 497–536.
- Dasgupta S., De Cian E., **Verdolini E.** (2017) "The Political Economy of Energy Innovation", in THE POLITICAL ECONOMY OF CLEAN ENERGY TRANSITIONS, ed. D. Arent, C. Arndt, Mackay Miller, Finn Tarp, and Owen Zinaman, Oxford University Press.
- Nemet G., Anadon L. D., **Verdolini E.** (2016) "Quantifying the effects of expert selection and elicitation design on experts' confidence in their judgments about future energy technologies", *Risk Analysis*. doi:10.1111/risa.12604

**There was a 5-month career break in 2016 due to maternity leave**

- Witajewki J., **Verdolini E.**, Tavoni M. (2015) "Bending the Learning Curve", *Energy Economics* 52(1):S86-S99
- Virdis M. R. et al. (2015). "Pathways to deep decarbonization in Italy", SDSN - IDDRI
- Bosetti V., Cattaneo, C., **Verdolini, E.**, (2015) "Migration of Skilled Workers and Innovation: A European Perspective", *Journal of International Economics*, 96(2):227-434
- Rubashkina, Y., Galeotti, M., **Verdolini, E.**, (2015) "Environmental Regulation and Competitiveness: Empirical Evidence on the Porter Hypothesis from European Manufacturing Sectors", *Energy Policy* 83:288–300
- Verdolini E.**, Anadon Diaz L., Liu J., Nemet G. (2015) "The effects of expert selection, elicitation design and R&D assumptions on experts' estimates of the future costs of photovoltaics", *Energy Policy* 80:233-243
- Voigt S., De Cian E., Schymura M., **Verdolini E.** (2014), "Energy Intensity Developments in 40 Major Economies: Structural Change or Technology Improvement?", *Energy Economics* 41(C): 47-62

**There was a 5-month career break in 2013-2014 due to maternity leave**

- Fiorese G., Catenacci M., Bosetti V., **Verdolini E.** (2013), "The Power of Biomass: Experts Disclose the Potential for Success of Bioenergy Technologies", *Energy Policy*. 65(C): 94-114
- Diaz Anadon L., Nemet G., **Verdolini E.** (2013), "The Future Costs of Nuclear Power using Multiple Expert Elicitations: Effects of RD&D and Elicitation Design", *Environmental Research Letters* 8(2013), 034020
- Catenacci M., **Verdolini E.**, Bosetti B., Fiorese G. (2013), "Going Electric: Expert Survey on the Future of Battery Technologies for Electric Vehicles", *Energy Policy* 61: 403–413
- Fiorese G., Catenacci M., **Verdolini E.**, Bosetti V. (2013), "Advanced Biofuels: Future Perspectives from an Expert Elicitation Survey", *Energy Policy* 56: 293-311

- Verdolini E.**, Johnstone N., Haščič I. (2012), “Empirical Study of Energy Efficiency and Carbon Intensity in Fossil Power Generation”, in *Energy and Climate Policy: Bending the Technological Trajectory*, OECD, Paris
- Bosetti V., Catenacci M., Fiorese G., **Verdolini E.** (2012), “The Future Prospect of PV and CSP Solar Technologies: An Expert Elicitation Survey”, *Energy Policy* 49(11): 308–317
- Lanzi E., **Verdolini E.**, Haščič I. (2011), “Efficiency Improving Fossil Fuel Technologies for Electricity Generation: Data Selection and Trends”, *Energy Policy* 39(11): 7000-7014
- Lanza A., **Verdolini E.** (2011), “The Role of R&D+i in the Energy Sector”, in I. Galarraga , M. González-Eguino, A. Markandya (eds.) *Handbook Of Sustainable Energy*, Edward Elgar Publishing
- Verdolini E.**, Galeotti M. (2011), “At Home and Abroad: An Empirical Analysis of Innovation and Diffusion in Energy Technologies”, *Journal of Environmental Economics and Management*, 61(2): 119-134
- Carraro C., De Cian E., Nicita L., Massetti M., **Verdolini E.** (2010), “Environmental Policy and Technical Change: A Survey”, *International Review of Environmental and Resource Economics*, 4: 163-219

### **Work in progress**

- Bontadini F., **Verdolini E.** and Vona F. *Competitiveness Effects of Environmental Policies*
- Y. Kim and Verdolini E., *Knowledge spillovers*
- Y. Kim, Bonacorsi, L. and **Verdolini E.** *Environmental Policies, Low-Carbon Technologies and Trade*
- Verdolini E.**, Jockers P., Bosetti V. *Policy and uncertainty on innovation in the wind industry*

### **Editorial, Referee and Project Evaluation Activity**

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|---------------------------|---|----------------------------|
| Member of Editorial Board | Global Challenges, Wiley and Sons                                   |                            |
| Project Evaluator         | ANR - Agence Nationale de la Recherche                              | EPO European Patent Office |
| Referee                   | Journal of Environmental Economics and Management                   |                            |
|                           | Journal of the Association of Environmental and Resource Economists |                            |
|                           | European Journal of Innovation Management                           | Research Policy            |
|                           | Journal of Agricultural and Resource Economics                      | Climatic Change            |
|                           | Environmental and Resource Economics                                | Energy Economics           |
|                           | The Energy Journal  | Ecological Economics       |
|                           | Australian Economic Review  | Energy Policy              |

### **Selected Seminars and Conferences**

#### **INVITED SPEAKER**

- Economics of Innovation: Spillovers*. T20 Seminar, Mercator Institute, Berlin, 19 May 2015
- The impact of policy uncertainty on innovation in the wind industry: evidence from EU countries*. Resource for the Future CECE Seminar, Washington DC, 06 August 2015
- Stimulating innovation: insights from the ENTRACTE Project*. ENTRACTE Final Meeting: European Climate Policy – Insights and Interactions, Brussels, 25 September 2015
- Decarbonization of the energy sector*. First meeting of the High-level Panel of the European decarbonisation pathways initiative, European Commission, Bruxelles, 21 October 2016
- Generating growth from innovation for the low carbon economy*. T20 Meeting, Berlin, 27 February 2017
- Innovation effects of environmental policy*. CARISMA Workshop: “Climate change mitigation in the EU: from research to practice”, Stockholm Environment Institute, Stockholm 27 March 2017
- Transition towards a green economy in Europe: Innovation and knowledge integration in the renewable energy sector*. Seminar of the Institut d’Economia de Barcelona, Barcelona, 23 November 2017
- Threshold effects and directed technical change in energy innovation*. 8th Annual Economics for Energy Workshop: “Economic challenges for energy”, Barcelona, 16 February 2018
- Transition towards a green economy in Europe: Innovation and knowledge integration in the renewable energy sector*. 2018 Academic Workshop: Developments in Energy Economics, Barcelona, 16 February 2018
- Decarbonization Innovation: What it could bring? How to make it work?* High Level Workshop “R&I contribution to the strategy for long term EU greenhouse gas emissions reduction”, European Commission, Brussels, 28 June 2018
- Cambia il clima, cambia il modo di raccontarlo. Innovare la comunicazione sul climate change*, Festival della Scienza di Genova, 1 November 2018

*Gli Effetti Distributivi delle Politiche Climatiche: un Commento*. Cariplo Foundation Seminar, 14 November 2018

*Implications of the IPCC Special Report SR1.5 for Members of the Board of Directors*, “Dinner with the climate expert” organized by ASSOGESTIONI, 10 December 2018

*Quando mezzo grado fa la differenza*, Bienale Democrazia di Torino, 29 March 2019

*Winter is not coming: Storie di un clima che cambia*, Festival dello sviluppo sostenibile, Università degli Studi di Milano 28 May 2019

*EU Technology Transition for industry – the role of research and innovation programmes*, COP25 Side Event, COP25, Madrid, EU Pavillion, 12 December 2019

*Domestic Climate Policy and International Competitiveness*, COP25, Japan Pavilion, 11 December 2019

*Keynote: Climate Change: Risks, Costs and challenges*. Path for the Public Finances 2020: Budgeting for Climate Change, Dublin Castle, 28 February 2020

*L’Europa a zero emissioni nette nel 2050: Mind the gap!*, Giornata di Studi: L’Europa e il climate change: giornata di studi, Palazzo Arese Borromeo, Cesano Maderno, 10 September 2020

#### CONFERENCES AND SUMMER SCHOOLS

*The impact of policy uncertainty on innovation in the wind industry: evidence from EU countries*. 29th Annual Congress of the European Economic Association, University of Toulouse, 25–29 August 2014

*Drivers of investment in cleaner energy*. 3rd Annual Conference of the Italian Association of Environmental and Resource Economists, University of Padua, Padova, 20-21 February 2015

*The drivers of investment in cleaner energy production*. 21st European Association of Environmental and Resource Economists Annual Conference, University of Helsinki, Helsinki, 24-27 June 2015

*Intra-EU knowledge flows in the renewable energy sector: a patent citation analysis*. Conference on the Economics of innovation, diffusion, growth and the environment. Grantham Research Institute, London, 16-18 September 2015

*Demand System Analysis for Italian Households: Elasticities and Welfare Effects of RES-E Incentives*. 4th Annual Conference of the Italian Association of Environmental and Resource Economists, University of Bologna, 11-12 February 2016

*The Political Economy of Energy Innovation*. 1st Energy Symposium of the Association of Italian Energy Economists: “Current and Future Challenges to Energy Security”, Bicocca University, Milan, 30 November - 2 December 2016

*Rebound Effects in Europe*. 5th International Academic Symposium: “Challenges for the Energy Sector”, University of Barcelona, 7 February 2017

*Transition towards a green economy in Europe: innovation and knowledge integration in the renewable energy sector*. 23rd Annual Conference of the European Association of Environmental and Resource Economists, Athens, 28 Jun – 1 Jul 2017

*The Carrot or the Stick? Directed Technical Change and Nonlinearities of Policy Effectiveness in Energy Innovation*. 6th European Conference on Corporate R&D and Innovation and Industrial Dynamics: “Challenges for the next decade”, Seville, 27-29 September 2017

*Transition towards a green economy in Europe: Innovation and knowledge integration in the renewable energy sector*. 2017 IP Statistics for Decision Makers (IPSDM) Conference, Mexico City, 14-15 November 2017

*The Carrot or the Stick? Directed Technical Change and Nonlinearities of Policy Effectiveness in Energy Innovation*. 10th Conference on Model-based Evidence on Innovation and Development (MEIDE), Montevideo, 16-17 November 2017

*Threshold policy effects and directed technical change*. SPRU Friday Seminar, University of Sussex, Brighton, 27 April 2018

*Threshold Policy Effects and Directed Technical Change in Energy Innovation*, 11th International Workshop on “Empirical Methods in Energy Economics” (EMEE), Fondazione Eni Enrico Mattei, Milano, 14-15 June 2018

*Environmental Policy and International Trade: New Evidence from Structural Gravity*. 6th World Congress of Environmental and Resource Economists (WCERE), Gothenburg, 25-29 June 2018

*What do we know about the environmental, technological, competitiveness and social outcomes of policy instruments for the low-carbon transition: the importance of policy design*, Advances in Decision Analysis Conference, Università Bocconi, Milano, 16-19 June 2019