

Curriculum Vitae Prof. Frank W. Geels

Frank Geels is Professor of System Innovation and Sustainability at the Manchester Institute of Innovation Research (MioIR) and Sustainable Consumption Institute (SCI), at the University of Manchester (UK). He is one of the world-leading scholars on socio-technical transitions, addressing interactions between social and technical developments in large-scale changes in energy, food and transport systems. The topic of socio-technical transitions is receiving increasing political and academic attention in the context of sustainable development and climate change, because they enable major sustainability improvements (factor 4 to 10). Geels is particularly well known for this work on the Multi-Level Perspective (MLP) (which provides an encompassing understanding of longitudinal transitions as interactions between radical niche-innovations, established regimes and an exogenous 'landscape') and on Strategic Niche Management (SNM), which explains how policymakers can influence the emergence of radical innovations. Geels also developed a socio-technical scenario methodology, which provides a novel way for exploring how future transitions arise from interactions between social, technical, political, cultural and economic developments.

Working in the field of innovation studies, Geels aims to make crossovers between the sub-communities of evolutionary economics (EE), Science and Technology Studies (STS) and Technology Innovation Management (TIM). His interdisciplinary style also uses insights from neo-institutional theory, sociology, history of technology, cultural studies and business studies. His work combines theoretical sensitivity with in-depth longitudinal case studies, aiming at pattern-recognition and causal process analysis.

Geels has studied a dozen historical case studies of transitions in various empirical domains: sea transport, urban land transport, highway systems, air transport, sewer systems, water supply, music, factory production, psychotropic drugs, pig farming, horticulture, and coal industry. He also studied contemporary and future sustainability transitions in biogas, electricity systems, pig farming, renewable energy technologies, and automobility.

Geels has published six books and 39 peer-reviewed articles, some of which are highly cited (respectively 475, 318 and 316 citations in the Web of Science for his 2002, 2007 and 2004 articles in *Research Policy*). In 2014 Thomson Reuters selected him into the list of 'Highly Cited Researchers'. His international standing led him to become chairman of the Sustainability Transitions Research Network (<http://www.transitionsnetwork.org/>), which has more than 700 members, is associated with the new journal *Environmental Innovation and Societal Transitions*, and contributes to organizing International Sustainability Conferences (Amsterdam, 2009; Lund, 2011; Copenhagen, 2012; Zurich, 2013).

Geels has had social and political impacts through interactions with policymakers and other stakeholders. The MLP, which was introduced to the Dutch government via a consultancy report, has inspired the Dutch transition management program (2002-2010). The UK Department of Environment, Food and Rural Affairs (DEFRA) has embraced transition thinking in *Defra's Evidence and Investment Strategy 2010-2013 and Beyond*, partly on the basis of two consultancy projects in which Geels was involved. The World Wildlife Fund explicitly uses the MLP to structure their strategies in the 'Great Transition' project, which led to the establishment of a Smart CSO initiative that includes 70 civil society organization across Europe (<http://www.smart-csos.org/>). Geels was recently invited to write a report for the OECD to help frame a 2-year research project (2013-2015) on System Innovation.

1. Personal information

Personal details

Name: Frank Willem Geels
Address: 16 Devonshire Road, Manchester, M21 8XB, United Kingdom
Telephone: +44 (0)161 275 7374 (work)
Email: frank.geels@mbs.ac.uk
Nationality: Dutch

Education

- Ph.D., Science, Technology and Innovation Studies, Twente University of Technology (Jan. 1998- July 2002), Netherlands. Supervisors: Arie Rip and Johan Schot. Title PhD thesis: *Understanding the Dynamics of Technological Transitions: A co-evolutionary and socio-technical analysis*.
- Masters degree in Philosophy of Science, Technology and Society, Twente University of Technology (1991-1996)
- Bachelor degree in Chemical Engineering, Twente University of Technology (1989-1991)

Employment history

- January 2014: Distinguished Scientist Fellowship Program, King Abdulaziz University, Jeddah, Saudi Arabia (Faculty of Economics and Administration)
- September 2012-present: Professor of System Innovation and Sustainability, Manchester Institute of Innovation Research, Manchester Business School, University of Manchester (UK)
- September 2008-August 2012: Professor of System Innovation and Sustainability, SPRU (Science Policy Research Unit), University of Sussex (UK)
- October 2007-Aug. 2008: Professor of Innovation, Socio-technical Change and Sustainability (0.5 fte) at Brunel Business School, Brunel University, London, UK
- Sept. 2004-Aug. 2008: Senior researcher, Eindhoven University of Technology:
- Sept. 2002-Aug. 2004: Post-doctoral researcher, Eindhoven University of Technology
- Oct. 1996-Oct 1997: Research assistant, Twente University of Technology

Guest Professorships:

- Oct. 2013-Sept. 2014: Helmholtz Alliance, linked to ENERGY TRANS project (Future infrastructures for meeting energy demands). Guest professorship located at University of Stuttgart, Germany (Institute of Social Sciences, Department of Organizational Sociology and Innovation Studies)
- 2010: Department of Management Engineering, Danish Technical University, Copenhagen, Denmark

2. Research interests

Research topics:

- Socio-technical transitions and system innovations
- Emergence of new technologies, and technological niches
- Co-evolution of technology and society
- The role of expectation, visions, cultural discourse and legitimacy in socio-technical change and transitions

- Destabilisation and decline of existing industries and technological regimes
- Co-evolution of societal problems and industry responses
- Industry reorientation and resistance strategies
- Sustainable development as a long-term societal challenge
- Sustainable Consumption and Production (SCP)

Theoretical interests:

- Multi-level perspective (MLP) on socio-technical transitions
- Strategic Niche Management (SNM) for managing radical innovation
- Crossovers between STS and evolutionary theories of technological change
- Foundational theory and ontologies
- Dialectic issue life cycle (DILC) model
- Tripple embeddedness framework (TEF) of industries

Research approach:

- Longitudinal case studies (historical and contemporary)
- Pattern recognition, narrative explanation, and process theory
- Socio-technical scenarios
- Inter-disciplinary theory building (crossovers, multi-paradigm analysis)
- Policy relevance: Make academic insights relevant for policy makers

3. Research grants

Cumulative grants: £11.5 million

1. EPSRC grant (Co-I) for, 'Reframing energy demand: Innovation for sustainable heat', £726.203 (2014-2017; 36 months).
2. FP-7 proposal (Co-I), 'Exploring transition pathways to sustainable, low carbon societies', €3.8 million (2013-2016)
3. EPSRC/ESRC grant (Co-I) for *Research Centre on Innovation and Energy Demand*, £3.7 million (2013-2018).
4. ESCR grant (Co-I) as part of Open Research Area in Europe ('Governance of the discontinuation of socio-technical systems'), €1.5 million, 3 years (2012-2015)
5. Proposal (failed) for ESRC centres and large grants competition 2011-2012 ('Transitions to a green economy: Economic risk, governance, and public participation'), £5 million (2012-2016)
6. Proposal (failed) to UKERC (UK Energy Research Centre), May 2011, ('Socio-technical scenarios for smart grids'), £500.000 (Co-I)
7. Starting Grant (PI) from European Research Council ('Destabilisation of sociotechnical regimes as the key to transitions towards sustainability') (€07.114) (2008-2012)
8. Grant from the Dutch Knowledge Network on System Innovation (KSI) for a 4-year PhD project (140.000 euro) titled: 'Culture in transitions' (2006-2009).
9. Grant from KSI for a 2-year postdoc research (€130.000) titled: 'Historical analysis of transitions in the medical system and health care' (2007-2008).
10. Research grant from the Dutch TransForum programme (Transitions to Sustainable Agriculture) for two 2-year postdoc project (€250.000), titled: 'Historical and future transitions in agriculture and food' (2007-2008).
11. Grant from KSI for a 3 year research project for 2 research fellows (€90.000), titled 'Historical Transition Pathways' (2004-2007).

4. Consultancy and stakeholder engagement

Consultancy projects

- Project on system innovation for OECD, TIP-unit (Innovation and Technology Policy), March-December 2013 ('System innovation: Concepts, dynamics and governance'), €10.000.
- Research project on 'Transformative Innovation for Sustainable Development' for the UK Department of Environment, Food and Rural Affairs (DEFRA), May-July 2009, £38.200
- Research project on the 'Feasibility of Systems thinking for Sustainable Production and Consumption Policy' for the UK Department of Environment, Food and Rural Affairs (DEFRA), May-July 2008, £19.000
- Research project on innovative performance in highway systems for Rijkswaterstaat, the engineering department of the Dutch Transport Ministry, Aug. 2002- Feb 2003, €24.000.
- Research project on sustainability transitions for the Dutch Ministry of Environmental Affairs, in preparation of their Fourth Environmental Policy Plan, June-November 2000.
- Research project on 'Behaviour and Technology' for Ministry of Environmental Affairs and Economic Affairs, Province Friesland and electricity company NUON, Oct. 1996, 34.500 guilders.

Presentations at high-level stakeholder meetings

- Invited speaker at policy roundtable on 'Industrial Policy for Smart, Sustainable and Inclusive growth' at the European Commission (DG REGIO) in **Brussels**, 8 October, 2014 (title talk: 'Sustainability transitions and the financial crisis').
- Member of high-level panel discussion (including representatives from DECC, Energy Savings Trust, Parliament) on the topic 'Can the UK achieve an energy efficiency revolution?', **Westminster, London**, 12 June, 2014
- Keynote presentation at Swedish Ministerial conference on "Innovation Policy for the Future: System Innovation for Societal Challenges, Job Creation and Sustainable Growth", organized by VINNOVA (Swedish Innovation Agency), 12 December, 2013, Stockholm, **Sweden** (title: 'System Innovation: Dynamics and policy implications')
- Keynote presentation at the 'Making Transitions Happen' Platform Event organized by Climate-KIC (Europe's largest public-private partnership focused on addressing climate change), **Brussels**, 27-28 November, 2013 (title: 'Making a reality of Europe's low carbon ambitions: System Innovation and Societal Transitions').
- Presentation at high-level internal WWF workshop on 'From planetary boundaries to global system transitions for a sustainable planet: Towards the identification of transformational leverage points', 5 September 2013, Stockholm, **Sweden** (title: 'A multi-level perspective on socio-technical transitions').
- Keynote presentation at OECD meeting of TIP-unit (Innovation and Technology Policy), 18 June, 2013, **Paris** (title: 'System innovation: Concepts, dynamics and governance').
- Presentation for Joint Programming Initiative on Climate Change (European Commission), workshop on Socio-ecological transformation, Vienna, **Austria**, 7-8 March, 2013 (title: 'Different research styles in socio-technical transitions and socio-ecological transformations: Ontological, epistemological, methodological reflections')
- Keynote talk at OECD workshop on 'System Innovation', organized by TIP-unit (Innovation and Technology Policy), 12 December, 2012, **Paris** (title: 'Systems innovation, the Multi-Level Perspective, and Transition Management')

- Keynote lecture at the 12th International Conference on Industrial Technology Innovation ('Heading towards a sustainable future'), organized by the Taiwan Institute of Economic Research (TIER), 25-26 August 2011, Taipei, **Taiwan** (title: 'Socio-technical transitions towards sustainability: Dynamics and policy implications')

Indications of social and political impact

- Member of the Advisory Board (since May 2014) for a sustainability transitions project (called the 'Global Opportunity Report') by DNV LG (one of the world's largest Norwegian shipping and offshore classification companies) and Monday Morning (a Scandinavian think tank). This project uses the MLP to guide its analysis.
- The MLP has been taken up by *Forum for the Future*, a non-profit organization working with business, government and other organisations to solve complex sustainability challenges. *Forum for the Future* uses the MLP to guide their 'Big Shift' programme which "has system innovation at the heart of its strategy".
- Geels was interviewed in a special issue on 'mobility transitions' in the Dutch magazine *Agora: Magazine for social-spatial issues* (number 2, volume 30, 2014); the (Dutch) article was titled 'Fixated on technology: Interview with David Banister and Frank Geels'
- A 2013 report from United Nations Environment Programme (UNEP) and International Resource Panel (*City-Level Decoupling: Urban Resource Flows and the Governance of Infrastructure Transitions*) dedicates a whole section (6.1.1.) to the multi-level perspective, because: "The multi-level perspective (MLP) provides an ambitious attempt to develop an understanding of 'system innovation' or 'sustainability oriented innovations' (SOIs), based on an interrelated three-level framework of landscape (macro), regime (meso) and niche (micro)."
- In 2011, WWF published a report (*Smart CSOs: Effective Change Strategies for the Great Transition: Five leverage points for civil society organizations*), which adopts the multi-level perspective (MLP) and uses it to underpin five strategies ('leverage points') to bring about transitions (see p. 15-19).
- The influential report from the German Advisory Council on Global Change (WBGU, 2011, *World in Transition: A Social Contract for Sustainability*) discusses the multi-level perspective (p. 92-94) as a useful framework to understand transitions: "The multilevel model is a helpful analysis grid as a basis for the structured discussion of transformation processes. It combines systemic perspectives (transition from high-carbon to low-carbon regime) allowing the consideration of path dependencies along with processes with more or less self-contained dynamics, which can be influenced, but not 'prevented' (urbanisation, population growth), with an actor's perspective, allowing the exploration of the scope for action (change agents)" (p. 94).
- A report by the United Nations Environment Program (UNEP, 2011), *Decoupling Natural Resource Use and Environmental Impacts from Economic Growth*, summarises the multi-level perspective (p. 41) and makes references to four of my publications.
- *Defra's Evidence and Investment Strategy 2010-2013 and beyond* (2011) embraces the importance of sustainability transitions and transformative innovation, and refers explicitly (on p. 5 and 13) to a report we wrote for Defra in 2009 ('Transformative Innovation for Sustainable Development')

Membership of advisory boards:

- Member of advisory group for the Climate-KIC platform 'Making Transitions Happen' (since October 2013). (Climate-KIC which is one of the three Knowledge, Innovation, and Communities created by the European Institute of Innovation and Technology)

5. Relations to the wider profession

Prizes, awards, and professional recognition of excellence

- Selected by Thomson Reuters into their prestigious list of *Highly Cited Researchers*, based on my publications in the 2002-2012 period in the ‘economics and business’-field (as one of five UK researchers).



- Identified as one *The World's Most Influential Scientific Minds 2014* (p. 39). “Everyone acknowledged in this book is a person of influence in the sciences and social sciences. They are the people who are on the cutting edge of their fields. They are performing and publishing work that their peers recognize as vital to the advancement of their science. These researchers are, undoubtedly, among the most influential scientific minds of our time” (p. 3).
- Research Publication Award from IAMOT (International Association for the Management of Technology), awarded in September 2013 to the top 50 authors of technology and innovation management over the last 5 years, based on a quantitative analysis of research outputs from 2008-2012.
- Winner of Best Paper Award from WWWforEurope (a European Commission project on ‘welfare, wealth and work’) in an open competition on issues related to the Socio-Ecological Transition (awarded in September 2013 for Geels, F.W., 2013, ‘The impact of the financial-economic crisis on sustainability transitions: Financial investment, governance and public discourse’, *Environmental Innovation and Societal Transitions*, 6, 67-95)
- 2nd-prize Best Paper award at the 4th International Conference on Sustainability Transitions, 19-21 June 2013, Zurich, Switzerland (regarding Penna, C. and Geels, F.W. ‘Climate change and the slow reorientation of the American car industry (1979-2018): An application and extension of the Dialectic Issue LifeCycle (DILC) model’)
- Winner of an ERC grant (2008-2012), which according to the ERC's previous president (Helga Nowotny) is "awarded to Europe's research elite".
- Research Publication Award from IAMOT (International Association for the Management of Technology), awarded in October 2008 to the top 50 authors of technology and innovation management over the last 5 years, based on a quantitative analysis of research outputs from 2002-2007.
- Winner of Forbes-price from the Foundation for the History of Technology (for best publication of junior scholar in history and sociology of technology), awarded in October 2001, for Geels, F.W., 2002, ‘Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study’, *Research Policy*, 31(8/9), 1257-1274

Membership of editorial boards:

- Technology Analysis & Strategic Management (since October 2007)
- Environmental Innovation and Societal Transitions (since March 2010)
- Journal of Innovation Economics (since August 2013)
- GAIA: Ecological perspectives on science and society (since May 2014)

Membership of advisory board:

- Advisory board for EPSRC-funded research proposa (Prof. Catherine Mitchell) on Innovation and Governance for a Sustainable and Affordable Economy (2012-2016)

Membership of professional societies:

- Society for the Social Study of Science (4S)
- European Association for the Study of Science and Technology (EASST)

Review work for journals:

Research Policy; Organization Studies; Science, Technology & Human Values; Journal of Evolutionary Economics; Industrial and Corporate Change; Technology Analysis & Strategic Management; Technological Forecasting and Social Change; Energy Policy; Science and Public Policy; Technovation ; Journal of Environment Policy & Planning; System Dynamics Review; New Political Economy; Environmental Innovaton & Societal Transitions

Review work for research councils:

- South African National Research Foundation (NRF) (November, 2013)
- Member of international expert panel for the Research Council of Norway (RCN) (evaluating social science-related energy research proposals; 11 October 2010)
- UK Economic and Social Research Council
- Dutch Research Council (NWO)

6. Teaching and supervision

Because I have always been employed through externally funded research projects (Dutch Research Council, Knowledge Network on System Innovation, European Research Council), I had limited time available for teaching. I have been voluntarily involved in teaching activities and guest lectures.

Teaching

- ‘Anchor teacher’ in 2-day PhD course on Sustainability Transitions, 17-19 November 2010, Department of Management Engineering, Danish Technical University, Denmark.
- I taught a course 'Technology and Policy' (2008) in the bachelor program 'Technical Innovation Science' at Eindhoven University of Technology. Students ranked me as best teacher from the six teachers in the module.
- I taught a two-day MBA course at Brunel Business School on ‘Managing for the Future’, (6-7 June 2008).
- For 3 years during my PhD, I taught a course called ‘Steering of Science and Technology’ (1998-2001) in the master program 'Philosophy of Science, Technology and Society', Twente University of Technology.
- I delivered various guest lectures at student courses, summerschools, and PhD courses:
 - 25-26 September, 2014, Presentation for IFRIS (Institute for Research and Innovation in Society) summerschool in Florence (‘Understanding the dynamics of transitions: The multi-level perspective and

reflections’)

- 6 September, 2014, Guest lecture for MBA course at Manchester Business School on ‘Sustainable Business’ (title: Climate change and the slow reorientation of the American car industry (1979-2013): Lessons for eco-innovation strategy)
- 2 September, 2014, Presentation for Climate-KIC Summerschool, Frankfurt, Germany (title: ‘Transitions thinking and the multi-level perspective: Deepening, broadening and scaling up’)
- 20 November, 2013, Guest lecture for University College Students at Manchester University (Title: ‘Socio-technical transitions to sustainability: The multi-level perspective and examples’)
- 17 October 2013, Guest lecture for innovation students at University of Stuttgart (title: ‘The arduous transition to low-carbon energy: A multi-level analysis of green niches and resilient regimes’).
- 26 September, 2013, c
- 1 September 2013, Guest lecture for MBA course at Manchester Business School on ‘Sustainable Business’ (title: Climate change and the slow reorientation of the American car industry (1979-2018): Lessons for eco-innovation management)
- 26 March, 2013, Guest lecture for MBS PhD students on ‘Mapping the diversity of innovation theories (and beyond): Understanding why theories differ’, Manchester Business School
- 15 May 2012, Seminar presentation for STEPS Summerschool, University of Sussex
- 25 April and 2 May 2012, two guest lectures for ‘Managing Change’, an undergraduate course for students at BMEC (Department of Business, Management and Economics), University of Sussex
- 19 January 2012, Guest lecture for SPRU master course ‘Perspectives, methods and skills for Science, Technology and Innovation Studies’, University of Sussex
- 18 April 2011 Guest lecture for ‘Managing Change’ undergraduate course for students at BMEC (Department of Business, Management and Economics), University of Sussex
- 20 January 2010, Guest lecture for ‘Energy Policy for Sustainability’ master course at SPRU
- 3 February 2009, Guest lecture for ‘Innovation for Sustainability’ master course at SPRU
- 27 January 2009, Guest lecture for ‘Energy Policy for Sustainability’ master course at SPRU
- 13 September 2007, Acted as teacher in post-doctoral course Transition Management, organised by DRIFT (Dutch Research Institute for Transitions).
- 9 January, 2007, Guest lecture at Maastricht University for student course (‘Historical analysis of transitions: Theory and case study’)
- 21 September 2006, Acted as teacher in post-doctoral course Transition Management, organised by DRIFT (Dutch Research Institute for Transitions).
- 20 September 2006, Presentation at summerschool on Technology Assessment, organised by Delft University of Technology and Rathenau Instituut.
- 12 January 2006, ‘Sociology of innovation, transitions and system innovations’. Presentation as teacher on PhD training Winterschool, organised by Knowledge Network System Innovation, Rolduc.
- 21 March, 2005, Guest lecture at Maastricht University for student course (‘Transitions and system innovations’)
- September 2004, Presentation at summerschool on Technology Assessment, organised by Delft University of Technology and Rathenau Instituut.

PhD supervision

Current supervision

1. Marc Hudson, *United States and Australian Coal Industry responses to the threats of climate change (1981 to 2013): An analysis using the Dialectical Life-Cycle Model*, started 1 September 2014, Sustainable Consumption Institute, University of Manchester
2. Miles Ten Brinke, *The Ongoing Reconfiguration of the British Electricity Grid: A Multi-Level Perspective and Large Technical Systems Analysis*, started 1 September 2013, Manchester Business School, University of Manchester
3. Cameron Roberts, *The role of political and cultural discursive conflict in twentieth century transport Transitions: A refinement of the Multi-Level Perspective*, started 1 September 2012, Manchester Business School, University of Manchester

Completed:

4. Caetano Penna, *The co-evolution of societal issues, technologies and industry regimes: Three case studies of the American automobile industry*, SPRU, University of Sussex (completed on 6 June, 2014)
5. Bruno Turnheim, (Completed on 2 July 2012) *The destabilisation of existing regimes in socio-technical transitions: Theoretical explorations and in-depth case studies of the British coal industry (1913-2010)*, SPRU, University of Sussex
6. Bram Verhees, (completed on 27 February 2012), *Cultural legitimacy and innovation journeys: A new perspective applied to Dutch and British nuclear power*, Eindhoven University of Technology.
7. Rob Raven, (completed on 30 March 2005), *Strategic Niche Management for Biomass*, Eindhoven University of Technology (supervision role in last stage)

Supervision master student dissertation

Gyto Pugh ('How has the financial crisis of 2008 affected General Motors' 'green' innovation strategies?'); May-September 2010

External PhD examiner

1. Robin Gustafsson, Institute of Strategy, Helsinki University of Technology, Finland, 9 September 2009 ('Awareness, institutional entrepreneurship, and contradictions in emerging technological fields')
2. Clovis Zapata, Cardiff Business School, Cardiff University, 17 June 2009 ('Environmental regulation and firm strategy: The evolution of automobile environmental policy')

7. Administrative and organisational experience

Administrative experience

- Deputy Director of the Research Centre on Innovation and Energy Demand (funded by EPSRC/ESRC, £3.7 million, 2013-2017).
- Member of the Research Committee of the Sustainable Consumption Institute (since September 2012)
- Chairman of the international Sustainability Transitions Research Network (since June 2011) (<http://www.transitionsnetwork.org/>)
- Member of SPRU Leadership Team (January 2009-August 2012, responsible for Research Excellence Framework)
- Member of Scientific Board of the Sustainability Transitions Research Network (since July 2009)
- Member of ECIS managerial board (Eindhoven Centre for Innovation Studies), October 2007-October 2008
- Member of education committee in national PhD school WTMC (Science, Technology and Modern Culture), June 2000 – October 2003.
- Member of interview/appointment panels (4 Professors, 2 senior researchers, 2 research assistants)

Organizational experience

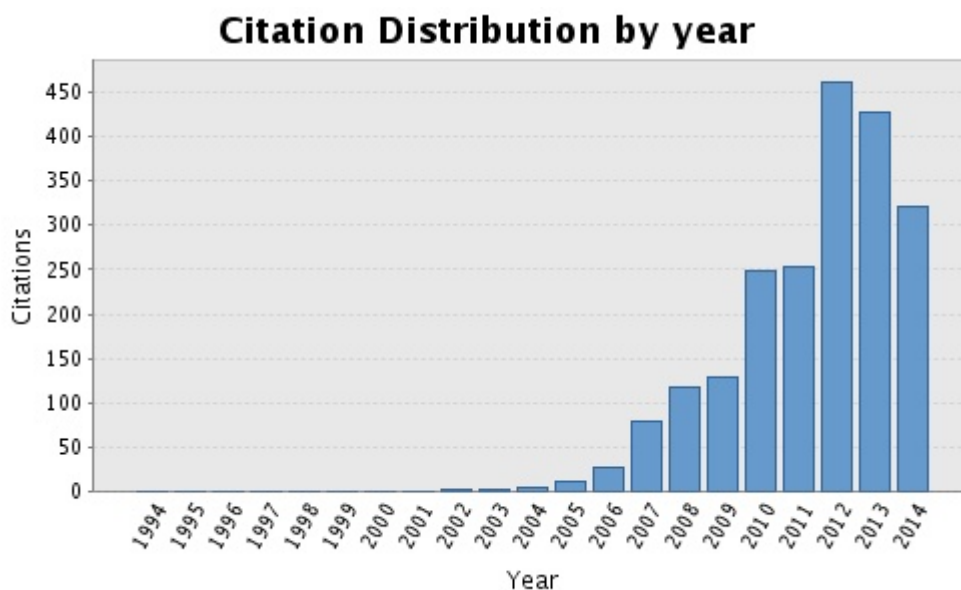
- Co-organized an international expert workshop (30 participants) on Incumbent-Challenger Interactions in Energy Transitions (22-23, Sept. 2014, Stuttgart, Germany)
- Organization committee of fifth International Sustainability Transitions conference in Utrecht (29-31 August, 2014), 225 participants

- Organization committee of fourth International Sustainability Transitions conference in Zurich (19-21 June, 2013), 250 participants
- Organization committee of third International Sustainability Transitions conference in Copenhagen (29-31 August, 2013), 300 participants
- Co-organized the Sussex Energy Group Conference (100 people), ‘Energy transitions in an interdependent world: what and where are the future social science research agendas?’, 25-26 February, 2010, SPRU, University of Sussex
- Organized a masterclass for 20 PhD students (8-9 May, 2008) with Professor Elizabeth Shove (Lancaster University, UK).
- Organiser of weekly seminars at ECIS (Eindhoven Centre for Innovation Studies), 2004 – 2008
- Organized an international expert workshop (50 participants) on 'Technological discontinuities and transitions: Evolution theory and inter-disciplinary crossovers' (14-16 May 2008), Eindhoven Centre for Innovation Studies (ECIS), Eindhoven University.
- Organized an international expert workshop (40 participants) on 'Sustainable Innovation Journeys' (2-3 October 2006, Utrecht, Netherlands). Resulted in a special issue in Technology Analysis & Strategic Management.
- Organiser of department seminars, Twente University of Technology, July 1998 – July 2000
- Organized an international workshop (40 participants) on system innovation (4-6 July 2002, Twente University, Netherlands); resulted in an edited book (Elzen, Geels, Green, 2004).

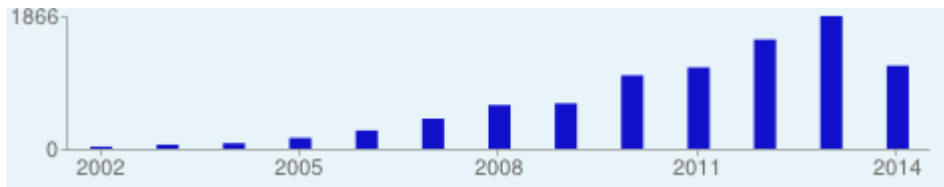
8. Publications and citations

| | Web of Science (excluding books) | Googe Scholar |
|--------------------------------|----------------------------------|---------------|
| Cumulative number of citations | 2084 | 9498 |
| h-index | 18 | 40 |
| Average citations per article | 65.1 | |
| Most cited paper (2002) | 475 | 1469 |

Citations per year (Web of Science):



Citations per year (Google Scholar)



Articles in international journals [and number of citations in Web of Science]

1. Geels, F.W., 2014, 'Regime resistance against low-carbon energy transitions: Introducing politics and power in the multi-level perspective', *Theory, Culture & Society*, 31(5), 21-40 [GOLD OPEN ACCESS]
2. Geels, F.W., 2014 'Reconceptualising the co-evolution of firms-in-industries and their environments: Developing an inter-disciplinary Triple Embeddedness Framework', *Research Policy*, 43(2), 261-277
3. Turnheim, B. and Geels, F.W., 2013 'The destabilisation of existing regimes: Confronting a multi-dimensional framework with a case study of the British coal industry (1913-1967)', *Research Policy*, 42(10), 1749-1767 [**1 citation**]
4. Geels, F.W., 2013, 'The impact of the financial-economic crisis on sustainability transitions: Financial investment, governance and public discourse', *Environmental Innovation and Societal Transitions*, 6, 67-95
5. Turnheim, B. and Geels, F.W., 2012, 'Regime destabilisation as the flipside of energy transitions: Lessons from the history of the British coal industry (1913-1997)', *Energy Policy*, 50, 35-49 [**7 citations**]
6. Geels, F.W., 2012, 'A socio-technical analysis of low-carbon transitions: Introducing the multi-level perspective into transport studies', *Journal of Transport Geography*, 24, 471-482 [**18 citations**]
7. Penna, C.C.R. and Geels, F.W., 2012, 'Multi-dimensional struggles in the greening of industry: A dialectic issue lifecycle model and case study', *Technological Forecasting and Social Change*, 79(6), 999-1020 [**3 citations**]
8. Elzen, B., Geels, F.W., Leeuwis, C., and Van Mierlo, B., 2011, 'Normative contestation in transitions 'in the making': Animal welfare concerns and system innovation in pig husbandry (1970-2008)', *Research Policy*, 40(2), 263-275 [**13 citations**]
9. Berkers, E. and Geels, F.W., 2011, 'System innovation through stepwise reconfiguration: The case of technological transitions in Dutch greenhouse horticulture (1930-1980)', *Technology Analysis & Strategic Management*, 23(3), pp. 227-247 [**5 citations**]
10. Geels, F.W. and Verhees, B., 2011, 'Cultural legitimacy and framing struggles in innovation journeys: A cultural-performative perspective and a case study of Dutch nuclear energy (1945-1986)', *Technological Forecasting and Social Change*, 78(6), 910-930 [**11 citations**]
11. Geels, F.W., 2011, 'The multi-level perspective on sustainability transitions: Responses to seven criticisms', *Environmental Innovation and Societal Transitions*, 1(1), 24-40
12. Raven, R.P.J.M. and Geels, F.W., 2010, 'Socio-cognitive evolution in niche development: Comparative analysis of biogas development in Denmark and the Netherlands (1973-2004)', *Technovation*, 30(2), 87-99 [**23 citations**]
13. Geels, F.W., 2010, 'Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective', *Research Policy*, 39(4), 495-510 [**70 citations**]
14. Verbong, G.P.J. and Geels, F.W., 2010, 'Exploring sustainability transitions in the electricity sector with socio-technical pathways', *Technological Forecasting and Social Change*, 77(8), 1214-1221 [**28 citations**]
15. Geels, F.W., 2009, 'Foundational ontologies and multi-paradigm analysis, applied to the

- socio-technical transition from mixed farming to intensive pig husbandry (1930-1980)', *Technology Analysis & Strategic Management*, 21(7), 805-832 [**5 citations**]
16. Geels, F.W., Hekkert, M. and Jacobsson, S., 2008, 'The dynamics of sustainable innovation journeys: Editorial', *Technology Analysis & Strategic Management*, 20(5), 521-536 [**35 citations**]
 17. Schot, J.W. and Geels, F.W., 2008, 'Strategic niche management and sustainable innovation journeys: Theory, findings, research agenda and policy', *Technology Analysis & Strategic Management*, 20(5), 537-554 [**115 citations**]
 18. Verbong, G.P.J., Geels, F.W. and Raven, R.P.J.M., 2008, 'Multi-niche analysis of dynamics and policies in Dutch renewable energy innovation journeys (1970-2006): Hype-cycles, closed networks and technology-focused learning', *Technology Analysis & Strategic Management*, 20(5), 555-573 [**36 citations**]
 19. Verbong, G.P.J. and Geels, F.W., 2007, 'The ongoing energy transition: Lessons from a socio-technical, multi-level analysis of the Dutch electricity system (1960-2004)', *Energy Policy*, 35(2), 1025-1037 [**104 citations**]
 20. Geels, F.W. and Raven, R.P.J.M., 2007, 'Socio-cognitive evolution and co-evolution in competing technical trajectories: Biogas development in Denmark (1970-2002)', *International Journal of Sustainable Development & World Ecology*, 14(1), 63-77 [**10 citations**]
 21. Geels, F.W., Pieters, T. and Snelders, S., 2007, 'Cultural enthusiasm, resistance and the societal embedding of new technologies: Psychotropic drugs in the 20th century', *Technology Analysis & Strategic Management*, 19(2), 145-165 [**10 citations**]
 22. Geels, F.W. and Schot, J.W., 2007, 'Typology of sociotechnical transition pathways', *Research Policy*, 36(3), 399-417 [**318 citations**]
 23. Geels, F.W., 2007, 'Analysing the breakthrough of rock 'n' roll (1930-1970): Multi-regime interaction and reconfiguration in the multi-level perspective', *Technological Forecasting and Social Change*, 74(8), 1411-1431 [**19 citations**]
 24. Geels, F.W. and Schot, J.W., 2007, 'Comment on "Techno therapy or nurtured niches?" by Hommels et al. [Res. Policy 36(7) (2007)]', *Research Policy*, 36(7), 1100-1101 [**4 citation**]
 25. Schot, J.W. and Geels, F.W., 2007, 'Niches in evolutionary theories of technical change: A critical survey of the literature', *Journal of Evolutionary Economics*, 17(5), 605-622 [**48 citations**]
 26. Geels, F.W. and Kemp, R., 2007, 'Dynamics in socio-technical systems: Typology of change processes and contrasting case studies', *Technology in Society*, 29(4), 441-455
 27. Geels, F.W., 2007, 'Transformations of large technical systems: A multi-level analysis of the Dutch highway system (1950-2000)', *Science Technology & Human Values*, 32(2), 123-149 [**11 citations**]
 28. Geels, F.W., 2007, 'Feelings of discontent and the promise of middle range theory for STS: Examples from technology dynamics', *Science, Technology & Human Values*, 32(6), 627-651 [**12 citations**]
 29. Geels, F.W. and Deuten, J.J., 2006, 'Local and global dynamics in technological development: A socio-cognitive perspective on knowledge flows and lessons from reinforced concrete', *Science and Public Policy*, 33(4), 265-275 [**5 citations**]
 30. Geels, F.W. and R.P.J.M. Raven, 2006, 'Non-linearity and expectations in niche-development trajectories: Ups and downs in Dutch biogas development (1973-2003)', *Technology Analysis & Strategic Management*, 18(3/4), 375-392 [**80 citations**]
 31. Geels, F.W., 2006, 'Co-evolutionary and multi-level dynamics in transitions: The

- transformation of aviation systems and the shift from propeller to turbojet (1930-1970)', *Technovation*, 26(9), 999-1016 [**41 citations**]
32. Geels, F.W., 2006, 'The hygienic transition from cesspools to sewer systems (1840-1930): The dynamics of regime transformation', *Research Policy*, 35(7), 1069-1082 [**50 citations**]
 33. Geels, F.W., 2006, 'Major system change through stepwise reconfiguration: A multi-level analysis of the transformation of American factory production (1850-1930)', *Technology in Society*, 28(4), 445-476 [**3 citations**]
 34. Geels, F.W., 2005, 'Processes and patterns in transitions and system innovations: Refining the co-evolutionary multi-level perspective', *Technological Forecasting and Social Change*, 72(6), 681-696 [**79 citations**]
 35. Geels, F.W., 2005, 'Co-evolution of technology and society: The transition in water supply and personal hygiene in the Netherlands (1850–1930)—a case study in multi-level perspective', *Technology in Society*, 27(3), 363-397 [**31 citations**]
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 37. Geels, F.W., 2004, 'From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory', *Research Policy*, 33(6/7), 897-920 [**316 citations**]
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41. Mylan, J., Geels, F.W., McMeekin, A., Gee, S., and Foster, C., 2014, 'Eco-innovation and retailers in UK milk, beef and bread chains: Enriching environmental supply chain management with insights from innovation studies', *Journal of Cleaner Production*, Accepted and forthcoming
42. Geels, F.W. and Penna, C.C.R., 2014, 'Societal problems and industry reorientation: Elaborating the Dialectic Issue LifeCycle (DILC) model and a case study of car safety in the USA (1900-1995)', *Research Policy*, Accepted and forthcoming
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44. Geels, F.W., McMeekin, A., Mylan, J., Southerton, D., 2014, A critical appraisal of Sustainable Consumption and Production research: The reformist, revolutionary and reconfiguration positions, *Global Environmental Change*, submitted 4 August, 2014
45. Geels, F.W., Fuchs, G., Kern, F., Kungl, G., Hinderer, N., Neukirch, M., and Wassermann, S., 2014, Unleashing new entrants versus working with incumbents: A comparative multi-level analysis of the German and UK low-carbon electricity transitions (1990-2013), *Research Policy*, in preparation

Articles in Dutch journals (peer-reviewed)

1. Kemp, R., Geels, F.W., and Verbong, G.P.J., 2005, 'Innovatie en duurzaamheidstransities', *Economische en Statistische Berichten*, 90(4461), 14-15
2. Geels, F.W., 2004, 'Een lange termijn analyse van het Nederlandse rijkswegenbeleid (1950-2000): Belemmeringen en mogelijkheden voor toekomstige systeeminnovaties', *Tijdschrift Vervoerswetenschap*, 40(3), 2-9
3. Harry Lintsen, Nil Disco en Frank Geels, 2004, 'Hoe innovatief is de Rijkswaterstaat: Een lange termijn analyse van de wegen, rivieren en kustverdediging', *Tijdschrift voor de waterstaatsgeschiedenis*, 13(1), 13-28

Books and special issue editorship

1. Geels, F.W., Kemp, R., Dudley, G. and Lyons, G. (eds.), 2012, *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport*, New York: Routledge (ISBN 978-0-415-88505-8)
2. Geels, F.W., Hekkert, M. and Jacobsson, S. (eds.), 2011, *The Dynamics of Sustainable Innovation Journeys*, Routledge (ISBN 978-0-415-61866-3)
3. Grin, J., Rotmans, J., Schot, J., Geels, F.W. and Loorbach, D., 2010, *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*, New York: Routledge (ISBN 978-0-415-87675-9) [**54 citations**]
4. Geels, F.W., Hekkert, M. and Jacobsson, S., 2008, edited a special issue on 'Sustainable Innovation Journeys' for *Technology Analysis & Strategic Management* (September-2008)
5. Geels, F.W., 2005, *Technological Transitions and System Innovations: A Co-evolutionary and Socio-Technical Analysis*, Cheltenham: Edward Elgar [**175 citations**]
6. Elzen, B., Geels, F.W., and Green, K. (eds.), 2004, *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*, Cheltenham: Edward Elgar [**131 citations**]

Book chapters (English and Dutch)

1. Geels, F.W., 2014, 'The arduous transition to low-carbon energy: A multi-level analysis of renewable electricity niches and resilient regimes', in: Fagerberg, J., Laestadius, S., and Martin, B. (Eds.), *The Triple Challenge: Europe in a New Age*, forthcoming
2. Geels, F.W., 2014, The chemical industry in transition? The multi-level perspective as an approach for understanding transformative change processes, Mohr, R. and Uttikal, H. (eds.), *Future Chemistry. Glimpses into the World of Tomorrow*, p. 236-240
3. Kemp, R., Geels, F.W. and Dudley, G., 2012, 'Introduction: Sustainability transitions in the automobility regime and the need for a new perspective', in: Geels, F.W., Kemp, R., Dudley, G. and Lyons, G. (eds.), 2012, *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport*, Routledge, pp. 3-28
4. Geels, F.W. and Kemp, R., 2012, 'The multi-level perspective as a new perspective for studying socio-technical transitions', in: Geels, F.W., Kemp, R., Dudley, G. and Lyons, G. (eds.), 2012, *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport*, Routledge, pp. 49-79
5. Geels, F.W. and Kemp, R., 2012, 'Findings, conclusions and assessments of sustainability transitions in transport', in: Geels, F.W., Kemp, R., Dudley, G. and Lyons, G. (eds.), 2012, *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport*, Routledge, pp. 335-373
6. Verbong, G.P.J. and Geels, F.W., 2012, 'Future electricity systems: Visions, scenarios and transition pathways', in: Verbong, G.P.J. and Loorbach, D. (eds.), *Governing the Energy Transition: Reality, Illusion or Necessity?*, Routledge, pp. 203-219

7. Geels, F.W., 2011, 'The role of the cities in technological transitions: Analytical clarifications and historical examples', in: Bulkeley, H., Broto, V.C., Hodson, M. and Marvin, S. (eds.), *Cities and Low Carbon Transitions*, Routledge: New York, pp. 13-28
8. Geels, F.W. and Schot, J.W., 2010, 'The dynamics of transitions: A socio-technical perspective' in: Grin, J., Rotmans, J., Schot, J., Geels, F.W. and Loorbach, D., 2010, *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*, Routledge, pp. 9-87
9. Geels, F.W. and Schot, J.W., 2010, 'Theoretical backgrounds: Science and technology studies, evolutionary economics and sociology', in: Grin, J., Rotmans, J., Schot, J., Geels, F.W. and Loorbach, D., 2010, *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*, Routledge, pp. 29-53
10. Geels, F.W. and Schot, J.W., 2010, 'Reflections: Process theory, causality and narrative explanation', chapter 1.6 in: Grin, J., Rotmans, J., Schot, J., Geels, F.W. and Loorbach, D., 2010, *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*, Routledge, pp.93-101
11. Verbong, G.P.J. and Geels, F.W., 2008, 'Barriers and options for future energy transitions: Lessons from a historical analysis of the Dutch electricity system', in: Van den Bergh, J.C.J.M. and F.R. Bruinsma (eds), *Managing the Transition to Renewable Energy: Theory and Practice from Local, Regional and Macro Perspectives*, Cheltenham: Edward Elgar, pp. 177-215
12. Geels, F.W., 2006, 'Multi-level perspective on system innovation: Relevance for Industrial Transformation', Olsthoorn X. and Wieczorek, A.J. (eds.), *Understanding Industrial Transformation: Views from Different Disciplines*, Springer, Dordrecht, the Netherlands, pp. 163-186
13. Geels, F.W. and Kemp, R., 2006, 'Transitions, transformations and reproduction: Dynamics of socio-technical systems', M. McKelvey and M. Holmén (eds.), *Flexibility and Stability in Economic Transformation*, New York: Oxford University Press, pp. 227-256
14. Geels, F.W., Elzen, B. And Green, K., 2004, 'General introduction: System innovation and transitions to sustainability', in: Geels, F.W., Elzen, B. And Green, K. (eds.), *System innovation and the transition to sustainability: Theory, Evidence and Policy*, Cheltenham: Edward Elgar, pp. 1-16
15. Geels, F.W., 2004, 'Understanding system innovations: A critical literature review and a conceptual synthesis', in: Elzen *et al.* (eds), *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*, Cheltenham: Edward Elgar, pp. 19-47
16. Elzen, B., Geels, F.W., Hofman, P. and Green, K., 2004, 'Sociotechnical scenarios as a tool for transition policy: An example from the traffic and transport domain', in: Elzen *et al.* (eds), *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*, Cheltenham: Edward Elgar, pp. 251-281
17. Geels, Frank, en René Kemp, 2004, 'Technologische transitie en duurzaamheid', in: Herman Vollebergh, Willem van Groenendaal, Marjan Hofkes, en René Kemp (red.) *Milieubeleid en Technologische Ontwikkeling in de Nederlandse Economie*, Sdu Uitgevers BV, Den Haag, pp. 17-44
18. Elzen, B.E., Geels, F.W., Hofman, P.S., 2004, 'Sociotechnische Scenario's als hulpmiddel voor Transitiebeleid: Een illustratie voor het domein van personenmobiliteit', in: Herman Vollebergh, Willem van Groenendaal, Marjan Hofkes, en René Kemp (red.) *Milieubeleid en Technologische Ontwikkeling in de Nederlandse Economie*, Sdu Uitgevers BV, Den Haag, pp. 169-193

19. Geels, F.W., 2002, 'Towards sociotechnical scenarios and reflexive anticipation: Using patterns and regularities in technology dynamics', Sørensen, K.H. and Williams, R. (editors), *Shaping Technology, Guiding Policy: Concepts, Spaces and Tools*, Cheltenham, UK, Northampton, MA, USA: Edward Elgar, pp. 359-385
20. Geels, F.W. and Smit, W.A., 2000, 'Potholes in the road to the future: Lessons and pitfalls from failed technology futures', in: Brown, N, Rappert, B. and Webster, A. (eds.), *Contested Futures: A Sociology of Prospective Techno-science*, Ashgate Publishing Company: Burlington, Singapore, Sydney, pp. 129-155

Non-refereed reports and professional publications

- Geels, F.W., 2013, *System innovation: Concepts, Dynamics and Governance*, Report for the OECD, TIP-unit (Innovation and Technology Policy), Paris, OECD
- Scrase I., Stirling A., Geels, F.W., Smith A. and Van Zwanenberg P., (2009), *Transformative Innovation: A report to the Department for Environment, Food and Rural Affairs*, SPRU – Science and Technology Policy Research, University of Sussex.
- Geels, F., Monaghan, A., Eames, M., and Steward, F., 2008, *The Feasibility of Systems Thinking in Sustainable Production and Consumption Policy: A Report to the Department for Environment, Food and Rural Affairs*, Brunel University, Defra, London.
- Geels, F.W., Schot, J. and Verbong, G., 2006, 'A multi-level analysis of historical transitions in agriculture and food', Working Papers series 2 'The organisation of innovation and transition', *Transforum, Agro & Groen*, pp. 126-155
- Geels, F.W., 2004, *Analysing the seams in seamful webs: Review and evaluation of WTMC-research in (international) STS context*, Invited expert essay for the Dutch research school WTMC
- Geels, F.W., 2003, *Het innovatief vermogen van Rijkswaterstaat in rijkswegebouw en transport-sector (1945-2000)*, Achtergrondrapport voor RWS-project 'Het innovatief vermogen van Rijkswaterstaat'
- Geels, F.W., Disco, N. en Lintsen, H., 2003, *Een historische analyse van het innovatief vermogen van Rijkswaterstaat (1930-2000)*, Rapport in opdracht van Rijkswaterstaat, Eindhoven: Stichting Historie der Techniek
- Lintsen, H., Disco, N. en Geels, F.W., 2003, 'Hoe innovatief is de Rijkswaterstaat', Essay voor en in opdracht van topmanagement van Rijkswaterstaat
- Boelie Elzen, Frank Geels en Peter Hofman, 2002, *Sociotechnical Scenarios (STSc): A new Methodology to Explore Technological Transitions*, Final Report for PRET project to NWO, Centre for Studies of Science, Technology and Society, University of Twente: Enschede, March 2002
- Ellen Moors en Frank Geels, 2001, *Dynamics of Sociotechnical Change in Transport & Mobility: Opportunities for Governance*, Report no. 410 200 071, Deliverable 3 in the MATRIC programme (Management of Technology Responses to the Climate Change Challenge), in kader van Nationaal Onderzoek Programma (NOP) naar Global Air Pollution and Climate Change, 219 blz.
- Rene Kemp en Frank Geels, 2001, 'Transities vanuit sociotechnisch perspectief', *Nieuwsbrief Milieu en Economie*, (NWO), Jaargang 15, nr. 1, blz. 10-11
- Geels, F.W. en Kemp, R., 2000, *Transities vanuit sociotechnisch perspectief*, Achtergrondrapport voor het NMP-4
- Rotmans, J., Kemp, R., Van Asselt, M., Geels, F., Verbong, G. en Molendijk, K., 2000, *Transities & transitie management: De casus van een emissiearme energievoorziening*, Rapport voor het Vierde Nationaal Milieubeleids Plan, NMP4-reeks

- Geels, F.W., 1999, 'Technological transitions and socio-technical scenarios', in: Dolfsma, W., Geels, F., Kemp, R., Moors, E. and Rip, A., 1999, *Management of technology responses to the climate change challenge: Theoretical elaboration of the co-evolutionary 'technology-in-society' Perspective*, Deliverable 1 for the Dutch National Research Programme on Global Air Pollution and Climate Change, Chapter 5, pp. 105-130
- Elzen, B., Geels, F.W., Hoogma, R., Schot, J.W. and Te Velde, R., 1998, *Strategieën voor innovatie: Experimenten met elektrische voertuigen als opstap naar marktontwikkeling*, Rapport voor N.V. Samenwerkende Elektriciteitsproductiebedrijven (Sep), Eindrapport van deelproject 3 van het project 'Verkeer en Vervoer in de 21^e eeuw', 208 p.
- Geels, F.W., 1997, *Met de blik vooruit: Op weg naar socio-technische scenario's*, Intern rapport in kader van samenwerking tussen de vakgroep FWT en vakgroep SW, 95 p.
- Geels, F.W., Smit, W.A. (1997). *Toekomstbeelden in het Verleden: De Invloed van de Informatiemaatschappij op Verkeer en Vervoer*. Achtergrondrapport. Rapport voor de Adviesdienst Verkeer en Vervoer, Ministerie van Verkeer en Waterstaat, 161p. Ook op CD-ROM *De invloed van de Informatiemaatschappij op Verkeer en Vervoer*. 3-54379-090013.
- Geels, F.W. & Smit, W.A. (1997). *Toekomstbeelden in het Verleden: De Invloed van de Informatiemaatschappij op Verkeer en Vervoer*. Hoofdrapport. Rapport voor de Adviesdienst Verkeer en Vervoer, Ministerie van Verkeer en Waterstaat, 54p. Ook op CD-ROM *De invloed van de Informatiemaatschappij op Verkeer en Vervoer*. 3-54379-090013.
- Geels, F.W., Asselt, M.B.A. van, and Rotmans, J., 1995, *Sulphate aerosols and the climate debate: an uncertainty assessment*, Globo working paper nr. 4, Rijksinstituut voor de Volksgezondheid en Milieuhygiëne (RIVM)

9. Keynote lectures and conference/seminar presentations

Key note lectures

1. Keynote lecture at international workshop on 'Innovation & Sustainability', 22 August, 2014, organised by Universidade Positivo, Curitiba, **Brazil** (title: 'Socio-technical transitions to sustainability: The multi-level perspective and policy implications')
2. Keynote lecture at an international conference on 'National Economy: Challenges and Ambitions', 22-24 April, 2014, organized by King Abdulaziz University, Jeddah, **Saudi Arabia** (title: 'The arduous transition to low-carbon energy: A multi-level analysis of renewable electricity niches and resilient regimes')
3. Keynote lecture at an international conference on 'Energy Systems in Transition: Inter- and Transdisciplinary Contributions', organized by the Helmholtz Alliance ENERGY-TRANS, 9-11 October 2013, Karlsruhe, **Germany** (title: 'The arduous transition to low-carbon energy: A multi-level analysis of renewable electricity niches and resilient regimes')
4. Keynote lecture at WWWforEurope conference on socio-ecological transitions, 18-19 September 2013, Vienna, **Austria** (title: 'Socio-technical transitions and implications for a new growth path for Europe')
5. Keynote lecture at international conference on 'Innovation and Research Policies for a Sustainable Transition', 28-31 August 2013, Belfort, **France**, organized by Research Network on Innovation (title: 'Socio-technical transitions to sustainability: The multi-level perspective and policy implications')
6. Keynote lecture at the ISDRC-19 conference (International Sustainable Development Research Society) on 'Just Transitions', 1-3 July, 2013, Cape Town, **South Africa**, ('Sustainable development through socio-technical transitions and system innovation')

7. Keynote lecture at LYNET annual conference (Finnish Partnership for Research on Natural Resources and the Environment), 10 October 2012, Helsinki, **Finland** ('Socio-technical transitions to sustainability: Business, society and policy').
8. Keynote speech, Final dissemination conference for ESRC project on 'Transition Pathways to a Low Carbon Economy', 18 April 2012, London, **UK** ('Transition pathways in auto-mobility? A multi-level analysis')
9. Keynote lecture at Technoport Conference 2012 ('Renewable Energy Research Conference'), 16-18 April 2012, Trondheim, **Norway** ('Socio-technical transitions to sustainability: A multi-level perspective and actor strategies')
10. Opening keynote speech at the Jean Monnet conference ('The governance of innovation and socio-technical systems in Europe: New trends, new challenges'), 1-2 March 2012, Copenhagen Business School, **Denmark** ('Socio-technical transitions: Dynamics and governance').
11. Keynote lecture at the 9th International Conference of the European Society for Ecological Economics, 17 June 2011, Istanbul, **Turkey** ('Socio-technical transitions towards sustainability: Dynamics and policy implications')
12. Keynote address at the Annual Conference of the Sustainable Development Research Network, 9 December 2010, London, **UK** ('Innovating for a transition to a sustainable economy')
13. Keynote address at the annual assembly of the UK Energy Research Centre, 10 July 2009, University of Sussex, **UK** ('Driving systemic change in the energy sector')
14. Keynote lecture at international expert workshop 'Transitions to sustainable development: Complexity, co-evolution and governance'. Based on paper 'Complexity and multi-level interactions in transitions: Insights from innovation studies, sociology and history of technology', 20-24 November, 2006, Egmond aan Zee, the **Netherlands**
15. Keynote lecture for workshop of the ESRC Sustainable Technologies Programme ('Pathways in socio-technical transitions'), May 12, 2005, London, **UK**.
16. Key note lecture at the sixth international conference on innovation systems and clusters (September 15-16, 2003), organized by TCI (The Competitiveness Institute) and Chalmers University of Technology, Gothenburg, **Sweden**, "Innovation and change in socio-technical systems: Insights and key issues from sociology of technology"

International expert workshops

1. 22-23 September, 2014, Geels, F.W. et al. ('Unleashing new entrants versus working with incumbents: A comparative multi-level analysis of the German and UK low-carbon electricity transitions (1990-2013)'), presentation at international expert workshop on Incumbent-challenger interactions in energy transitions, University of Stuttgart, Germany.
2. 29 July, 2014, Geels, F.W. ('The arduous transition to low-carbon energy: A multi-level analysis of renewable electricity niches and resilient regimes'), presentation at expert workshop on energy transitions at the Institute for Technology Assessment and Systems Analysis (ITAS), Karlsruhe Institute of Technology, Germany
3. 12-13 May, 2014, Geels, F.W. ('Understanding barriers to transition in the multi-level perspective (MLP)'), presentation at expert workshop on 'Policy support for energy transitions: Where is public money best spent?', London, organised by KAPSARC (King Abdullah Petroleum Studies and Research Center)
4. 7 May 2014, Geels, F.W. ('Technological reorientation for sustainability: A dialectic industry-in-context perspective'), presentation for the international 'Innovation 4 Sustainability' network, Manchester, UK.
5. 30 April 2013, Geels, F.W. ('Politics and power in low-carbon electricity transitions: A

- multi-level analysis of green niche-innovations and resilient regimes’), Paper presented at a workshop on ‘Theorising Governance Change for a Sustainable Economy’, London, UK
6. 14-15 March, 2013, Geels, F.W. (‘Two steps forward, one step back: The arduous transition towards a low-carbon society’), Paper presented at workshop on ‘Challenges for Europe in a new age’, 2nd Lundvall symposium, Aalborg, Denmark
 7. 29 November, 2012, Penna, C. and Geels, F.W., (‘The co-evolution of the climate change problem and car industry strategies (1979-2012): Replicating and elaborating the Dialectic Issue LifeCycle (DILC) model’), Paper presented at the Workshop on ‘Electrification of the car: will the momentum last?’, Delft University of Technology - OTB Research Institute for the Built Environment, Delft, the Netherlands.
 8. 9 October 2012, Presentation at expert workshop (‘Sustainability transitions research: theoretical concepts and empirical cases’), organised by the Finnish Environment Institute, Helsinki, Finland (‘Reflections on the multi-level perspective and socio-technical transitions to sustainability’)
 9. 28 September, 2012, Presentation at expert workshop on ‘Urban waste transitions: connecting innovation, infrastructure and households’, Manchester, organised by Sustainable Consumption Institute (‘Socio-technical transitions to sustainability: An introduction’)
 10. 25 September, 2012, Presentation at expert workshop on ‘2 degrees: Views on feasibility of transition scenarios’, Utrecht (NL), organised by Dutch Planning Bureau for the Environment, (‘Socio-technical transition perspective’)
 11. 21-23 March 2012, Presentation at international workshop on ‘Innovation, society and complexity: Dynamics of detecting, solving and creating problems, Venice, Italy, organized by INSITE (Innovation, Sustainability, Technology), (‘Transitions to sustainability: A socio-technical and co-evolutionary approach’)
 12. 11 October 2011, Presentation at ESRC-seminar on ‘Eco-city innovation: integrated systems management and policy co-ordination’, London, Westminster University (‘Strategic niche management for eco-cities’)
 13. 5-7 October 2011, Presentation at international Smart Grid Workshop, Ottawa, Canada (‘Smart grid roles in electricity system evolution: Different transition paths’)
 14. 25 March, 2011, Presentation at UKTRC seminar ‘Theoretical perspectives on climate change mitigation in transport’, organized by UK Transport Research Centre (UKTRC), Oxford University (‘Introduction to socio-technical transitions theory’)
 15. 14-15 March, 2011, Presentation at workshop ‘Smart Civil Society Organizations: Effective Change Strategies for the Great Transition’, organized by the World Wildlife Fund, London
 16. 10-11 March, 2011, presentation at expert workshop on ‘Achieving decarbonisation: Transforming National Energy Systems’, organized by the Energy Climate and Innovation Program, Fletcher School of Law and Diplomacy, Tufts University, Boston, USA
 17. 22-23 April 2010, paper presentation at memorial symposium for Ken Green on ‘Innovation, demand and sustainability’, Manchester Business School, Manchester (‘Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective’)
 18. 29 September-1 October 2009: Verbong and Geels (‘Exploring sustainability transitions in the electricity sector with socio-technical pathways’), paper presented at DIME workshop (network of excellence), Karlsruhe
 19. 14-16 May 2008, Geels and Schot (‘Path creation and societal embedding in socio-technical transitions: How automobiles entered Dutch society (1898-1970)’), paper presented at International expert workshop on ‘Technological discontinuities and

- transitions: Evolution theory and inter-disciplinary crossovers' (14-16 May 2008), Eindhoven University
20. 15-18 April 2007, Schot, J.W., Mom, G. and Geels, F.W., "Path creation, societal embedding and socio-technical transitions: The emergence *and* diffusion of automobiles in the Netherlands (1898-1970)', Paper presented at workshop 'Innovation, institutions and path dependence: the management of variation and diversity in innovation systems', Zurich, Swiss Federal Institute for Environmental Science and Technology (EAWAG), Cirus (Centre for Innovation Research in the Utility Sector)
 21. 2-3 October 2006, Paper presentation at international expert workshop on 'Sustainable Innovation Journeys', Utrecht (Johan Schot and Frank Geels, 'Strategic Niche Management: Theoretical background and policy considerations')
 22. 2-3 October 2006, Paper presentation at international expert workshop on 'Sustainable Innovation Journeys', Utrecht (Rob Raven and Frank Geels, 'The dynamics of niche-development trajectories: Comparing manure digestion in Denmark and the Netherlands')
 23. 2-3 October 2006, Paper presentation at international expert workshop on 'Sustainable Innovation Journeys', Utrecht (Geert Verbong, Rob Raven and Frank Geels, 'Multi-niche analysis of renewable electricity innovation-trajectories (1970-2004)')
 24. 25 August 2005, Verbong, G.P.J. and Geels, F.W., 'A long-term historical analysis of path dependencies and changes in the Dutch electricity system: Hindrances and possibilities for future energy transitions', Paper presented at Workshop on 'The energy transition', Amsterdam. Organised as part of the 45th European Congress of the Regional Science Association, 23–27 August 2005
 25. 27-29 April 2005, Invited paper presentation for dedicated workshop on 'Middle range theories in science and technology studies', University of Amsterdam, Amsterdam ('Theories of the middle range in STS: Achievements and steps to be taken')
 26. 10 March, 2005, Invited presentation at expert-workshop for the Scientific Committee of the IHDP-IT, Amsterdam ('System Innovation from socio-technical and multi-level perspective')
 27. 11 September 2003, Invited presentation at international workshop on Industrial Transformation organised by IHDP, Amsterdam (Geels, F.W., 'Industrial Transformations and system innovation: Insights from sociology of technology and innovation studies')
 28. 4-6 July 2002, Paper presented at international workshop on system innovation, Enschede, Twente University (Geels, F.W., 2002, 'Understanding Technological Transitions: A critical literature review and a pragmatic conceptual synthesis')
 29. 4-6 July, 2002, Paper presented at international workshop on system innovation, Enschede, Twente University (Elzen, B., Geels, F.W., Hofman, P. and Green, K., 2002, 'Sociotechnical scenarios as a tool for transition policy: An example from the traffic and transport domain')
 30. June 13-14, 2003, Invited at expert-workshop: "Expectations in Science & Technology", Utrecht (organised by Nik Brown, Harro van Lente and Arie Rip)
 31. 16 June 2000, Paper presented at workshop 'The Rise of Systemic Society', Eindhoven (Schot, J. and Geels, F.W., 'Emerging Impacts of Technological Change')
 32. 29 November, 1999, Invited as expert on COOL workshop in Brussels (Climate Change Options for the Long term).
 33. July 1-2, 1999, Participant at expert- workshop on path dependence, organised by Maastricht Economic Research Institute on Innovation and Technology (MERIT), Maastricht University

Presentations at international conferences

1. 27-29 August, 2014, Geels, F.W., 'Regime resistance against low-carbon energy transitions: Introducing politics and power in the multi-level perspective', Paper presented at the 5th International Conference on Sustainability Transitions, Utrecht, Netherlands
2. 27-29 August, 2014, Geels, F.W., McMeekin, A., Mylan, J., Southerton, D., 2014, 'A critical appraisal of Sustainable Consumption and Production research: The reformist, revolutionary and transition agendas', Paper presented at the 5th International Conference on Sustainability Transitions, Utrecht, Netherlands
3. 19-21 June, 2013, Penna, C. and Geels, F.W. 'Climate change and the slow reorientation of the American car industry (1979-2018): An application and extension of the Dialectic Issue LifeCycle (DILC) model', Paper presented at the 4th International Conference on Sustainability Transitions, Zurich, Zwitserland
4. 29-31 August, 2012, Geels, F.W., ('Transitions to a green economy. Economic risk, governance, and public participation'), Paper presented at the 3d International Conference on Sustainability Transitions, Copenhagen, Denmark
5. 29-31 August, 2012, Penna, C. and Geels, F.W. ('The Co-evolution of societal problems, innovation and incumbent industries: Ups and downs in the issue lifecycle trajectory of American car-safety (1900-2000)'), Paper presented at the 3rd International Conference on Sustainability Transitions, Copenhagen, Denmark.
6. 29-31 August, 2012, Geels, F.W., ('A socio-technical analysis of low-carbon transitions: Introducing the multi-level perspective into transport studies'), Paper presented at the 3d International Conference on Sustainability Transitions, Copenhagen, Denmark
7. 13-15 June, 2011, F.W. Geels, ('The multi-level perspective on sustainability transitions: Responses to seven criticisms'), Paper presented at 2nd International Conference on Sustainability Transitions, Lund, Sweden
8. 13-15 June, 2011, B. Turnheim and F.W. Geels ('The role of pressure interactions in industry destabilisation: The socio-political mediation of decline in the British coal industry (1970-1997)'), Paper presented at 2nd International Conference on Sustainability Transitions, Lund, Sweden
9. 6-8 April 2011, C. Penna and F. Geels, ('Enriching the greening of industry literature with issue life cycle theory and a triple embeddedness framework: Air pollution, technical innovation and the American car industry revisited (1943-1985)'), Paper presented at DIME conference, Maastricht, Netherlands
10. 3 September, 2010, Penna, C., Geels, F.W. ('Air pollution, technical innovation and the American car industry revisited (1943-1985)'), Conference paper presented at the EASST Conference, Trento, Italy.
11. 21-24 June, 2010, F. W. Geels ('Societal problems (such as sustainability) and a neo-evolutionary theory of industrial change: Technology, markets, civil society and polity'), Paper presented at Schumpeter conference, Aalborg, Denmark
12. 29-30 March 2010, F. Geels and B. Turnheim, ('The destabilisation existing regimes in socio-technical transitions: the case of the British coal industry 1913-1970'), Paper presented at the NickFest, Technical Change: History, Economics and Policy. A Conference in Honour of Nick von Tunzelmann, SPRU, University of Sussex
13. 25-26 Feb., 2010, Paper presented at the Sussex Energy Group Conference, University of Sussex, UK, (F.W. Geels and B. Turnheim, 'The destabilisation of existing regimes in socio-technical transitions: Lessons from the British coal industry and the smoke problem (1913-1970)')
14. 4-6 June, 2009, Paper presented at the First European Conference on Sustainability Transitions, Amsterdam, Netherlands ('Destabilization and decline of existing regimes as the key to transitions towards sustainability')

15. 4-6 June, 2009, Paper presented at the First European Conference on Sustainability Transitions, Amsterdam, Netherlands (B. Turnheim and F. Geels, 'Environmental pressures and the destabilization of existing regimes: The case of the British coal industry')
16. 10-12 November 2008, Paper presented at Next Generation Infrastructure (NGI) conference 'Building networks for a brighter future', Rotterdam, Netherlands (Verbong and Geels, 'Pathways for sustainability transitions in the electricity sector: Multi-level analysis and empirical illustration')
17. 11-13 September 2006, Paper presented at SPRU 40th Anniversary Conference, Sussex University, Brighton, UK (Geels, F.W., 'System innovations and transitions to sustainability: Challenges for innovation theory')
18. 19-21 May, 2005, Paper presented at the 4th European Meeting on Applied Evolutionary Economics (EMAE), Utrecht, The Netherlands (Geels, F.W., 'Reconfiguring the American music industry and the breakthrough of rock 'n' roll (1930-1970): A multi-level analysis of the production, distribution and consumption of music')
19. 27-29 June 2005, Paper presented at DRUID Conference, Copenhagen (Geels, F.W. and Kemp, R., 'Transitions, Transformations and Reproduction: Dynamics in socio-technical systems')
20. 26-29 August, 2004, Paper presented at 4S/EASST conference, Paris (Frank Geels and Johan Schot, 2004, 'The importance of niches in evolutionary perspectives on radical technological change')
21. 16-18 October, 2003, Paper presented at International Human Dimensions Program (IHDP) Conference 'Taking stock and moving forward', Montreal, Canada (Geels, F.W., 'The dynamics of transitions and system innovations: Lessons from the transition from horse-and-carriage to automobiles (1860-1930)')
22. 7-9 April 2003, Manchester, UK, Paper presented at ASEAT Conference 'Knowledge and economic and social change: New challenges to innovation studies' (Geels, F.W., 'Processes, patterns and mechanisms in system innovations: A co-evolutionary and sociotechnical perspective') (Advances in the Sociological and Economic Analysis of Technology)
23. 20-23 September 2001, Paper presented at ECIS conference 'The Future of Innovation Studies', Eindhoven (Geels, F.W., 'Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-level Perspective and a Case-study')
24. 12-15 May, 2001, Paper presented at DRUID Conference in honour of Nelson and Winter, Aalborg, Denmark (Geels, F.W., 2001, 'Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-level Perspective and a Case-study')
25. 11-12 November 1999, Paper presented at COST A4 conference on Social Shaping of Technology and its relevance for technology policy, Amsterdam (Geels, F.W., 1999, 'Sociotechnical scenarios as a tool for reflexive technology policies: Using evolutionary insights from technology studies')
26. 28-31 Oktober 1999, Paper presented at 4S-conference, San Diego (Geels, F.W., 1999, 'Sociotechnical scenarios as a tool for reflexive technology policies: Using evolutionary insights from technology studies')
27. 14-15 September 1998, Paper presented at Conference 'Constructing tomorrow: Technology strategies for the new millenium, Bristol (Geels, F.W. and Schot, J., 1998, 'Reflexive technology policies and sociotechnical scenarios')

Presentations at colloquia, seminars

1. 29 October 2013, Research seminar at the School of Environment and Development, University of Manchester (title: 'The arduous transition to low-carbon energy: A multi-

- level analysis of renewable electricity niches and resilient regimes’)
2. 5 February 2013, Research seminar at Centre for Mobilities Research, Lancaster University (‘Automobility in transition? A socio-technical analysis of sustainable transport’)
 3. 19 December 2012, Research seminar at Sustainable Consumption Institute, Manchester University (‘Automobility in transition? A socio-technical analysis of sustainable transport’)
 4. 10 May, 2012, Seminar at Sustainable Consumption Institute, Manchester University (‘Sustainable Production and Consumption: A socio-technical transitions perspective’)
 5. 4 October 2011, Seminar presentation at the School of Public Policy and Administration, Carleton University, Canada (‘Socio-technical transitions towards sustainability: The multi-level perspective and policy implications’)
 6. 9 June 2010, Presentation in Interdisciplinary Seminar Series on Energy and Sustainability research seminar (‘The multi-level perspective (MLP) on transitions: Generalizing via robust (process) theory’) Cardiff University
 7. 10 May 2010, 1-day research seminar dedicated to my work on socio-technical transitions, at Technical University of Denmark (DTU), Department of Management and Engineering, Copenhagen, Denmark
 8. 26 April 2010, Research seminar at ISSTI (Institute for the Study of Science Technology and Innovation), The University of Edinburgh, (‘Towards a socio-evolutionary theory of industrial change: Technology, markets, civil society, and polity’)
 9. 4 December 2009: Freeman Centre Seminar, (‘Towards a neo(co)evolutionary theory of industry, civil society, polity and technology’), SPRU, University of Sussex
 10. 14 November 2007: Presentation at Research Seminar (‘Socio-technical system transitions and implications for strategy’), Brunel Business School, Brunel University, London
 11. 9 October, 2007: Presentation at TAG-workshop on 'sustainable pig farming' (‘Transition lessons from a historical example’), Utrecht
 12. 14 March, 2007, Invited seminar at DRIFT (Dutch Research Institute for Transitions), Erasmus University Rotterdam (‘Typology of sociotechnical transition pathways’)
 13. 1 February, 2007, Paper presentation at workshop at Brunel University, London, UK (‘Dynamics of niche development trajectories: Biogas in the Netherlands 1975-2003’)
 14. 31 January, 2007, Seminar at Brunel University, London, UK (‘Typology of sociotechnical transition pathways’)
 15. 15 January, 2007, Seminar at University of Amsterdam, Amsterdam School of Social Research (ASSR) (discussion of two articles)
 16. 13 December 2006, Presentation at STeHPS Seminar (Science, Technology, Health and Policy Studies), Twente University (‘Typology of sociotechnical transition pathways’)
 17. 27 October 2005, ‘Taxonomy of sociotechnical transition paths’, Presentation at bilateral workshop between Eindhoven and SPRU groups: ‘Understanding transitions’, Brighton, Sussex, UK
 18. 8 September 2005, ‘Functional approach and SNM: Similarities, strengths, weaknesses, and challenges’, Presentation at workshop ‘Understanding the dynamics of innovation journeys: Similarities and differences in niche approach and functional approach’, Eindhoven
 19. 1 June 2005, Presentation at ECIS-seminar (Eindhoven Centre for Innovation Studies), Eindhoven University (‘Taxonomy of transition pathways’).
 20. 8-14 May, 2005: ‘UK tour’; invited visit to British academic research groups)
 - a) Science and Technology Policy Research Unit (SPRU) at the University of Sussex;
 - b) Institute of Innovation Research (IoIR) at University of Manchester

21. 24 February 2005, Reading seminar at CONTEC about my essay 'Analysing the seams in seamful webs: Review and evaluation of WTMC-research in (international) STS context', Eindhoven
22. 11-12 November 2004, presentation of Invited expert essay for the Dutch research school WTMC, Rolduc (*Analysing the seams in seamful webs: Review and evaluation of WTMC-research in (international) STS context*)
23. 17 June 2004, 'Understanding the dynamics of transitions and system innovations: Lessons from the hygienic transition (1870-1930)', Invited lecture at SENSE Summer Symposium, Utrecht
24. 10 September 2003, 'Understanding the dynamics of Technological Transitions: A multi-level perspective and distinction of transition routes', Invited lecture at Eindhoven Centre for Innovation Studies, Eindhoven University, The Netherlands
25. 23 Mei 2003, 'Processes and patterns in Technological Transitions', Invited lecture at TNO-MEP, Apeldoorn
26. 25 Maart 2003, Presentatie bij Rijkswaterstaat, afdeling Kennis en Ontwikkeling, 'Een historische analyse van het innovatief vermogen van Rijkswaterstaat (1950-2000)'
27. 20 Maart, 2003, 'Understanding the Dynamics of Technological Transitions: Processes, patterns and mechanisms', Presentatie Technische Universiteit Eindhoven, capaciteitsgroep Algemene Wetenschappen
28. November 25-26, 2002, 'Transities en systeem-innovaties', Invited lecture at WTMC Voortgangskonferentie, Leusden
29. March 8, 2001, 'Technological Transitions: Patterns and mechanisms', Invited lecture on research seminar from Wageningen Universiteit, Sub-Department Rurale Sociologie
30. February 28, 2001, 'A perspective on technological transitions', Presentatie op workshop over socio-technische scenarios, Ministerie van VROM, Den Haag
31. January 29, 2001, 'Technological Transitions: A conceptual perspective and some mechanisms', Invited lecture for research seminar at the Sub-department of Innovation Sciences, Universiteit Utrecht
32. November 30, 2000, 'Technological Transitions: Patterns and mechanisms', Invited lecture at SWOME-workshop (Sociaal-Wetenschappelijk Onderzoek Milieu en Energie), The Hague, Ministry of VROM
33. November 6-7, 2000, Invited kick-off presentation at WTMC Voortgangskonferentie, Leusden
34. September 28, 2000, 'Technological Transitions: Patterns and mechanisms', Invited presentation at lunch seminar of RIVM
35. 15 September, 2000, 'Towards sociotechnical scenarios and reflexive anticipation: Using insights about patterns and regularities in technology dynamics', Presentation at PRET workshop, Erasmus Universiteit Rotterdam
36. 9 June, 2000, 'Technological Transitions: How do they come about?', Invited lecture at National Research Day of Dutch Research Council (NWO), Utrecht
37. 23 February, 1999, Presentation for NWO research project 'Technological regime shifts to environmental sustainability' (Twente and Merit)