

# Acknowledgements

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- Feedback and guidance from the EEA Management Board.
- Feedback from the European Chemicals Agency (ECHA) and the European Food Safety Authority (EFSA).
- Feedback from EEA colleagues.

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*SOER 2020 is dedicated to our valued colleagues Pawel Kaźmierczyk and Anca-Diana Barbu, who sadly passed away during the implementation of the SOER 2020 project, in acknowledgement of their contributions to several SOER reports, including this one.*

# → References



## CHAPTER 00 — REPORTING ON THE ENVIRONMENT IN EUROPE

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CEC, 1987, *The state of the environment in the European Community 1986*, Commission of the European Communities, Brussels, Belgium (<https://publications.europa.eu/en/publication-detail/-/publication/555c58a3-09c1-466b-b261-309d13dabcae>) accessed 6 August 2019.

DEFRA, 2017, *Assessment of global trends in relation to potential implications for the strategic policy priorities for environment, food and rural affairs in the UK*, DEFRA internal document, Department for Environment, Food and Rural Affairs, London, UK.

EEA, 2010, 'Assessment of global megatrends', in: *The European environment — state and outlook 2010*, European Environment Agency.

EEA, 2015a, *Global megatrends assessment — extended background analysis complementing the SOER 2015 'Assessment of global megatrends'*, EEA Technical Report No 11/2015, European Environment Agency (<https://www.eea.europa.eu/publications/global-megatrends-assessment-extended-background-analysis>) accessed 6 August 2019.

EEA, 2015b, *The European environment — state and outlook 2015: assessment of global megatrends*, European Environment Agency.

EEA, 2015c, *The European environment — state and outlook 2015: Synthesis report*, European Environment Agency (<https://www.eea.europa.eu/soer-2015/synthesis/report>) accessed 6 August 2019.

EEA and Eionet, 2016, *Sustainability transitions: now for the long term*, Eionet Report No 1/2016, European Environment Agency (<https://www.eea.europa.eu/publications/sustainability-transitions-now-for-the>) accessed 6 August 2019.

EEA and Eionet, 2017, *Mapping Europe's environmental future: understanding the impacts of global megatrends at the national level*, Eionet Report No 1/2017 (<https://www.eea.europa.eu/publications/mapping-europes-environmental-future-understanding>) accessed 17 January 2019.

ESPAS, 2019, *Global trends to 2030 — challenges and choices for Europe*, European Strategy and Policy Analysis System

([https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/ESPAS\\_Report2019.pdf](https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/ESPAS_Report2019.pdf)) accessed 6 August 2019.

ETC/ICM, 2018, *Water use in the Western Balkans: regional outlooks and global megatrends*, Technical Report No 2/2018, European Topic Centre on Inland, Coastal and Marine Waters (<https://www.eionet.europa.eu/etcs/etc-icm/products/etc-icm-reports/water-use-in-the-western-balkans-regional-outlooks-and-global-megatrends>) accessed 25 June 2019.

EU, 2009, Regulation (EC) No 401/2009 of the European Parliament and of the Council of 23 April 2009 on the European Environment Agency and the European Environment Information and Observation Network (OJ L 126, 21.5.2009, pp. 13-22).

EU, 2013, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

Flemish Environment Agency, 2014, *Megatrends: far-reaching, but also out of reach? How do megatrends influence the environment in Flanders?*, Vlaams Milieumaatschappij, Aalst, Belgium (<https://en.vmm.be/news/archive/megatrends-far-reaching-but-also-out-of-reach>) accessed 6 August 2019.

FOEN, 2016, *Workshop on global megatrends*, FOEN workshop paper, Federal Office for the Environment, Ittigen, Switzerland.

MA, 2017, *Global megatrends: implication on the environment of Hungary — summary of report*, Ministry of Agriculture, Budapest, Hungary ([https://eionet.kormany.hu/admin/download/3/29/e1000/GMT\\_in\\_Hungary.pdf](https://eionet.kormany.hu/admin/download/3/29/e1000/GMT_in_Hungary.pdf)) accessed 6 August 2019.

Naturvårdsverket, 2014, *Impact assessment of global megatrends — two case studies connecting global megatrends to regional topics*, Report No 6602, Swedish Environmental Protection Agency, Stockholm, Sweden (<https://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6602-4.pdf?pid=11739>) accessed 6 August 2019.

PBL, 2013, *Welvaar en leefomgeving — horizonscan*, Netherlands Environmental Assessment Agency, The Hague, Netherlands (<https://www.cpb.nl/sites/default/files/publicaties/download/pbl-cpb-boek-9-welvaart-en-leefomgeving-horizonscan.pdf>) accessed 6 August 2019.

SEA, 2018, *Influence of global megatrends on the state of environment in Slovenia: conclusions and key messages*, Slovenian Environment Agency, Ministry for the Environment and Spatial Planning, Ljubljana, Slovenia.

Slovak Environment Agency, et al., 2016, *Global megatrends and implications for the Slovak Republic*, Bratislava, Slovakia (<https://www.enviroportal.sk/uploads/report/7101.pdf>) accessed 6 August 2019.

Snyder, T., 2018, *The road to unfreedom: Russia, Europe, America*, Random House, New York, NY.

Swiss Federal Council, 2018, *Environment Switzerland 2018*, Swiss Federal Council, Bern, Switzerland (<https://www.bafu.admin.ch/bafu/en/home/state/publications-on-the-state-of-the-environment/environment-switzerland-2018.html>) accessed 6 August 2019.

Valtioneuvooston kanslia, 2017, *Valtioneuvooston yhteiset muutostekijät [Government's change factors]*, Valtioneuvooston kanslian julkaisusarja No 14/2017, Valtioneuvooston kanslia, Helsinki, Finland ([http://julkaisut.valtioneuvoosto.fi/bitstream/handle/10024/80753/j\\_14\\_2017.pdf](http://julkaisut.valtioneuvoosto.fi/bitstream/handle/10024/80753/j_14_2017.pdf)) accessed 6 August 2019.



## CHAPTER 01 — ASSESSING THE GLOBAL-EUROPEAN CONTEXT AND TRENDS

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Alessandrini, M., et al., 2017, *The future of industry in Europe*, European Committee of the Regions (<https://cor.europa.eu/en/engage/studies/Documents/The%20future%20of%20industry%20in%20Europe/future-of-industry.pdf>) accessed 31 August 2018.

Baldé, C. P., et al., 2017, *The global e-waste monitor 2017: quantities, flows and resources*, United Nations University, Bonn, Germany (<https://www.itu.int/en/ITU-D/Climate-Change/Pages/Global-E-waste-Monitor-2017.aspx>) accessed 29 August 2018.

Bar-On, Y. M., et al., 2018, 'The biomass distribution on Earth', *Proceedings of the National Academy of Sciences* 115(25), pp. 6506-6511 (DOI: 10.1073/pnas.1711842115).

Beylot, A., et al., 2019, 'Assessing the environmental impacts of EU consumption at macro-scale', *Journal of Cleaner*

*Production* 216, pp. 382-393 (DOI: 10.1016/j.jclepro.2019.01.134).

Bolt, J., et al., 2018, *Maddison Project Database, version 2018*, Maddison Project Working Paper No 10, University of Groningen, Groningen, Netherlands (<https://www.rug.nl/ggd/historicaldevelopment/maddison/releases/maddison-project-database-2018>) accessed 9 May 2018.

Ceballos, G., et al., 2015, 'Accelerated modern human-induced species losses: entering the sixth mass extinction', *Science Advances* 1(5), pp. e1400253-e1400253 (DOI: 10.1126/sciadv.1400253).

Cole, M. J., 2015, *Is South Africa operating in a safe and just space? Using the doughnut model to explore environmental sustainability and social justice*, Oxfam, Oxford, UK ([http://policy-practice.oxfam.org.uk/publications/is-south-africa-operating-in-a-safe-and-just-space-using-the-doughnut-model-to-555842?intcmp=RM\\_SADoughnut](http://policy-practice.oxfam.org.uk/publications/is-south-africa-operating-in-a-safe-and-just-space-using-the-doughnut-model-to-555842?intcmp=RM_SADoughnut)) accessed 8 June 2019.

Dao, H., et al., 2018, 'National environmental limits and footprints based on the planetary boundaries framework: the case of Switzerland', *Global Environmental Change* 52, pp. 49-57 (DOI: 10.1016/j.gloenvcha.2018.06.005).

Dirzo, R., et al., 2014, 'Defaunation in the Anthropocene', *Science* 345(6195), pp. 401-406 (DOI: 10.1126/science.1251817).

EC, 2013, Commission recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations (2013/179/EU, Brussels, 4.5.2013).

EC, 2016, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Digitising European Industry Reaping the full benefits of a Digital Single Market (COM(2016) 180 final).

EC, 2017a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the 2017 list of critical raw materials for the EU (COM(2017) 490 final).

EC, 2017b, *The 2018 ageing report: underlying assumptions and projection methodologies*, Institutional Paper No 065, European Commission, Brussels ([https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-underlying-assumptions-and-projection-methodologies\\_en](https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-underlying-assumptions-and-projection-methodologies_en)) accessed 8 June 2019.

EC, 2018a, 'Challenges for Europe — internal market, industry, entrepreneurship and SMEs' (/growth/industry/policy/key-enabling-technologies/challenges\_en) accessed 5 September 2018.

EC, 2018b, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A clean planet for all: a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final).

EEA, forthcoming, *Drivers of change and their implications on European production and consumption: a system-based assessment*, European Environment Agency.

EEA, 2010, 'Assessment of global megatrends', in: *The European environment — state and outlook 2010*, European Environment Agency.

EEA, 2013, *European Union CO<sub>2</sub> emissions: different accounting perspectives*, EEA Technical Report No 20/2013, European Environment Agency (<http://www.eea.europa.eu/publications/european-union-co2-emissions-accounting>) accessed 6 August 2019.

EEA, 2015, *The European environment — state and outlook 2015: assessment of global megatrends*, European Environment Agency.

EEA, 2016, *Climate change, impacts and vulnerability in Europe 2016 — an indicator-based report*, EEA Report No 1/2017, European Environment Agency (<https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016>) accessed 8 June 2019.

EEA, 2018, *Natural capital accounting in support of policymaking in Europe. A review based on EEA ecosystem accounting work*, EEA Report No 26/2018, European Environment Agency (<https://www.eea.europa.eu/publications/natural-capital-accounting-in-support>) accessed 8 June 2019.

EEA and FOEN, forthcoming, *Assessment of Europe's environmental footprint in relation to planetary boundaries [working title]*, European Environment Agency; Swiss Federal Office for the Environment.

EPRS, 2018, *Global trends to 2035 — economy and society*, Report No PE 627.126, European Parliamentary Research Service, Brussels, Belgium ([http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS\\_STU\(2018\)627126](http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_STU(2018)627126)) accessed 8 June 2019.

EPSC, 2018, *Geopolitical outlook for Europe: confrontation vs cooperation*, EPSC Brief, European Political Strategy Centre ([https://ec.europa.eu/epsc/sites/epsc/files/epsc\\_brief\\_](https://ec.europa.eu/epsc/sites/epsc/files/epsc_brief_)

[geopolitical.pdf](#)) accessed 9 June 2018.

ESPAS, 2015, *Global trends to 2030: can the EU meet the challenges ahead?*, European Strategy and Policy Analysis System (<https://espas.secure.europarl.europa.eu/orbis/document/global-trends-2030-can-eu-meet-challenges-ahead>) accessed 6 September 2018.

ESPAS, 2017, *Shaping the Future of Geopolitics: Foresight and strategic game changers – hard and soft power in a changing world*, European Strategy and Policy Analysis System (<https://espas.secure.europarl.europa.eu/orbis/document/shaping-future-geopolitics>) accessed 27 August 2018.

Eurostat, 2016, *Urban Europe — statistics on cities, towns and suburbs: 2016 edition*, Publications Office of the European Union, Luxembourg (<https://ec.europa.eu/eurostat/documents/3217494/7596823/KS-01-16-691-EN-N.pdf/0abf140c-ccc7-4a7f-b236-682effcde10f>) accessed 8 June 2019.

Eurostat, 2018a, 'Database — general government gross debt' (<https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=teina225&plugin=1>) accessed 7 September 2018.

Eurostat, 2018b, *EU energy in figures: statistical pocketbook 2018*, Luxembourg, Publications Office of the European Union (<https://publications.europa.eu/en/publication-detail/-/publication/99fc30eb-c06d-11e8-9893-01aa75ed71a1/language-en/format-PDF>) accessed 6 November 2018.

Eurostat, 2018c, 'Overweight and obesity — BMI statistics', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php/Overweight\\_and\\_obesity\\_-\\_BMI\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php/Overweight_and_obesity_-_BMI_statistics)) accessed 7 September 2018.

FAO, 2016, *The state of world fisheries and aquaculture 2016. contributing to food security and nutrition for all*, Food and Agriculture Organization of the United Nations, Rome, Italy (<http://www.fao.org/3/a-i5555e.pdf>) accessed 8 June 2019.

Frischknecht, R., et al., 2018, *Umwelt-Fussabdrücke der Schweiz. Zeitlicher Verlauf 1996-2015*, Umwelt-Zustand No 1811, Bundesamt für Umwelt, Bern (<https://www.bafu.admin.ch/bafu/de/home/themen/wirtschaft-konsum/publikationen-studien/publikationen/umwelt-fussabdruecke-der-schweiz.html>) accessed 8 June 2019.

Haberl, H., et al., 2012, 'Natural and socioeconomic determinants of the embodied human appropriation of net primary production and its relation to other resource use indicators', *Ecological Indicators* 23, pp. 222-231 (DOI: 10.1016/j.ecolind.2012.03.027).

Hansen, J., et al., 2016, 'Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate

modeling, and modern observations that 2 °C global warming could be dangerous', *Atmospheric Chemistry and Physics* 16(6), pp. 3761-3812 (DOI: 10.5194/acp-16-3761-2016).

Häyhä, T., et al., 2018, *Operationalizing the concept of a safe operating space at the EU level — first steps and explorations*, Stockholm Resilience Centre, Stockholm, Sweden (<http://www.stockholmresilience.org/publications/artiklar/2018-07-03-operationalizing-the-concept-of-a-safe-operating-space-at-the-eu-level---first-steps-and-explorations.html>) accessed 10 August 2018.

Hoff, H., et al., 2014, *Living well, within the limits of our planet? Measuring Europe's growing external footprint*, No 2014-05, Stockholm Environment Institute, Stockholm, Sweden (<https://mediamanager.sei.org/documents/Publications/SEI-WP-2014-05-Hoff-EU-Planetary-boundaries.pdf>) accessed 8 June 2019.

Höhne, N., et al., 2014, 'Regional GHG reduction targets based on effort sharing: a comparison of studies', *Climate Policy* 14(1), pp. 122-147 (DOI: 10.1080/14693062.2014.849452).

Hunter, M. C., et al., 2017, 'Agriculture in 2050: recalibrating targets for sustainable intensification', *BioScience* 67(4), pp. 386-391 (DOI: 10.1093/biosci/bix010).

IEA, 2017, *World energy outlook 2017*, International Energy Agency, Paris, France (<https://www.iea.org/weo2017/>) accessed 3 September 2018.

ILO, 2016, *Executive summary — Trends in the world of work: what effects on inequalities and middle-income groups*, International Labour Organization, Geneva, Switzerland ([http://www.ilo.org/brussels/press/press-releases/WCMS\\_455739/lang--en/index.htm](http://www.ilo.org/brussels/press/press-releases/WCMS_455739/lang--en/index.htm)) accessed 6 September 2018.

IPBES, 2018, *The assessment report on land degradation and restoration*, Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany (<https://www.ipbes.net/assessment-reports/ldr>) accessed 20 March 2019.

IPBES, 2019, *Global assessment report on biodiversity and ecosystem services*, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany (<https://www.ipbes.net/global-assessment-report-biodiversity-ecosystem-services>) accessed 6 August 2019.

IPCC, 2013a, *Climate change 2013: the physical science basis: contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge.

IPCC, 2013b, 'Summary for policymakers', in: Stocker, T. F. et al. (eds), *Climate change 2013: the physical science basis*.

*Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, pp. 1-29.

IPCC, 2018, *Global warming of 1.5 °C*, Intergovernmental Panel on Climate Change (<http://www.ipcc.ch/report/sr15/>) accessed 10 November 2018.

IPPR, 2015, *Technology, globalisation and the future of work in Europe: essays on employment in a digitised economy*, Institute for Public Policy Research, London, UK (<https://www.ippr.org/research/publications/technology-globalisation-and-the-future-of-work-in-europe>) accessed 5 September 2018.

IRP, 2019, *Global resources outlook 2019: natural resources for the future we want*, Report of the International Resource Panel, United Nations Environment Programme (<http://www.resourcepanel.org/reports/global-resources-outlook>) accessed 20 March 2019.

Jambeck, J. R., et al., 2015, 'Plastic waste inputs from land into the ocean', *Science* 347(6223), pp. 768-771 (DOI: 10.1126/science.1260352).

Kastner, T., et al., 2015, 'Global human appropriation of net primary production for biomass consumption in the European Union, 1986–2007', *Journal of Industrial Ecology* 19(5), pp. 825-836 (DOI: 10.1111/jiec.12238).

Kharas, H., 2017, *The unprecedented expansion of the global middle class — an update*, Working Paper 100, Brookings ([https://www.brookings.edu/wp-content/uploads/2017/02/global\\_20170228\\_global-middle-class.pdf](https://www.brookings.edu/wp-content/uploads/2017/02/global_20170228_global-middle-class.pdf)) accessed 9 May 2018.

Krausmann, F., et al., 2009, 'Growth in global materials use, GDP and population during the 20th century', *Ecological Economics* 68(10), pp. 2696-2705.

Leakey, R. E. and Lewin, R., 1996, *The sixth extinction: patterns of life and the future of humankind*, Anchor Books, New York, NY.

Lenton, T. M., et al., 2008, 'Tipping elements in the Earth's climate system', *Proceedings of the National Academy of Sciences* 105(6), pp. 1786-1793 (DOI: 10.1073/pnas.0705414105).

Lenzen, M., et al., 2013, 'Building EORA: a global multi-region input-output database at high country and sector resolution', *Economic Systems Research* 25(1), pp. 20-49 (DOI: 10.1080/09535314.2013.769938).

Levermann, A., et al., 2012, 'Potential climatic transitions with profound impact on Europe', *Climatic Change* 110(3-4), pp. 845-878 (DOI: 10.1007/s10584-011-0126-5).

- Lucas, P. and Wilting, H., 2018, *Using planetary boundaries to support national implementation of environment-related Sustainable Development Goals*, Report No 2748, Netherlands Environmental Assessment Agency, The Hague, Netherlands (<https://www.pbl.nl/sites/default/files/cms/publicaties/Using%20planetary%20boundaries%20to%20support%20national%20implementation%20of%20environment-related%20Sustainable%20Development%20Goals%20-%202748.pdf>) accessed 1 September 2019.
- Mace, G. M., et al., 2014, 'Approaches to defining a planetary boundary for biodiversity', *Global Environmental Change* 28, pp. 289-297 (DOI: 10.1016/j.gloenvcha.2014.07.009).
- McCauley, D. J., et al., 2015, 'Marine defaunation: animal loss in the global ocean', *Science* 347(6219), pp. 1255641-1255641 (DOI: 10.1126/science.1255641).
- Missirian, A. and Schlenker, W., 2017, 'Asylum applications respond to temperature fluctuations', *Science* 358(6370), pp. 1610-1614 (DOI: 10.1126/science.aao0432).
- Montoya, J. M., et al., 2018, 'Planetary boundaries for biodiversity: implausible science, pernicious policies', *Trends in Ecology & Evolution* 33(2), pp. 71-73 (DOI: 10.1016/j.tree.2017.10.004).
- Moran, D. and Kanemoto, K., 2017, 'Identifying species threat hotspots from global supply chains', *Nature Ecology & Evolution* 1(1), p. 23 (DOI: 10.1038/s41559-016-0023).
- Newbold, T., et al., 2016, 'Has land use pushed terrestrial biodiversity beyond the planetary boundary? A global assessment', *Science* 353(6296), pp. 288-291 (DOI: 10.1126/science.aaf2201).
- Nykvist, B., et al., 2013, *National environmental performance on planetary boundaries — a study for the Swedish environmental protection agency*, No 6576, Stockholm Resilience Centre and Stockholm Environment Institute, Stockholm, Sweden (<https://www.naturvardsverket.se/Documents/publikationer/6400/978-91-620-6576-8.pdf>) accessed 6 August 2019.
- OECD, 2012, *OECD environmental outlook to 2050 – the consequences of inaction*, Organisation for Economic Co-operation and Development (<http://www.oecd-ilibrary.org/content/book/9789264122246-en>) accessed 21 September 2018.
- OECD, 2015, *In it together: why less inequality benefits all*, Organisation for Economic Co-operation and Development, Paris, France.
- OECD, 2017a, *OECD employment outlook 2017*, Organisation for Economic Co-operation and Development, Paris, France ([https://doi.org/10.1787/empl\\_outlook-2017-en](https://doi.org/10.1787/empl_outlook-2017-en)) accessed 18 September 2018.
- OECD, 2017b, *The next production revolution — implications for governments and business*, Organisation for Economic Co-operation and Development, Paris, France.
- OECD, ed., 2018a, *Human acceleration of the nitrogen cycle: managing risks and uncertainty*, OECD Publishing, Paris, France.
- OECD, 2018b, 'Long-term baseline projections, No 103, OECD economic outlook: statistics and projections (database)' ([https://www.oecd-ilibrary.org/economics/data/oecd-economic-outlook-statistics-and-projections/long-term-baseline-projections-no-103\\_68465614-en](https://www.oecd-ilibrary.org/economics/data/oecd-economic-outlook-statistics-and-projections/long-term-baseline-projections-no-103_68465614-en)) accessed 5 September 2018.
- OECD, 2018c, *Release of main science and technology indicators: latest estimates of R&D investment in OECD and major economies*, OECD Data Brief, Organisation for Economic Co-operation and Development, Paris, France ([https://www.oecd.org/sti/DataBrief\\_MSTI\\_2018.pdf](https://www.oecd.org/sti/DataBrief_MSTI_2018.pdf)) accessed 9 May 2018.
- OECD, 2018d, *Transformative technologies and jobs of the future*, Background report for the Canadian G7 Innovation Ministers' Meeting, Organisation for Economic Co-operation and Development, Montreal, Canada (<https://www.oecd.org/innovation/transformative-technologies-and-jobs-of-the-future.pdf>) accessed 6 August 2019.
- OECD/DASTI, 2016, *An OECD horizon scan of megatrends and technology trends in the context of future research policy*, Organisation for Economic Co-operation and Development; Danish Agency for Science, Technology and Innovation (<https://ufm.dk/en/publications/2016/an-oecd-horizon-scan-of-megatrends-and-technology-trends-in-the-context-of-future-research-policy>) accessed 6 August 2019.
- OECD/FAO, 2018, *OECD-FAO agricultural outlook 2018-2027*, Text, Organisation for Economic Co-operation and Development; Food and Agriculture Organization of the United Nations, Paris, France ([https://www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2018-2027\\_agr\\_outlook-2018-en](https://www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2018-2027_agr_outlook-2018-en)) accessed 3 September 2018.
- O'Neill, D. W., et al., 2018, 'A good life for all within planetary boundaries', *Nature Sustainability* 1(2), pp. 88-95 (DOI: 10.1038/s41893-018-0021-4).
- Patel, R., et al., 2018, 'Collapse of Newfoundland cod fisheries, Northwest Atlantic', Regime Shifts Database (<http://www.regimeshifts.org/what-is-a-regime-shift/item/585-collapse-of-newfoundland-cod-fisheries-northwest-atlantic>) accessed 25 September 2018.

- Ripple, W. J., et al., 2017, 'World scientists' warning to humanity: a second notice', *BioScience* 67(12), pp. 1026-1028 (DOI: 10.1093/biosci/bix125).
- Rockström, J., et al., 2009, 'Planetary boundaries: exploring the safe operating space for humanity', *Ecology & Society* 14(2), p. 32.
- Rockström, J., et al., 2018, 'Planetary boundaries: separating fact from fiction. A response to Montoya et al.', *Trends in Ecology & Evolution* 33(4), pp. 233-234 (DOI: 10.1016/j.tree.2018.01.010).
- Ruggie, J. G., 2018, 'Multinationals as global institution: power, authority and relative autonomy', *Regulation & Governance* 12(3), pp. 317-333 (DOI: 10.1111/rego.12154).
- Sala, S., et al., forthcoming, *Consumption and consumer footprint: methodology and results — indicators and assessment of the environmental impact of EU consumption*, Publications Office of the European Union, Luxembourg.
- Sala, S., et al., 2019, *Indicators and assessment of the environmental impact of EU consumption*, JRC Science for Policy Report, Publications Office of the European Union, Luxembourg (<https://ec.europa.eu/jrc/en/publication/euro-scientific-and-technical-research-reports/indicators-and-assessment-environmental-impact-eu-consumption>) accessed 6 August 2019.
- Schellnhuber, H. J., et al., 2016, 'Why the right climate target was agreed in Paris', *Nature Climate Change* 6(7), pp. 649-653 (DOI: 10.1038/nclimate3013).
- Schwab, K., 2017, *The Fourth Industrial Revolution*, Currency, New York.
- Serrano, A., et al., 2016, 'Virtual water flows in the EU-27: a consumption-based approach', *Journal of Industrial Ecology* 20(3), pp. 547-558 (DOI: 10.1111/jiec.12454).
- Stadler, K., et al., 2018, 'Exiobase 3: developing a time series of detailed environmentally extended multi-regional input-output tables', *Journal of Industrial Ecology* 22(3), pp. 502-515 (DOI: 10.1111/jiec.12715).
- Steffen, W., et al., 2011, 'The Anthropocene: conceptual and historical perspectives', *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 369(1938), pp. 842-867 (DOI: 10.1098/rsta.2010.0327).
- Steffen, W., et al., 2015a, 'Planetary boundaries: guiding human development on a changing planet', *Science* 347(6223), p. 1259855 (DOI: 10.1126/science.1259855).
- Steffen, W., et al., 2015b, 'The trajectory of the Anthropocene: the Great Acceleration', *The Anthropocene Review* 2(1), pp. 81-98.
- Steffen, W., et al., 2018, 'Trajectories of the Earth system in the Anthropocene', *Proceedings of the National Academy of Sciences* 115(33), pp. 8252-8259 (DOI: 10.1073/pnas.1810141115).
- Timmer, M. P., et al., 2015, 'An illustrated user guide to the world input-output database: the case of global automotive production', *Review of International Economics* 23(3), pp. 575-605 (DOI: 10.1111/roie.12178).
- Tukker, A., et al., 2016, 'Environmental and resource footprints in a global context: Europe's structural deficit in resource endowments', *Global Environmental Change* 40, pp. 171-181 (DOI: 10.1016/j.gloenvcha.2016.07.002).
- UN Environment, 2019, *Global environment outlook — Geo-6: healthy planet, healthy people.*, Cambridge University Press, Cambridge, UK.
- UN Water, 2018, *World water development report 2018: nature-based solutions for water*, United Nations World Water Assessment Programme, Paris, France (<http://www.unwater.org/publications/world-water-development-report-2018/>) accessed 3 September 2018.
- UNCCD, 2017, *The global land outlook*, United Nations Convention to Combat Desertification, Bonn, Germany (<https://knowledge.unccd.int/glo>) accessed 3 September 2018.
- UNDESA, 2017a, *The international migration report 2017*, Report No ST/ESA/SER.A/ 404, United Nations Department of Economic and Social Affairs, New York, NY (<https://www.un.org/development/desa/publications/international-migration-report-2017.html>) accessed 29 August 2018.
- UNDESA, 2017b, 'World Population Prospects: the 2017 revision — data center' (<https://esa.un.org/unpd/wpp/Download/Standard/Population/>) accessed 6 September 2018.
- UNDESA, 2017c, *World population prospects: the 2017 revision — key findings and advance tables*, Working Paper No ESA/P/WP/248, United Nations Department of Economic and Social Affairs, New York, NY ([https://esa.un.org/unpd/wpp/Publications/Files/WPP2017\\_KeyFindings.pdf](https://esa.un.org/unpd/wpp/Publications/Files/WPP2017_KeyFindings.pdf)) accessed 8 August 2018.
- UNDESA, 2018, 'Data query — World urbanization prospects 2018: the 2018 revision', United Nations Department of Economic and Social Affairs (<https://esa.un.org/unpd/wup/DataQuery/>) accessed 28 August 2018.
- UNECE, 2016, *Towards cleaner air — scientific assessment report 2016: summary for policymakers*, EMEP Steering Body and Working Group on Effects of the Convention on Long-Range Transboundary Air Pollution, United Nations Economic



Commission for Europe, Oslo, Norway (<http://www.unece.org/index.php?id=42859>) accessed 6 August 2019.

UNEP, 2017a, *Frontiers 2017: emerging issues of environmental concern*, United Nations Environment Programme (<https://wedocs.unep.org/handle/20.500.11822/22255>) accessed 5 September 2018.

UNEP, 2017b, *Towards a pollution-free planet*, United Nations Environment Programme, Nairobi, Kenya ([https://wedocs.unep.org/bitstream/handle/20.500.11822/21800/UNEA\\_towardspollution\\_long%20version\\_Web.pdf?sequence=1&isAllowed=y](https://wedocs.unep.org/bitstream/handle/20.500.11822/21800/UNEA_towardspollution_long%20version_Web.pdf?sequence=1&isAllowed=y)) accessed 6 August 2019.

UNEP, 2018, *The emissions gap report 2018*, United Nations Environment Programme, Nairobi, Kenya ([http://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018\\_FullReport\\_EN.pdf?isAllowed=y&sequence=1](http://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018_FullReport_EN.pdf?isAllowed=y&sequence=1)) accessed 6 August 2019.

UNHCR, 2017, *Global trends: forced displacement in 2017*, United Nations Refugee Agency, Geneva, Switzerland (<http://www.unhcr.org/globaltrends2017/>) accessed 29 August 2018.

UNWTO, 2017, *UNWTO tourism highlights 2017*, World Tourism Organization, Madrid, Spain (<http://mkt.unwto.org/publication/unwto-tourism-highlights>) accessed 16 August 2018.

Veldkamp, T. I. E., et al., 2017, 'Water scarcity hotspots travel downstream due to human interventions in the 20th and 21st century', *Nature Communications* 8, p. 15697 (DOI: 10.1038/ncomms15697).

Walker, B., et al., 2004, 'Resilience, adaptability and transformability in social-ecological systems', *Ecology and Society* 9(2), p. 5.

Waters, C. N., et al., 2016, 'The Anthropocene is functionally and stratigraphically distinct from the Holocene', *Science* 351(6269), pp. aad2622-aad2622 (DOI: 10.1126/science.aad2622).

WEF, et al., 2016, *The new plastics economy — rethinking the future of plastics*, World Economic Forum and Ellen MacArthur Foundation, Geneva, Switzerland ([https://www.ellenmacarthurfoundation.org/assets/downloads/EllenMacArthurFoundation\\_TheNewPlasticsEconomy\\_15-3-16.pdf](https://www.ellenmacarthurfoundation.org/assets/downloads/EllenMacArthurFoundation_TheNewPlasticsEconomy_15-3-16.pdf)) accessed 17 October 2017.

WEF, 2017, *The global risks report 2017*, Insight Report No 12, World Economic Forum, Geneva, Switzerland ([http://www3.weforum.org/docs/GRR17\\_Report\\_web.pdf](http://www3.weforum.org/docs/GRR17_Report_web.pdf)) accessed 6 August 2019.

WEF, 2019, *The global risks report 2019*, Insight Report No 14, World Economic Forum, Geneva, Switzerland ([http://www3.weforum.org/docs/WEF\\_Global\\_Risks\\_Report\\_2019.pdf](http://www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf))

accessed 6 August 2019.

WHO, 2018, 'Who global health observatory data' ([http://www.who.int/gho/ncd/mortality\\_morbidity/en/](http://www.who.int/gho/ncd/mortality_morbidity/en/)) accessed 7 September 2018.

WIL, 2017, *World inequality report 2018*, World Inequality Lab, Paris School of Economics, Paris, France (<https://wir2018.wid.world/>) accessed 6 September 2018.

Wood, R., et al., 2018, 'Growth in environmental footprints and environmental impacts embodied in trade: resource efficiency indicators from Exiobase3', *Journal of Industrial Ecology* 22(3), pp. 553-564 (DOI: 10.1111/jiec.12735).

World Bank, 2018a, 'Households and NPISHs: final consumption expenditure per capita (constant 2010 US\$)' (<https://data.worldbank.org/indicator/NE.CON.PRVT.PC.KD?locations=EU-1W>) accessed 17 January 2019.

World Bank, 2018b, 'Poverty | Data' (<https://data.worldbank.org/topic/poverty>) accessed 16 August 2018.

World Bank, 2018c, 'Prevalence of stunting, height for age (% of children under 5) | Data' (<https://data.worldbank.org/indicator/SH.STA.STNT.ZS>) accessed 16 August 2018.

World Bank, 2018d, 'World Bank DataBank' (<http://databank.worldbank.org/data/home>) accessed 5 September 2018.

WU Vienna, 2018, 'The material flow analysis portal' (<http://www.materialflows.net/>) accessed 6 September 2018.

Yu, Y., et al., 2013, 'Tele-connecting local consumption to global land use', *Global Environmental Change* 23(5), pp. 1178-1186 (DOI: 10.1016/j.gloenvcha.2013.04.006).



## CHAPTER 02 — EUROPE'S POLICIES AND SUSTAINABILITY GOALS

Ban Ki-moon, 2014, 'Big Idea 2015: Sustainability is common sense' (<https://www.linkedin.com/pulse/big-idea-2015-sustainability-ban-ki-moon>) accessed 10 April 2018.

CBD, 2013, 'Aichi biodiversity targets' (<http://www.cbd.int/sp/targets/>) accessed 28 January 2013.

Covenant of Mayors, 2019, 'Covenant of Mayors — signatories' (<https://www.covenantofmayors.eu/about/covenant-community/signatories.html>) accessed 9 April 2019.

EC, 2010, Communication from the Commission — Europe 2020 — A strategy for smart, sustainable and inclusive growth (COM(2010) 2020 final, Brussels, 3.3.2010).

EC, 2011a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Energy Roadmap 2050 (COM(2011) 885 final).

EC, 2011b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (COM (2011) 244 final, Brussels, 3.5.2011).

EC, 2012, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Innovating for sustainable growth: a bioeconomy for Europe (COM(2012) 60 final).

EC, 2013, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — An EU strategy on adaptation to climate change (COM(2013) 216 final, Brussels, 16.4.2013).

EC, 2015a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Closing the loop: an EU action plan for the circular economy (COM(2015) 614 final).

EC, 2015b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A framework strategy for a resilient Energy Union with a forward-looking climate change policy (COM(2015) 80 final).

EC, 2016a, Commission staff working document — Key European action supporting the 2030 agenda and the Sustainable Development Goals (SWD(2016) 390 final).

EC, 2016b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Next steps for a sustainable European future — European action for sustainability (COM(2016) 739 final).

EC, 2016c, 'Environment — LIFE: funding: LIFE+' (<http://ec.europa.eu/environment/life/funding/ngos/index.htm>) accessed 18 April 2016.

EC, 2017a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions

— The EU Environmental Implementation Review: common challenges and how to combine efforts to deliver better results (COM(2017) 63 final).

EC, 2017b, *Review of the 2012 European bioeconomy strategy*, European Commission ([https://ec.europa.eu/research/bioeconomy/pdf/review\\_of\\_2012\\_eu\\_bes.pdf](https://ec.europa.eu/research/bioeconomy/pdf/review_of_2012_eu_bes.pdf)).

EC, 2017c, *Special Eurobarometer 468 — Attitudes of European citizens towards the environment*, European Commission (<http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/ResultDoc/download/DocumentKy/81259>).

EC, 2017d, 'Sustainable finance' ([https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance\\_en](https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance_en)) accessed 1 June 2018.

EC, 2018a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A European strategy for plastics in a circular economy (COM(2018) 28 final).

EC, 2018b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment (COM(2018) 673 final, Brussels, 11.10.2018).

EC, 2018c, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A clean planet for all: a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final).

EC, 2018d, Communication from the Commission to the European Parliament, the European Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions — Action plan: financing sustainable growth (COM(2018) 97 final).

EC, 2018e, 'Corporate social responsibility and responsible business conduct' ([http://ec.europa.eu/growth/industry/corporate-social-responsibility\\_en](http://ec.europa.eu/growth/industry/corporate-social-responsibility_en)).

EC, 2018f, 'Eco-Management and Audit Scheme' ([http://ec.europa.eu/environment/emas/index\\_en.htm](http://ec.europa.eu/environment/emas/index_en.htm)) accessed 5 October 2018.

EC, 2018g, 'European Green Capital Award' ([http://ec.europa.eu/environment/europeangreencapital/index\\_en.htm](http://ec.europa.eu/environment/europeangreencapital/index_en.htm)) accessed 5 October 2018.

EC, 2018h, 'Multi-stakeholder platform on SDGs', European

Commission ([https://ec.europa.eu/info/strategy/international-strategies/global-topics/sustainable-development-goals/multi-stakeholder-platform-sdgs\\_en](https://ec.europa.eu/info/strategy/international-strategies/global-topics/sustainable-development-goals/multi-stakeholder-platform-sdgs_en)) accessed 5 October 2018.

EC, 2018i, Report from the Commission to the European Parliament and the Council on the implementation of the EU Strategy on adaptation to climate change (COM(2018) 738 final).

EC, 2018j, *Statement of estimates of the European Commission for the financial year 2019*, European Commission (<http://ec.europa.eu/budget/library/biblio/documents/2019/SoE2019%20with%20covers.pdf>).

EC, 2018k, 'UN climate talks: EU plays instrumental role in making the Paris Agreement operational', European Commission — Climate Action ([https://ec.europa.eu/clima/news/un-climate-talks-eu-plays-instrumental-role-making-paris-agreement-operational\\_en](https://ec.europa.eu/clima/news/un-climate-talks-eu-plays-instrumental-role-making-paris-agreement-operational_en)) accessed 11 April 2019.

EC, 2019a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Environmental Implementation Review 2019: a Europe that protects its citizens and enhances their quality of life (COM(2019) 149 final).

EC, 2019b, 'Green public procurement', European Commission — Environment ([http://ec.europa.eu/environment/gpp/index\\_en.htm](http://ec.europa.eu/environment/gpp/index_en.htm)) accessed 11 April 2019.

EC, 2019c, *Towards a sustainable Europe by 2030*, Reflection paper, European Commission ([https://ec.europa.eu/commission/sites/beta-political/files/rp\\_sustainable\\_europe\\_30-01\\_en\\_web.pdf](https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf)) accessed 15 May 2019.

EEA, 2015a, *The European environment — state and outlook 2015: assessment of global megatrends*, European Environment Agency.

EEA, 2015b, *Urban sustainability issues — enabling resource-efficient cities*, EEA Technical Report No 23/2015, European Environment Agency (<http://www.eea.europa.eu/publications/resource-efficient-cities>) accessed 14 July 2015.

EEA, 2016, *Circular economy in Europe — Developing the knowledge base*, EEA Report No 2/2016, European Environment Agency.

EEA and EC, 2019, 'Climate-ADAPT' (<http://climate-adapt.eea.europa.eu/>) accessed 10 April 2019.

EEA and Eionet, 2016, *Sustainability transitions: now for the long term*, Eionet Report No 1/2016, European Environment Agency (<https://www.eea.europa.eu/publications/sustainability-transitions-now-for-the>)

accessed 6 August 2019.

EEC, 1975, Council Directive 75/442/EEC of 15 July 1975 on waste (OJ L 194, 25.7.1975, pp. 39-41).

EEC, 1976, Council Directive 76/160/EEC of 8 December 1975 concerning the quality of bathing water (OJ L 31, 5.2.1976, p. 1-7).

EEC, 1979, Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (OJ L 103, 25.4.1979, pp. 1-18).

EEC, 1987, Single European Act (OJ L 169, 29.6.1987, pp. 1-28).

EEC, 1992, Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1992, pp. 7-50).

EU, 1997, Treaty of Amsterdam amending the Treaty on European Union, the Treaties establishing the European Communities and certain related acts — final act (OJ C 340, 10.11.1997).

EU, 2004, Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage (OJ L 143, 30.4.2004, pp. 56-75).

EU, 2007, Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007 (2007/C 306/01).

EU, 2013a, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

EU, 2013b, Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 — the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC (OJ L 347, 20.12.2013, pp. 104-173).

EU, 2013c, Regulation (EU) No 1293/2013 of the European Parliament and of the Council of 11 December 2013 on the establishment of a Programme for the Environment and Climate Action (LIFE) and repealing Regulation (EC) No 614/2007 (OJ L 347, 20.12.2013).

EU, 2013d, Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005 (OJ L 347, 20.12.2013, pp. 487-548).

EU, 2013e, Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009 (OJ L 347, 20.12.2013, pp. 608-670).

EU, 2016, 'Urban agenda for the EU — Pact of Amsterdam', European Commission ([http://urbanagendaforthe.eu/wp-content/uploads/2016/05/Pact-of-Amsterdam\\_v7\\_WEB.pdf](http://urbanagendaforthe.eu/wp-content/uploads/2016/05/Pact-of-Amsterdam_v7_WEB.pdf)) accessed 25 July 2016.

EU, 2018a, Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (OJ L 328, 21.12.2018, pp. 82-209).

EU, 2018b, Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency (OJ L 328, 21.12.2018, pp. 210-230).

EU, 2018c, 'Precautionary principle', EUR-Lex Glossary of summaries ([https://eur-lex.europa.eu/summary/glossary/precautionary\\_principle.html](https://eur-lex.europa.eu/summary/glossary/precautionary_principle.html)) accessed 10 April 2018.

EU, 2018d, Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (OJ L 156, 19.6.2018, pp. 1-25).

EU, 2018e, Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (OJ L 156, 19.6.2018, pp. 26-42).

EU, 2018f, Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action (OJ L 328, 21.12.2018, pp. 1-77).

EU, 2018g, 'The 2030 agenda for sustainable development' ([https://ec.europa.eu/europeaid/policies/european-development-policy/2030-agenda-sustainable-development\\_en](https://ec.europa.eu/europeaid/policies/european-development-policy/2030-agenda-sustainable-development_en)) accessed 10 April 2018.

EU and Euratom, 2013, Council Regulation (EU, Euratom) No 1311/2013 of 2 December 2013 laying down the multiannual financial framework for the years 2014-2020 (OJ L 347, 20.12.2013).

European Council, 2014, European Council (23 and 24 October 2014) — Conclusions on 2030 Climate and Energy Policy Framework (SN 79/14).

Eurostat, 2018, *Sustainable development in the European Union — monitoring report on progress towards the SDGs in an EU context — 2018 edition* (<https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-01-18-656>) accessed 14 January 2019.

Mayors Adapt, 2015, 'Mayors Adapt' (<http://mayors-adapt.eu/>) accessed 13 July 2015.

RFSC, 2018, 'Reference Framework for European Sustainable Cities' (<http://rfsc.eu/>) accessed 5 October 2018.

UN, 2015a, Resolution adopted by the General Assembly on 3 June 2015: 69/283. Sendai Framework for Disaster Risk Reduction 2015-2030 (A/RES/69/283).

UN, 2015b, Resolution adopted by the General Assembly on 25 September 2015. Transforming our world: the 2030 agenda for sustainable development (A/RES/70/1).

UN, 2015c, Resolution adopted by the General Assembly on 27 July 2015: 69/313. Addis Ababa Action Agenda of the Third International Conference on Financing for Development (A/RES/69/313).

UN Global Compact, 2018, 'UN Global Compact — Europe region' (<https://www.unglobalcompact.org/engage-locally/europe>) accessed 5 October 2018.

UNCED, 1992, Rio Declaration on Environment and Development (A/CONF.151/26).

UNECE, 1998, Convention on access to information, public participation in decision-making and access to justice in environmental affairs (Aarhus Convention).

UNFCCC, 1997, Kyoto Protocol to the United Nations Framework Convention on Climate Change.

UNFCCC, 2015a, Adoption of the Paris Agreement (FCCC/CP/2015/L.9/Rev.1).

UNFCCC, 2015b, Paris Agreement (Decision 1/CP.21).

UNFCCC, 2017, 'UNFCCC statement on the US decision to Withdraw from Paris Agreement' (<https://unfccc.int/news/unfccc-statement-on-the-us-decision-to-withdraw-from-paris-agreement>) accessed 4 October 2018.

WCED, 1987, *Our common future*, Oxford University Press, Oxford, UK.



## CHAPTER 03 — BIODIVERSITY AND NATURE

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BirdLife International, 2019, 'Spanish imperial eagle (*Aquila adalberti*) — BirdLife species factsheet' (<http://datazone.birdlife.org/species/factsheet/spanish-imperial-eagle-aquila-adalberti>) accessed 8 January 2019.

Birkhofer, K., et al., 2018, 'Relationships between multiple biodiversity components and ecosystem services along a landscape complexity gradient', *Biological Conservation* 218, pp. 247-253 (DOI: 10.1016/j.biocon.2017.12.027).

Bloem, J., et al., 2005, *Microbiological methods for assessing soil quality*, CABI, Wallingford, UK.

Brink, P. ten, et al., 2013, *Economic benefits of the Natura 2000 network: synthesis report*, Publications Office of the European Union, Luxembourg.

Brussaard, L., et al., 2007, 'Soil biodiversity for agricultural sustainability', *Agriculture, Ecosystems & Environment* 121(3), pp. 233-244 (DOI: 10.1016/j.agee.2006.12.013).

CBD, 1992, *Convention on biological diversity*, Secretariat to the Convention on Biological Diversity, Rio de Janeiro, Brazil.

Council of Europe, 1979, 'Convention on the conservation of European wildlife and natural habitats (Bern Convention)' (<https://www.coe.int/en/web/bern-convention/home>) accessed 28 May 2019.

Crenna, E., et al., 2019, 'Biodiversity impacts due to food consumption in Europe', *Journal of Cleaner Production* 227, pp. 378-391 (DOI: 10.1016/j.jclepro.2019.04.054).

Deinet, S., et al., 2013, *Wildlife comeback in Europe: the recovery of selected mammal and bird species.*, ZSL, London, UK.

Donald, P. F., et al., 2001, 'Agricultural intensification and the collapse of Europe's farmland bird populations', *Proceedings of the Royal Society B Biological Sciences* 268(1462), p. 25 (DOI: 10.1098/rspb.2000.1325).

EBCC, 2019, 'What is Pan-European Common Bird Monitoring Scheme? | European Bird Census Council' (<https://www.ebcc.info/pan-european-common-bird-monitoring-scheme-pecbms/>) accessed 16 August 2019.

EC, 2011, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions — Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (COM(2011) 244 final).

EC, 2015, Report from the Commission to the European Parliament and the Council — The mid-term review of the EU biodiversity strategy to 2020 (COM(2015) 478 final).

EC, 2016a, 'Fitness check of the Birds and Habitats Directives', European Commission ([http://ec.europa.eu/environment/nature/legislation/fitness\\_check/index\\_en.htm](http://ec.europa.eu/environment/nature/legislation/fitness_check/index_en.htm)) accessed 6 April 2019.

EC, 2016b, *Preparatory action on EU plant and animal genetic resources*, European Commission, Brussels, Belgium.

EC, 2016c, 'Sustainable land use (greening)', European Commission — Policies, information and Services ([https://ec.europa.eu/agriculture/direct-support/greening\\_en](https://ec.europa.eu/agriculture/direct-support/greening_en)) accessed 6 April 2019.

EC, 2017, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - EU Action Plan for nature, people and the economy', European Commission — Environment ([http://ec.europa.eu/environment/nature/legislation/fitness\\_check/action\\_plan/index\\_en.htm](http://ec.europa.eu/environment/nature/legislation/fitness_check/action_plan/index_en.htm)) accessed 6 April 2019.

EC, 2018a, Commission staff working document accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — EU Pollinators Initiative (SWD(2018) 302 final/2).

EC, 2018b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — EU Pollinators Initiative (COM(2018) 395 final).

EC, 2018c, 'European Red List — Bees' (<http://ec.europa.eu/environment/nature/conservation/species/redlist/bees/summary.htm>) accessed 29 May 2019.

EC, 2019, *Special Eurobarometer 481 — Attitudes of Europeans towards biodiversity* (<http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/survey/getsurveydetail/instruments/special/surveyky/2194>) accessed 28 May 2019.

EEA, 2012, *Protected areas in Europe — an overview*, EEA Report No 5/2012, European Environment Agency.

EEA, 2015a, 'Article 17 reports and assessments 2007-2012' (<http://www.eea.europa.eu/data-and-maps/data/article-17-database-habitats-directive-92-43-eeec-1>) accessed 16 August 2019.

EEA, 2015b, *State of nature in the EU: results from reporting under the nature directives 2007-2012*, EEA Technical Report

No 2/2015, European Environment Agency (<http://www.eea.europa.eu/publications/state-of-nature-in-the-eu>) accessed 21 August 2019.

EEA, 2016a, *Flood risks and environmental vulnerability — exploring the synergies between floodplain restoration, water policies and thematic policies*, EEA Report No 1/2016, European Environment Agency (<http://www.eea.europa.eu/publications/flood-risks-and-environmental-vulnerability/>) accessed 15 August 2019.

EEA, 2016b, 'Habitats of European interest (CSI 057/SEBI 005)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/habitats-of-european-interest-1/assessment>) accessed 10 January 2019.

EEA, 2016c, *Mapping and assessing the condition of Europe's ecosystems: progress and challenges*, EEA Report No 3/2016, European Environment Agency (<http://www.eea.europa.eu/publications/mapping-europes-ecosystems>) accessed 21 August 2019.

EEA, 2016d, 'Public awareness (SEBI 026)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/public-awareness-1/assessment>) accessed 10 January 2019.

EEA, 2016e, 'Species of European interest (CSI 007/SEBI 003)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/species-of-european-interest-2/assessment>) accessed 10 January 2019.

EEA, 2017, *Climate change, impacts and vulnerability in Europe 2016 — an indicator-based report*, EEA Report No 1/2017, European Environment Agency (<https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016>) accessed 12 August 2019.

EEA, 2018a, *European waters — assessment of status and pressures 2018*, EEA Report No 7/2018, European Environment Agency (<https://www.eea.europa.eu/publications/state-of-water>) accessed 6 December 2018.

EEA, 2018b, 'Nationally designated protected areas (CSI 008/SEBI 007)' (<https://www.eea.europa.eu/data-and-maps/indicators/nationally-designated-protected-areas-10/assessment>) accessed 8 January 2019.

EEA, 2018c, 'Sites designated under the EU Habitats and Birds Directives (SEBI 008)' (<https://www.eea.europa.eu/data-and-maps/indicators/sites-designated-under-the-eu-2/assessment>) accessed 8 January 2019.

EEA, 2019a, 'Abundance and distribution of selected European species (SEBI 001/CSI 050)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/abundance-and-distribution-of-selected-species-8/>)

assessment) accessed 16 August 2019.

EEA, 2019b, 'Ecological footprint of European countries (SEBI 023)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/ecological-footprint-of-european-countries-1/assessment>) accessed 16 August 2019.

EFSA, 2016, 'Guidance to develop specific protection goals options for environmental risk assessment at EFSA, in relation to biodiversity and ecosystem services', *EFSA Journal* 14(6), p. e04499 (DOI: 10.2903/j.efsa.2016.4499).

EU, 2013, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

EU, 2014, Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species (OJ L 317, 4.11.2014, pp. 35-55).

EU, 2019, Commission Implementing Regulation (EU) 2016/1141 of 13 July 2016 adopting a list of invasive alien species of Union concern pursuant to Regulation (EU) No 1143/2014 of the European Parliament and of the Council (OJ L 189 14.7.2016, p. 4).

European Court of Auditors, 2017, *Greening: a more complex income support scheme, not yet environmentally effective*, Special Report No 21/2017 ([https://www.eca.europa.eu/Lists/ECADocuments/SR17\\_21/SR\\_GREENING\\_EN.pdf](https://www.eca.europa.eu/Lists/ECADocuments/SR17_21/SR_GREENING_EN.pdf)) accessed 2 July 2019.

Eurostat, 2019, 'Sustainable development in the European Union — Monitoring report on progress towards the SDGs in an EU context — 2019 edition' (<https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-02-19-165>) accessed 16 August 2019.

FAO, 2015, *The second report on the state of the world's animal genetic resources*, Food and Agriculture Organization of the United Nations (<http://www.fao.org/publications/sowangr/en/>) accessed 14 January 2019.

FAO, 2018, 'Domestic Animal Diversity Information System (DAD-IS)', Food and Agriculture Organization of the United Nations (<http://www.fao.org/dad-is/en/>) accessed 8 January 2019.

FAO, 2019, 'Genetic resources for food and agriculture', Food and Agriculture Organization of the United Nations (<http://www.fao.org/policy-support/policy-themes/genetic-resources/en/>) accessed 9 January 2019.

Fraixedas, S., et al., 2015, 'Population trends of common

- breeding forest birds in southern Finland are consistent with trends in forest management and climate change', *Ornis Fennica* 92, pp. 187-203.
- Fu, Y.-B., 2015, 'Understanding crop genetic diversity under modern plant breeding', *Theoretical and Applied Genetics* 128(11), pp. 2131-2142 (DOI: 10.1007/s00122-015-2585-y).
- Gans, J., et al., 2005, 'Computational improvements reveal great bacterial diversity and high metal toxicity in soil', *Science* 309(5739), pp. 1387-1390 (DOI: 10.1126/science.1112665).
- Gardi, C., et al., 2013, 'An estimate of potential threats levels to soil biodiversity in EU', *Global Change Biology* 19(5), pp. 1538-1548 (DOI: 10.1111/gcb.12159).
- Goulson, D., 2014, 'Ecology: pesticides linked to bird declines', *Nature* 511(7509), pp. 295-296 (DOI: 10.1038/nature13642).
- Guerrero, I., et al., 2012, 'Response of ground-nesting farmland birds to agricultural intensification across Europe: landscape and field level management factors', *Biological Conservation* 152, pp. 74-80 (DOI: 10.1016/j.biocon.2012.04.001).
- Hallmann, C. A., et al., 2014, 'Declines in insectivorous birds are associated with high neonicotinoid concentrations', *Nature* 511(7509), pp. 341-343 (DOI: 10.1038/nature13531).
- Hallmann, C. A., et al., 2017, 'More than 75 percent decline over 27 years in total flying insect biomass in protected areas', *PLoS ONE* 12(10), p. e0185809 (DOI: 10.1371/journal.pone.0185809).
- Hiemstra, S. J., et al., 2010, *Local cattle breeds in Europe: development of policies and strategies for self-sustaining breeds*, Wageningen Academic Publishers, Wageningen, Netherlands.
- IPBES, 2016, *Assessment report on pollinators, pollination and food production*, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany.
- IPBES, 2018, *The IPBES regional assessment report on biodiversity and ecosystem services for Europe and Central Asia*, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany.
- IPBES, 2019, *Global assessment report on biodiversity and ecosystem services*, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany (<https://www.ipbes.net/global-assessment-report-biodiversity-ecosystem-services>) accessed 6 August 2019.
- Jeffery, S., et al., 2015, *European atlas of soil biodiversity*, Publications Office of the European Union, Luxembourg ([http://eusoils.jrc.ec.europa.eu/library/maps/biodiversity\\_atlas/](http://eusoils.jrc.ec.europa.eu/library/maps/biodiversity_atlas/)) accessed 21 August 2019.
- Jeliaskov, A., et al., 2016, 'Impacts of agricultural intensification on bird communities: New insights from a multi-level and multi-facet approach of biodiversity', *Agriculture, Ecosystems & Environment* 216, pp. 9-22 (DOI: 10.1016/j.agee.2015.09.017).
- JRC, 2019a, 'Baseline distribution of species listed in the first update of invasive alien species of Union concern', EU Science Hub — European Commission (<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/baseline-distribution-species-listed-1st-update-invasive-alien-species-union-concern>) accessed 21 March 2019.
- JRC, 2019b, 'Digital Observatory for Protected Areas', Joint Research Centre (<http://dopa.jrc.ec.europa.eu/en>) accessed 26 March 2019.
- JRC, 2019c, 'European Alien Species Information Network (EASIN)', Joint Research Centre (<https://easin.jrc.ec.europa.eu/easin>) accessed 8 January 2019.
- Landis, D. A., 2017, 'Designing agricultural landscapes for biodiversity-based ecosystem services', *Basic and Applied Ecology* 18, pp. 1-12 (DOI: 10.1016/j.baee.2016.07.005).
- Maes, J., et al., 2013, *Mapping and assessment of ecosystems and their services: an analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020*, Luxembourg ([http://ec.europa.eu/environment/nature/knowledge/ecosystem\\_assessment/pdf/MAESWorkingPaper2013.pdf](http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/pdf/MAESWorkingPaper2013.pdf)) accessed 21 August 2019.
- Maes, J., et al., 2018, *Mapping and assessment of ecosystems and their services: an analytical framework for ecosystem condition*, MAES 5th report ([http://catalogue.biodiversity.europa.eu/uploads/document/file/1673/5th\\_MAES\\_report.pdf](http://catalogue.biodiversity.europa.eu/uploads/document/file/1673/5th_MAES_report.pdf)) accessed 21 August 2019.
- Marquardt, S. G., et al., 2019, 'Consumption-based biodiversity footprints — do different indicators yield different results?', *Ecological Indicators* 103, pp. 461-470 (DOI: 10.1016/j.ecolind.2019.04.022).
- Martinez, A. and Amri, A., 2008, *Managing plant genetic resources in the agro-ecosystem: global change, crop-associated biodiversity and ecosystem services. Thematic background study*, Commission on Genetic Resources for Food and Agriculture (<http://www.fao.org/docrep/013/i1500e/i1500e15.pdf>) accessed 8 January 2019.
- Ministerio para la Transición Ecológica, 2018, 'Estrategia para la conservación del águila imperial ibérica' (<https://www.miteco.gob.es/es/biodiversidad/publicaciones/pbl-fauna-flora-estrategias-aguila.aspx>) accessed 1 April 2019.
- Mouillé, B., et al., 2010, *The contribution of plant genetic resources to health and dietary diversity*, Commission on

Genetic Resources for Food and Agriculture, Rome, Italy.

Musitelli, F., et al., 2016, 'Effects of livestock farming on birds of rural areas in Europe', *Biodiversity and Conservation* 25(4), pp. 615-631 (DOI: 10.1007/s10531-016-1087-9).

Noriega, J. A., et al., 2018, 'Research trends in ecosystem services provided by insects', *Basic and Applied Ecology* 26, pp. 8-23 (DOI: 10.1016/j.baae.2017.09.006).

Orgiazzi, A., et al., 2016, *Global soil biodiversity atlas*, Publications Office of the European Union, Luxembourg.

Potts, S. G., et al., 2010, 'Declines of managed honey bees and beekeepers in Europe', *Journal of Apicultural Research* 49(1), pp. 15-22 (DOI: 10.3896/IBRA.1.49.1.02).

Rabitsch, W., et al., 2016, 'Developing and testing alien species indicators for Europe', *Journal for Nature Conservation* 29, pp. 89-96 (DOI: 10.1016/j.jnc.2015.12.001).

Sánchez-Bayo, F. and Wyckhuys, K. A. G., 2019, 'Worldwide decline of the entomofauna: a review of its drivers', *Biological Conservation* 232, pp. 8-27 (DOI: 10.1016/j.biocon.2019.01.020).

Saura, S., et al., 2018, 'Protected area connectivity: shortfalls in global targets and country-level priorities', *Biological Conservation* 219, pp. 53-67 (DOI: 10.1016/j.biocon.2017.12.020).

Schowalter, T. D., et al., 2018, 'Insect effects on ecosystem services — introduction', *Basic and Applied Ecology* 26, pp. 1-7 (DOI: 10.1016/j.baae.2017.09.011).

Setälä, H. and McLean, M. A., 2004, 'Decomposition rate of organic substrates in relation to the species diversity of soil saprophytic fungi', *Oecologia* 139(1), pp. 98-107 (DOI: 10.1007/s00442-003-1478-y).

Simberloff, D., et al., 2013, 'Impacts of biological invasions: what's what and the way forward', *Trends in Ecology & Evolution* 28(1), pp. 58-66 (DOI: 10.1016/j.tree.2012.07.013).

van der Sluis, T., et al., 2016, *How much biodiversity is in Natura 2000? The 'umbrella effect' of the European Natura 2000 protected area network*, Wageningen University and Research, Wageningen, Netherlands.

Van Dyck, H., et al., 2009, 'Declines in common, widespread butterflies in a landscape under intense human use', *Conservation Biology* 23(4), pp. 957-965 (DOI: 10.1111/j.1523-1739.2009.01175.x).

Vickery, J. A., et al., 2009, 'Arable field margins managed for biodiversity conservation: a review of food resource provision for farmland birds', *Agriculture, Ecosystems & Environment*

133(1), pp. 1-13 (DOI: 10.1016/j.agee.2009.05.012).

Virkkala, R., 2016, 'Long-term decline of southern boreal forest birds: consequence of habitat alteration or climate change?', *Biodiversity and Conservation* 25(1), pp. 151-167 (DOI: 10.1007/s10531-015-1043-0).

Walther, G.-R., et al., 2009, 'Alien species in a warmer world: risks and opportunities', *Trends in Ecology & Evolution* 24(12), pp. 686-693 (DOI: 10.1016/j.tree.2009.06.008).



## CHAPTER 04 — FRESHWATER

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Bastin, L., et al., 2019, 'Inland surface waters in protected areas globally: current coverage and 30-year trends', *PLOS ONE* 14(1), p. e0210496 (DOI: 10.1371/journal.pone.0210496).

EC, 2011a, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions — Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (COM(2011) 244 final).

EC, 2011b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Roadmap to a resource efficient Europe (SEC(2011) 1068 final).

EC, 2012, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Blueprint to safeguard Europe's water resources (COM(2012) 673 final, Brussels, 14.11.2012).

EC, 2013, *Living well, within the limits of our planet: 7th EAP — the new general Union Environment Action Programme to 2020*, European Commission, Brussels, Belgium.

EC, 2018a, *Report from the Commission to the Council and the European Parliament on the implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member State reports for the period 2012-2015*, Commission Staff Working Document No 257.

EC, 2018b, 'Water reuse' (<http://ec.europa.eu/environment/water/reuse.htm>) accessed 15 August 2019.

EC, 2019, Report from the Commission to the European Parliament and Council on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive



(2007/60/EC) Second River Basin Management Plans First Flood Risk Management Plans (COM(2019) 95 final).

EEA, forthcoming, *Floodplains: ecosystems and mitigators of flood risks*, European Environment Agency.

EEA, 2016, *Flood risks and environmental vulnerability — exploring the synergies between floodplain restoration, water policies and thematic policies*, EEA Report No 1/2016, European Environment Agency (<http://www.eea.europa.eu/publications/flood-risks-and-environmental-vulnerability/>) accessed 15 August 2019.

EEA, 2017a, *Green infrastructure and flood management: promoting cost-efficiency flood risk reduction via green infrastructure solutions*, EEA Report No 14/2017, European Environment Agency (<https://www.eea.europa.eu/publications/green-infrastructure-and-flood-management>) accessed 15 August 2019.

EEA, 2017b, 'Urban waste water treatment (WAT 005)' (<https://www.eea.europa.eu/data-and-maps/indicators/urban-waste-water-treatment/urban-waste-water-treatment-assessment-4>) accessed 15 August 2019.

EEA, 2018a, *Chemicals in European waters — knowledge developments*, EEA Report No 18/2018, European Environment Agency (<https://www.eea.europa.eu/publications/chemicals-in-european-waters>) accessed 15 August 2019.

EEA, 2018b, *European waters: assessment of status and pressures 2018*, EEA Report No 7/2018, European Environment Agency (<https://www.eea.europa.eu/publications/state-of-water>) accessed 15 August 2019.

EEA, 2018c, 'Use of freshwater resources (CSI 018)' (<https://www.eea.europa.eu/data-and-maps/indicators/use-of-freshwater-resources-2/assessment-3>) accessed 15 August 2019.

EEA, 2018d, 'WISE Water Framework Directive data viewer — Groundwater' ([https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE\\_SOW\\_GWB\\_Status\\_Maps/GWB\\_Status\\_ue&:embed=y&:showAppBanner=false&:display\\_count=no&:showVizHome=no](https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE_SOW_GWB_Status_Maps/GWB_Status_ue&:embed=y&:showAppBanner=false&:display_count=no&:showVizHome=no)) accessed 15 August 2019.

EEA, 2018e, 'WISE Water Framework Directive data viewer — Surface water' (<https://www.eea.europa.eu/data-and-maps/dashboards/wise-wfd>) accessed 15 August 2019.

EEA, 2019a, 'Agricultural nitrogen balance in Europe (SEBI 019)' (<https://www.eea.europa.eu/data-and-maps/indicators/agriculture-nitrogen-balance-1/assessment>) accessed 15 August 2019.

EEA, 2019b, *European bathing water quality in 2018*, No 3/2019, European Environment Agency (<https://www.eea.europa.eu/publications/european-bathing-water-quality-in-2018>) accessed 15 August 2019.

eu/publications/european-bathing-water-quality-in-2018) accessed 15 August 2019.

EEA, 2019c, 'Nutrients in freshwater (CSI 020)' (<https://www.eea.europa.eu/data-and-maps/indicators/nutrients-in-freshwater/nutrients-in-freshwater-assessment-published-6>) accessed 15 August 2019.

EEC, 1979, Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (OJ L 103, 25.4.1979, pp. 1-18).

EEC, 1992, Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1992, pp. 7-50).

EU, 1976, Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (OJ L 129, 18.5.1976, pp. 23-29).

EU, 1991a, Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment (OJ L 135, 30.5.1991, pp. 40-52).

EU, 1991b, Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (OJ L 375, 31.12.1991, pp. 1-8).

EU, 1998, Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption (OJ L 330, 05.12.98, pp. 32-54).

EU, 2000, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327, 22.12.2000, pp. 1-73).

EU, 2006, Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC (OJ L 64, 4.3.2006, pp. 37-51).

EU, 2007, Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (OJ L 288, 6.11.2007, pp. 27-34).

EU, 2008a, Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive) (OJ L 164, 25.6.2008, pp. 19-40).

EU, 2008b, Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/

EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council (OJ L 348, 24.12.2008, pp. 84-97).

EU, 2010, Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010, pp. 17-119).

EU, 2013a, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

EU, 2013b, Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy (OJ L 226, 24.8.2013, pp. 1-17).

EU, 2017, Commission Decision (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU (OJ L 125, 18.5.2017, pp. 43-74).

Kampa, E. and Bussettini, M., 2018, *River hydromorphological assessment and monitoring methodologies — final report. Part 1 — summary of European country questionnaires* (<https://circabc.europa.eu/ui/group/9ab5926d-bed4-4322-9aa7-9964bbe8312d/library/cb7d6f1d-3fac-441d-bf24-1ecff5a90c3f/details>) accessed 15 August 2019.

Maes, J., et al., 2018, *Mapping and assessment of ecosystems and their services: an analytical framework for ecosystem condition*, MAES 5th report ([http://catalogue.biodiversity.europa.eu/uploads/document/file/1673/5th\\_MAES\\_report.pdf](http://catalogue.biodiversity.europa.eu/uploads/document/file/1673/5th_MAES_report.pdf)) accessed 15 August 2019.

NEA, 2018, 'River regulation for hydropower production', Norwegian Environment Agency (<https://tema.miljodirektoratet.no/en/Areas-of-activity1/Species-and-ecosystems/Salmon-trout-and-Arctic-char/Pressures-on-salmonids/River-regulation-for-hydropower-production/>) accessed 15 August 2019.

NWRM, 2019, 'Natural Water Retention Measures Platform', Natural Water Retention Measures Platform (<http://nwrn.eu/>) accessed 15 August 2019.

Orkustofnun, 2018, 'Orkustofnun Data Repository' (<https://orkustofnun.is/gogn/Talnaefni/OS-2018-T006-01.pdf>) accessed 15 August 2019.

Tockner, K. and Stanford, J. A., 2002, 'Riverine flood plains: present state and future trends', *Environmental Conservation*

29(3), pp. 308-330 (DOI: 10.1017/S037689290200022X).

UN, 2016, 'Sustainable Development Goal 6 — Ensure availability and sustainable management of water and sanitation for all' (<https://sustainabledevelopment.un.org/sdg6>) accessed 15 August 2019.

VRL, 2018, *Status of wild Atlantic salmon in Norway 2018*, Summary Report No 11, Vitenskapelig råd for lakseforvaltning.



## CHAPTER 05 — LAND AND SOIL

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Assandri, G., et al., 2019, 'Toward the next Common Agricultural Policy reform: determinants of avian communities in hay meadows reveal current policy's inadequacy for biodiversity conservation in grassland ecosystems', *Journal of Applied Ecology* 56(3), pp. 604-617 (DOI: 10.1111/1365-2664.13332).

BAFU, 2017, *Boden in der Schweiz. Zustand und Entwicklung. Stand 2017*, Umwelt-Zustand No 1721, Bundesamt für Umwelt, Bern ([www.bafu.admin.ch/uz-1721-d](http://www.bafu.admin.ch/uz-1721-d)).

Ballabio, C., et al., 2018, 'Copper distribution in European topsoils: an assessment based on LUCAS soil survey', *Science of the Total Environment* 636, pp. 282-298 (DOI: 10.1016/j.scitotenv.2018.04.268).

Bartkowski, B., et al., 2018, 'Institutional economics of agricultural soil ecosystem services', *Sustainability* 10(7), p. 2447 (DOI: 10.3390/su10072447).

Bengtsson, J., et al., 2000, 'Biodiversity, disturbances, ecosystem function and management of European forests', *Forest Ecology and Management* 132(1), pp. 39-50 (DOI: 10.1016/S0378-1127(00)00378-9).

Borrelli, P., et al., 2017, 'A New Assessment of Soil Loss Due to Wind Erosion in European Agricultural Soils Using a Quantitative Spatially Distributed Modelling Approach', *Land Degradation & Development* 28(1), pp. 335-344 (DOI: 10.1002/ldr.2588).

Brady, M. V., et al., 2015, 'Valuing supporting soil ecosystem services in agriculture: a natural capital approach', *Agronomy Journal* 107(5), pp. 1809-1821 (DOI: 10.2134/agronj14.0597).

Brus, D. J. and van den Akker, J. J. H., 2018, 'How serious a problem is subsoil compaction in the Netherlands? A survey based on probability sampling', *SOIL* 4(1), pp. 37-45 (DOI: 10.5194/soil-4-37-2018).

- Byrne, K. A. and et al., 2004, *EU peatlands: current carbon stocks and trace gas fluxes*, EU project CARBOEUROPE-GHG, Report on a workshop held at GeoBiosphere Science Centre, 21-22 October 2003, Lund, Sweden ([https://www.researchgate.net/publication/254451107\\_EU\\_Peatlands\\_Current\\_Carbon\\_Stocks\\_and\\_Trace\\_Gas\\_Fluxes](https://www.researchgate.net/publication/254451107_EU_Peatlands_Current_Carbon_Stocks_and_Trace_Gas_Fluxes)) accessed 23 August 2019.
- Camia, A., et al., 2018, *Biomass production, supply, uses and flows in the European Union: first results from an integrated assessment*, Publications Office of the European Union, Luxembourg ([http://publications.europa.eu/publication/manifstation\\_identifier/PUB\\_KJNA28993ENN](http://publications.europa.eu/publication/manifstation_identifier/PUB_KJNA28993ENN)) accessed 3 June 2019.
- Colsaet, A., et al., 2018, 'What drives land take and urban land expansion? A systematic review', *Land Use Policy* 79, pp. 339-349 (DOI: 10.1016/j.landusepol.2018.08.017).
- De Vries, W., et al., forthcoming, *Impacts of nutrients and heavy metals in European agriculture. Current and critical inputs in view of air, soil and water quality*, ETC/ULS Report (in preparation).
- De Vries, W., et al., 2007, 'Impact of soil properties on critical concentrations of cadmium, lead, copper, zinc, and mercury in soil and soil solution in view of ecotoxicological effects', in: *Reviews of environmental contamination and toxicology*, Springer, New York, pp. 47-89.
- Decoville, A. and Schneider, M., 2016, 'Can the 2050 zero land take objective of the EU be reliably monitored? A comparative study', *Journal of Land Use Science* 11(3), pp. 331-349 (DOI: 10.1080/1747423X.2014.994567).
- Dijkstra, L., et al., eds., 2016, *The state of European cities 2016: cities leading the way to a better future*, Publications Office of the European Union, Luxembourg.
- Dise, N. B., 2011, 'Nitrogen as a threat to European terrestrial biodiversity', in: *The European nitrogen assessment: sources, effects and policy perspectives*, Cambridge University Press, New York, pp. 463-494.
- EC, 2006, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions — Thematic strategy for soil protection (COM(2006) 231 final).
- EC, 2014, *Climate impacts in Europe. The JRC PESETA II project*, Publications Office of the European Union, Luxembourg.
- EC DG AGRI, 2015, *Food and farming: focus on land*, EU Agricultural Outlook Conference, Brussels, 1-2 December 2015 ([https://ec.europa.eu/agriculture/sites/agriculture/files/events/2015/outlook-conference/brochure-land\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/events/2015/outlook-conference/brochure-land_en.pdf)) accessed 23 August 2019.
- ECA, 2018, *Combating desertification in the EU: a growing threat in need of more action*, Special Report No 33, European Court of Auditors, Luxembourg ([https://www.eca.europa.eu/Lists/ECADocuments/SR18\\_33/SR\\_DESERTIFICATION\\_EN.pdf](https://www.eca.europa.eu/Lists/ECADocuments/SR18_33/SR_DESERTIFICATION_EN.pdf)).
- Edenhofer, O., et al., 2011, *Renewable energy sources and climate change mitigation: summary for policymakers and technical summary. Special report of the Intergovernmental Panel on Climate Change*, Intergovernmental Panel on Climate Change.
- EEA, forthcoming (a), 'Land take (CSI 014/LSI 001)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/land-take-3/assessment>) accessed 28 August 2019.
- EEA, forthcoming (b), 'Landscape fragmentation pressure and trends', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/mobility-and-urbanisation-pressure-on-ecosystems-2/assessment>).
- EEA, 2016, *European forest ecosystems: state and trends*, European Environment Agency.
- EEA, 2017, 'Land take (CSI 014/LSI 001)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/land-take-2/assessment-1>) accessed 29 May 2019.
- EEA, 2018a, 'Forest dynamics in Europe and their ecological consequences', European Environment Agency (<https://www.eea.europa.eu/themes/biodiversity/forests/forest-dynamics-in-europe-and>) accessed 29 May 2019.
- EEA, 2018b, 'Land recycling and densification (LSI 008)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/land-recycling-and-densification/assessment-1>) accessed 29 May 2019.
- EEA, 2018c, *Land systems at European level — analytical assessment framework*, EEA Briefing, European Environment Agency (<https://www.eea.europa.eu/themes/landuse/land-systems/land-system-at-european-level>) accessed 27 May 2019.
- EEA, 2018d, 'Landscape fragmentation pressure from urban and transport infrastructure expansion (LSI 004/CSI 054)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/mobility-and-urbanisation-pressure-on-ecosystems/assessment>) accessed 29 May 2019.
- EEA, 2019, 'Natura 2000 and land cover data viewer' (<https://www.eea.europa.eu/data-and-maps/dashboards/natura-2000-data-viewer>) accessed 27 August 2019.
- FAO and ITPS, 2015, *Status of the world's soil resources: main*

report, Food and Agriculture Organization of the United Nations, Rome.

FAO and ITPS, 2017, *Global assessment of the impact of plant protection products on soil functions and soil ecosystems*, Rome (<http://www.fao.org/3/I8168EN/I8168en.pdf>) accessed 20 August 2019.

Forest Europe, 2015, *State of Europe's forests 2015 report* (<https://foresteurope.org/state-europes-forests-2015-report/>) accessed 6 November 2018.

Freligh, L. E., et al., 2018, 'Natural disturbances and forest management: interacting patterns on the landscape', in: Perera, A. H. et al. (eds), *Ecosystem services from forest landscapes*, Springer International Publishing, Cham, Switzerland, pp. 221-248.

Frelih-Larsen, A., et al., 2017, *Updated inventory and assessment of soil protection policy instruments in EU Member States*, Final Report, Ecologic Institute, Berlin ([https://ieep.eu/uploads/articles/attachments/31a3e243-fc54-4d88-9a13-12bbd91d3e96/Soil\\_inventory\\_report.pdf?v=63675466312](https://ieep.eu/uploads/articles/attachments/31a3e243-fc54-4d88-9a13-12bbd91d3e96/Soil_inventory_report.pdf?v=63675466312)) accessed 23 August 2019.

Glæsner, N., et al., 2014, 'Do current European policies prevent soil threats and support soil functions?', *Sustainability* 6(12), pp. 9538-9563 (DOI: 10.3390/su6129538).

Gobin, A., et al., 2011, *Soil organic matter management across the EU — best practices, constraints and trade-offs*, Final Report for the European Commission Directorate-General for Environment, Brussels.

Günal, H., et al., 2015, 'Threats to sustainability of soil functions in central and southeast Europe', *Sustainability* 7(2), pp. 2161-2188 (DOI: 10.3390/su7022161).

Henle, K., et al., 2008, 'Identifying and managing the conflicts between agriculture and biodiversity conservation in Europe — a review', *Agriculture, Ecosystems & Environment* 124(1-2), pp. 60-71 (DOI: 10.1016/j.agee.2007.09.005).

Hiederer, R., 2018, *Data evaluation of LUCAS soil component laboratory data for soil organic carbon*, JRC Technical Report No JRC112711, Publications Office of the European Union, Luxembourg ([https://esdac.jrc.ec.europa.eu/public\\_path/shared\\_folder/JRC112711\\_lucas\\_oc\\_data\\_evaluation\\_final.pdf](https://esdac.jrc.ec.europa.eu/public_path/shared_folder/JRC112711_lucas_oc_data_evaluation_final.pdf)) accessed 23 August 2019.

Holman, I. P., et al., 2017, 'Can we be certain about future land use change in Europe? A multi-scenario, integrated-assessment analysis', *Agricultural Systems* 151, pp. 126-135 (DOI: 10.1016/j.agsy.2016.12.001).

IPBES, 2018, *The IPBES regional assessment report on biodiversity and ecosystem services for Europe and Central Asia*,

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany.

Juvonen, J., et al., 2017, *Maa- ja metsätalouden kuormittamien pohjavesien MaaMet-seuranta — Torjunta-aineet ja ravinteet 2007–2015 [Monitoring of groundwater bodies affected by agriculture and forestry (MaaMet) — Pesticides and nutrients 2007-2015*, Reports of the Finnish Environment Institute 15/2017 (<http://hdl.handle.net/10138/192749>) accessed 23 August 2019.

Kaczynski, R., et al., 2017, 'Modelling soil carbon trends for agriculture development scenarios at regional level', *Geoderma* 286, pp. 104-115 (DOI: 10.1016/j.geoderma.2016.10.026).

Kobza, J., 2015, 'Permanent soil monitoring system as a basic tool for protection of soils and sustainable land use in Slovakia', *IOP Conference Series: Earth and Environmental Science* 25, p. 012011 (DOI: 10.1088/1755-1315/25/1/012011).

Kompil, M., et al., 2015, *European cities: territorial analysis of characteristics and trends. An application of the LUISA Modelling Platform (EU Reference Scenario 2013 — Updated configuration 2014)*, JRC Technical Report, Publications Office of the European Union, Luxembourg (<http://bookshop.europa.eu/uri?target=EUB:NOTICE:LBNA27709:EN:HTML>) accessed 13 April 2019.

Lavalle, C. and Barbosa, A., 2015, 'LF431 — Share of built-up area over the total land (LUISA Platform REF2014)' (<http://data.europa.eu/89h/jrc-luisa-lf431-share-of-built-up-area-over-the-total-land-ref-2014>) accessed 13 April 2019.

Lavalle, C. and Vallecillo, S., 2015, 'LF622 — Landscape Fragmentation (LUISA Platform REF2014)' (<http://data.europa.eu/89h/jrc-luisa-lf622-landscape-fragmentation-ref-2014>) accessed 13 April 2019.

Levers, C., et al., 2014, 'Drivers of forest harvesting intensity patterns in Europe', *Forest Ecology and Management* 315, pp. 160-172 (DOI: 10.1016/j.foreco.2013.12.030).

Louwagie, G., et al., 2011, 'The potential of European Union policies to address soil degradation in agriculture', *Land Degradation & Development* 22(1), pp. 5-17 (DOI: 10.1002/ldr.1028).

Luyssaert, S., et al., 2010, 'The European carbon balance. Part 3: forests', *Global Change Biology* 16, pp. 1429-1450 (DOI: 10.1111/j.1365-2486.2009.02056.x).

Moser, B., et al., 2007, 'Modification of the effective mesh size for measuring landscape fragmentation to solve the boundary problem', *Landscape Ecology* 22(3), pp. 447-459 (DOI: 10.1007/s10980-006-9023-0).

- Orgiazzi, A., et al., 2016, *Global soil biodiversity atlas*, Publications Office of the European Union, Luxembourg.
- Panagos, P., et al., 2015, 'The new assessment of soil loss by water erosion in Europe', *Environmental Science & Policy* 54, pp. 438-447 (DOI: 10.1016/j.envsci.2015.08.012).
- Panagos, P., et al., 2016, 'Soil conservation in Europe: wish or reality?', *Land Degradation & Development* (27), pp. 1547-1551.
- Panagos, P., et al., 2017, 'Towards estimates of future rainfall erosivity in Europe based on REDES and WorldClim datasets', *Journal of Hydrology* 548, pp. 251-262 (DOI: 10.1016/j.jhydrol.2017.03.006).
- Panagos, P., et al., 2018, 'Cost of agricultural productivity loss due to soil erosion in the European Union: From direct cost evaluation approaches to the use of macroeconomic models', *Land Degradation & Development* 29(3), pp. 471-484 (DOI: 10.1002/ldr.2879).
- Panagos, P., et al., 2019, 'Soil loss due to crop harvesting in the European Union: a first estimation of an underrated geomorphic process', *Science of The Total Environment* 664, pp. 487-498 (DOI: 10.1016/j.scitotenv.2019.02.009).
- Paracchini, M.-L., et al., 2008, *High nature value farmland in Europe — an estimate of the distribution patterns on the basis of land cover and biodiversity data*, EUR - Scientific and Technical Research Report (<http://publications.jrc.ec.europa.eu/repository/handle/111111111/10583>) accessed 4 June 2019.
- Payá Pérez, A. and Rodríguez Eugenio, N., 2018, *Status of local soil contamination in Europe: revision of the indicator 'Progress in the management of contaminated sites in Europe*, Publications Office of the European Union, Luxembourg (DOI: 10.2760/093804, JRC107508).
- Pricewaterhouse Coopers EU, 2017, *Sustainable and optimal use of biomass for energy in the EU beyond 2020*, European Commission Directorate-General for Energy ([https://ec.europa.eu/energy/sites/ener/files/documents/biosustain\\_report\\_final.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/biosustain_report_final.pdf)) accessed 23 August 2019.
- Renwick, A., et al., 2013, 'Policy reform and agricultural land abandonment in the EU', *Land Use Policy* 30(1), pp. 446-457 (DOI: 10.1016/j.landusepol.2012.04.005).
- Schelhaas, M.-J., et al., 2018, 'Actual European forest management by region, tree species and owner based on 714,000 re-measured trees in national forest inventories' Hanewinkel, M. (ed.), *PLOS ONE* 13(11), p. e0207151 (DOI: 10.1371/journal.pone.0207151).
- Schils, R., et al., 2008, *Review of existing information on the interrelations between soil and climate change (Climsoil)*, Final report For the European Commission Directorate-General for Environment, European Commission, Brussels.
- Schjønning, et al., 2015, 'Soil compaction', in: *Soil threats in Europe: status, methods, drivers and effects on ecosystem services. A review report, deliverable 2.1 of the RECARE project*, JRC Technical Report, Joint Research Centre, pp. 92-101.
- Schneiders, A., et al., 2012, 'Biodiversity and ecosystem services: complementary approaches for ecosystem management?', *Ecological Indicators* 21, pp. 123-133 (DOI: 10.1016/j.ecolind.2011.06.021).
- Scholes, R. J., et al., 2018, *IPBES (2018): Summary for policymakers of the assessment report on land degradation and restoration of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany.
- Science for Environment Policy, et al., 2016, *No net land take by 2050?*, Future Brief 14, European Commission Directorate-General for Environment ([http://ec.europa.eu/environment/integration/research/newsalert/pdf/no\\_net\\_land\\_take\\_by\\_2050\\_FB14\\_en.pdf](http://ec.europa.eu/environment/integration/research/newsalert/pdf/no_net_land_take_by_2050_FB14_en.pdf)) accessed 27 May 2019.
- Silva, J. P., et al., 2008, *LIFE and Europe's grasslands: restoring a forgotten habitat*, Office for Official Publications of the European Communities, Luxembourg.
- Silva, V., et al., 2018, 'Distribution of glyphosate and aminomethylphosphonic acid (AMPA) in agricultural topsoils of the European Union', *Science of the Total Environment* 621, pp. 1352-1359 (DOI: 10.1016/j.scitotenv.2017.10.093).
- Silva, V., et al., 2019, 'Pesticide residues in European agricultural soils – a hidden reality unfolded', *Science of the Total Environment* 653, pp. 1532-1545 (DOI: <https://doi.org/10.1016/j.scitotenv.2018.10.441>).
- Stolte, J., et al., 2016, *Soil threats in Europe: status, methods, drivers and effects on ecosystem services. A review report, deliverable 2.1 of the RECARE project*, JRC Technical Report ([https://esdac.jrc.ec.europa.eu/public\\_path/shared\\_folder/doc\\_pub/EUR27607.pdf](https://esdac.jrc.ec.europa.eu/public_path/shared_folder/doc_pub/EUR27607.pdf)) accessed 23 August 2019.
- Stürck, J., et al., 2018, 'Simulating and delineating future land change trajectories across Europe', *Regional Environmental Change* 18(3), pp. 733-749 (DOI: 10.1007/s10113-015-0876-0).
- Swartjes, F. A., et al., 2016, *Appraisal of measures for the reduction of pesticide load in groundwater as drinking water resource [in Dutch]*, RIVM Report No 2016-0083, RIVM, Bilthoven, Netherlands (<https://www.rivm.nl/bibliotheek/rapporten/2016-0083.pdf>) accessed 23 August 2019.
- Tanneberger, F., et al., 2017, 'The peatland map of Europe', *Mires and Peat* (19), pp. 1-17

(DOI: 10.19189/MaP.2016.OMB.264).

Tsiafouli, M. A., et al., 2015, 'Intensive agriculture reduces soil biodiversity across Europe', *Global Change Biology* 21(2), pp. 973-985 (DOI: 10.1111/gcb.12752).

UNEP, ed., 2014, *Assessing global land use: balancing consumption with sustainable supply*, United Nations Environment Programme, Nairobi, Kenya.

UNEP, 2017, *Managing soil pollution to achieve sustainable development* (<https://papersmart.unon.org/resolution/uploads/k1800204.english.pdf>) accessed 23 August 2019.

Van Grinsven, H. J. M., et al., 2013, 'Costs and benefits of nitrogen for Europe and implications for mitigation', *Environmental Science & Technology* 47(8), pp. 3571-3579 (DOI: 10.1021/es303804g).

Virto, I., et al., 2014, 'Soil degradation and soil quality in western Europe: current situation and future perspectives', *Sustainability* 7(1), pp. 313-365 (DOI: 10.3390/su7010313).

Vrebos, D., et al., 2017, 'The impact of policy instruments on soil multifunctionality in the European Union', *Sustainability* 9(3), p. 407 (DOI: 10.3390/su9030407).



## CHAPTER 06 — MARINE ENVIRONMENT

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4C Offshore, 2018, 'European offshore wind farms data set' (<http://www.4coffshore.com/windfarms/>) accessed 21 August 2019.

Aarhus University, 2018, 'PCB pollution threatens to wipe out killer whales', ScienceDaily (<https://www.sciencedaily.com/releases/2018/09/180927145334.htm>) accessed 20 February 2019.

Agnesi, S., et al., 2017, *Spatial analysis of marine protected area networks in Europe's seas II, Volume A*, ETC/ICM Technical Report No 4/2017, European Topic Centre on Inland, Coastal and Marine Water (<https://www.eionet.europa.eu/etcs/etc-icm/products/etc-icm-reports/spatial-analysis-of-marine-protected-area-networks-in-europe2019s-seas-ii-volume-a-2017>) accessed 20 August 2019.

AMAP, 2017, *AMAP Assessment 2016: chemicals of emerging Arctic concern*, Arctic Monitoring and Assessment Programme, Oslo, Norway ([www.amap.no](http://www.amap.no)) accessed 20 August 2019.

Andersen, J. H., et al., 2017, 'Long-term temporal and

spatial trends in eutrophication status of the Baltic Sea: eutrophication in the Baltic Sea', *Biological Reviews* 92(1), pp. 135-149 (DOI: 10.1111/brv.12221).

Bianchi, C. N. and Morri, C., 2000, 'Marine biodiversity of the Mediterranean Sea: situation, problems and prospects for future research', *Marine Pollution Bulletin* 40(5), pp. 367-376.

BirdLife International, 2015, *European Red List of Birds*, Publications Office of the European Union, Luxembourg (<http://datazone.birdlife.org/info/euroredlist>) accessed 20 August 2019.

Bradai, M. N., et al., 2012, *Studies and reviews. Elasmobranchs of the Mediterranean Sea: status, ecology and biology bibliographic analysis*, No 91, Institut National des Sciences et Technologies de la Mer, Tunis.

Breitbart, D., et al., 2018, 'Declining oxygen in the global ocean and coastal waters', *Science* 359(6371), p. eaam7240 (DOI: 10.1126/science.aam7240).

Capet, A., et al., 2016, 'Decline of the Black Sea oxygen inventory', *Biogeosciences* 13(4), pp. 1287-1297 (DOI: 10.5194/bg-13-1287-2016).

Carstensen, J., et al., 2014, 'Deoxygenation of the Baltic Sea during the last century', *Proceedings of the National Academy of Sciences* 111(15), pp. 5628-5633 (DOI: 10.1073/pnas.1323156111).

Carstensen, J., 2019, 'The expansion of low oxygen zones in the global ocean and coastal waters', conference paper presented at: the Royal Swedish Academy of Sciences, Stockholm, Sweden, 2019.

COGEA, et al., 2017, 'Study on the establishment of a framework for processing and analysing maritime economic data in Europe. Final report for DG Maritime Affairs and Fisheries under contract no EASME/EMFF/2014/1.3.1.13/SI2.718095. Accompanying statistical database'.

Conley, D. J., et al., 2011, 'Hypoxia is increasing in the coastal zone of the Baltic Sea', *Environmental Science & Technology* 45(16), pp. 6777-6783 (DOI: 10.1021/es201212r).

Desforges, J.-P., et al., 2018, 'Predicting global killer whale population collapse from PCB pollution', *Science* 361(6409), pp. 1373-1376 (DOI: 10.1126/science.aat1953).

Dureuil, M., et al., 2018, 'Elevated trawling inside protected areas undermines conservation outcomes in a global fishing hot spot', *Science* 362(6421), pp. 1403-1407 (DOI: 10.1126/science.aau0561).

EC, 2007, Communication from the Commission to the Council, the European Parliament, the European Economic

and Social Committee and the Committee of the Regions — An integrated maritime policy for the European Union (COM(2007) 575 final).

EC, 2011, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions — Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (COM(2011) 244 final).

EC, 2017, Commission Staff Working Document 'Report on the Blue Growth Strategy: towards more sustainable growth and jobs in the blue economy' (SWD(2017) 128 final).

EC, 2018a, Report from the Commission to the European Parliament and the Council — Assessing Member States' programmes of measures under the Marine Strategy Framework Directive (COM(2018)562 final).

Edwards, M., et al., 2016, *Global marine ecological status report: results from the global CPR Survey 2014/2015*, SAHFOS Technical Report No 11, SAHFOS Technical Report, Plymouth, UK (<https://www.sahfos.ac.uk/media/1289/gacs-status-11-high-res.pdf>).

EEA, 2015a, *Marine protected areas in Europe's seas — an overview and perspectives for the future*, EEA Report No 3/2015, European Environment Agency.

EEA, 2015b, *SOER 2015 — The European environment — State and outlook 2015*, European Environmental Agency (<http://www.eea.europa.eu/soer>).

EEA, 2015c, *State of Europe's seas*, EEA Report No 2/2015, European Environment Agency (<http://www.eea.europa.eu/publications/state-of-europes-seas>) accessed 21 August 2019.

EEA, 2015d, *State of nature in the EU: results from reporting under the nature directives 2007-2012*, EEA Technical Report No 2/2015, European Environment Agency (<http://www.eea.europa.eu/publications/state-of-nature-in-the-eu>) accessed 21 August 2019.

EEA, 2015e, 'Trends in marine non-indigenous species (MAR 002)' (<http://www.eea.europa.eu/data-and-maps/indicators/trends-in-marine-alien-species-mas-2/assessment>) accessed 21 August 2019.

EEA, 2016a, 'Ocean acidification (CLIM 043)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-349-en](https://www.eea.europa.eu/ds_resolveuid/IND-349-en)) accessed 9 April 2019.

EEA, 2016b, 'Sea surface temperature (CSI 046/CLIM 013)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-100-en](https://www.eea.europa.eu/ds_resolveuid/IND-100-en)) accessed 9 April 2019.

EEA, 2016c, 'Transport in Europe: key facts and trends',

European Environment Agency (<https://www.eea.europa.eu/signals/signals-2016/articles/transport-in-europe-key-facts-trends>) accessed 20 August 2019.

EEA, 2017, *Climate change adaptation and disaster risk reduction in Europe: enhancing coherence of the knowledge base, policies and practices*, EEA Report No 15/2017, European Environment Agency (<https://www.eea.europa.eu/publications/climate-change-adaptation-and-disaster>) accessed 10 April 2019.

EEA, 2018a, *European waters: assessment of status and pressures 2018*, European Environment Agency.

EEA, 2018b, 'Marine litter — Citizens collect plastic and data to protect Europe's marine environment', European Environment Agency (<https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/marine-litterwatch/briefing>) accessed 8 February 2019.

EEA, 2018c, *Marine protected areas*, European Environment Agency (<https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/marine-protected-areas>) accessed 7 January 2019.

EEA, 2019a, 'About WISE — Freshwater' (<https://water.europa.eu/freshwater/info>) accessed 20 August 2019.

EEA, 2019b, *Contaminants in Europe's seas — moving towards a clean, non-toxic marine environment*, EEA Report No 25/2018, European Environment Agency (<https://www.eea.europa.eu/publications/contaminants-in-europes-seas/>).

EEA, 2019c, 'Status of marine fish and shellfish stocks in European seas (CSI 032/MAR 007)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/status-of-marine-fish-stocks-3/assessment-1>) accessed 23 August 2019.

EEA, 2019d, 'Trends in marine non-indigenous species', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/trends-in-marine-alien-species-mas-3>) accessed 20 August 2019.

EEA (forthcoming), 2019, *Eutrophication in Europe's seas*, EEA Report, European Environment Agency.

EEC, 1979, Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (OJ L 103, 25.4.1979, pp. 1-18).

EEC, 1992, Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1992, pp. 7-50).

ETC/BD, 2012, 'Article 17 web tool on biogeographical assessments of conservation status of species and habitats under article 17 of the Habitats Directive', European Topic

- Centre on Biological Diversity (<http://art17.eionet.europa.eu/article17/reports2012/>).
- ETC/ICM (forthcoming), 2019, *Pressures and their effects upon Europe's marine environment*, European Topic Centre for Inland, Coastal and Marine Waters.
- EU, 2000, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327, 22.12.2000, pp. 1-73).
- EU, 2008a, DIRECTIVE 2008/56/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).
- EU, 2013, Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC (OJ L 354, 28.12.2013, pp. 22-61).
- EU, 2014, Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning (OJ L 257, 28.8.2014, pp. 135-145).
- EU, 2017, Commission Directive (EU) 2017/845 of 17 May 2017 amending Directive 2008/56/EC of the European Parliament and of the Council as regards the indicative lists of elements to be taken into account for the preparation of marine strategies (OJ L 125, 18.5.2017, pp. 27-33).
- Eurostat, 2017, 'Freight transport statistics — Statistics Explained' ([https://ec.europa.eu/eurostat/statistics-explained/index.php/Freight\\_transport\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php/Freight_transport_statistics)) accessed 11 January 2019.
- Eurostat, 2018, 'The EU in the world — industry, trade and services — Statistics Explained' ([https://ec.europa.eu/eurostat/statistics-explained/index.php/The\\_EU\\_in\\_the\\_world\\_-\\_industry,\\_trade\\_and\\_services#Tourism](https://ec.europa.eu/eurostat/statistics-explained/index.php/The_EU_in_the_world_-_industry,_trade_and_services#Tourism)) accessed 12 March 2019.
- Fabry, V. J., et al., 2008, 'Impacts of ocean acidification on marine fauna and ecosystem processes', *ICES Journal of Marine Science: Journal du Conseil* 65(3), pp. 414-432 (DOI: 10.1093/icesjms/fsn048).
- FAO, 2016, *The state of Mediterranean and Black Sea fisheries*, Food and Agriculture Organization of the United Nations, Rome (<http://www.fao.org/3/a-i5496e.pdf>) accessed 20 August 2019.
- FAO, 2018, *The state of the Mediterranean and Black Sea fisheries*, Food and Agriculture Organization of the United Nations, Rome (<http://www.fao.org/3/CA2702EN/ca2702en.pdf>) accessed 21 August 2019.
- Fishsource, 2018, 'FishSource - Atlantic bluefin tuna - Eastern Atlantic and Mediterranean', Fishsource ([https://www.fishsource.org/stock\\_page/679](https://www.fishsource.org/stock_page/679)) accessed 21 February 2019.
- Froese, R., et al., 2018, 'Status and rebuilding of European fisheries', *Marine Policy* 93, pp. 159-170 (DOI: 10.1016/j.marpol.2018.04.018).
- Gynther, I., et al., 2016, *Confirmation of the extinction of the Bramble Cay melomys Melomys rubicola on Bramble Cay, Torres Strait: results and conclusions from a comprehensive survey in August-September 2014*, Report to the Department of Environment and Heritage Protection, Queensland Government, Threatened Species Unit, Department of Environment and Heritage Protection, Brisbane, Australia (<https://environment.des.qld.gov.au/wildlife/threatened-species/documents/bramble-cay-melomys-survey-report.pdf>) accessed 20 August 2019.
- Halpern, B. S., et al., 2008, 'A global map of human impact on marine ecosystems', *Science* 319(5865), pp. 948-952 (DOI: 10.1126/science.1149345).
- Helcom, 2018a, *State of the Baltic Sea — second Helcom holistic assessment 2011-2016*, No 155, Baltic Marine Environment Protection Commission, Helsinki, Finland ([www.helcom.fi/baltic-sea-trends/holistic-assessments/state-of-the-baltic-sea-2018/reports-and-materials/](http://www.helcom.fi/baltic-sea-trends/holistic-assessments/state-of-the-baltic-sea-2018/reports-and-materials/)) accessed 21 August 2019.
- Helcom, 2018b, 'White-tailed eagle productivity — Helcom core indicator report' (<http://www.helcom.fi/baltic-sea-trends/indicators/white-tailed-eagle-productivity/>) accessed 11 January 2019.
- ICCAT, 2017a, '17-07 Recommendation by ICCAT amending the recommendation 14-04 on Bluefin tuna in the Eastern Atlantic and Mediterranean' (<https://www.iccat.int/Documents/Recs/compendiopdf-e/2017-07-e.pdf>) accessed 21 August 2019.
- ICCAT, 2017b, 'Report of the 2017 ICCAT Bluefin stock assessment meeting' ([https://www.iccat.int/Documents/Meetings/Docs/2017\\_BFT\\_ASS\\_REP\\_ENG.pdf](https://www.iccat.int/Documents/Meetings/Docs/2017_BFT_ASS_REP_ENG.pdf)) accessed 21 August 2019.
- Jackson, J. B. C., et al., 2001, 'Historical overfishing and the recent collapse of coastal ecosystems', *Science* 293(5530), pp. 629-637 (DOI: 10.1126/science.1059199).
- Jardim, E., et al., 2018, *Scientific, Technical and Economic Committee for Fisheries (STECF) monitoring the performance of the Common Fisheries Policy (STECF-Adhoc-18-01)*, Publications Office of the European Union, Luxembourg.



- Livsmedelsverket, 2018, 'Dioxiner och PCB' (<https://www.livsmedelsverket.se/livsmedel-och-innehall/oonskade-amnen/miljogifter/dioxiner-och-pcb#R%e5d>) accessed 21 August 2019.
- Micheli, F., et al., 2013, 'Cumulative human impacts on Mediterranean and Black Sea marine ecosystems: assessing current pressures and opportunities' Meador, J. P. (ed.), *PLoS ONE* 8(12), p. e79889 (DOI: 10.1371/journal.pone.0079889).
- Murray, C. J., et al., 2019, 'Past, present and future eutrophication status of the Baltic Sea', *Frontiers in Marine Science* 6 (DOI: 10.3389/fmars.2019.00002).
- Nieto, H. A., et al., 2015, *European Red List of Marine Fishes*, European Commission, Brussels.
- NOAA, 2013, 'Ocean acidification', National Oceanic and Atmospheric Administration (<https://www.noaa.gov/education/resource-collections/ocean-coasts-education-resources/ocean-acidification>) accessed 20 February 2019.
- Notarbartolo di Sciarra, G. and Kotomatas, S., 2016, 'Are Mediterranean monk seals, *Monachus monachus*, being left to save themselves from extinction?', *Advances in Marine Biology* 75, pp. 359-386 (DOI: 10.1016/bs.amb.2016.08.004).
- OSPAR, 2017a, 'Extent of physical damage to predominant and special habitats', OSPAR Assessment Portal (<https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/habitats/extent-physical-damage-predominant-and-special-habitats/>) accessed 20 February 2019.
- OSPAR, 2017b, *Intermediate assessment 2017*, OSPAR Commission, London (<https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017>) accessed 20 August 2019.
- OSPAR, 2017c, 'Mixed signals for marine mammals' (<https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/key-messages-and-highlights/marine-mammals/>) accessed 20 February 2019.
- Pham, C. K., et al., 2014, 'Marine litter distribution and density in European seas, from the shelves to deep basins', *PLoS ONE* 9(4), p. e95839 (DOI: 10.1371/journal.pone.0095839).
- Rockström, J., et al., 2009, 'A safe operating space for humanity', *Nature* 461(7263), pp. 472-475 (DOI: 10.1038/461472a).
- Schmidtko, S., et al., 2017, 'Decline in global oceanic oxygen content during the past five decades', *Nature* 542(7641), pp. 335-339 (DOI: 10.1038/nature21399).
- Schøyen, M., et al., 2019, 'Levels and trends of tributyltin (TBT) and imposex in dogwhelk (*Nucella lapillus*) along the Norwegian coastline from 1991 to 2017', *Marine Environmental Research* 144, pp. 1-8 (DOI: 10.1016/j.marenvres.2018.11.011).
- Steffen, W., et al., 2015, 'The trajectory of the Anthropocene: the great acceleration', *The Anthropocene Review* 2(1), pp. 81-98 (DOI: 10.1177/2053019614564785).
- Stiasny, M. H., et al., 2019, 'Divergent responses of Atlantic cod to ocean acidification and food limitation', *Global Change Biology* 25(3), pp. 839-849 (DOI: 10.1111/gcb.14554).
- Temple, H. J. and Terry, A., 2007, *The status and distribution of European mammals*, Office for Official Publications of the European Communities, Luxembourg.
- Tsiamis, K., et al., 2018, 'The native distribution range of the European marine non-indigenous species', *Aquatic Invasions* 13(2), pp. 187-198 (DOI: 10.3391/ai.2018.13.2.01).
- UKMMAS, 2010, *Charting Progress 2 — The state of UK seas*, Department for Environment, Food and Rural Affairs, London ([http://chartingprogress.defra.gov.uk/feeder/Section\\_3.8\\_Mineral\\_Extraction.pdf](http://chartingprogress.defra.gov.uk/feeder/Section_3.8_Mineral_Extraction.pdf)) accessed 24 April 2015.
- UNEP-MAP, 2017, *Mediterranean quality status Report. Mediterranean Action Plan*, Barcelona Convention and United Nations Environment Programme (<http://www.medqsr.org>) accessed 21 August 2019.
- United Nations, 2015, 'Transforming our world: the 2030 agenda for sustainable development. A/RES/70/1', United Nations, Division for Sustainable Development, UN-DESA (<https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>) accessed 3 January 2018.
- von Schuckmann, K., et al., 2016, 'The Copernicus marine environment monitoring service ocean state report', *Journal of Operational Oceanography* 9(Suppl 2), pp. s235-s320 (DOI: 10.1080/1755876X.2016.1273446).
- Vuorinen, P. J., et al., 2012, 'Biomagnification of organohalogenes in Atlantic salmon (*Salmo salar*) from its main prey species in three areas of the Baltic Sea', *Science of the Total Environment* 421-422, pp. 129-143 (DOI: 10.1016/j.scitotenv.2012.02.002).
- WOR, 2010, 'World Ocean Review: living with the oceans, 1', *World Ocean Review* (<https://worldoceanreview.com/en/wor-1/>).
- Yuneev, O., et al., 2017, 'Reconstructing the trophic history of the Black Sea shelf', *Continental Shelf Research* 150, pp. 1-9 (DOI: 10.1016/j.csr.2016.08.008).



## CHAPTER 07 — CLIMATE CHANGE

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AdaptationWatch, 2016, *Towards transparency. 2016 Adaptation finance transparency gap report*, AdaptationWatch (<http://www.adaptationwatch.org/s/Adaptation-Watch-Report-2016-Digital-FIN.pdf>) accessed 12 August 2019.

Aguiar, F. C., et al., 2018, 'Adaptation to climate change at local level in Europe: an overview', *Environmental Science & Policy* 86, pp. 38-63 (DOI: 10.1016/j.envsci.2018.04.010).

C3S, 2018a, *European state of the climate 2018*, Climate Bulletin, Copernicus Climate Change Service (<https://climate.copernicus.eu/ESOTC>) accessed 16 May 2019.

C3S, 2018b, 'Indicators 2017 — Sea level', Copernicus Climate Change Service (<https://climate.copernicus.eu/node/339>) accessed 19 December 2018.

C3S, 2019, 'Observed temperature extremes', Copernicus Climate Change Service ([http://surfobs.climate.copernicus.eu/stateoftheclimate/observed\\_extremes.php](http://surfobs.climate.copernicus.eu/stateoftheclimate/observed_extremes.php)) accessed 21 August 2019.

Ciscar, J. C., et al., 2018, *Climate impacts in Europe: Final report of the JRC PESETA III project*, JRC Science for Policy Report, Publications Office of the European Union, Luxembourg (<http://doi.org/10.2760/93257>) accessed 29 November 2018.

Council of the European Union, 2013, Conclusions on an EU strategy on adaptation to climate change, Environment Council Meeting, Luxembourg, 18 June 2013 (ST 10876 2013 INIT).

Covenant of Mayors, 2019a, 'Covenant of Mayors — signatories' (<https://www.covenantofmayors.eu/about/covenant-community/signatories.html>) accessed 9 April 2019.

Covenant of Mayors, 2019b, 'European Union & Western Europe - Global Covenant of Mayors' (<https://www.globalcovenantofmayors.org/region/europe/>) accessed 4 January 2019.

EC, 2008, *European energy and transport — trends to 2030 — update 2007*, European Commission ([https://ec.europa.eu/energy/sites/ener/files/documents/trends\\_to\\_2030\\_update\\_2007.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/trends_to_2030_update_2007.pdf)) accessed 11 September 2018.

EC, 2010, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — European Union strategy for Danube region (COM(2010) 715 final of 8 December 2010).

EC, 2011, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A budget for Europe 2020. Part II: policy fiches (COM(2011) 500 final).

EC, 2012a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — EU regulatory fitness (COM(2012) 746 final of 12 December 2012).

EC, 2012b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Blueprint to safeguard Europe's water resources (COM(2012) 673 final, Brussels, 14.11.2012).

EC, 2012c, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions concerning the European Union Strategy for the Baltic Sea Region (COM(2012) 128 final).

EC, 2013a, Commission staff working document — Elements of the Union greenhouse gas inventory system and the quality assurance and control (QA/QC) programme (SWD(2013) 308 final).

EC, 2013b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — An EU strategy on adaptation to climate change (COM(2013) 216 final, Brussels, 16.4.2013).

EC, 2013c, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Green infrastructure (GI): enhancing Europe's natural capital (COM(2013) 249 final).

EC, 2013d, *EU energy, transport and GHG emissions — trends to 2050 — reference scenario 2013*, Publications Office of the European Union, Luxembourg (<http://ec.europa.eu/transport/media/publications/doc/trends-to-2050-update-2013.pdf>) accessed 12 August 2019.

EC, 2014, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions concerning the European Union Strategy for the Adriatic and Ionian Region (COM(2014) 357 final).

EC, 2015a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Closing the loop: an EU action plan for the circular economy (COM(2015) 614 final).

EC, 2015b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions concerning a European Union Strategy for the Alpine Region (COM(2015) 366 final).

EC, 2015c, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A framework strategy for a resilient Energy Union with a forward-looking climate change policy (COM(2015) 80 final).

EC, 2016, Commission Staff Working Document accompanying the document Communication from the Commission to the European Parliament and the Council Mid-term review/revision of the multiannual financial framework 2014-2020 — An EU budget focused on results (SWD(2016) 299 final).

EC, 2018a, Commission Staff Working Document — Adaptation preparedness scoreboard. Country fiches accompanying the document from the Commission to the European Parliament and the Council on the implementation of the EU strategy on adaptation to climate change (SWD(2018) 460 final).

EC, 2018b, Commission Staff Working Document — Evaluation of the EU Strategy on adaptation to climate change — accompanying the document Report from the Commission to the European Parliament and the Council on the implementation of the EU Strategy on adaptation to climate change (SWD(2018) 461 final).

EC, 2018c, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A clean planet for all: a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final).

EC, 2018d, Communication from the Commission to the European Parliament, the European Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions — Action plan: financing sustainable growth (COM(2018) 97 final).

EC, 2018e, *In-depth analysis in support of the Commission Communication COM(2018) 773 — A Clean Planet for All: a European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy* ([https://ec.europa.eu/clima/sites/clima/files/docs/pages/com\\_2018\\_733\\_analysis\\_in\\_support\\_en\\_0.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_analysis_in_support_en_0.pdf)) accessed 20 August 2019.

EC, 2018f, Report from the Commission to the European Parliament and the Council — Report on the functioning of

the European carbon market (COM(2018) 842 final, Brussels, 17.12.2018).

EC, 2018g, Report from the Commission to the European Parliament and the Council on the implementation of the EU Strategy on adaptation to climate change (COM(2018) 738 final).

EC, 2019a, 'AMECO database (Annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs)' ([https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/macro-economic-database-ameco/ameco-database\\_en](https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/macro-economic-database-ameco/ameco-database_en)) accessed 23 August 2019.

EC, 2019b, 'Effort sharing: Member States' emission targets | Climate Action' ([https://ec.europa.eu/clima/policies/effort\\_en](https://ec.europa.eu/clima/policies/effort_en)) accessed 4 January 2019.

EC, 2019c, 'EU Emissions Trading System (EU ETS) | Climate Action' ([https://ec.europa.eu/clima/policies/ets\\_en](https://ec.europa.eu/clima/policies/ets_en)) accessed 4 January 2019.

ECA, 2016, *Spending at least one euro in every five from the EU budget on climate action: ambitious work under way, but at serious risk of falling short*, Special Report No 31/2016, European Court of Auditors, Luxembourg (<https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=39853>) accessed 10 April 2019.

ECA, 2018, *Floods Directive: progress in assessing risks, while planning and implementation need to improve*, Special report No 25/2018, European Court of Auditors, Luxembourg (<https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=47211>) accessed 12 August 2019.

EEA, forthcoming (a), 'Member States' greenhouse gas (GHG) emission projections', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/data/greenhouse-gas-emission-projections-for-4>).

EEA, forthcoming (b), 'Final energy consumption by sector (ENER 016)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/final-energy-consumption-by-sector-9/assessment-4>).

EEA, forthcoming (c), 'Primary energy consumption by fuel' ([https://www.eea.europa.eu/ds\\_resolveuid/IND-1-en](https://www.eea.europa.eu/ds_resolveuid/IND-1-en)).

EEA, 2011, *Greenhouse gas emissions in Europe: a retrospective trend analysis for the period 1990-2008*, EEA Report No 6/2011, European Environment Agency (<https://www.eea.europa.eu/publications/ghg-retrospective-trend-analysis-1990-2008>) accessed 4 January 2019.

EEA, 2012, *End-user GHG emissions from energy: reallocation of emissions from energy industries to end users 2005-2010*, EEA

Technical Report No 18/2012, European Environment Agency (<https://www.eea.europa.eu/publications/end-user-ghg-emissions-energy>) accessed 4 January 2019.

EEA, 2014a, *National adaptation policy processes in European countries — 2014*, EEA Report No 4/2014, European Environment Agency (<http://www.eea.europa.eu/publications/national-adaptation-policy-processes>) accessed 11 June 2015.

EEA, 2014b, 'Why did GHG emissions decrease in the EU between 1990 and 2012? — European Environment Agency' (<https://www.eea.europa.eu/publications/why-are-greenhouse-gases-decreasing>) accessed 4 January 2019.

EEA, 2016a, *Analysis of key trends and drivers in greenhouse gas emissions in the EU between 1990 and 2014*, EEA Analysis, European Environment Agency.

EEA, 2016b, 'Distribution shifts of marine species (CLIM 015)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-102-en](https://www.eea.europa.eu/ds_resolveuid/IND-102-en)) accessed 9 April 2019.

EEA, 2016c, 'Distribution shifts of plant and animal species (CLIM 022)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-184-en](https://www.eea.europa.eu/ds_resolveuid/IND-184-en)) accessed 9 April 2019.

EEA, 2016d, 'Extreme temperatures and health (CLIM 036)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-189-en](https://www.eea.europa.eu/ds_resolveuid/IND-189-en)) accessed 9 April 2019.

EEA, 2016e, 'Glaciers (CLIM 007)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-95-en](https://www.eea.europa.eu/ds_resolveuid/IND-95-en)) accessed 9 April 2019.

EEA, 2016f, 'Ocean acidification (CLIM 043)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-349-en](https://www.eea.europa.eu/ds_resolveuid/IND-349-en)) accessed 9 April 2019.

EEA, 2016g, 'Phenology of plant and animal species (CLIM 023)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-192-en](https://www.eea.europa.eu/ds_resolveuid/IND-192-en)) accessed 9 April 2019.

EEA, 2016h, 'Sea surface temperature (CSI 046/CLIM 013)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-100-en](https://www.eea.europa.eu/ds_resolveuid/IND-100-en)) accessed 9 April 2019.

EEA, 2016i, *Urban adaptation to climate change in Europe 2016 — transforming cities in a changing climate*, EEA Report No 12/2016, European Environment Agency (<https://www.eea.europa.eu/publications/urban-adaptation-2016>) accessed 12 August 2019.

EEA, 2017a, *Analysis of key trends and drivers in greenhouse gas emissions in the EU between 1990 and 2015*, EEA Report No 8/2017 (<https://www.eea.europa.eu/publications/analysis-of-key-trends-and>) accessed 4 January 2019.

EEA, 2017b, *Climate change adaptation and disaster risk reduction in Europe: enhancing coherence of the knowledge base, policies and practices*, EEA Report No 15/2017, European Environment Agency (<https://www.eea.europa.eu/publications/climate-change-adaptation-and-disaster>) accessed 10 April 2019.

EEA, 2017c, *Climate change, impacts and vulnerability in Europe 2016 — an indicator-based report*, EEA Report No 1/2017, European Environment Agency (<https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016>) accessed 12 August 2019.

EEA, 2017d, 'Forest composition and distribution (CLIM 034)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-186-en](https://www.eea.europa.eu/ds_resolveuid/IND-186-en)) accessed 9 April 2019.

EEA, 2017e, 'Mean precipitation (CLIM 002)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-91-en](https://www.eea.europa.eu/ds_resolveuid/IND-91-en)) accessed 9 April 2019.

EEA, 2017f, 'River floods (CLIM 017)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-104-en](https://www.eea.europa.eu/ds_resolveuid/IND-104-en)) accessed 9 April 2019.

EEA, 2018a, *Addressing climate change adaptation in transnational regions in Europe*, EEA Briefing, European Environment Agency (<https://www.eea.europa.eu/themes/climate-change-adaptation/adaptation-policies/adaptation-policies-in-transnational-regions>) accessed 12 August 2019.

EEA, 2018b, 'Approximated estimates for the share of gross final consumption of renewable energy sources in 2016 (EEA 2016 RES share proxies)' ([https://www.eea.europa.eu/ds\\_resolveuid/DAT-187-en](https://www.eea.europa.eu/ds_resolveuid/DAT-187-en)) accessed 10 September 2018.

EEA, 2018c, 'Arctic and Baltic sea ice (CSI 053/CLIM 010)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-98-en](https://www.eea.europa.eu/ds_resolveuid/IND-98-en)) accessed 9 April 2019.

EEA, 2018d, *National climate change vulnerability and risk assessments in Europe, 2018*, EEA Report No 1/2018, European Environment Agency (<https://www.eea.europa.eu/publications/national-climate-change-vulnerability-2018>) accessed 10 April 2019.

EEA, 2018e, *National policies and measures on climate change mitigation in Europe in 2017*, EEA Report, European Environment Agency (<https://www.eea.europa.eu/publications/national-policies-and-measures-on-climate-change-mitigation>) accessed 4 January 2019.

EEA, 2018f, *Number of countries that have adopted a climate change adaptation strategy/plan*, EEA Briefing, European Environment Agency (<https://www.eea.europa.eu/airs/2018/environment-and-health/climate-change-adaptation-strategies>) accessed 18 December 2018.

EEA, 2018g, 'Progress on energy efficiency in Europe (ENER 037)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/progress-on-energy-efficiency-in-europe-3/assessment>) accessed 11 July 2019.

EEA, 2018h, *Renewable energy in Europe — 2018: recent growth and knock-on effects*, EEA Report No 20/2018, European Environment Agency (<https://www.eea.europa.eu/publications/renewable-energy-in-europe-2018>) accessed 1 September 2019.

EEA, 2018i, *Sharing adaptation information across Europe*, EEA Report No 3/2018, European Environment Agency (<https://www.eea.europa.eu/publications/sharing-adaptation-information-across-europe>) accessed 17 August 2018.

EEA, 2018j, *Trends and projections in Europe 2018 — tracking progress towards Europe's climate and energy targets*, EEA Report No 16/2018, European Environment Agency (<https://www.eea.europa.eu/publications/trends-and-projections-in-europe-2018-climate-and-energy>) accessed 4 January 2019.

EEA, 2018k, 'Urban vulnerability map viewer — Climate-ADAPT' (<https://climate-adapt.eea.europa.eu/knowledge/tools/urban-adaptation>) accessed 9 April 2019.

EEA, 2019a, *Assessing the effectiveness of EU policy on large combustion plants in reducing air pollutant emissions*, EEA Report No 7/2019, European Environment Agency.

EEA, 2019b, 'Economic losses from climate-related extremes in Europe (CSI 042/CLIM 039)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-182-en](https://www.eea.europa.eu/ds_resolveuid/IND-182-en)) accessed 9 April 2019.

EEA, 2019c, 'EEA greenhouse gas - data viewer' (<https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer>) accessed 3 July 2019.

EEA, 2019d, 'Forest fires (CLIM 035)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-185-en](https://www.eea.europa.eu/ds_resolveuid/IND-185-en)) accessed 9 April 2019.

EEA, 2019e, 'Global and European sea level (CSI 047/CLIM 012)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-193-en](https://www.eea.europa.eu/ds_resolveuid/IND-193-en)) accessed 9 April 2019.

EEA, 2019f, 'Global and European temperature (CSI 012/CLIM 001)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-4-en](https://www.eea.europa.eu/ds_resolveuid/IND-4-en)) accessed 9 April 2019.

EEA, 2019g, 'Heating and cooling degree days (CLIM 047)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-348-en](https://www.eea.europa.eu/ds_resolveuid/IND-348-en)) accessed 9 April 2019.

EEA, 2019h, 'Heavy precipitation (CLIM 004)', European Environment Agency ([https://www.eea.europa.eu/ds\\_](https://www.eea.europa.eu/ds_)

[resolveuid/IND-92-en](https://www.eea.europa.eu/ds_resolveuid/IND-92-en)) accessed 9 April 2019.

EEA, 2019i, 'Meteorological and hydrological droughts (CLIM 018)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-105-en](https://www.eea.europa.eu/ds_resolveuid/IND-105-en)) accessed 9 April 2019.

EEA, 2019j, *Unequal exposure and unequal impacts: social vulnerability to air pollution, noise and extreme temperatures in Europe*, EEA Report No 22/2018, European Environment Agency (<https://www.eea.europa.eu/publications/unequal-exposure-and-unequal-impacts>) accessed 12 August 2019.

Eionet, 2019, 'Deliveries for national adaptation actions — Eionet Reporting Obligations Database', European Information and Observation Network (<https://rod.eionet.europa.eu/obligations/703/deliveries>) accessed 8 April 2019.

EU, 2000, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000, establishing a framework for community action in the field of water policy (OJ L 327, 22.12.2000, pp. 1-72).

EU, 2007, Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (OJ L 288, 6.11.2007, pp. 27-34).

EU, 2009, Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community (OJ L 8, 13.1.2009, pp. 3-21).

EU, 2013a, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

EU, 2013b, Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC (OJ L 165, 18.6.2013, pp. 13-40).

EU, 2018a, Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 (OJ L 76, 19.3.2018, pp. 3-27).

EU, 2018b, Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action (OJ L 328, 21.12.2018, pp. 1-77).

European Council, 2013, Conclusions of the European Council (Multiannual Financial Framework) (EUCO 37/13).

European Council, 2014, European Council (23 and 24 October 2014) — Conclusions on 2030 Climate and Energy Policy Framework (SN 79/14).

Eurostat, 2019a, 'Energy database (nrg)' (<https://ec.europa.eu/eurostat/web/energy/data/database>) accessed 26 August 2019.

Eurostat, 2019b, 'Population change - Demographic balance and crude rates at national level (demo\_gind)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo\\_gind](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_gind)) accessed 16 April 2019.

Fischer, E. M. and Schär, C., 2010, 'Consistent geographical patterns of changes in high-impact European heatwaves', *Nature Geoscience* 3(6), pp. 398-403 (DOI: 10.1038/ngeo866).

Forster, D., et al., 2017, *Climate mainstreaming in the EU budget. Preparing for the next MFF: final report*, Publications Office of the European Union, Luxembourg.

Forzieri, G., et al., 2016, 'Multi-hazard assessment in Europe under climate change', *Climatic Change* 137(1-2), pp. 105-119 (DOI: 10.1007/s10584-016-1661-x).

Forzieri, G., et al., 2018, 'Escalating impacts of climate extremes on critical infrastructures in Europe', *Global Environmental Change* 48, pp. 97-107 (DOI: 10.1016/j.gloenvcha.2017.11.007).

Fouillet, A., et al., 2006, 'Excess mortality related to the August 2003 heat wave in France', *International Archives of Occupational and Environmental Health* 80(1), pp. 16-24 (DOI: 10.1007/s00420-006-0089-4).

IPCC, 2013, 'Summary for policymakers', in: Stocker, T. F. et al. (eds), *Climate change 2013: the physical science basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, pp. 1-29.

IPCC, 2018, *Global warming of 1.5 °C*, Intergovernmental Panel on Climate Change (<http://www.ipcc.ch/report/sr15/>) accessed 10 November 2018.

Kundzewicz, Z. W., et al., 2016, 'Differences in flood hazard projections in Europe – their causes and consequences for decision making', *Hydrological Sciences Journal* (DOI: 10.1080/02626667.2016.1241398).

Kundzewicz, Z. W., et al., 2018, 'Changes in river flood hazard in Europe: a review', *Hydrology Research* 49(2), pp. 294-302 (DOI: 10.2166/nh.2017.016).

Mäkinen, K., et al., 2018, *Indicators for adaptation to climate change at national level — lessons from emerging practice in Europe*, ETC/CCA Technical Paper No 2018/3 ([https://cca.eionet.europa.eu/reports/TP\\_3-2018](https://cca.eionet.europa.eu/reports/TP_3-2018)) accessed 12 August 2019.

Ministry of Environmental Protection, 2017, *Second national communication of the Republic of Serbia under the United Nations Framework Convention on Climate Change*, Ministry of Environmental Protection, Belgrade ([https://unfccc.int/sites/default/files/resource/SNC%20Eng\\_Serbia.pdf](https://unfccc.int/sites/default/files/resource/SNC%20Eng_Serbia.pdf)) accessed 17 August 2018.

Ministry of the Environment, 2018, 'Development of urban adaptation plans for cities with more than 100,000 inhabitants in Poland' (<http://44mpa.pl/?lang=en>) accessed 30 August 2018.

NWRM, 2019, 'Natural Water Retention Measures Platform', Natural Water Retention Measures Platform (<http://nwrmeu/>) accessed 15 August 2019.

OECD, 2016, *2020 projections of climate finance towards the USD 100 billion goal*, Technical Note, OECD Publishing (<https://www.oecd.org/environment/cc/Projecting%20Climate%20Change%202020%20WEB.pdf>) accessed 12 August 2019.

Radusin, S., et al., 2017, *Third national communication and second biennial update report on greenhouse gas emissions of Bosnia and Herzegovina — under the United Nations Framework Convention On Climate Change, July 2016*, UNDP in Bosnia and Herzegovina, Sarajevo (<https://unfccc.int/sites/default/files/resource/TNC%20AND%20SBUR%20ENG.pdf>) accessed 12 August 2019.

Rafaelsen, B., et al., 2017, *Study on macro-regional strategies and their links with cohesion policy*, Final Report, European Commission, Brussels ([http://ec.europa.eu/regional\\_policy/sources/cooperate/alpine/eusalp\\_links\\_cohesion\\_policy.pdf](http://ec.europa.eu/regional_policy/sources/cooperate/alpine/eusalp_links_cohesion_policy.pdf)) accessed 12 August 2019.

Ramieri, E., et al., 2018, *Adaptation policies and knowledge base in transnational regions in Europe*, ETC/CCA Technical Paper No 2018/4 ([https://cca.eionet.europa.eu/reports/TP\\_4-2018](https://cca.eionet.europa.eu/reports/TP_4-2018)) accessed 12 August 2019.

Robine, J.-M., et al., 2008, 'Death toll exceeded 70 000 in Europe during the summer of 2003', *Comptes Rendus Biologies* 331(2), pp. 171-178 (DOI: 10.1016/j.crvi.2007.12.001).

Russo, S., et al., 2014, 'Magnitude of extreme heat waves in present climate and their projection in a warming world', *Journal of Geophysical Research: Atmospheres* 119(22), pp. 12500-12512 (DOI: 10.1002/2014JD022098).

Secretariat of the Convention on Biological Diversity, 2009, *Connecting biodiversity and climate change mitigation and adaptation. Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change*, Technical Series

No 41, Convention on Biological Diversity, Montreal (<https://www.cbd.int/doc/publications/cbd-ts-41-en.pdf>) accessed 7 September 2018.

Spinoni, J., et al., 2018, 'Will drought events become more frequent and severe in Europe?', *International Journal of Climatology* 38(4), pp. 1718-1736 (DOI: 10.1002/joc.5291).

Thieken, A. H., et al., 2016, 'Review of the flood risk management system in Germany after the major flood in 2013', *Ecology and Society* 21(2), p. art51 (DOI: 10.5751/ES-08547-210251).

UN, 2015, Transforming our world: The 2030 Agenda for Sustainable Development. Resolution adopted by the General Assembly on 25 September 2015 (A/RES/70/1).

UN, 2017, 'Sustainable development agenda', United Nations Sustainable Development (<http://www.un.org/sustainabledevelopment/development-agenda/>) accessed 22 November 2017.

UNDP, 2018, 'National Adaptation Plans in Bosnia and Herzegovina | UNDP's Climate Change Adaptation Portal' (<http://adaptation-undp.org/projects/national-adaptation-plans-bosnia-and-herzegovina>) accessed 30 August 2018.

UNEP, 2018, *Emissions gap report 2018*, United Nations Environment Programme (<https://www.unenvironment.org/resources/emissions-gap-report-2018>) accessed 12 August 2019.

UNFCCC, 1992, 'Status of ratification of the Convention', United Nations Framework Convention on Climate Change (<https://unfccc.int/process/the-convention/what-is-the-convention/status-of-ratification-of-the-convention>) accessed 7 January 2019.

UNFCCC, 2010, *Report of the Conference of the Parties on its fifteenth session, held in Copenhagen from 7 to 19 December 2009. Addendum. Part two: action taken by the Conference of the Parties at its fifteenth session*, Conference Report No FCCC/CP/2009/11/Add.1, United Nations Framework Convention on Climate Change, Geneva, Switzerland ([http://unfccc.int/documentation/documents/advanced\\_search/items/6911.php?preref=600005735#beg](http://unfccc.int/documentation/documents/advanced_search/items/6911.php?preref=600005735#beg)) accessed 12 August 2019.

UNFCCC, 2015a, 'EU Submits its Climate Action Plan | UNFCCC' (<https://unfccc.int/news/eu-submits-its-climate-action-plan>) accessed 4 January 2019.

UNFCCC, 2015b, Paris Agreement (Decision 1/CP.21).

UNFCCC, 2016, 'Roadmap to US\$100 Billion. Submission as requested by Paris decision para 114 of 1.CP/21' (<https://www.gov.uk/government/publications/climate-finance-roadmap-to-us100-billion>) accessed 12 August 2019.

UNFCCC, 2019, *Decisions adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement*, Report No FCCC/PA/CMA/2018/3/Add.1, United Nations Framework Convention on Climate Change ([https://unfccc.int/sites/default/files/resource/cma2018\\_3\\_add1\\_advance.pdf](https://unfccc.int/sites/default/files/resource/cma2018_3_add1_advance.pdf)) accessed 12 August 2019.

UNISDR, 2015, *Sendai Framework for Disaster Risk Reduction 2015-2030*, United Nations Office for Disaster Risk Reduction, Geneva (<http://www.unisdr.org/we/inform/publications/43291>) accessed 23 November 2017.

Vautard, R., et al., 2014, 'The European climate under a 2 °C global warming', *Environmental Research Letters* 9(3), p. 034006 (DOI: 10.1088/1748-9326/9/3/034006).

Vautard, R., et al., 2019, 'Human contribution to the record-breaking July 2019 heatwave in Western Europe', World Weather Attribution (<https://www.worldweatherattribution.org/human-contribution-to-the-record-breaking-july-2019-heat-wave-in-western-europe/>) accessed 12 August 2019.

Velders, G. J. M., et al., 2007, 'The importance of the Montreal Protocol in protecting climate', *Proceedings of the National Academy of Sciences* 104(12), pp. 4814-4819 (DOI: 10.1073/pnas.0610328104).

WMO, 2019, 'July matched, and maybe broke, the record for the hottest month since analysis began', World Meteorological Organization (<https://public.wmo.int/en/media/news/july-matched-and-maybe-broke-record-hottest-month-analysis-began>) accessed 12 August 2019.

WMO and WHO, 2015, *Heatwaves and health: guidance on warning-system development*, World Meteorological Organization and World Health Organization, Geneva (<http://www.who.int/globalchange/publications/heatwaves-health-guidance/en/>) accessed 12 August 2019.

World Bank, 2019, 'DataBank' (<https://databank.worldbank.org/home.aspx>) accessed 23 August 2019.

Zdraveva, P., et al., 2014, *Third national communication on climate change*, Ministry of environment and physical planning, Skopje (<https://unfccc.int/sites/default/files/resource/mkdnc3.pdf>) accessed 17 August 2018.



## CHAPTER 08 — AIR POLLUTION

Amann, M., et al., 2017, *Measures to address air pollution from agricultural sources*, IIASA Report, International Institute

for Applied Systems Analysis, Laxenburg, Austria.

Amann, M., et al., 2018a, *Measures to address air pollution from small combustion sources*, IIASA Report, International Institute for Applied Systems Analysis, Laxenburg, Austria.

Amann, M., et al., 2018b, *Progress towards the achievement of the EU's air quality and emission objectives*, IIASA Report, International Institute for Applied Systems Analysis, Laxenburg, Austria.

CAMS, 2018, 'European air quality', Copernicus Atmosphere Monitoring Service (<https://atmosphere.copernicus.eu/>) accessed 19 August 2020.

Curieuzeneuzen Vlaanderen, 2018, 'Curieuzeneuzen Vlaanderen is the largest citizen science project on air quality to date' (<https://curieuzeneuzen.be/in-english/>) accessed 19 August 2019.

EC, 2013a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A clean air programme for Europe (COM(2013) 918 final).

EC, 2013b, *Living well, within the limits of our planet: 7th EAP — the new general Union Environment Action Programme to 2020*, European Commission, Brussels, Belgium.

EC, 2015, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A framework strategy for a resilient Energy Union with a forward-looking climate change policy (COM(2015) 80 final).

EC, 2017, Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Actions to streamline environmental reporting (COM(2017) 312 final).

EC, 2018a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A clean planet for all: a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final).

EC, 2018b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A Europe that protects (COM(2018)330 final).

EC, 2018c, Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — The first Clean Air Outlook (COM(2018)446 final).

EC, 2019a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Environmental Implementation Review 2019: a Europe that protects its citizens and enhances their quality of life (COM(2019) 149 final).

EC, 2019b, 'The EU and international air pollution policy', European Commission (<http://ec.europa.eu/environment/air/policy/index.htm>) accessed 19 August 2019.

ECA, 2018, *Air pollution: our health still insufficiently protected*, European Court of Auditors, Luxembourg.

EEA, 2013, *Air implementation pilot. Lessons learnt from the implementation of air quality legislation at urban level*, EEA Report No 7/2013, European Environment Agency.

EEA, 2015, *Air quality in Europe — 2015 report*, EEA Report No 5/2015, European Environment Agency.

EEA, 2016, *Air quality in Europe — 2016 report*, EEA Report No 28/2016, European Environment Agency.

EEA, 2017, *Aviation and shipping — impacts on Europe's environment, TERM 2017: Transport and Environment Reporting Mechanism (TERM) report*, EEA Report No 22/2017, European Environment Agency.

EEA, 2018a, *Assessing the risks to health from air pollution*, EEA Briefing No 11/2018, European Environment Agency.

EEA, 2018b, *Electric vehicles from life cycle and circular economy perspectives, TERM 2018: Transport and Environment Reporting Mechanism (TERM) report*, EEA Report No 13/2018, European Environment Agency.

EEA, 2018c, *Unequal exposure and unequal impacts: social vulnerability to air pollution, noise and extreme temperatures in Europe*, EEA Report No 22/2018, European Environment Agency.

EEA, 2019a, 'Air quality e-reporting database', Download of UTD Air Quality data (<http://discomap.eea.europa.eu/map/fme/AirQualityExport.htm>) accessed 23 August 2019.

EEA, 2019b, *Air quality in Europe — 2019 report*, EEA Report No 10/2019, European Environment Agency.

EEA, 2019c, 'Air quality management', European Environment Agency (<https://www.eea.europa.eu/themes/air/explore-air-pollution-data#tab-air-quality-management>) accessed 21 August 2019.

EEA, 2019d, 'Emissions of the main air pollutants in Europe (CSI 040)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/main-anthropogenic>



air-pollutant-emissions/assessment-5) accessed 19 August 2019.

EEA, 2019e, *European Union emission inventory report 1990-2017, under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP)*, EEA Report No 8/2019, European Environment Agency.

EEA, 2019f, *Europe's urban air quality — re-assessing implementation challenges for cities*, EEA Report No 24/2018, European Environment Agency.

EEA, 2019g, 'Exceedance of air quality standards in urban areas (CSI 004)' (<https://www.eea.europa.eu/data-and-maps/indicators/exceedance-of-air-quality-limit-3/assessment-5>) accessed 19 August 2019.

EEA, 2019h, 'Exceedances of air quality limit values due to traffic (TERM 004)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/exceedances-of-air-quality-objectives-7/assessment-2>) accessed 19 August 2019.

EEA, 2019i, 'Exposure of ecosystems to acidification, eutrophication and ozone (CSI 005)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/exposure-of-ecosystems-to-acidification-14/assessment-2>) accessed 19 August 2019.

EEA, 2019j, 'Key air quality statistics for the main air pollutants', Air quality statistics (<https://www.eea.europa.eu/data-and-maps/dashboards/air-quality-statistics#tab-based-on-data>) accessed 19 August 2019.

EEA, 2019k, *NEC Directive reporting status 2019*, EEA Briefing No 2/2019, European Environment Agency.

EMEP, 2018, *Transboundary particulate matter, photo-oxidants, acidifying and eutrophying components*, Status Report No 1/2018, Cooperative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe.

Engleryd, A. and Grennfelt, P., 2018, *Clean air for a sustainable future — goals and challenges*, *Saltsjöbaden VI Workshop 2018*, TemaNord No 2018:540, Nordic Council of Ministers, Copenhagen, Denmark.

ESA, 2019, 'Sentinel 5P', European Space Agency ([https://www.esa.int/Our\\_Activities/Observing\\_the\\_Earth/Copernicus/Sentinel-5P](https://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Sentinel-5P)) accessed 19 August 2019.

ETC/ACM, et al., 2018, *Long-term air quality trends in Europe — fine particulate matter (PM<sub>2.5</sub>) health impacts*, ETC/ACM Technical Paper No 2017/4, European Topic Centre on Air Pollution and Climate Change Mitigation.

EU, 2004, Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to

arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (OJ L 23, 26.1.2005, pp. 3-16).

EU, 2008, Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (OJ L 152, 11.6.2008, pp. 1-44).

EU, 2010, Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010, pp. 17-119).

EU, 2016, Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (OJ L 344, 17.12.2016, pp. 1-31).

EU, 2019, Regulation (EU) 2019/631 of the European Parliament and of the Council of 17 April 2019 setting CO<sub>2</sub> emission performance standards for new passenger cars and for new light commercial vehicles, and repealing Regulations (EC) No 443/2009 and (EU) No 510/2011 (OJ L 111, 25.4.2019, pp. 13-53).

Eurostat, 2018, 'Statistics on rural areas in the EU' ([https://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics\\_on\\_rural\\_areas\\_in\\_the\\_EU](https://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_rural_areas_in_the_EU)) accessed 19 August 2019.

Hamer, P., et al., 2017, *Interim annual assessment report for 2016 — European air quality in 2016*, CAMS Report, Copernicus Atmosphere Monitoring Service.

IARC, 2013, *Outdoor air pollution a leading environmental cause of cancer deaths*, Press release No 221, 17 October 2013, International Agency for Research on Cancer, Lyon, France.

Maas, R. and Grennfelt, P., 2016, *Towards cleaner air. Scientific assessment report 2016*, CLRTAP-EMEP Report, EMEP Steering Body and Working Group on Effects of the Convention on Long-range Transboundary Air Pollution.

Mills, G., et al., 2017, *Flux-based critical levels of ozone pollution for vegetation: overview of new developments*, Working Group on Effects of the Convention on Long-range Transboundary Air Pollution (<https://icpvegetation.ceh.ac.uk/sites/default/files/Flux-based%20critical%20levels%20of%20ozone%20pollution%20for%20vegetation.pdf>) accessed 19 August 2019.

Ricci, S., et al., 2017, *Study on urban vehicle access regulation — Final report*, Directorate-General for Mobility and Transport Report, European Commission.

Tarraşón, L., et al., 2016, *Interim annual assessment report for 2015 — European air quality in 2015*, CAMS Report, Copernicus Atmosphere Monitoring Service.

Tarrasón, L., et al., 2018, *Interim annual assessment report for 2017 — European air quality in 2017*, CAMS Report, Copernicus Atmosphere Monitoring Service.

UNECE, 1979, Convention on Long-range Transboundary Air Pollution (United Nations Economic Commission for Europe).

UNECE, 2018a, 'Amendment of the text and annexes II to IX to the Protocol to the 1979 Convention on Long-range Transboundary Air Pollution to abate acidification, eutrophication and ground-level ozone and the addition of new Annexes X and XI', United Nations, Treaty Collection.

UNECE, 2018b, 'ICP modelling and mapping international cooperative programme on modelling and mapping of critical loads and levels and air pollution effects, risks and trends', UNECE Convention on Long-range Transboundary Air Pollution.

UNECE, 2019, 'Protocols', United Nations Economic Commission for Europe ([https://www.unece.org/env/lrtap/status/lrtap\\_s.html](https://www.unece.org/env/lrtap/status/lrtap_s.html)) accessed 19 August 2019.

UNFCCC, 2015, Paris Agreement (Decision 1/CP.21).

Vandyck, T., et al., 2018, 'Air quality co-benefits for human health and agriculture counterbalance costs to meet the Paris agreement pledges', *Nature Communications* (DOI: 10.1038/s41467-018-06885-9).

WHO, 2006, *WHO air quality guidelines. Global update 2005. Particulate matter, ozone, nitrogen dioxide and sulfur dioxide*, World Health Organization, Geneva.

WHO, 2015, *WHO expert consultation: available evidence for the future update of the WHO global air quality guidelines (AQGs)*, WHO meeting report, World Health Organization, Geneva.



## CHAPTER 09 — WASTE AND RESOURCES IN A CIRCULAR ECONOMY

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British Geological Survey, et al., 2017, *Study on the review of the list of critical raw materials: final report*, Publications Office of the European Union, Luxembourg (<https://publications.europa.eu/en/publication-detail/-/publication/08fdab5f-9766-11e7-b92d-01aa75ed71a1/language-en>) accessed 15 February 2019.

Ciccarese, L. and Vulcano, G., 2017, *Food wastage: a systemic approach for structural prevention and reduction*, Rapporti 267/2017, ISPRA — Istituto Superiore per la Protezione e la

Ricerca Ambientale, Rome (<http://www.isprambiente.gov.it/en/publications/reports/food-waste-a-systemic-approach-for-structural-prevention-and-reduction/view>) accessed 26 March 2019.

D-Waste Environmental Consultants Ltd., 2014, *Waste Atlas - The World's 50 Biggest Dumpsites, 2014 Report* (<http://www.atlas.d-waste.com/Documents/Waste-Atlas-report-2014-webEdition.pdf>) accessed 12 August 2019.

EC, 2008, Communication from the Commission to the European Parliament and the Council — The raw materials initiative: meeting our critical needs for growth and jobs in Europe (COM(2008) 699 final of 4 November 2008).

EC, 2011a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Roadmap to a resource efficient Europe (COM(2011) 571 final).

EC, 2011b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Tackling the challenges in commodity markets and on raw materials (COM/2011/0025 final).

EC, 2015, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Closing the loop: an EU action plan for the circular economy (COM(2015) 614 final).

EC, 2017a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — The EU Environmental Implementation Review: common challenges and how to combine efforts to deliver better results (COM(2017) 63 final).

EC, 2017b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the 2017 list of critical raw materials for the EU (COM(2017) 490 final).

EC, 2017c, Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the implementation of the circular economy action plan (COM(2017) 33 final).

EC, 2018a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A European strategy for plastics in a circular economy (COM(2018) 28 final).

EC, 2018b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment (COM(2018) 673 final, Brussels, 11.10.2018).

EC, 2018c, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a monitoring framework for the circular economy (COM(2018) 29 final).

EC, 2018d, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation (COM(2018) 32 final).

EC, 2018e, In-depth analysis in support of the Commission Communication. A clean planet for all — a European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy.

EC, 2018f, *Raw materials scoreboard 2018*, Publications Office of the European Union, Luxembourg (<https://publications.europa.eu/en/publication-detail/-/publication/117c8d9b-e3d3-11e8-b690-01aa75ed71a1>) accessed 18 December 2018.

EC, 2018g, Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the implementation of EU waste legislation, including the early warning report for Member States at risk of missing the 2020 preparation for re-use/recycling target on municipal waste (COM(2018) 656 final).

EC, 2018h, Report on critical raw materials and the circular economy (SWD(2018) 36 final, Brussels, 16.1.2018).

EC, 2019a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Environmental Implementation Review 2019: a Europe that protects its citizens and enhances their quality of life (COM(2019) 149 final).

EC, 2019b, 'Infringement decisions (database)', European Commission ([http://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/infringement\\_decisions/](http://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/infringement_decisions/)) accessed 24 May 2019.

EC, 2019c, Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on

the implementation of the circular economy action plan (COM(2019) 190 final).

ECA, 2016, *Combating food waste: an opportunity for the EU to improve the resource-efficiency of the food supply chain*, European Court of Auditors ([https://www.eca.europa.eu/Lists/ECADocuments/SR16\\_34/SR\\_FOOD\\_WASTE\\_EN.pdf](https://www.eca.europa.eu/Lists/ECADocuments/SR16_34/SR_FOOD_WASTE_EN.pdf)) accessed 26 March 2019.

EEA, forthcoming, *Resource efficiency and circular economy in Europe — Even more from less*, European Environment Agency.

EEA, 2016a, *Circular economy in Europe — Developing the knowledge base*, EEA Report No 2/2016, European Environment Agency.

EEA, 2016b, *Municipal waste management across European countries*, EEA Briefing, European Environment Agency (<https://www.eea.europa.eu/themes/waste/municipal-waste/municipal-waste-management-across-european-countries>) accessed 20 July 2018.

EEA, 2019, *Preventing plastic waste in Europe*, EEA report No 2/2019, European Environment Agency (<https://www.eea.europa.eu/publications/preventing-plastic-waste-in-europe>) accessed 12 August 2019.

EnviCrimeNet and Europol, 2015, *Intelligence Project on Environmental Crime — Report on environmental crime in Europe*, Europol, The Hague (<https://www.europol.europa.eu/publications-documents/report-environmental-crime-in-europe>) accessed 20 July 2018.

ETC/WMGE, 2016, *Municipal waste management in Turkey*, ETC/WMGE Working Paper, European Topic Centre on Waste and Materials in a Green Economy ([https://www.eionet.europa.eu/etcs/etc-wmge/products/other-products/docs/turkey\\_msw\\_2016.pdf/view](https://www.eionet.europa.eu/etcs/etc-wmge/products/other-products/docs/turkey_msw_2016.pdf/view)) accessed 16 July 2019.

ETC/WMGE, 2017, *Waste incineration capacity and waste shipments*, European Topic Centre on Waste and Materials in a Green Economy (<https://www.eionet.europa.eu/etcs/etc-wmge/products/etc-reports/assessment-of-waste-incineration-capacity-and-waste-shipments-in-europe>) accessed 21 August 2019.

ETC/WMGE, 2018, *Scenarios for municipal waste recycling based on the European Reference Model on Municipal Waste. A contribution to the first early warning report*, European Topic Centre on Waste and Materials in a Green Economy (<https://www.eionet.europa.eu/etcs/etc-wmge/products/etc-reports/scenarios-for-municipal-waste-recycling-based-on-the-european-reference-model-on-municipal-waste>) accessed 12 August 2019.

ETC/WMGE, 2019, 'European Reference Model on Municipal Waste', European Topic Centre on Waste and Materials in

a Green Economy (<https://www.eionet.europa.eu/etcs/etc-wmge/products/wastemodel>) accessed 12 August 2019.

EU, 1994, European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste (OJ L 365, 31.12.1994, pp. 10-23).

EU, 1999, Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (OJ L 182, 16.07.1999, pp. 1-19).

EU, 2000, Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles - Commission Statements (OJ L 269, 21.10.2000, pp. 34-43).

EU, 2002, Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE) - Joint declaration of the European Parliament, the Council and the Commission relating to Article 9 (OJ L 37, 13.2.2003, pp. 24-39).

EU, 2006, Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC (OJ L 266, 26.9.2006, pp. 1-14).

EU, 2008, Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312, 22.11.2008, pp. 3-30).

EU, 2010, Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010, pp. 17-119).

EU, 2012, Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) (OJ L 197, 24.7.2012, pp. 38-71).

EU, 2013, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

EU, 2018a, Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste (text with EEA relevance) (OJ L 150, 14.6.2018, pp. 100-108).

EU, 2018b, Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (text with EEA relevance) (OJ L 150, 14.6.2018, pp. 109-140).

EU, 2018c, Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 amending

Directive 94/62/EC on packaging and packaging waste (text with EEA relevance) (OJ L 150, 14.6.2018, pp. 141-154).

EU, 2019a, Directive (EU) 2019/883 of the European Parliament and of the Council of 17 April 2019 on port reception facilities for the delivery of waste from ships, amending Directive 2010/65/EU and repealing Directive 2000/59/EC (text with EEA relevance) (OJ L 151, 7.6.2019, pp. 116-142).

EU, 2019b, Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment (text with EEA relevance) (OJ L 155, 12.6.2019, pp. 1-19).

Eurostat, 2017, *Country specific notes on waste electrical and electronic equipment (WEEE), Revision December 2017* ([https://ec.europa.eu/eurostat/cache/metadata/Annexes/env\\_waselee\\_esms\\_an1.pdf](https://ec.europa.eu/eurostat/cache/metadata/Annexes/env_waselee_esms_an1.pdf)) accessed 6 September 2018.

Eurostat, 2019a, 'Circular material use rate by material type (env\_ac\_curmy)' ([http://ec.europa.eu/eurostat/web/products-datasets/-/env\\_ac\\_curm](http://ec.europa.eu/eurostat/web/products-datasets/-/env_ac_curm)) accessed 26 July 2019.

Eurostat, 2019b, 'Employment in the environmental goods and services sector (env\_ac\_egss1)' (<http://ec.europa.eu/eurostat/web/environment/environmental-goods-and-services-sector/database>) accessed 20 August 2019.

Eurostat, 2019c, 'End-of-life vehicles — reuse, recycling and recovery, totals (env\_waselvt)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env\\_waselvt&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_waselvt&lang=en)) accessed 30 March 2019.

Eurostat, 2019d, 'GDP and main components (nama\_10\_gdp)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_gdp&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_gdp&lang=en)) accessed 16 April 2019.

Eurostat, 2019e, 'Generation of waste by waste category, hazardousness and NACE Rev. 2 activity (env\_wasgen)' (<http://ec.europa.eu/eurostat/web/waste/data/database>) accessed 24 March 2019.

Eurostat, 2019f, 'Gross value added and income by A\*10 industry breakdowns (nama\_10\_a10)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_a10&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10&lang=en)) accessed 20 August 2019.

Eurostat, 2019g, 'Material flow accounts (env\_ac\_mfa)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?lang=en&dataset=env\\_ac\\_mfa](http://appsso.eurostat.ec.europa.eu/nui/show.do?lang=en&dataset=env_ac_mfa)) accessed 20 August 2019.

Eurostat, 2019h, 'Material flow accounts in raw material equivalents - modelling estimates (env\_ac\_rme)' (<https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>) accessed 20 August 2019.

Eurostat, 2019i, 'Mining and quarrying statistics — NACE Rev. 2', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Mining\\_and\\_quarrying\\_statistics\\_-\\_NACE\\_Rev\\_2](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Mining_and_quarrying_statistics_-_NACE_Rev_2)) accessed 5 April 2019.

Eurostat, 2019j, 'Municipal waste by waste operations (env\_wasmun)' ([http://echttp://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env\\_waspac&lang=en](http://echttp://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_waspac&lang=en)) accessed 30 March 2019.

Eurostat, 2019k, 'Packaging waste by waste operations and waste flow (env\_waspac)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env\\_waspac&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_waspac&lang=en)) accessed 30 March 2019.

Eurostat, 2019l, 'Population change - Demographic balance and crude rates at national level (demo\_gind)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo\\_gind](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_gind)) accessed 16 April 2019.

Eurostat, 2019m, 'Resource productivity (env\_ac\_rp)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?lang=en&dataset=env\\_ac\\_rp](http://appsso.eurostat.ec.europa.eu/nui/show.do?lang=en&dataset=env_ac_rp)) accessed 20 August 2019.

Eurostat, 2019n, 'Sales and collection of portable batteries and accumulators (env\_waspb)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env\\_waspb&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_waspb&lang=en)) accessed 30 March 2019.

Eurostat, 2019o, 'Treatment of waste by waste category, hazardousness and waste operations (env\_wastrt)' (<http://ec.europa.eu/eurostat/web/waste/data/database>) accessed 25 May 2019.

Eurostat, 2019p, 'Waste electrical and electronic equipment (WEEE) by waste operations [env\_waselee]' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env\\_waselee&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_waselee&lang=en)) accessed 30 March 2019.

Hogg, D., et al., 2017, *A comprehensive assessment of the current waste management situation in South East Europe and future perspectives for the sector including options for regional cooperation recycling of electric and electronic waste final report*, Publications Office of the European Union, Luxembourg.

Huisman, J., et al., 2015, *Countering WEEE Illegal Trade (CWIT): summary report, market assessment, legal analysis, crime analysis and recommendations roadmap* (<http://www.cwitproject.eu/wp-content/uploads/2015/09/CWIT-Final-Report.pdf>) accessed 20 July 2018.

Huisman, J., et al., 2016, *Prospecting secondary raw materials in the urban mine and mining waste (ProSUM), Deliverable 3.1 — Historic and current stocks* ([http://www.prosumproject.eu/sites/default/files/ProSUM%20D3.1%20Historic%20%26%20Current%20Stocks\\_0\\_0.pdf](http://www.prosumproject.eu/sites/default/files/ProSUM%20D3.1%20Historic%20%26%20Current%20Stocks_0_0.pdf)) accessed 19 July 2018.

IRP, 2019, *Global resources outlook 2019: natural resources for the future we want*, Report of the International Resource Panel, United Nations Environment Programme (<http://www.resourcepanel.org/reports/global-resources-outlook>) accessed 20 March 2019.

OECD, 2019, *Global material resources outlook to 2060: economic drivers and environmental consequences*, Organisation for Economic Co-operation and Development, Paris (<http://www.oecd.org/publications/global-material-resources-outlook-to-2060-9789264307452-en.htm>) accessed 25 March 2019.

Peck, D., et al., 2017, *Prospecting secondary raw materials in the urban mine and mining waste (ProSUM), Deliverable 2.4 — CRM trends and scenarios* (<http://www.prosumproject.eu/sites/default/files/Final%20D2.4%20report%20CRM%20Trends%20and%20Scenarios%20Final%20Submitted.pdf>) accessed 18 July 2018.

Pivnenko, K., et al., 2016, 'Recycling of plastic waste: presence of phthalates in plastics from households and industry', *Waste Management* 54, pp. 44-52 (DOI: 10.1016/j.wasman.2016.05.014).

Scherhauser, S., et al., 2018, 'Environmental impacts of food waste in Europe', *Waste Management* 77, pp. 98-113 (DOI: 10.1016/j.wasman.2018.04.038).

UN, 2015, Resolution adopted by the General Assembly on 25 September 2015. Transforming our world: the 2030 agenda for sustainable development (A/RES/70/1).



## CHAPTER 10 — CHEMICAL POLLUTION

AMAP, 2018, *AMAP assessment 2018: biological effects of contaminants on Arctic wildlife and fish*, Arctic Monitoring and Assessment Programme, Tromsø, Norway (<https://www.amap.no/documents/doc/AMAP-Assessment-2018-Biological-Effects-of-Contaminants-on-Arctic-Wildlife-and-Fish-Preprint/1663>) accessed 5 November 2018.

Amec Foster Wheeler, et al., 2017, *Study supporting the Fitness Check on the most relevant chemicals legislation ("Fitness Check+"),*.

Arp, H. P., 2018, *Preliminary assessment of substances registered under REACH that could fulfil the proposed PMT/vPvM criteria*, Technical Note 20160426-TN-01, Background document to the workshop 'PMT and vPvM substances under REACH', 13-14 March, Bundespresseamt, Berlin.

- Arp, H. P. H., et al., 2017, 'Ranking REACH registered neutral, ionizable and ionic organic chemicals based on their aquatic persistency and mobility', *Environmental Science: Processes & Impacts* 19(7), pp. 939-955.
- Arp, H. P. and Hale, S. E., *REACH, forthcoming: Improvement of guidance and methods for the identification and assessment of PMT/vPvM substances*, No (FKZ) 3716 67 416 0, German Environmental Agency (UBA), Dessau, Germany.
- Bellanger, M, Pichery, C, Aerts, D, Berglund, M, Castaño, A, Čejchanová, M, Crettaz, P, Davidson, F, Esteban, M, Fischer, ME, Gurzau, AE, Halzlova, K, Katsonouri, A, Knudsen, LE, Kolossa-Gehring, M, Koppen, G, Ligocka, D, Miklavčič, A, Reis, MF, Rudnai, P, Tratnik, JS, Weihe, P, Budtz-Jorgensen, E & Grandjean, P 2013, 'Economic benefits of methylmercury exposure control in Europe: Monetary value of neurotoxicity prevention', *Environmental Health: A Global Access Science Source*, vol. 12, no. 1, 3. <https://doi.org/10.1186/1476-069X-12-3>
- Bernhardt, E. S., et al., 2017, 'Synthetic chemicals as agents of global change', *Frontiers in Ecology and the Environment* 15(2), pp. 84-90 (DOI: 10.1002/fee.1450).
- BfR, 2018, *REACH compliance workshop at the BfR*, BfR Communication No 030/2018 of 25 September 2018, Bundesinstitut für Risikobewertung (<https://www.bfr.bund.de/cm/349/reach-compliance-workshop-at-the-bfr.pdf>) accessed 6 March 2019.
- BiPro, et al., 2017, *Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance*, Report for the European Commission, Contract No 070201/2016/736294/ENV.B.3 ([http://ec.europa.eu/environment/waste/studies/pdf/20180227\\_Haz\\_Waste\\_Final\\_RepV5\\_clear.pdf](http://ec.europa.eu/environment/waste/studies/pdf/20180227_Haz_Waste_Final_RepV5_clear.pdf)) accessed 5 December 2018.
- Bolinus, D. J., et al., 2018, 'Evaluating the consumption of chemical products and articles as proxies for diffuse emissions to the environment', *Environmental Science: Processes & Impacts* 20, pp. 1427-1440.
- Bopp, S. K., et al., 2015, *Scientific methodologies for the assessment of combined effects of chemicals — a survey and literature review*, Publications Office of the European Union (<http://publications.jrc.ec.europa.eu/repository/handle/111111111/37888>) accessed 9 January 2019.
- Bopp, S. K., et al., 2016, *Review of case studies on the human and environmental risk assessment of chemical mixtures*, JRC Technical Report No EUR 27968 EN (doi:10.2788/272583).
- Bopp, S. K., et al., 2018, 'Current EU research activities on combined exposure to multiple chemicals ☆', 120(May), pp. 544-562 (DOI: 10.1016/j.envint.2018.07.037).
- Brack, W., et al., 2017, 'Towards the review of the European Union Water Framework management of chemical contamination in European surface water resources', *Science of the Total Environment* 576, pp. 720-737.
- Brendel, S., et al., 2018, 'Short-chain perfluoroalkyl acids: environmental concerns and a regulatory strategy under REACH', *Environmental Sciences Europe* 30(9).
- Camboni, M., et al., 2016, *Study on the calculation of the benefits of chemicals legislation on human health and the environment: development of a system of indicators*, Report for the European Commission, Publications Office of the European Union, Luxembourg, (<https://publications.europa.eu/en/publication-detail/-/publication/3dcb5c7a-1029-11e6-ba9a-01aa75ed71a1>) accessed 6 March 2019.
- Castano, A., Cutanda, F., Esteban, M., Part, P., Navarro, C., Gomez, S. et al., 'Fish consumption patterns and hair mercury levels in children and their mothers in 17 EU countries' *Environ. Res.*, 141 (2015), pp. 58-68, 10.1016/j.envres.2014.10.029
- CEFIC, 2018, *Landscape of the European chemical industry 2018, EU-28*, European Chemical Industry Council (<http://www.chemlandscape.cefic.org/wp-content/uploads/pdfs/EU28-23.pdf>) accessed 5 November 2018.
- Council of the European Union, 2013, Minamata Convention on Mercury (ST 11995 2013 ADD 1).
- Council of the European Union, 2016, Council conclusions of 19 December 2016 on the protection of human health and the environment through the sound management of chemicals (15673/16).
- Cousins, I. T., et al., 2019, 'Why is high persistence alone a major cause of concern?', *Environmental Science: Processes & Impacts* 21(5), pp. 781-792 (DOI: 10.1039/C8EM00515J).
- Danish EPA, 2019, *Substances in household detergents Survey and environmental and health assessment*, No 2073 (<https://www2.mst.dk/Udgiv/publikationer/2019/03/978-87-7038-048-5.pdf>) accessed 23 August 2019AD.
- Desforges, J.-P., et al., 2018, 'Predicting global killer whale population collapse from PCB pollution', *Science* 361(6409), pp. 1373-1376 (DOI: 10.1126/science.aat1953).
- DTU, 2019, 'Danish (Q)SAR Database' (<http://qsar.food.dtu.dk/>) accessed 23 August 2019.
- EC, 2000, Communication from the Commission on the precautionary principle (COM(2000) 1 final of 2 February 2000).
- EC, 2005, Communication from the Commission to the

Council and the European Parliament — Community strategy concerning mercury {SEC(2005) 101} (COM(2005) 20 final).

EC, 2012, Communication from the Commission to the Council — The combination effects of chemicals: chemical mixtures (COM(2012) 252 final 31 May 2012).

EC, 2015, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Closing the loop: an EU action plan for the circular economy (COM(2015) 614 final).

EC, 2016, 'Commission proposes to protect workers better from cancer-causing chemicals' (<http://ec.europa.eu/social/main.jsp?catId=89&langId=en&newsId=2536&furtherNews=yes>) accessed 7 November 2018.

EC, 2017, Communication from the Commission to the Council and the European Parliament — A European One Health action plan against antimicrobial resistance (AMR) (COM(2017) 339 final).

EC, 2018a, Commission Staff Working Document accompanying the document Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee — Commission general report on the operation of REACH and review of certain elements — conclusions and actions (SWD(2018) 58 final of 5 March 2018).

EC, 2018b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Towards a comprehensive European Union framework on endocrine disruptors (COM(2018) 734 final).

EC, 2018c, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation (COM(2018) 32 final).

EC, 2019a, Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee. European Union Strategic Approach to Pharmaceuticals in the Environment (COM(2019) 128 final).

EC, 2019b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Environmental Implementation Review 2019: a Europe that protects its citizens and enhances their quality of life (COM(2019) 149 final).

EC, 2019c, *Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Findings of the Fitness Check of the most relevant chemicals legislation (excluding REACH) and identified challenges, gaps and weaknesses*, No COM/2019/264 final (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1561530857605&uri=COM:2019:264:FIN>) accessed 29 August 2019.

ECHA, 2018a, *ECHA strategic plan 2019-2023*, European Chemicals Agency, Helsinki ([https://echa.europa.eu/documents/10162/26075800/echa\\_strategic\\_plan\\_2019-2023\\_en.pdf](https://echa.europa.eu/documents/10162/26075800/echa_strategic_plan_2019-2023_en.pdf)) accessed 4 March 2019.

ECHA, 2018b, *Evaluation under REACH: progress report 2017 — 10 years of experience*, Helsinki ([https://echa.europa.eu/documents/10162/13628/evaluation\\_under\\_reach\\_progress\\_en.pdf/24c24728-2543-640c-204e-c61c36401048](https://echa.europa.eu/documents/10162/13628/evaluation_under_reach_progress_en.pdf/24c24728-2543-640c-204e-c61c36401048)).

ECHA, 2018c, 'Forum work programme 2019-2023: enforcement priorities', European Chemicals Agency, Helsinki ([https://echa.europa.eu/documents/10162/13577/forum\\_work\\_programme\\_2019-2023\\_en.pdf/f8add1f0-f25e-abfc-fb0d-5ad66c717a6e](https://echa.europa.eu/documents/10162/13577/forum_work_programme_2019-2023_en.pdf/f8add1f0-f25e-abfc-fb0d-5ad66c717a6e)) accessed 23 August 2019.

ECHA, 2018d, *Strategy to promote substitution to safer chemicals through innovation: January 2018* (<https://publications.europa.eu/en/publication-detail/-/publication/a5932f85-0571-11e8-b8f5-01aa75ed71a1/language-en>) accessed 19 December 2018.

ECHA, 2019a, 'Advanced Search for Chemicals - ECHA' (<https://echa.europa.eu/advanced-search-for-chemicals>) accessed 23 August 2019.

ECHA, 2019b, *Mapping the chemical universe to address substances of concern: integrated regulatory strategy: annual report 2019 -April 2019*. ([http://publications.europa.eu/publication/manifestation\\_identifier/PUB\\_EDBD19001ENN](http://publications.europa.eu/publication/manifestation_identifier/PUB_EDBD19001ENN)) accessed 23 August 2019.

ECHA, 2019c, 'Registered substances', European Chemicals Agency (<https://echa.europa.eu/information-on-chemicals/registered-substances>) accessed 6 June 2019.

EEA, 2013, *Late lessons from early warnings: science, precaution, innovation*, EEA Report No 1/2013, European Environment Agency.

EEA, 2015, 'Hazardous substances in marine organisms (MAR 001)' (<http://www.eea.europa.eu/data-and-maps/indicators/hazardous-substances-in-marine-organisms/hazardous-substances-in-marine-organisms-1>) accessed 23 August 2019.

EEA, 2016, *European water policies and human health*, EEA Report No 32/2016, European Environment Agency.

EEA, 2017a, *Circular by design — Products in the circular economy*, EEA Report No 6/2017, European Environment Agency (<https://www.eea.europa.eu/publications/circular-by-design>) accessed 25 September 2018.

EEA, 2017b, 'Production and consumption of ozone-depleting substances (CSI 006/CLIM 049)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/production-and-consumption-of-ozone-2>) accessed 5 November 2018.

EEA, 2018a, *Chemicals for a sustainable future*, EEA Report No 2/2018, European Environment Agency (<https://www.eea.europa.eu/about-us/governance/scientific-committee/reports/chemicals-for-a-sustainable-future>) accessed 31 October 2018.

EEA, 2018b, *Chemicals in European waters — knowledge developments*, EEA Report No 18/2018, European Environment Agency.

EEA, 2018c, *European Union emission inventory report 1990-2016 under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP)*, EEA Report No 6/2018, European Environment Agency (<https://www.eea.europa.eu/publications/european-union-emission-inventory-report-1>).

EEA, 2018d, *European waters — assessment of status and pressures 2018*, EEA Report No 7/2018, European Environment Agency (<https://www.eea.europa.eu/publications/state-of-water>) accessed 6 December 2018.

EEA, 2019a, *European Union emission inventory report 1990-2017, under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP)*, EEA Report No 8/2019, European Environment Agency.

EEA, 2019b, *Industrial waste water treatment — pressures on Europe's environment*, EEA Report No 23/2018, European Environment Agency ([https://www.eea.europa.eu/publications/industrial-waste-water-treatment-pressures/at\\_download/file](https://www.eea.europa.eu/publications/industrial-waste-water-treatment-pressures/at_download/file)) accessed 4 April 2019.

EEA, 2019c, 'The European Pollutant Release and Transfer Register (E-PRTR), Member States reporting under Article 7 of Regulation (EC) No 166/2006', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/data/member-states-reporting-art-7-under-the-european-pollutant-release-and-transfer-register-e-prtr-regulation-18>) accessed 29 May 2019.

EEB, 2017, *Keeping it clean: How to protect the circular economy from hazardous substances*, European Environmental Bureau, Brussels.

EFSA, 2012, 'Report of ESCO WG on non-plastic food contact materials', *EFSA Supporting Publications* 8(7).

EFSA, 2017, 'The 2015 European Union report on pesticide residues in food', *EFSA Journal* 15(4).

EFSA, 2018, 'Risk to human health related to the presence of perfluorooctane sulfonic acid and perfluorooctanoic acid in food', *EFSA Journal* 16(12).

EFSA Scientific Committee, et al., 2019, 'Guidance on harmonised methodologies for human health, animal health and ecological risk assessment of combined exposure to multiple chemicals', *EFSA Journal* 17(3) (DOI: 10.2903/j.efsa.2019.5634).

EU, 2001a, Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC (text with EEA relevance) (OJ L 331, 15.12.2001, pp. 1-5).

EU, 2001b, Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community code relating to medicinal products for human use (OJ L 311, 28.11.2001, pp. 67-128).

EU, 2002, Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety (OJ L 31, 1.2.2002, pp. 1-24).

EU, 2004a, Regulation (EC) No 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents (Text with EEA relevance) (OJ L 104, 8.4.2004, pp. 1-35).

EU, 2004b, Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC (OJ L 158, 30.4.2004, pp. 7-49).

EU, 2006a, Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration (OJ L 372, 27.12.2006, pp. 19-31).

EU, 2006b, Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (OJ L 396, 30.12.2006, pp. 1-849).

EU, 2008a, Consolidated version of the Treaty on the Functioning of the European Union — Part three: Union Policies and Internal Actions — Title VII: Common Rules on Competition, Taxation and Approximation of Laws — Chapter 1: Rules on competition — Section 2: Aids granted by States — Article 107 (ex Article 87 TEC) (OJ C 115, 9.5.2008, pp. 91-92).



EU, 2008b, Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (OJ L 353, 31.12.2008, pp. 1-1355).

EU, 2009a, Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys (Text with EEA relevance) (170).

EU, 2009b, Directive 2009/104/EC of the European Parliament and of the Council of 16 September 2009 concerning the minimum safety and health requirements for the use of work equipment by workers at work (second individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) (text with EEA relevance) (OJ L 260, 3.10.2009, pp. 5-19).

EU, 2009c, Regulation (EC) No 1223/2009 of the European Parliament and of the Council of 30 November 2009 on cosmetic products (Text with EEA relevance).

EU, 2009d, Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC (OJ L 309, 24.11.2009, pp. 1-50).

EU, 2010, Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010, pp. 17-119).

EU, 2011a, Commission Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food (OJ L 12, 15.1.2011, pp. 1-89).

EU, 2011b, Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (OJ L 174, 1.7.2011, pp. 88-110).

EU, 2012, Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products (text with EEA relevance) (OJ L 167, 27.6.2012, pp. 1-123).

EU, 2013, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

EU, 2015, List of substances banned for use in cosmetic products — CMR substances of category 1A, 1B or 2.

EU, 2016, Commission Regulation (EU) 2016/2235 of 12

December 2016 amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards bisphenol A (Text with EEA relevance ) (OJ L).

EU, 2017, Commission Delegated Regulation (EU) 2017/2100 of 4 September 2017 setting out scientific criteria for the determination of endocrine-disrupting properties pursuant to Regulation (EU) No 528/2012 of the European Parliament and Council (text with EEA relevance) (OJ L 301, 17.11.2017, pp. 1-5).

EU, 2018a, Commission Regulation (EU) 2018/ 1513 of 10 October 2018 amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards certain substances classified as carcinogenic, mutagenic or toxic for reproduction (CMR), category 1A or 1B (OJ L 256, 10.10.2018, p. 1).

EU, 2018b, Commission Regulation (EU) 2018/2005 of 17 December 2018 amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards bis(2-ethylhexyl) phthalate (DEHP), dibutyl phthalate (DBP), benzyl butyl phthalate (BBP) and diisobutyl phthalate (DIBP) (Text with EEA relevance.) (OJ L).

EU-OSHA, 2017a, 'EU roadmap on carcinogens', European Agency for Safety and Health at Work (<https://osha.europa.eu/en/themes/dangerous-substances/roadmap-to-carcinogens>) accessed 31 October 2018.

EU-OSHA, 2017b, 'Work-related accidents and injuries cost EU €476 billion a year according to new global estimates — Press release', European Agency for Safety and Health at Work (<https://osha.europa.eu/en/about-eu-osha/press-room/eu-osha-presents-new-figures-costs-poor-workplace-safety-and-health-world>) accessed 31 October 2018.

European Parliament, 2018, *Revision of the Drinking Water Directive*, Briefing on EU Legislation in Progress, European Parliamentary Research Service ([http://www.europarl.europa.eu/RegData/etudes/BRIE/2018/625179/EPRS\\_BRI\(2018\)625179\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2018/625179/EPRS_BRI(2018)625179_EN.pdf)) accessed 3 June 2019.

Eurostat, 2019, 'Production and consumption of chemicals by hazard class (env\_chmhaz)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env\\_chmhaz](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_chmhaz)) accessed 23 August 2019.

Evans, R. M., et al., 2016, 'Should the scope of human mixture risk assessment span legislative/regulatory silos for chemicals?', *Science of the Total Environment* 543, pp. 757-764 (DOI: 10.1016/j.scitotenv.2015.10.162).

- Fång, J., et al., 2015, 'Spatial and temporal trends of the Stockholm Convention POPs in mothers' milk — a global review', *Environmental Science and Pollution Research* 22(12), pp. 8989-9041 (DOI: 10.1007/s11356-015-4080-z).
- Gabbert, S. and Hilber, I., 2016, 'Time matters: a stock-pollution approach to authorisation decision-making for PBT/vPvB chemicals under REACH', *Journal of Environmental Management* 183, pp. 236-244 (DOI: 10.1016/j.jenvman.2016.08.038).
- Geiser, K., 2015, *Chemicals without Harm | The MIT Press*, MIT Press.
- Gercken, J., et al., 2018, *Hazardous substances occurrence in Baltic Sea pilot municipalities. NonHazCity Major output from the tracking and ranking for prioritisation of sources in NonHazCity project*, City of Stockholm Environmental Department ([http://nonhazcity.eu/wp-content/uploads/2017/03/Report\\_D2.4\\_CC2018\\_final.pdf](http://nonhazcity.eu/wp-content/uploads/2017/03/Report_D2.4_CC2018_final.pdf)) accessed 3 June 2019.
- Glüge, J., et al., 2017, 'Import, use, and emissions of PCBs in Switzerland from 1930 to 2100', *PLoS ONE* 12(10), p. e0183768 (DOI: 10.1371/journal.pone.0183768).
- Grandjean, P. and Bellanger, M., 2017, 'Calculation of the disease burden associated with environmental chemical exposures: application of toxicological information in health economic estimation', *Environmental Health* 16(1), p. 123 (DOI: 10.1186/s12940-017-0340-3).
- Grandjean, P. and Landrigan, P. J., 2014, 'Neurobehavioural effects of developmental toxicity', *The Lancet Neurology* 13(3), pp. 330-338 (DOI: 10.1016/S1474-4422(13)70278-3).
- Gross, L. and Birnbaum, L. S., 2017, 'Regulating toxic chemicals for public and environmental health', *PLOS Biology* 15(12), p. e2004814 (DOI: 10.1371/journal.pbio.2004814).
- Hallmann, C. A., et al., 2014, 'Declines in insectivorous birds are associated with high neonicotinoid concentrations', *Nature* 511(7509), pp. 341-343 (DOI: 10.1038/nature13531).
- Hallmann, C. A., et al., 2017, 'More than 75 percent decline over 27 years in total flying insect biomass in protected areas', *PLoS ONE* 12(10), p. e0185809 (DOI: 10.1371/journal.pone.0185809).
- Hansen, S. F., 2018, Registration, evaluation, authorisation, categorisation and tools to evaluate nanomaterials – opportunities and weaknesses (REACT NOW), Doctoral thesis, Technical University of Denmark, Kgs. Lyngby, Denmark.
- Hass, U., et al., 2017, 'Combined exposure to low doses of pesticides causes decreased birth weights in rats', *Reproductive Toxicology* 72, pp. 97-105 (DOI: <https://doi.org/10.1016/j.reprotox.2017.05.004>).
- Helmholtz Centre for Environmental Research, 2018, 'Protecting Water Resources from Mobile Trace Chemicals — PROMOTE, a Water JPI project' (<http://www.ufz.de/promote/>) accessed 4 January 2019.
- Huber, S., et al., 2016, 'A first screening and risk assessment of pharmaceuticals and additives in personal care products in waste water, sludge, recipient water and sediment from Faroe Islands, Iceland and Greenland', *Science of the Total Environment* 562(9038), pp. 13-25 (DOI: 10.1016/j.scitotenv.2016.03.063).
- JRC, 2016, *Non-harmonised food contact materials in the EU: regulatory and market situation. BASELINE STUDY Final report* (<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/non-harmonised-food-contact-materials-eu-regulatory-and-market-situation-baseline-study>) accessed 23 August 2019.
- JRC, 2018, 'Major accident reporting system', European Commission Joint Research Centre (<https://emars.jrc.ec.europa.eu/en/emars/content>) accessed 19 October 2018.
- Kar, S., et al., 2017, 'Endocrine-disrupting activity of per- and polyfluoroalkyl substances: exploring combined approaches of ligand and structure based modeling', *Chemosphere* 184, pp. 514-523.
- Kortenkamp, A., et al., 2012, *State of the art assessment of endocrine disrupters*, Final report to the European Commission ([http://ec.europa.eu/environment/chemicals/endocrine/pdf/sota\\_edc\\_final\\_report.pdf](http://ec.europa.eu/environment/chemicals/endocrine/pdf/sota_edc_final_report.pdf)) accessed 17 July 2019.
- Kümmerer, K., 2018, 'Sustainable chemistry – the need for a broader approach', *Scitech Europa Quarterly*, 6 June 2018.
- Landrigan, P. J., et al., 2017, 'The Lancet Commission on pollution and health', *The Lancet* 391(10119), pp. 462-512 (DOI: 10.1016/S0140-6736(17)32345-0).
- Liess, M., et al., 2016, 'Predicting the synergy of multiple stress effects', *Scientific Reports* 6(32965).
- Malaj, E., et al., 2014, 'Organic chemicals jeopardize the health of freshwater ecosystems on the continental scale', *Proceedings of the National Academy of Sciences* 111(26), pp. 9549-9554 (DOI: 10.1073/pnas.1321082111).
- Mie, A., et al., 2018, 'Safety of safety evaluation of Pesticides: developmental neurotoxicity of chlorpyrifos and chlorpyrifos-methyl', *Environmental Health* 17(1), p. 77 (DOI: 10.1186/s12940-018-0421-y).
- Milieu Ltd, et al., 2017, *Study for the strategy for a non-toxic environment of the 7th Environment Action Programme*, Report for the European Commission (<http://ec.europa.eu/environment/chemicals/non-toxic/pdf/NTE%20main%20>

report%20final.pdf) accessed 31 October 2018.

MoEE, 2019, *Republic of Croatia 2019, Informative inventory report (1990 — 2017), Submission under the Convention on Long-range Transboundary Air Pollution (CLRTAP) and National Emission Ceilings Directive (NECD 2016/2284/EU)*, Ministry of Environment and Energy, Zagreb, Croatia.

Moritz, S., et al., 2017, *Developments in society and implications for emerging pollutants in the aquatic environment*, Öko-Institut Working Paper 1/2017 (<https://www.oeko.de/fileadmin/oekodoc/WP-Emerging-Pollutants.pdf>) accessed 23 October 2018.

Neumann, M. and Schliebner, I., 2017, *Position — Protecting the sources of our drinking water: a revised proposal for implementing criteria and an assessment procedure to identify persistent, mobile and toxic (PMT) and very persistent, very mobile (vPvM) substances registered under REACH*, German Environmental Agency (UBA), Dessau, Germany ([https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/171027\\_uba\\_pos\\_pmt\\_substances\\_engl\\_2aufl\\_bf.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/171027_uba_pos_pmt_substances_engl_2aufl_bf.pdf)) accessed 26 August 2019.

Newkirk II, V. R., 2017, 'The looming superfund nightmare', *The Atlantic*, 12 September 2017 (<https://www.theatlantic.com/health/archive/2017/09/the-looming-superfund-nightmare/539316/>) accessed 6 November 2018.

Ng, C. A., et al., 2011, 'A framework for evaluating the contribution of transformation products to chemical persistence in the environment', *Environmental Science & Technology* 45, pp. 111-117.

Nordic Council of Ministers, 2019, 'The cost of inaction', Nordisk Samarbejde (<https://www.norden.org/en/publication/cost-inaction-0>) accessed 8 April 2019.

Nyberg, E., et al., 2018, 'Inter-individual, inter-city, and temporal trends of per- and polyfluoroalkyl substances in human milk from Swedish mothers between 1972 and 2016', *Environmental Science: Processes & Impacts* 20(8), pp. 1136-1147 (DOI: 10.1039/C8EM00174J).

OECD, 2012, *OECD environmental outlook to 2050 – the consequences of inaction*, Organisation for Economic Co-operation and Development (<http://www.oecd-ilibrary.org/content/book/9789264122246-en>) accessed 21 September 2013.

OECD, 2018, *Toward a new comprehensive global database of per- and polyfluoroalkyl substances (PFASs): summary report on updating the OECD 2007 list of per- and polyfluoroalkyl substances (PFAs)*, Organisation for Economic Co-operation and Development ([http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV-JM-MONO\(2018\)7&doclanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV-JM-MONO(2018)7&doclanguage=en)) accessed 3 June 2019.

Oltmanns, J., et al., 2019, 'Final report — Applying a tested procedure for the identification of potential emerging chemical risks in the food chain to the substances registered under REACH — REACH 2', *EFSA Supporting Publications* 16(3) (DOI: 10.2903/sp.efsa.2019.EN-1597).

Payá Pérez, A. and Rodríguez Eugenio, N., 2018, *Status of local soil contamination in Europe: revision of the indicator 'Progress in the management of contaminated sites in Europe'*, Publications Office of the European Union, Luxembourg (DOI: 10.2760/093804, JRC107508).

Pivnenko and Fruergaard, 2016, 'The challenge of chemicals in material lifecycles', *Waste Management* 56, pp. 1-2.

Posthuma, L., et al., 2016, 'Eco-epidemiology of aquatic ecosystems: separating chemicals from multiple stressors', *Science of the Total Environment* 573, pp. 1303-1319 (DOI: 10.1016/j.scitotenv.2016.06.242).

Posthuma, L., et al., 2019, 'Species sensitivity distributions for use in environmental protection, assessment and management of aquatic ecosystems for 12,386 chemicals', *Environmental Toxicology and Chemistry* 38(4), pp. 905-917.

Rappazzo, K. M., et al., 2017, 'Exposure to perfluorinated alkyl substances and health outcomes in children: a systematic review of the epidemiologic literature', *International Journal of Environmental Research and Public Health* 14(7) (DOI: 10.3390/ijerph14070691).

Ritscher, A., et al., 2018, 'Zürich statement on future actions on per- and polyfluoroalkyl substances (PFASs)', *Environmental Health Perspectives* 126(8), p. 84502 (DOI: 10.1289/EHP4158).

Scheringer, M., et al., 2014, 'Helsingør statement on poly- and perfluorinated alkyl substances (PFASs)', *Chemosphere* 114, pp. 337-339 (DOI: 10.1016/j.chemosphere.2014.05.044).

Schulze, S., et al., 2018, 'Using REACH registration data to rank the environmental emission potential of persistent and mobile organic chemicals', *Science of The Total Environment* 625, pp. 1122-1128 (DOI: 10.1016/j.scitotenv.2017.12.305).

Schulze, S., et al., 2019, 'Occurrence of emerging persistent and mobile organic contaminants in European water samples', *Water Research* 153, pp. 80-90 (DOI: <https://doi.org/10.1016/j.watres.2019.01.008>).

Skakkebaek, N. E., et al., 2015, 'Male Reproductive Disorders and Fertility Trends: Influences of Environment and Genetic Susceptibility', *Physiological Reviews* 96(1), pp. 55-97 (DOI: 10.1152/physrev.00017.2015).

Sobek, A., et al., 2016, 'The dilemma in prioritising chemicals for environmental analysis: known versus unknown hazards',

*Environmental Science: Processes & Impacts* 18, pp. 1042-1049.

Trasande, L., et al., 2016, 'Burden of disease and costs of exposure to endocrine disrupting chemicals in the European Union: an updated analysis', *Andrology* 4(4), pp. 565-572 (DOI: 10.1111/andr.12178).

UN, 2015, Resolution adopted by the General Assembly on 25 September 2015. Transforming our world: the 2030 agenda for sustainable development (A/RES/70/1).

UNECE, 1979, Convention on Long-range Transboundary Air Pollution (United Nations Economic Commission for Europe).

UNEP, 2006, *Strategic approach to international chemicals management. comprising the Dubai Declaration on international chemicals management, the overarching policy strategy and the global plan of action. Resolutions of the International Conference on Chemicals Management*, United Nations Environment Programme (<http://www.saicm.org/Portals/12/documents/saicmtxts/SAICM-publication-EN.pdf>) accessed 4 March 2019.

UNEP, 2017, *Frontiers 2017: emerging issues of environmental concern*, United Nations Environment Programme (<https://wedocs.unep.org/handle/20.500.11822/22255>) accessed 5 September 2018.

UNEP, 2018, *Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer*, No 12th edition ([https://ozone.unep.org/sites/default/files/MP\\_handbook-english-2018.pdf](https://ozone.unep.org/sites/default/files/MP_handbook-english-2018.pdf)) accessed 23 August 2019.

UNEP, 2019, *Global chemicals outlook II. From legacies to innovative solutions: implementing the 2030 Agenda for Sustainable Development*, United Nations Environment Programme (<https://www.unenvironment.org/resources/report/global-chemicals-outlook-ii-legacies-innovative-solutions>) accessed 4 June 2019.

Warner, J. C. and Ludwig, J. K., 2016, 'Rethink how chemical hazards are tested', *Nature News* 536(7616), p. 269 (DOI: 10.1038/536269a).

WHO, 2016, *The public health impact of chemicals: knowns and unknowns*, World Health Organization (<http://www.who.int/ipcs/publications/chemicals-public-health-impact/en/>) accessed 31 October 2018.

WHO, 2017, 'One Health' (<http://www.who.int/features/qa/one-health/en>) accessed 22 May 2019.

Wöhrnschimmel, H., et al., 2016, 'Ten years after entry into force of the Stockholm Convention: what do air monitoring data tell about its effectiveness?', *Environmental Pollution* 217, pp. 149-158 (DOI: 10.1016/j.envpol.2016.01.090).



## CHAPTER 11 — ENVIRONMENTAL NOISE

Dominoni, D. M., et al., 2016, 'Airport noise predicts song timing of European birds', *Ecology and Evolution* 6(17), pp. 6151-6159 (DOI: 10.1002/ece3.2357).

EASA, et al., 2016, *European aviation environmental report 2016*, European Union Aviation Safety Agency, Cologne, Germany.

EC, 2000, *The noise policy of the European Union*, Office for Official Publications of the European Communities, Luxembourg ([http://www.moa.gov.cy/moa/environment/environmentnew.nsf/69D658BCCDE2FD B5C2258041002D61F5/\\$file/%CE%9Doise%20brochure.pdf](http://www.moa.gov.cy/moa/environment/environmentnew.nsf/69D658BCCDE2FD B5C2258041002D61F5/$file/%CE%9Doise%20brochure.pdf)) accessed 7 December 2018.

EC, 2011, White Paper — Roadmap to a single European transport area: towards a competitive and resource efficient transport system (COM(2011) 144 final).

EC, 2017, Report from the Commission to the European Parliament and the Council on the implementation of the Environmental Noise Directive in accordance with Article 11 of Directive 2002/49/EC (COM(2017) 151 final).

EC, 2019, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Environmental Implementation Review 2019: a Europe that protects its citizens and enhances their quality of life (COM(2019) 149 final).

EEA, 2014, *Noise in Europe 2014*, EEA Report No 10/2014, European Environment Agency (<http://www.eea.europa.eu/publications/noise-in-europe-2014>).

EEA, 2017, *Managing exposure to noise in Europe*, EEA Briefing, European Environment Agency (<https://www.eea.europa.eu/themes/human/noise/sub-sections/noise-in-europe-updated-population-exposure>) accessed 24 May 2019.

EEA, 2019a, *Environmental Noise in Europe - 2019*, forthcoming, European Environment Agency.

EEA, 2019b, 'Reported data on noise exposure covered by Directive 2002/49/EC', European Environment Agency, forthcoming (<https://www.eea.europa.eu/data-and-maps/data/data-on-noise-exposure-7>).

ERA, 2018, Recommendation No 006REC1072-1 of the European Union Agency for Railways on the amendment of Commission Regulation (EU) No 1299/2014 on the

technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union, Commission Regulation (EU) No 1301/2014 on the technical specifications for interoperability relating to the 'energy' subsystem of the rail system in the European Union and Commission Regulation (EU) No 1304/2014 on the technical specification for interoperability relating to the subsystem 'rolling stock — noise' amending Decision 2008/232/EC and repealing Decision 2011/229/EU (European Union Agency For Railways, Valenciennes).

ETC/ATNI, 2019a, *Noise exposure scenarios in 2020 and 2030 — outlooks for EU 28*, Eionet Report ETC/ATNI No 2019/3, European Topic Centre on Air pollution, transport, noise and industrial pollution (<https://www.eionet.europa.eu/etcs/etc-atni/products/etc-atni-reports/etc-atni-report-3-2019-noise-exposure-scenarios-in-2020-and-2030-outlooks-for-eu-28>) accessed 30 June 2019.

ETC/ATNI, 2019b, *Noise indicators under the Environmental Noise Directive. Methodology for estimating missing data*, Eionet Report ETC/ATNI No 2019/1, European Topic Centre on Air pollution, transport, noise and industrial pollution (<https://www.eionet.europa.eu/etcs/etc-atni/products/etc-atni-reports/noise-indicators-under-the-environmental-noise-directive-methodology-for-estimating-missing-data>) accessed 30 June 2019.

ETC/ATNI, 2019c, *Status of quiet areas in European urban agglomerations*, forthcoming No 2019/10, European Topic Centre on Air pollution, transport, noise and industrial pollution.

EU, 2002, Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise (OJ L 189, 18.7.2002, pp. 12-25).

EU, 2013, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

EU, 2014, Regulation (EU) No 598/2014 of the European Parliament and of the Council of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC (OJ L 173, 12.6.2014, pp. 65-78).

Gil, D. and Brumm, H., 2013, *Acoustic communication in the urban environment: patterns, mechanisms, and potential consequences of avian song adjustments*, Oxford University Press, Oxford, UK.

Hänninen, O., et al., 2014, 'Environmental burden of disease

in Europe: assessing nine risk factors in six countries', *Environmental Health Perspectives* 122(5), pp. 439-446 (DOI: 10.1289/ehp.1206154).

Jarosińska, D., et al., 2018, 'Development of the WHO Environmental Noise Guidelines for the European Region: an introduction', *International Journal of Environmental Research and Public Health* 15(4) (DOI: 10.3390/ijerph15040813).

Matsinos, Y. G., et al., 2017, 'Identifying the quiet areas of a small urban setting: the case of Mytilene', *Global NEST Journal* 19(4), pp. 674-681.

Peris, E., et al., 2019, 'Assessment of quiet areas in Europe', conference paper presented at: 23rd International Congress on Acoustics, Aachen, Germany, 2019.

Shannon, G., et al., 2016, 'A synthesis of two decades of research documenting the effects of noise on wildlife', *Biological Reviews* 91(4), pp. 982-1005 (DOI: 10.1111/brv.12207).

Shepherd, D., et al., 2013, 'Do quiet areas afford greater health-related quality of life than noisy areas?', *International Journal of Environmental Research and Public Health* 10(4), pp. 1284-1303 (DOI: 10.3390/ijerph10041284).

WHO, 2009, *Night noise guidelines for Europe*, WHO Regional Office for Europe, Copenhagen.

WHO, 2018, *Environmental noise guidelines for the European region*, WHO Regional Office for Europe, Copenhagen (<http://www.euro.who.int/en/health-topics/environment-and-health/noise/publications/2018/environmental-noise-guidelines-for-the-european-region-2018>) accessed 7 December 2018.

WHO and JRC, 2011, *Burden of disease from environmental noise — quantification of healthy life years lost in Europe*, World Health Organization ([http://www.who.int/quantifying\\_ehimpacts/publications/e94888/en/](http://www.who.int/quantifying_ehimpacts/publications/e94888/en/)) accessed 5 May 2014.



## CHAPTER 12 — INDUSTRIAL POLLUTION

Amec Foster Wheeler, 2016a, *Assessment and summary of the Member States implementation reports for the IED, IPPCD, SED and WID — IED final report*, Report to the European Commission, Amec Foster Wheeler Environment & Infrastructure UK (<https://circabc.europa.eu/ui/group/06f33a94-9829-4eee-b187-21bb783a0fbf/library/99b250aa-17db-40d0-b8f9-57f58a3465fe/details>) accessed 19 October 2018.

Amec Foster Wheeler, 2016b, *Assessment and summary of the Member States' Implementation Reports for the IED, IPPCD, SED and WID — IPPC Directive Final Report*, Report to the European Commission, Amec Foster Wheeler Environment & Infrastructure UK (<https://circabc.europa.eu/ui/group/06f33a94-9829-4eee-b187-21bb783a0fbf/library/bdf649e5-f315-45c7-9652-cacc1a013150/details>) accessed 19 October 2018.

Bilsen, V., et al., 2015, *Analysis of certain waste streams and the potential of industrial symbiosis to promote waste as a resource for EU industry final report*, Publications Office of the European Union, Luxembourg.

Conti, M. E., et al., 2015, 'The industrial emissions trend and the problem of the implementation of the Industrial Emissions Directive (IED)', *Air Quality, Atmosphere & Health* 8(2), pp. 151-161 (DOI: 10.1007/s11869-014-0282-7).

EC, 2009, 'The 2020 climate and energy package' ([http://ec.europa.eu/clima/policies/package/index\\_en.htm](http://ec.europa.eu/clima/policies/package/index_en.htm)) accessed 26 November 2014.

EC, 2013, *Living well, within the limits of our planet: 7th EAP — the new general Union Environment Action Programme to 2020*, European Commission, Brussels, Belgium.

EC, 2014, Communication from the Commission to the European Parliament and the Council — Energy efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy (COM(2014) 520 final, Brussels, 23.7.2014).

EC, 2015, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Closing the loop: an EU action plan for the circular economy (COM(2015) 614 final).

EC, 2017, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — Investing in a smart, innovative and sustainable industry — a renewed EU Industrial Policy Strategy (COM(2017) 479 final, Brussels, 13.9.2017).

EC, 2018, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A clean planet for all: a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final).

ECHA, 2019, 'REACH Registration statistics', European Chemicals Agency ([https://echa.europa.eu/registration-](https://echa.europa.eu/registration-statistics)

[statistics](https://echa.europa.eu/registration-statistics)) accessed 10 October 2019.

EEA, 2014, *Revealing the costs of air pollution from industrial facilities in Europe — an updated assessment*, EEA Technical Report No 20/2014, European Environment Agency.

EEA, 2016, *Circular economy in Europe — Developing the knowledge base*, EEA Report No 2/2016, European Environment Agency.

EEA, 2017a, 'Emissions of air pollutants from large combustion plants (IND 427)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/emissions-of-air-pollutants-from/assessment-1>) accessed 19 October 2018.

EEA, 2017b, 'Urban waste water treatment (WAT 005)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/urban-waste-water-treatment/urban-waste-water-treatment-assessment-4>) accessed 22 October 2018.

EEA, 2018a, *European waters — assessment of status and pressures 2018*, EEA Report No 7/2018, European Environment Agency (<https://www.eea.europa.eu/publications/state-of-water>) accessed 6 December 2018.

EEA, 2018b, 'Mapping of nomenclatures relevant to emission reporting', Eionet Central Data Repository ([http://cdr.eionet.europa.eu/help/nomenclature\\_emission](http://cdr.eionet.europa.eu/help/nomenclature_emission)) accessed 3 December 2018.

EEA, 2018c, 'Reported data on large combustion plants covered by the Industrial Emissions Directive (2010/75/EU)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/data/lcp-6>) accessed 19 October 2018.

EEA, 2019a, *A decade of industrial pollution data*, EEA Briefing, European Environment Agency (<https://www.eea.europa.eu/themes/industry/industrial-pollution-in-europe/a-decade-of-industrial-pollution-data>) accessed 2 August 2019.

EEA, 2019b, *Assessing the effectiveness of EU policy on large combustion plants in reducing air pollutant emissions*, European Environment Agency.

EEA, 2019c, *Greening the power sector: benefits of an ambitious implementation of Europe's environment and climate policies*, EEA Briefing, European Environment Agency (<https://www.eea.europa.eu/themes/industry/industrial-pollution-in-europe/benefits-of-an-ambitious-implementation>) accessed 9 April 2019.

EEA, 2019d, 'Industrial waste in Europe (IND 437)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-473-en](https://www.eea.europa.eu/ds_resolveuid/IND-473-en)) accessed 9 April 2019.

EEA, 2019e, *Industrial waste water treatment — pressures on Europe's environment*, EEA Report No 23/2018, European Environment Agency ([https://www.eea.europa.eu/publications/industrial-waste-water-treatment-pressures/at\\_download/file](https://www.eea.europa.eu/publications/industrial-waste-water-treatment-pressures/at_download/file)) accessed 4 April 2019.

EEA, 2019f, 'National emissions reported to the Convention on Long-range Transboundary Air Pollution (LRTAP Convention)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-convention-on-long-range-transboundary-air-pollution-lrtap-convention-13>) accessed 2 August 2019.

EEA, 2019g, 'National emissions reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-15>) accessed 2 August 2019.

EEA, 2019h, 'The European Pollutant Release and Transfer Register (E-PRTR), Member States reporting under Article 7 of Regulation (EC) No 166/2006', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/data/member-states-reporting-art-7-under-the-european-pollutant-release-and-transfer-register-e-prtr-regulation-18>) accessed 29 May 2019.

Entec, 2011, *Assessment of the implementation of the IPPC Directive phase 3*, Report to the European Commission, Entec UK Limited (<https://circabc.europa.eu/ui/group/442f566e-5951-4779-9c65-75228988907/library/bc059242-87b2-42c8-8063-800c9838615b/details>) accessed 19 October 2018.

ETC/ACM and Dauwe, T., 2018, *Emission scenarios for large combustion plants under the IED regime*, Eionet Report No ETC/ACM 2018/16, European Topic Centre on Air Pollution and Climate Change Mitigation ([https://acm.eionet.europa.eu/reports/docs/EIONET\\_Rep\\_ETCACM\\_2018\\_16\\_IEDregime\\_LCPscenarios-web2.pdf](https://acm.eionet.europa.eu/reports/docs/EIONET_Rep_ETCACM_2018_16_IEDregime_LCPscenarios-web2.pdf)) accessed 2 August 2019.

ETC/ATNI, 2019, *Emissions outsourcing in the EU*, Eionet Report No ETC/ATNI Report 7/2019, European Topic Centre on Air pollution, transport, noise and industrial pollution.

EU, 2010, Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010, pp. 17-119).

Eurostat, 2018a, 'Employment by A\*10 industry breakdowns', Eurostat — Data Explorer ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_a10\\_e&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10_e&lang=en)) accessed 19 October 2018.

Eurostat, 2018b, 'Gross value added and income by A\*10 industry breakdowns', Eurostat — Data Explorer

([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_a10&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10&lang=en)) accessed 19 October 2018.

Eurostat, 2018c, 'Number and capacity of recovery and disposal facilities by NUTS 2 regions', Eurostat — Data Explorer ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env\\_wasfac&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_wasfac&lang=en)) accessed 18 December 2018.

Evrard, D., et al., 2016, 'Best Available Technique assessment methods: a literature review from sector to installation level', *Journal of Cleaner Production* 121, pp. 72-83 (DOI: <https://doi.org/10.1016/j.jclepro.2016.01.096>).

Ghisellini, P., et al., 2016, 'A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems', *Journal of Cleaner Production* 114, pp. 11-32 (DOI: [10.1016/j.jclepro.2015.09.007](https://doi.org/10.1016/j.jclepro.2015.09.007)).

Hey, C., 2005, 'EU environmental policies: a short history of the policy strategies', in: *EU environmental policy handbook*, European Environmental Bureau, Brussels.

JRC, 2018, 'Reference documents under the IPPC Directive and the IED', Joint Research Centre (<http://eippcb.jrc.ec.europa.eu/reference/>) accessed 19 October 2018.

Koutalakis, C., et al., 2010, 'When soft regulation is not enough: the Integrated Pollution Prevention and Control Directive of the European Union', *Regulation & Governance* 4(3), pp. 329-344 (DOI: [10.1111/j.1748-5991.2010.01084.x](https://doi.org/10.1111/j.1748-5991.2010.01084.x)).

Lange, B., 2011, 'The EU Directive on Industrial Emissions: squaring the circle of integrated, harmonised and ambitious technology standards?', *Environmental Law Review* 13(3), pp. 199-204 (DOI: [10.1350/enlr.2011.13.3.129](https://doi.org/10.1350/enlr.2011.13.3.129)).

Lee, M., 2014, *EU environmental law, governance and decision-making*, Bloomsbury Publishing, London.

Lieder, M. and Rashid, A., 2016, 'Towards circular economy implementation: a comprehensive review in context of manufacturing industry', *Journal of Cleaner Production* 115, pp. 36-51 (DOI: [10.1016/j.jclepro.2015.12.042](https://doi.org/10.1016/j.jclepro.2015.12.042)).

Peeters, M. and Oosterhuis, F., 2014, 'Limits to integration in pollution prevention and control', in: *EU environmental legislation: legal perspectives on regulatory strategies*, Edward Elgar, Cheltenham, UK.

Ricardo Energy & Environment, 2017, *Technical support for developing the profile of certain categories of large combustion plants regulated under the Industrial Emissions Directive*, Report to the European Commission (<https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp>) accessed 8 April 2019.

Ricardo Energy & Environment, 2018, *Ex-post assessment of costs and benefits from implementing BAT under the Industrial Emissions Directive*, Report to the European Commission (<https://circabc.europa.eu/ui/group/06f33a94-9829-4eee-b187-21bb783a0fbf/library/28bb7d3c-cf70-4a80-a73a-9fb90bb4968f/details>) accessed 3 December 2018.

Ricardo Energy & Environment and VITO, 2019, *IED Contribution to the circular economy*, Report to the European Commission (<https://circabc.europa.eu/sd/a/23fd890d-83f9-4372-8f26-669ff50e106a/IED%20contribution%20to%20Circular%20Economy%20report.pdf>) accessed 2 August 2019.

Sanden, J., 2012, 'Coherence in European environmental law with particular regard to the Industrial Emissions Directive', *European Energy and Environmental Law Review* 21(5), pp. 220-238.

UN, 2015, Resolution adopted by the General Assembly on 25 September 2015. Transforming our world: the 2030 agenda for sustainable development (A/RES/70/1).

UNECE, 1979, Convention on Long-range Transboundary Air Pollution (United Nations Economic Commission for Europe).

UNECE, 2018, 'Disseminating data on pollutant releases: promoting informed decisions for a sustainable future', conference paper presented at: Third Global Roundtable on PRTRs, Geneva, 2018.



## CHAPTER 13 — ENVIRONMENTAL PRESSURES AND SECTORS

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Alliance Environnement, 2007, *Evaluation of the application of cross-compliance as foreseen under Regulation 1782/2003*, Deliverable prepared for DG Agriculture ([https://ec.europa.eu/agriculture/sites/agriculture/files/evaluation/market-and-income-reports/2007/cross-compliance/short\\_sum\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/evaluation/market-and-income-reports/2007/cross-compliance/short_sum_en.pdf)) accessed 8 November 2018.

Alliance Environnement, 2017, *Literature reviews on the effects of farming practices associated with the CAP greening measures on climate and the environment, carried out for the evaluation study of the payment for agricultural practices beneficial for the climate and the environment ('greening' of direct payments)*, Report to the European Commission.

Alquézar, J. and Kwiatkowski, C., 2019, 'The role of research and innovation for the transition to a circular economy in Europe. Evidence from the community innovation survey 2014', in: *Progress towards the resources revolution*, World

Resources Forum, St. Gallen, Switzerland, pp. 22-28.

Bais-Moleman, A. L., et al., 2018, 'Assessing wood use efficiency and greenhouse gas emissions of wood product cascading in the European Union', *Journal of Cleaner Production* 172, pp. 3942-3954.

Balafoutis, A., et al., 2017, 'Precision agriculture technologies positively contributing to GHG emissions mitigation, farm productivity and economics', *Sustainability* 9(8), p. 1339 (DOI: 10.3390/su9081339).

Banaś, J., et al., 2018, 'An example of uneven-aged forest management for sustainable timber harvesting', *Sustainability* 10(9), p. 3305 (DOI: 10.3390/su10093305).

Bedia, J., et al., 2014, 'Forest fire danger projections in the Mediterranean using ENSEMBLES regional climate change scenarios', *Climatic Change* 122(1-2), pp. 185-199 (DOI: 10.1007/s10584-013-1005-z).

BMU, 2014, *GreenTech made in Germany 4.0* (<https://www.bmu.de/en/topics/economy-products-resources-tourism/economy-and-environment/environmental-technology/environmental-technology-atlas-for-germany/>) accessed 22 November 2018.

BMU, 2018, *GreenTech made in Germany 2018: environmental technology atlas for Germany*, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin (<https://www.bmu.de/PU481-1>) accessed 22 November 2018.

Brown, C., et al., 2019, *Understanding farmer uptake of measures that support biodiversity and ecosystem services in the Common Agricultural Policy (CAP). Report prepared by an EKLIPSE Expert Working Group. Centre for Ecology & Hydrology, Wallingford, United Kingdom* ([http://www.eklipse-mechanism.eu/apps/Ekclipse\\_data/website/EKLIPSE\\_CAP-AgriReport\\_Final\\_DigitalVersion.pdf](http://www.eklipse-mechanism.eu/apps/Ekclipse_data/website/EKLIPSE_CAP-AgriReport_Final_DigitalVersion.pdf)) accessed 20 August 2019.

Buckwell, A., et al., 2017, *CAP — thinking out of the box: further modernisation of the CAP – why, what and how?*, RISE Foundation ([http://www.risefoundation.eu/images/files/2017/2017\\_RISE\\_CAP\\_Full\\_Report.pdf](http://www.risefoundation.eu/images/files/2017/2017_RISE_CAP_Full_Report.pdf)) accessed 20 August 2019.

Camia, A., et al., 2018, *Biomass production, supply, uses and flows in the European Union: first results from an integrated assessment*, Publications Office of the European Union, Luxembourg ([http://publications.europa.eu/publication/manifstation\\_identifer/PUB\\_KJNA28993ENN](http://publications.europa.eu/publication/manifstation_identifer/PUB_KJNA28993ENN)) accessed 3 June 2019.

Certini, G., 2005, 'Effects of fire on properties of forest soils: a review', *Oecologia* 143(1), pp. 1-10 (DOI: 10.1007/s00442-004-1788-8).



Chaudhary, A., et al., 2016, 'Impact of forest management on species richness: global meta-analysis and economic trade-offs', *Scientific Reports* 6, p. 23954 (DOI: 10.1038/srep23954).

Ciscar, J. C., et al., 2014, *Climate impacts in Europe: the JRC PESETA II project*, JRC Scientific and Policy Reports, European Commission Joint Research Centre (<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/climate-impacts-europe-jrc-peseta-ii-project>) accessed 20 August 2019.

de Jong, E., et al., 2012, *Bio-based chemicals value added products from biorefineries*, Task 42, Biorefinery 34, IEA Bioenergy (<http://www.ieabioenergy.com/wp-content/uploads/2013/10/Task-42-Biobased-Chemicals-value-added-products-from-biorefineries.pdf>) accessed 20 August 2019.

Desprez-Loustau, M.-L., et al., 2007, 'Simulating the effects of a climate-change scenario on the geographical range and activity of forest-pathogenic fungi', *Canadian Journal of Plant Pathology* 29(2), pp. 101-120 (DOI: 10.1080/07060660709507447).

DG Agriculture, 2017a, 'CAP context indicators — 2017', European Commission Directorate-General for Agriculture ([https://ec.europa.eu/agriculture/cap-indicators/context/2017\\_en](https://ec.europa.eu/agriculture/cap-indicators/context/2017_en)) accessed 8 November 2018.

DG Agriculture, 2017b, *CAP context indicators 2014-2020. 34. Natura 2000 areas*, European Commission Directorate-General for Agriculture ([https://ec.europa.eu/agriculture/cap-indicators/context/2017/c34\\_en.pdf](https://ec.europa.eu/agriculture/cap-indicators/context/2017/c34_en.pdf)) accessed 20 August 2019.

DG Agriculture, 2018a, *Direct payments to agricultural producers — graphs and figures, financial year 2017*, European Commission Directorate-General for Agriculture ([https://ec.europa.eu/agriculture/sites/agriculture/files/cap-funding/beneficiaries/direct-aid/pdf/direct-aid-report-2017\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/cap-funding/beneficiaries/direct-aid/pdf/direct-aid-report-2017_en.pdf)) accessed 6 February 2019.

DG Agriculture, 2018b, *Indicative figures on the distribution of aid, by size-class of aid, received in the context of direct aid paid to the producers according to Council Regulation (EC) No 1307/2013 (financial year 2017)*, European Commission Directorate-General for Agriculture ([https://ec.europa.eu/agriculture/sites/agriculture/files/cap-funding/beneficiaries/direct-aid/pdf/direct-aid-indicative-figures-2017\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/cap-funding/beneficiaries/direct-aid/pdf/direct-aid-indicative-figures-2017_en.pdf)) accessed 6 February 2019.

DG Agriculture, 2019, 'Dashboard of CAP indicators. Agricultural area subject to environmental requirements', European Commission Directorate-General for Agriculture (<https://agridata.ec.europa.eu/extensions/DashboardIndicators/Environment.html>) accessed 4 June 2019.

EC, 2011a, Communication from the Commission to the

European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions — Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (COM(2011) 244 final).

EC, 2011b, *High commodity prices and volatility*, Brief No 1 ([https://ec.europa.eu/agriculture/sites/agriculture/files/markets-and-prices/market-briefs/pdf/01\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/markets-and-prices/market-briefs/pdf/01_en.pdf)) accessed 12 June 2018.

EC, 2011c, White Paper — Roadmap to a single European transport area — towards a competitive and resource efficient transport system (COM(2011) 144 final 28 March 2011).

EC, 2013a, Communication from the Commission to the European Parliament and the Council, the Economic and Social Committee and the Committee of the Regions — A new EU Forest Strategy: for forests and the forest-based sector (COM(2013) 659 final, Brussels, 20.9.2013).

EC, 2013b, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions 'Green infrastructure (GI) — Enhancing Europe's natural capital' (COM(2013) 659 final).

EC, 2013c, *Living well, within the limits of our planet: 7th EAP — the new general Union Environment Action Programme to 2020*, European Commission, Brussels, Belgium.

EC, 2013d, *Overview of CAP reform 2014-2020*, Agricultural Policy Perspectives Brief No 5 ([https://ec.europa.eu/agriculture/sites/agriculture/files/policy-perspectives/policy-briefs/05\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/policy-perspectives/policy-briefs/05_en.pdf)) accessed 8 November 2018.

EC, 2015a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Closing the loop: an EU action plan for the circular economy (COM(2015) 614 final).

EC, 2015b, Report from the Commission to the European Parliament and the Council — The mid-term review of the EU Biodiversity Strategy to 2020 (COM(2015) 478 final, Brussels, 2.10.2015).

EC, 2016a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A European strategy for low-emission mobility (COM(2016) 501 final).

EC, 2016b, 'Fitness check of the Birds and Habitats Directives', European Commission ([http://ec.europa.eu/environment/nature/legislation/fitness\\_check/index\\_en.htm](http://ec.europa.eu/environment/nature/legislation/fitness_check/index_en.htm)) accessed 6 April 2019.

EC, 2016c, *Impacts of EU trade agreements on the agricultural sector*, Publications Office of the European Union, Luxembourg ([https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2016-bilateral-trade-agreements/final-report\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2016-bilateral-trade-agreements/final-report_en.pdf)) accessed 8 November 2018.

EC, 2017a, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — Investing in a smart, innovative and sustainable industry. A renewed EU Industrial Policy Strategy (COM(2017) 479).

EC, 2017b, *EU agricultural outlook for agricultural markets and income 2017-2030*, European Commission ([https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/agricultural-outlook-2017-30\\_en.pdf](https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/agricultural-outlook-2017-30_en.pdf)) accessed 20 August 2019.

EC, 2018a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment (COM(2018) 673 final, Brussels, 11.10.2018).

EC, 2018c, *In-depth analysis in support of the Commission Communication COM(2018) 773 — A Clean Planet for All: a European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy* ([https://ec.europa.eu/clima/sites/clima/files/docs/pages/com\\_2018\\_773\\_analysis\\_in\\_support\\_en\\_0.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_773_analysis_in_support_en_0.pdf)) accessed 20 August 2019.

EC, 2018d, Progress in the implementation of the EU Forest Strategy 'A new EU Forest Strategy: for forests and the forest sector' (COM(2018) 811 final).

EC, 2019, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Environmental Implementation Review 2019: a Europe that protects its citizens and enhances their quality of life (COM(2019) 149 final).

ECA, 2016, *Making cross-compliance more effective and achieving simplification remains challenging*, Special Report No 26/2016, European Court of Auditors (<https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=38185>) accessed 9 January 2019.

ECA, 2017, *Greening: a more complex income support scheme, not yet environmentally effective*, Special Report No 21/2017, European Court of Auditors (<https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=44179>) accessed 8 November 2018.

EEA, 2013, *Achieving energy efficiency through behaviour*

*change what does it take?*, Technical Report No 5/2013, European Environment Agency.

EEA, 2014, *Resource-efficient green economy and EU policies*, EEA Report No 2/2014, European Environment Agency.

EEA, 2015, *State of nature in the EU: results from reporting under the nature directives 2007-2012*, EEA Technical Report No 2/2015, European Environment Agency (<http://www.eea.europa.eu/publications/state-of-nature-in-the-eu>) accessed 21 August 2019.

EEA, 2016a, *Air quality in Europe — 2016 report*, EEA Report No 28/2016, European Environment Agency (<https://www.eea.europa.eu/publications/air-quality-in-europe-2016>).

EEA, 2016b, *European forest ecosystems — state and trends*, EEA Report No 5/2016, European Environment Agency.

EEA, 2017a, *Aviation and shipping — impacts on Europe's environment, TERM 2017: Transport and Environment Reporting Mechanism (TERM) report*, EEA Report No 22/2017, European Environment Agency.

EEA, 2017b, *Climate change, impacts and vulnerability in Europe — an indicator-based report*, EEA Report No 1/2017, European Environment Agency.

EEA, 2017c, *Food in a green light: a systems approach to sustainable food*, EEA Report No 16/2017, European Environment Agency.

EEA, 2018a, 'Abundance and distribution of selected species (CSI 050/SEBI 001)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/abundance-and-distribution-of-selected-species-7/assessment>) accessed 9 April 2019.

EEA, 2018b, 'Air pollutant emissions data viewer (Gothenburg Protocol, LRTAP Convention) 1990-2016', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/dashboards/air-pollutant-emissions-data-viewer-1>) accessed 11 March 2019.

EEA, 2018c, 'Aquaculture production (CSI 033)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/aquaculture-production-4/assessment>) accessed 18 July 2019.

EEA, 2018d, *Land systems at European level — analytical assessment framework*, EEA Briefing, European Environment Agency (<https://www.eea.europa.eu/themes/landuse/land-systems/land-system-at-european-level>) accessed 27 May 2019.

EEA, 2018e, *Progress of EU transport sector towards its environment and climate objectives*, EEA Briefing No 15/2018,

European Environment Agency (<https://www.eea.europa.eu/publications/progress-of-eu-transport-sector-1>) accessed 20 August 2019.

EEA, 2019a, *Climate change adaptation in the agriculture sector in Europe*, EEA Report No 4/2019, European Environment Agency.

EEA, 2019b, 'Status of marine fish and shellfish stocks in European seas (CSI 032/MAR 007)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/status-of-marine-fish-stocks-3/assessment-1>) accessed 23 August 2019.

Energy Transition Commission, 2018, *Mission possible: reaching net-zero carbon emissions from harder-to-abate sectors by mid-century* (<http://www.energy-transitions.org/mission-possible>) accessed 20 August 2019.

ENRD, 2017, *Promoting the transition to a green economy*, European Network for Rural Development ([https://enrd.ec.europa.eu/sites/enrd/files/tg-resource-efficiency\\_synthesis-report.pdf](https://enrd.ec.europa.eu/sites/enrd/files/tg-resource-efficiency_synthesis-report.pdf)) accessed 1 February 2019.

ETC/ULS, 2019, *Final report (D23) Task 1.8.2.5 — Work on agriculture in 2018*, European Topic Centre on Urban, Land and Soil Systems.

EU, 2018, Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (OJ L 328, 21.12.2018, pp. 82-209).

EU, 2019, Regulation (EU) 2019/631 of the European Parliament and of the Council of 17 April 2019 setting CO<sub>2</sub> emission performance standards for new passenger cars and for new light commercial vehicles, and repealing Regulations (EC) No 443/2009 and (EU) No 510/2011 (OJ L 111, 25.4.2019, pp. 13-53).

EUMOFA, 2018, 'The EU fish market. 2018 edition', European Market Observatory for Fisheries and Aquaculture Products ([https://www.eumofa.eu/documents/20178/132648/EN\\_The+EU+fish+market+2018.pdf](https://www.eumofa.eu/documents/20178/132648/EN_The+EU+fish+market+2018.pdf)) accessed 24 September 2018.

European Parliament Research Service, 2017, *Current priorities and challenges in EU agricultural policy* ([http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS\\_BRI\(2017\)607262](http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI(2017)607262)) accessed 8 November 2018.

Eurostat, 2016a, *Agriculture, forestry and fishery statistics — 2016 edition*, Publications Office of the European Union, Luxembourg.

Eurostat, 2016b, *Environmental goods and services sector accounts — Handbook 2016 edition* (<https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS->

GQ-16-008) accessed 22 November 2018.

Eurostat, 2017, *Agriculture, forestry and fishery statistics — 2017 edition*, Publications Office of the European Union, Luxembourg (<https://ec.europa.eu/eurostat/documents/3217494/8538823/KS-FK-17-001-EN-N.pdf/c7957b31-be5c-4260-8f61-988b9c7f2316>) accessed 6 November 2018.

Eurostat, 2018a, *Agriculture, forestry and fishery statistics — 2018 edition*, Publications Office of the European Union, Luxembourg ([https://ec.europa.eu/eurostat/web/products-statistical-books/product/-/asset\\_publisher/AJvyaqHloCCp/content/KS-FK-18-001?inheritRedirect=false](https://ec.europa.eu/eurostat/web/products-statistical-books/product/-/asset_publisher/AJvyaqHloCCp/content/KS-FK-18-001?inheritRedirect=false)) accessed 9 January 2019.

Eurostat, 2018b, 'Agri-environmental indicator — gross nitrogen balance', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental\\_indicator\\_-\\_gross\\_nitrogen\\_balance](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_gross_nitrogen_balance)) accessed 8 November 2018.

Eurostat, 2018c, 'Farm indicators by agricultural area, type of farm, standard output, legal form and NUTS 2 regions (ef\_m\_farmleg)' (<https://ec.europa.eu/eurostat/web/agriculture/data/database>) accessed 9 January 2019.

Eurostat, 2018d, 'Organic farming statistics', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php/Organic\\_farming\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php/Organic_farming_statistics)) accessed 9 January 2019.

Eurostat, 2019a, 'Employment by A\*10 industry breakdowns [nama\_10\_a10\_e]', Eurostat - Data Explorer ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_a10\\_e&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10_e&lang=en)) accessed 20 August 2019.

Eurostat, 2019b, 'Employment in the environmental goods and services sector [env\_ac\_egss1]', Eurostat - Data Explorer ([https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env\\_ac\\_egss1&lang=en](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_ac_egss1&lang=en)) accessed 20 August 2019.

Eurostat, 2019c, 'Farms and farmland in the European Union', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php/Farms\\_and\\_farmland\\_in\\_the\\_European\\_Union\\_-\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php/Farms_and_farmland_in_the_European_Union_-_statistics)) accessed 4 June 2019.

Eurostat, 2019d, 'GDP and main components (output, expenditure and income) [nama\_10\_gdp]' ([https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_gdp&lang=en](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_gdp&lang=en)) accessed 20 August 2019.

Eurostat, 2019e, 'Gross value added and income by A\*10 industry breakdowns [nama\_10\_a10]', Eurostat - Data Explorer (<http://appsso.eurostat.ec.europa.eu/nui/show>

- do?dataset=nama\_10\_a10&lang=en) accessed 20 August 2019.
- Eurostat, 2019f, 'National accounts aggregates by industry (up to NACE A\*64)', Eurostat — Data Viewer ([https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_a64&lang=en](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64&lang=en)) accessed 20 August 2019.
- Eurostat, 2019g, 'National accounts employment data by industry (up to NACE A\*64)', Eurostat — Data Viewer ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_a64\\_e&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64_e&lang=en)) accessed 12 August 2019.
- Eurostat, 2019h, 'Production, value added and exports in the environmental goods and services sector [env\_ac\_egss2]', Eurostat - Data Explorer ([https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env\\_ac\\_egss2&lang=en](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_ac_egss2&lang=en)) accessed 20 August 2019.
- Eurostat, 2019i, 'SHARES (Short Assessment of Renewable Energy Sources) 2017 Summary results' (<https://ec.europa.eu/eurostat/web/energy/data/shares>) accessed 4 June 2019.
- FAO, 2006, *Global forest resources assessment 2005, main report. Progress towards sustainable forest management*, FAO Forestry Paper 147, Food and Agriculture Organization of the United Nations (<http://www.fao.org/docrep/008/a0400e/a0400e00.htm>) accessed 20 August 2019.
- FAO, 2018, *The state of world fisheries and aquaculture 2018 — meeting the Sustainable Development Goals*, Food and Agriculture Organization of the United Nations (<http://www.fao.org/3/i9540en/i9540EN.pdf>) accessed 1 October 2019.
- Forest Europe, 2015a, *Annex 1 to Madrid Ministerial Declaration: updated pan-European indicators for sustainable forest management. Forest Europe 7th Ministerial Conference, Madrid, Spain* ([https://foresteurope.org/wp-content/uploads/2016/11/III-ELM\\_7MC\\_2\\_2015\\_MinisterialDeclaration\\_adopted-2.pdf#page=5](https://foresteurope.org/wp-content/uploads/2016/11/III-ELM_7MC_2_2015_MinisterialDeclaration_adopted-2.pdf#page=5)) accessed 20 August 2019.
- Forest Europe, 2015b, *State of Europe's forests 2015 report* (<https://foresteurope.org/state-europes-forests-2015-report/>) accessed 6 November 2018.
- Gardiner, B., et al., eds., 2013, *Living with storm damage to forests*, European Forestry institute, Joensuu, Finland.
- Gehrke, B. and Schasse, U., 2017, *Die Umweltschutzwirtschaft in Deutschland Produktion, Umsatz und Außenhandel, Aktualisierte Ausgabe 2017*, Umweltbundesamt, Dessau-Rosslau, Germany ([https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2017-11-28\\_uib\\_03-2017\\_umweltschutzwirtschaft.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2017-11-28_uib_03-2017_umweltschutzwirtschaft.pdf)) accessed 22 November 2018.
- Goswami, S., et al., 2017, 'Phosphorus limitation of aboveground production in northern hardwood forests', *Ecology* 99(2), pp. 438-449.
- Greening, L. A., et al., 2000, 'Energy efficiency and consumption — the rebound effect — a survey', *Energy Policy* 28(6), pp. 389-401 (DOI: 10.1016/S0301-4215(00)00021-5).
- Hessenmöller, D., et al., 2018, 'A silvicultural strategy for managing uneven-aged beech-dominated forests in Thuringia, Germany: a new approach to an old problem', *Scandinavian Journal of Forest Research* 33(7), pp. 668-680 (DOI: 10.1080/02827581.2018.1453081).
- IEA, 2018, *World energy investment 2018*, International Energy Agency (<https://www.iea.org/wei2018/>) accessed 22 November 2018.
- IEEP, 2010, *Farmland abandonment in the EU: an assessment of trends and prospects*, Institute for European Environmental Policy (<https://ieep.eu/publications/farmland-abandonment-in-the-eu-an-assessment-of-trends-and-prospects>) accessed 1 July 2019.
- IPBES, 2018, *Assessment report on biodiversity and ecosystem services for Europe and Central Asia*, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (<https://www.ipbes.net/assessment-reports/eca>) accessed 9 April 2019.
- Jackson, J. B. C., et al., 2001, 'Historical overfishing and the recent collapse of coastal ecosystems', *Science* 293(5530), pp. 629-637 (DOI: 10.1126/science.1059199).
- Kändler, G. and Riemer, U., 2017, 'Germany', in: Barreiro, S. et al. (eds), *Forest inventory-based projection systems for wood and biomass availability*, Managing Forest Ecosystems, Springer International Publishing, Cham, pp. 175-183.
- Khabarov, N., et al., 2016, 'Forest fires and adaptation options in Europe', *Regional Environmental Change* 16(1), pp. 21-30 (DOI: 10.1007/s10113-014-0621-0).
- Ludwig, S. M., et al., 2018, 'Fire severity effects on soil carbon and nutrients and microbial processes in a Siberian larch forest', *Global Change Biology* 24(12), pp. 5841-5852 (DOI: 10.1111/gcb.14455).
- Marchetti, M., et al., 2018, 'Inference on forest attributes and ecological diversity of trees outside forest by a two-phase inventory', *Annals of Forest Science* 75(2), p. 37 (DOI: 10.1007/s13595-018-0718-6).
- McKinsey & Company, 2018, *Decarbonization of industrial sectors: the next frontier*, Amsterdam (<https://www.mckinsey.com/business-functions/sustainability/our-insights/how-industry-can-move-toward-a-low-carbon-future>) accessed 22 November 2018.
- Michel, A. and Seidling, W., 2017, *Forest Condition in Europe: 2017*, Report under the UNECE Convention on Long-Range

Transboundary Air Pollution (CLRTAP) No BFW Dokumentation 24/2017, BFW Austrian Research Centre for Forests, Vienna.

Nimmo, F. and Cappell, R., 2017, *Taking stock — progress towards ending overfishing in the EU. Report produced by Poseidon Aquatic Resource Management Ltd for the Pew Charitable Trusts*, Poseidon Aquatic Resource Management ([https://www.consult-poseidon.com/fishery-reports/Poseidon\\_Taking\\_Stock\\_2017.pdf](https://www.consult-poseidon.com/fishery-reports/Poseidon_Taking_Stock_2017.pdf)) accessed 1 October 2019.

OECD/FAO, 2017, *OECD-FAO agricultural outlook 2017-2026*, OECD Publishing ([https://www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2017-2026\\_agr\\_outlook-2017-en](https://www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2017-2026_agr_outlook-2017-en)) accessed 8 November 2018.

OECD/FAO, 2018, *OECD-FAO agricultural outlook 2018-2027*, OECD Publishing (<http://www.fao.org/documents/card/en/c/I9166EN>) accessed 1 March 2019.

Pe'er, G., et al., 2017, 'Adding some green to the greening: improving the EU's ecological focus areas for biodiversity and farmers', *Conservation Letters* 10(5), pp. 517-530 (DOI: 10.1111/conl.12333).

Petrash, D., et al., 2019, 'Spatially Resolved Soil Solution Chemistry in a Central European Atmospherically Polluted High-Elevation Catchment', (DOI: 10.20944/preprints201902.0167.v1).

Puettmann, K., et al., 2015, 'Silvicultural alternatives to conventional even-aged forest management — what limits global adoption?', *Forest Ecosystems* 2, p. 8 (DOI: 10.1186/s40663-015-0031-x).

Pureswaran, D. S., et al., 2018, 'Forest insects and climate change', *Current Forestry Reports* 4(2), pp. 35-50 (DOI: 10.1007/s40725-018-0075-6).

REN21, 2018, *Renewables global status report* (<http://www.ren21.net/status-of-renewables/global-status-report/>) accessed 22 November 2018.

Sabatini, F. M., et al., 2018, 'Where are Europe's last primary forests?', *Diversity and Distributions* 24(10), pp. 1426-1439 (DOI: 10.1111/ddi.12778).

Santín, C. and Doerr, S. H., 2016, 'Fire effects on soils: the human dimension', *Philosophical Transactions of the Royal Society B: Biological Sciences* 371(1696), p. 20150171 (DOI: 10.1098/rstb.2015.0171).

Sardans, J., et al., 2016, 'Foliar and soil concentrations and stoichiometry of nitrogen and phosphorous across European *Pinus sylvestris* forests: relationships with climate, N deposition and tree growth', *Functional Ecology* 30(5), pp. 676-689 (DOI: 10.1111/1365-2435.12541).

Schelhaas, M.-J., et al., 2018, 'Actual European forest management by region, tree species and owner based on 714,000 re-measured trees in national forest inventories', *PLOS ONE* 13(11), p. e0207151 (DOI: 10.1371/journal.pone.0207151).

Schmithüsen, F. and Hirsch, F., 2010, *Private forest ownership in Europe*, United Nations Economic Commission for Europe (<http://www.unece.org/fileadmin/DAM/timber/publications/SP-26.pdf>) accessed 20 August 2019.

Schrijver, R., 2016, *Precision agriculture and the future of farming in Europe*, Scientific Foresight Study, European Parliament ([http://www.europarl.europa.eu/RegData/etudes/STUD/2016/581892/EPRS\\_STU\(2016\)581892\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/581892/EPRS_STU(2016)581892_EN.pdf)) accessed 20 August 2019.

Seidl, R., et al., 2017, 'Forest disturbances under climate change', *Nature Climate Change* 7, pp. 395-402 (DOI: 10.1038/nclimate3303).

Sing, L., et al., 2018, 'A review of the effects of forest management intensity on ecosystem services for northern European temperate forests with a focus on the UK', *Forestry: An International Journal of Forest Research* 91(2), pp. 151-164 (DOI: 10.1093/forestry/cpx042).

Skjelvik, J., et al., 2017, *Environmental impacts and potential of the sharing economy*, TemaNord 2017:554, Nordic Council of Ministers (<https://norden.diva-portal.org/smash/get/diva2:1145502/FULLTEXT01.pdf>) accessed 20 August 2019.

Sorrell, S., 2007, *The rebound effect: an assessment of the evidence for economy-wide energy savings from improved energy efficiency*, UK Energy Research Centre, London (<http://www.ukerc.ac.uk/programmes/technology-and-policy-assessment/the-rebound-effect-report.html>) accessed 20 August 2019.

STECF, 2017, *The 2017 annual economic report on the EU fishing fleet (STECF 17-12)*, Scientific, Technical and Economic Committee for Fisheries (<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/2017-annual-economic-report-eu-fishing-fleet-stecf-17-12>) accessed 21 September 2018.

STECF, 2018a, *Economic report of the EU aquaculture sector (STECF 18-19)*, Scientific, Technical and Economic Committee for Fisheries.

STECF, 2018b, *The 2018 annual economic report on the EU fishing fleet (STECF 18-07)*, Scientific, Technical and Economic Committee for Fisheries (<http://publications.jrc.ec.europa.eu/repository/handle/JRC112940>) accessed 20 August 2019.

Sutherland, W. J., et al., 2017, *What Works in Conservation 2017 (archived)*, Open Book Publishers.

Terluin, I., et al., 2017, *Research for AGRI Committee – CAP implementation: flexibility given to Member States — state of play and perspectives*, European Parliament ([http://www.europarl.europa.eu/RegData/etudes/STUD/2017/601975/IPOL\\_STU\(2017\)601975\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2017/601975/IPOL_STU(2017)601975_EN.pdf)) accessed 1 February 2019.

Terres, J.-M., et al., 2015, 'Farmland abandonment in Europe: identification of drivers and indicators, and development of a composite indicator of risk', *Land Use Policy* 49, pp. 20-34 (DOI: 10.1016/j.landusepol.2015.06.009).

Thorsen, J., et al., 2014, *The provision of forest ecosystem services. Volume I: Quantifying and valuing non-market ecosystem services*, What Science Can Tell Us ([https://curis.ku.dk/ws/files/132340220/efi\\_wsctu\\_5\\_vol\\_1\\_en\\_net.pdf](https://curis.ku.dk/ws/files/132340220/efi_wsctu_5_vol_1_en_net.pdf)) accessed 20 August 2019.

UBA, 2017, *A resource efficient pathway towards a greenhouse gas neutral Germany*, Dessau-Rosslau, Germany (<https://www.umweltbundesamt.de/en/publikationen/a-resource-efficient-pathway-towards-a-greenhouse>) accessed 20 August 2019.

UN, 2015, Resolution adopted by the General Assembly on 3 June 2015: 69/283. Sendai Framework for Disaster Risk Reduction 2015-2030 (A/RES/69/283).

World Bank, 2017, *World Bank Annual Report 2017*, No 119779, The World Bank (<http://documents.worldbank.org/curated/en/143021506909711004/World-Bank-Annual-Report-2017>) accessed 24 September 2018.

Zarco-Tejada, P., et al., 2014, *Precision agriculture: an opportunity for EU farmers — potential support with the CAP 2014-2020*, European Parliament ([http://www.europarl.europa.eu/RegData/etudes/note/join/2014/529049/IPOL-AGRI\\_NT%282014%29529049\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/note/join/2014/529049/IPOL-AGRI_NT%282014%29529049_EN.pdf)) accessed 20 August 2019.

Zeza, A., 2017, *Research for AGRI Committee — Policy support for productivity vs. sustainability in EU agriculture: towards viable farming and green growth*, European Parliament ([http://www.europarl.europa.eu/RegData/etudes/STUD/2017/585905/IPOL\\_STU\(2017\)585905\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2017/585905/IPOL_STU(2017)585905_EN.pdf)) accessed 1 February 2019.



## CHAPTER 14 — SUMMARY ASSESSMENT

Brink, P. ten, et al., 2013, *Economic benefits of the Natura 2000 network: synthesis report*, Publications Office of the European Union, Luxembourg.

COWI and Eunomia, 2019, *The costs of not implementing EU*

*environmental law*, European Commission ([http://ec.europa.eu/environment/eir/pdf/study\\_costs\\_not\\_implementing\\_env\\_law.pdf](http://ec.europa.eu/environment/eir/pdf/study_costs_not_implementing_env_law.pdf)) accessed 13 August 2019.

EC, 2018a, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A clean planet for all: a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final).

EC, 2018b, Report from the Commission to the Council and the European Parliament on the implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member State reports for the period 2012–2015 {SWD(2018) 246 final} (COM(2018) 257 final).

EC, 2018c, *Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) Statement on emerging health and environmental issues (2018)* ([https://ec.europa.eu/health/sites/health/files/scientific\\_committees/scheer/docs/scheer\\_s\\_002.pdf](https://ec.europa.eu/health/sites/health/files/scientific_committees/scheer/docs/scheer_s_002.pdf)) accessed 15 August 2019.

EC, 2019a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Environmental Implementation Review 2019: a Europe that protects its citizens and enhances their quality of life (COM(2019) 149 final).

EC, 2019b, Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the evaluation of the 7th Environment Action Programme (COM(2019) 233 final).

EEA, 2015, *The European environment — State and outlook 2015: Synthesis report*, European Environment Agency (<https://www.eea.europa.eu/soer-2015/synthesis/report>) accessed 6 August 2019.

EEA, 2016, *Environmental indicator report 2016 — in support to the monitoring of the 7th Environment Action Programme*, EEA Report No 30/2016, European Environment Agency.

EEA, 2017, *Environmental indicator report 2017 — in support to the monitoring of the 7th Environment Action Programme*, EEA Report No 21/2017 (<https://www.eea.europa.eu/publications/environmental-indicator-report-2017>) accessed 7 November 2018.

EEA, 2018, *Environmental indicator report 2018 — in support to the monitoring of the Seventh Environment Action Programme*, EEA Report No 19/2018, European Environment Agency

(<https://www.eea.europa.eu/publications/environmental-indicator-report-2018>) accessed 15 August 2019.

EEA, 2019, *Unequal exposure and unequal impacts: social vulnerability to air pollution, noise and extreme temperatures in Europe*, EEA Report No 22/2018, European Environment Agency (<https://www.eea.europa.eu/publications/unequal-exposure-and-unequal-impacts>) accessed 12 August 2019.

EU, 2013, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

European Parliament, 2017, *Implementation of the 7th Environment Action Programme. Mid-term review. European implementation assessment* (<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A8-2018-0059+0+DOC+XML+V0//EN>) accessed 15 August 2019.

Paleari, S., 2019, *EU environmental targets and objectives 2015-2050*, Eionet Report ETC/WMGE 2019/2, European Topic Centre on Waste and Materials in a Green Economy.

Sutton, M. A., et al., 2011, *The European nitrogen assessment: summary for policy makers*, Cambridge University Press, Cambridge.

Sutton, M. A., et al., 2017, *The European nitrogen assessment 6 years after: what was the outcome and what are the future research challenges?* (<https://static1.squarespace.com/static/58cff61c414fb598d9e947ca/t/5abb898faa4a99a0ab4e71d9/1522239888660/The+European+Nitrogen+Assessment+-+Prof+Mark+Sutton+%28003%29.pdf>) accessed 13 November 2018.

Westhoek, H., et al., 2015, *Nitrogen on the table: the influence of food choices on nitrogen emissions and the European environment*, Special Report, Centre for Ecology and Hydrology, Edinburgh (<http://nora.nerc.ac.uk/513111/>) accessed 15 August 2019.



## CHAPTER 15 — SUSTAINABILITY THROUGH A SYSTEM LENS

Åhman, M., et al., 2018, *Hydrogen steelmaking for a low-carbon economy: a joint LU-SEI working paper for the HYBRIT project*, SEI Working paper WP 2018-07, Stockholm Environment Institute and Lund University ([https://www.researchgate.net/publication/327646584\\_Hydrogen\\_steelmaking\\_for\\_a\\_low-carbon\\_economy\\_A\\_joint\\_LU-SEI\\_working\\_paper\\_for\\_the\\_HYBRIT\\_project](https://www.researchgate.net/publication/327646584_Hydrogen_steelmaking_for_a_low-carbon_economy_A_joint_LU-SEI_working_paper_for_the_HYBRIT_project)) accessed 29 October 2018.

Bardazzi, R. and Pazienza, M. G., 2017, 'Switch off the light, please! Energy use, aging population and consumption habits', *Energy Economics* 65(C), pp. 161-171.

CBD, 2015, *Synthetic biology*, Technical Series No 82, Secretariat of the Convention on Biological Diversity, Montreal (<https://www.cbd.int/doc/publications/cbd-ts-82-en.pdf>) accessed 22 May 2019.

EC, 2006, Communication from the Commission to the Council and the European Parliament — Halting the loss of biodiversity by 2010 and beyond (COM(2006) 216 final of 22 May 2006).

EC, 2011a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Energy Roadmap 2050 (COM(2011) 885 final).

EC, 2011b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (COM (2011) 244 final, Brussels, 3.5.2011).

EC, 2015, 'Headline target — mid-term review of the EU biodiversity strategy to 2020 — Biodiversity Information system for Europe' (<https://biodiversity.europa.eu/mtr/biodiversity-strategy-plan/headline-target-review>) accessed 22 May 2019.

EC, 2017a, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — Investing in a smart, innovative and sustainable industry — a renewed EU Industrial Policy Strategy (COM(2017) 479 final, Brussels, 13.9.2017).

EC, 2018a, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A clean planet for all: a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final).

EC, 2018b, 'Trade policy coherence for development' ([https://ec.europa.eu/europeaid/sectors/economic-growth/trade/trade-policy-coherence-development\\_en](https://ec.europa.eu/europeaid/sectors/economic-growth/trade/trade-policy-coherence-development_en)) accessed 29 October 2018.

EC, 2019, *Towards a sustainable Europe by 2030*, Reflection

paper, European Commission ([https://ec.europa.eu/commission/sites/beta-political/files/rp\\_sustainable\\_europe\\_30-01\\_en\\_web.pdf](https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf)) accessed 15 May 2019.

EEA (forthcoming), 2020a, *Demographic change, technological change, and fiscal sustainability: Scenarios for sustainable consumption and production*, European Environment Agency.

EEA (forthcoming), 2020b, *Drivers of change and their implications on European production and consumption: a system-based assessment*, European Environment Agency.

EEA, 2015, *The European environment — State and outlook 2015: Synthesis report*, European Environment Agency (<https://www.eea.europa.eu/soer-2015/synthesis/report>) accessed 6 August 2019.

EEA, 2016, *Seafood in Europe: a food system approach for sustainability*, EEA Report No 25/2016, European Environment Agency (<https://www.eea.europa.eu/publications/seafood-in-europe-a-food>) accessed 25 October 2018.

EEA, 2017, *Circular by design — Products in the circular economy*, EEA Report No 6/2017, European Environment Agency (<https://www.eea.europa.eu/publications/circular-by-design>) accessed 25 September 2018.

EEA, 2018a, *EEA framework for international engagement*, Corporate Document No 1/2018, European Environment Agency (<https://www.eea.europa.eu/publications/eea-framework-for-international-engagement/download>) accessed 29 May 2019.

EEA, 2018b, *Perspectives on transitions to sustainability*, EEA Report No 25/2017, European Environment Agency (<https://www.eea.europa.eu/publications/perspectives-on-transitions-to-sustainability>) accessed 8 June 2019.

EEA, 2019, 'Implementation of the Shared Environmental Information System (SEIS) principles and practices in the European neighbourhood regions (February 2016-January 2020)', ENI SEIS II (<https://eni-seis.eionet.europa.eu/>) accessed 6 April 2019.

EEA and FLIS, 2019, *Four emerging trends and their implications for the European environment*, EEA Briefing, European Environment Agency.

EEA and SEI, 2019, *Identifying critical SDG interactions for the environment in the EU*, European Environment Agency and Stockholm Environment Institute.

EPSC, 2018, *Geopolitical outlook for Europe*, ESPC Brief, European Political Strategy Centre, European Commission, Brussels ([https://ec.europa.eu/epsc/sites/epsc/files/epsc\\_brief\\_geopolitical.pdf](https://ec.europa.eu/epsc/sites/epsc/files/epsc_brief_geopolitical.pdf)) accessed 16 May 2019.

ESPAS, 2019, *Global trends to 2030 — challenges and choices for Europe*, European Strategy and Policy Analysis System ([https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/ESPAS\\_Report2019.pdf](https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/ESPAS_Report2019.pdf)) accessed 6 August 2019.

EU, 2007, Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007 (2007/C 306/01).

EU, 2013, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

European Council, 2014, European Council (23 and 24 October 2014) — Conclusions on 2030 Climate and Energy Policy Framework (SN 79/14).

Figliozzi, M. A., 2017, 'Lifecycle modeling and assessment of unmanned aerial vehicles (drones) CO<sub>2</sub> emissions', *Transportation Research Part D: Transport and Environment* 57, pp. 251-261 (DOI: 10.1016/j.trd.2017.09.011).

Future Earth, 2019, 'Future Earth Transformations' (<http://futureearth.org/future-earth-transformations>) accessed 27 May 2019.

Gerber, P. J., et al., 2013, *Tackling climate change through livestock — a global assessment of emissions and mitigation opportunities*, Food and Agriculture Organization of the United Nations, Rome ([www.fao.org/3/a-i3437e.pdf](http://www.fao.org/3/a-i3437e.pdf)) accessed 31 March 2019.

Goodchild, A. and Toy, J., 2018, 'Delivery by drone: an evaluation of unmanned aerial vehicle technology in reducing CO<sub>2</sub> emissions in the delivery service industry', *Transportation Research Part D: Transport and Environment* 61, pp. 58-67 (DOI: 10.1016/j.trd.2017.02.017).

Griggs, D., et al., 2017, *A guide to SDG interactions: from science to implementation*, International Council for Science, Paris (<https://council.science/cms/2017/05/SDGs-Guide-to-Interactions.pdf>) accessed 8 October 2018.

Hajer, M., 2011, *The energetic society: in search of a governance philosophy for a clean economy*, PBL, Netherlands Environmental Assessment Agency, The Hague, Netherlands.

IPBES, 2019, *Global assessment report on biodiversity and ecosystem services*, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany (<https://www.ipbes.net/global-assessment-report-biodiversity-ecosystem-services>) accessed 6 August 2019.



IPCC, 2018, *Global warming of 1.5 °C*, Intergovernmental Panel on Climate Change (<http://www.ipcc.ch/report/sr15/>) accessed 10 November 2018.

Kouhizadeh, M. and Sarkis, J., 2018, 'Blockchain practices, potentials, and perspectives in greening supply chains', *Sustainability* 10(10), p. 3652 (DOI: 10.3390/su10103652).

Lucas, K., et al., 2016, *Sustainable development goals in the Netherlands — building blocks for environmental policy for 2030*, PBL, Netherlands Environment Assessment Agency (<http://www.pbl.nl/en/news/newsitems/2016/un-sustainable-development-goals-also-require-policy-effort-in-the-netherlands>) accessed 9 October 2018.

MSC, 2019, *Munich security report 2019*, Munich Security Conference (<https://www.securityconference.de/en/publications/munich-security-report/>) accessed 16 May 2019.

Nilsson, M., et al., 2016, 'Map the interactions between Sustainable Development Goals', *Nature* 534(7607), pp. 320-322.

OECD, 2016, *OECD science, technology and innovation outlook 2016*, Organisation for Economic Co-operation and Development ([https://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-innovation-outlook-2016/system-innovation\\_sti\\_in\\_outlook-2016-9-en](https://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-innovation-outlook-2016/system-innovation_sti_in_outlook-2016-9-en)) accessed 22 May 2019.

OECD, 2017, *Policy coherence for sustainable development 2017*, OECD Publishing, Paris.

OECD, 2018, *Policy coherence for sustainable development 2018: towards sustainable and resilient societies*, Organisation for Economic Co-operation and Development.

Park, J., et al., 2018, 'A comparative analysis of the environmental benefits of drone-based delivery services in urban and rural areas', *Sustainability* 10(3), p. 888 (DOI: 10.3390/su10030888).

Pérez-Fortes, M., et al., 2014, 'CO<sub>2</sub> capture and utilization in cement and iron and steel industries', *Energy Procedia* 63, pp. 6534-6543 (DOI: 10.1016/j.egypro.2014.11.689).

Science for Environment Policy, 2016, *Synthetic biology and biodiversity*, Future Brief 15, European Commission, Brussels ([https://ec.europa.eu/environment/integration/research/newsalert/pdf/synthetic\\_biology\\_biodiversity\\_FB15\\_en.pdf](https://ec.europa.eu/environment/integration/research/newsalert/pdf/synthetic_biology_biodiversity_FB15_en.pdf)) accessed 22 May 2019.

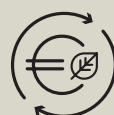
TWI2050, 2018, *Transformations to achieve the sustainable development goals. Report prepared by The World in 2050 initiative*, International Institute for Applied Systems Analysis (<http://www.iiasa.ac.at/web/home/research/twi/>

Report2018.html) accessed 18 January 2019.

UN, 2015, Resolution adopted by the General Assembly on 25 September 2015. Transforming our world: the 2030 agenda for sustainable development (A/RES/70/1).

UN Environment, 2019, *Global environment outlook — GEO-6: healthy planet, healthy people*, United Nations Environment Programme (<https://www.unenvironment.org/resources/global-environment-outlook-6>) accessed 27 May 2019.

Weitz, N., et al., 2018, 'Towards systemic and contextual priority setting for implementing the 2030 Agenda', *Sustainability Science* 13(2), pp. 531-548 (DOI: 10.1007/s11625-017-0470-0).



## CHAPTER 16 — UNDERSTANDING SUSTAINABILITY CHALLENGES

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ACEA, 2018, 'Share of diesel in new passenger cars', European Automobile Manufacturers' Association (<https://www.acea.be/statistics/tag/category/share-of-diesel-in-new-passenger-cars>) accessed 12 April 2019.

Allwood, J., et al., 2014, 'Annex I: Glossary, acronyms and chemical symbols', in: *Climate change 2014: mitigation of climate change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK.

Arthur, W. B., 1994, *Increasing returns and path dependence in the economy*, University of Michigan Press, Ann Arbor, MI, USA.

Backhaus, J., 2010, 'Intermediaries as innovating actors in the transition to a sustainable energy system', *Central European Journal of Public Policy* 4(1), pp. 86-109.

Baumert, N., et al., 2019, 'Global outsourcing of carbon emissions 1995-2009: a reassessment', *Environment Science & Policy* 92, pp. 228-236.

Beylot, A., et al., 2019a, 'Assessing the environmental impacts of EU consumption at macro-scale', *Journal of Cleaner Production* 216, pp. 382-393 (DOI: 10.1016/j.jclepro.2019.01.134).

Beylot, A., et al., 2019b, 'Environmental impacts of European trade: interpreting results of process-based LCA and environmentally extended input-output analysis towards hotspots identification', *International Journal of Life Cycle Assessment* (DOI: <https://doi.org/10.1007/s11367-019-01649-z>).

Buckwell, A. and Nadeu, E., 2018, *What is the safe operating space for EU livestock?*, RISE Foundation, Brussels.

Coady, D., et al., 2015, *How large are global energy subsidies?*, IMF Working Paper No WP/15/ 105, International Monetary Fund, Washington, DC (<http://www.imf.org/external/pubs/ft/wp/2015/wp15105.pdf>) accessed 15 November 2018.

Conijn, J. G., et al., 2018, 'Can our global food system meet food demand within planetary boundaries?', *Agriculture, Ecosystems & Environment* 251, pp. 244-256 (DOI: 10.1016/j.agee.2017.06.001).

Corrado, S. and Sala, S., 2018, 'Food waste accounting along global and European food supply chains: state of the art and outlook', *Waste Management* 79, pp. 120-131 (DOI: 10.1016/j.wasman.2018.07.032).

Crenna, E., et al., 2019, 'Biodiversity impacts due to food consumption in Europe', *Journal of Cleaner Production* 227, pp. 378-391.

Creutzig, F., et al., 2018, 'Towards demand-side solutions for mitigating climate change', *Nature Climate Change* 8(4), p. 268.

Di Felice, L. J., et al., 2018, 'Deep decarbonisation from a biophysical perspective: GHG emissions of a renewable electricity transformation in the EU', *Sustainability* 10(10), p. 3685 (DOI: 10.3390/su10103685).

EC, 2011a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Roadmap to a resource efficient Europe (COM(2011) 571 final).

EC, 2011b, White Paper — Roadmap to a single European transport area — towards a competitive and resource efficient transport system (COM(2011) 144 final 28 March 2011).

EC, 2012, Impact assessment accompanying the document Proposal for a Directive of the European Parliament and of the Council amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources (SWD(2012) 343 final, Brussels, 17.10.2012).

EC, 2014, *EU Action plan on childhood obesity 2014-2020*, European Commission, Brussels.

EC, 2015, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Closing the loop: an EU action plan for the circular economy (COM(2015) 614 final).

EC, 2016a, Commission Staff Working Document — European research and innovation for food and nutrition security

(SWD(2016) 319 final).

EC, 2016b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — Clean energy for all Europeans (COM(2016) 860 final).

EC, 2016c, Impact Assessment accompanying the document Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity (recast) Proposal for a Regulation of the European Parliament and of the Council on the electricity market (recast) Proposal for a Regulation of the European Parliament and of the Council establishing a European Union Agency for the Cooperation of Energy Regulators (recast) Proposal for a Regulation of the European Parliament and of the Council on risk preparedness in the electricity sector (SWD(2016) 410 final).

EC, 2016d, Proposal for a Regulation of the European Parliament and of the Council laying down rules on the making available on the market of CE marked fertilising products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009 COM/2016/0157 final - 2016/084 (COD) (COM(2016) 157 final 2016/084 (COD)).

EC, 2017a, Commission staff working document accompanying the document Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions — Europe on the move: an agenda for a socially fair transition towards clean, competitive and connected mobility for all (SWD(2017) 177 final).

EC, 2017b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Communication on strengthening Europe's energy networks (COM(2017) 718 final).

EC, 2017c, Proposal for a Regulation of the European Parliament and of the Council setting emission performance standards for new passenger cars and for new light commercial vehicles as part of the Union's integrated approach to reduce CO<sub>2</sub> emissions from light-duty vehicles and amending Regulation (EC) No 715/2007 (recast) (COM(2017) 676 final 2017/0293 (COD)).

EC, 2018a, 'Carbon capture and storage', European Commission — Energy (<https://ec.europa.eu/energy/en/topics/oil-gas-and-coal/carbon-capture-and-storage>) accessed 18 January 2019.

EC, 2018c, Commission Staff Working Document accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the

Committee of the Regions — A European strategy for plastics in a circular economy (SWD(2018) 16 final).

EC, 2018d, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment (COM(2018) 673 final, Brussels, 11.10.2018).

EC, 2018e, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Europe on the Move, sustainable mobility for Europe: safe, connected and clean (COM(2018) 293 final).

EC, 2018f, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A clean planet for all: a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final).

EC, 2018g, *In-depth analysis in support of the Commission Communication COM(2018) 773: A clean planet for all — a European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy*, European Commission ([https://ec.europa.eu/clima/sites/clima/files/docs/pages/com\\_2018\\_733\\_analysis\\_in\\_support\\_en\\_0.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_analysis_in_support_en_0.pdf)) accessed 3 July 2019.

EC, 2018h, Proposal for a Regulation of the European Parliament and of the Council establishing rules on support for strategic plans to be drawn up by Member States under the Common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulation (EU) No 1305/2013 of the European Parliament and of the Council and Regulation (EU) No 1307/2013 of the European Parliament and of the Council {SEC(2018) 305 final} {SWD(2018) 301 final} (COM(2018) 392 final 2018/0216 (COD)).

EC, 2018i, Proposal for a Regulation of the European Parliament and of the Council setting CO<sub>2</sub> emission performance standards for new heavy-duty vehicles (COM(2018) 284 final 2018/0143 (COD)).

EC, 2018j, 'Statistical factsheet — May 2018', European Commission ([https://ec.europa.eu/agriculture/sites/agriculture/files/statistics/factsheets/pdf/eu\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/statistics/factsheets/pdf/eu_en.pdf)) accessed 15 January 2019.

EC, 2018k, *Statistical pocketbook 2018 — mobility and transport* (<https://ec.europa.eu/transport/facts-fundings/>

[statistics/pocketbook-2018\\_en](https://ec.europa.eu/transport/facts-fundings/)) accessed 24 September 2018.

EC, 2018l, 'Trans-European Transport Network TENtec', European Commission ([http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/index\\_en.htm](http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/index_en.htm)) accessed 12 April 2019.

EC, 2019a, 'European Parliament votes for single-use plastics ban', European Commission — Environment ([https://ec.europa.eu/environment/efe/content/european-parliament-votes-single-use-plastics-ban\\_en](https://ec.europa.eu/environment/efe/content/european-parliament-votes-single-use-plastics-ban_en)) accessed 12 April 2019.

EC, 2019b, 'Press release — Clean Energy for All Europeans: Commission welcomes European Parliament's adoption of new electricity market design proposals', European Commission ([http://europa.eu/rapid/press-release\\_IP-19-1836\\_en.htm](http://europa.eu/rapid/press-release_IP-19-1836_en.htm)) accessed 12 April 2019.

EC, 2019c, Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the implementation of the circular economy action plan (COM(2019) 190 final).

EC, 2019d, *Towards a sustainable Europe by 2030*, Reflection paper, European Commission ([https://ec.europa.eu/commission/sites/beta-political/files/rp\\_sustainable\\_europe\\_30-01\\_en\\_web.pdf](https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf)) accessed 15 May 2019.

EC, 2019e, 'Weekly Oil Bulletin', European Commission — Energy (<https://ec.europa.eu/energy/en/data-analysis/weekly-oil-bulletin>) accessed 12 April 2019.

ECA, 2016, *The EU system for the certification of sustainable biofuels*, Special Report No 18, European Court of Auditors, Luxembourg ([https://www.eca.europa.eu/Lists/ECADocuments/SR16\\_18/SR\\_BIOFUELS\\_EN.pdf](https://www.eca.europa.eu/Lists/ECADocuments/SR16_18/SR_BIOFUELS_EN.pdf)) accessed 29 March 2019.

ECA, 2018, *Future of the CAP*, Briefing paper, March 2018, European Court of Auditors, Luxembourg.

EEA, 2011a, *Air pollution impacts from carbon capture and storage (CCS)*, EEA Technical Report No 14/2011, European Environment Agency (<https://www.eea.europa.eu/publications/carbon-capture-and-storage>) accessed 18 January 2019.

EEA, 2011b, *Environmental tax reform in Europe: implications for income distribution*, EEA Technical Report No 16/2011, European Environment Agency.

EEA, 2012, *The European environment — state and outlook 2010: consumption and the environment — 2012 update*, European Environment Agency (<http://www.eea.europa.eu>

eu/publications/consumption-and-the-environment-2012/) accessed 15 September 2018.

EEA, 2013a, *Environmental pressures from European consumption and production*, EEA Technical Report No 2/2013, European Environment Agency (<http://www.eea.europa.eu/publications/environmental-pressures-from-european-consumption>) accessed 9 January 2018.

EEA, 2013b, *EU bioenergy potential from a resource efficiency perspective*, EEA Report No 6/2013, European Environment Agency.

EEA, 2013c, *Late lessons from early warnings: science, precaution, innovation*, EEA Report No 1/2013, European Environment Agency.

EEA, 2014a, *Environmental indicator report: environmental impacts of production-consumption systems in Europe*, European Environment Agency (<http://www.eea.europa.eu/publications/environmental-indicator-report-2014>) accessed 15 November 2018.

EEA, 2014b, *Resource-efficient green economy and EU policies*, EEA Report No 2/2014, European Environment Agency (<https://www.eea.europa.eu/publications/resourceefficient-green-economy-and-eu>) accessed 22 November 2018.

EEA, 2015, *The European environment — state and outlook 2015*, European Environment Agency.

EEA, 2016a, *Electric vehicles in Europe*, EEA Report No 20/2016, European Environment Agency (<http://www.eea.europa.eu/publications/electric-vehicles-in-europe>).

EEA, 2016b, *Environmental taxation and EU environmental policies*, EEA Report No 17/2016, European Environment Agency, Copenhagen.

EEA, 2016c, *The direct and indirect impacts of EU policies on land*, EEA Report No 8/2016, European Environment Agency (<http://www.eea.europa.eu/publications/impacts-of-eu-policies-on-land>) accessed 15 October 2018.

EEA, 2016d, *Transforming the EU power sector: avoiding a carbon lock-in*, EEA Report No 22/2016, European Environment Agency (<http://www.eea.europa.eu/publications/transforming-the-eu-power-sector>) accessed 15 September 2018.

EEA, 2016e, *Transitions towards a more sustainable mobility system — TERM 2016*, EEA Report No 34/2016, European Environment Agency (<https://www.eea.europa.eu/publications/term-report-2016>) accessed 10 December 2018.

EEA, 2017a, *Circular by design — Products in the circular economy*, EEA Report No 6/2017, European Environment Agency.

EEA, 2017b, *Food in a green light: a systems approach to sustainable food*, EEA Report No 16/2017, European Environment Agency.

EEA, 2017c, *Renewable energy in Europe — 2017 update: recent growth and knock-on effects*, EEA Report No 3/2017, European Environment Agency (<https://www.eea.europa.eu/publications/renewable-energy-in-europe-2017>) accessed 26 June 2018.

EEA, 2017d, *Signals 2017 — Shaping the future of energy in Europe: clean, smart and renewable*, European Environment Agency (<https://www.eea.europa.eu/signals/signals-2017>) accessed 16 May 2019.

EEA, 2018a, *Electric vehicles from life cycle and circular economy perspectives, TERM 2018: Transport and Environment Reporting Mechanism (TERM) report*, EEA Report No 13/2018, European Environment Agency.

EEA, 2018b, 'Final energy consumption by sector and fuel (ENER 016)', European Environment Agency ([https://www.eea.europa.eu/ds\\_resolveuid/IND-16-en](https://www.eea.europa.eu/ds_resolveuid/IND-16-en)) accessed 7 November 2018.

EEA, 2018c, 'Household energy consumption', European Environment Agency (<https://www.eea.europa.eu/airs/2018/resource-efficiency-and-low-carbon-economy/household-energy-consumption>) accessed 12 April 2019.

EEA, 2018d, *Monitoring CO<sub>2</sub> emissions from new passenger cars and vans in 2017*, EEA Report No 15/2018, European Environment Agency.

EEA, 2018e, 'Overview of electricity production and use in Europe (ENER 038)', European Environment Agency ([https://www.eea.europa.eu/data-and-maps/indicators/overview-of-the-electricity-production-2/assessment-4?utm\\_source=EEASubscriptions&utm\\_medium=RSSFeeds&utm\\_campaign=Generic](https://www.eea.europa.eu/data-and-maps/indicators/overview-of-the-electricity-production-2/assessment-4?utm_source=EEASubscriptions&utm_medium=RSSFeeds&utm_campaign=Generic)) accessed 16 May 2019.

EEA, 2018f, 'Passenger and freight transport demand (CSI 056/TERM 039)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/passenger-and-freight-transport-demand/assessment>) accessed 12 March 2019.

EEA, 2018g, *Recent trends and projections in EU greenhouse gas emissions*, EEA Briefing No 12/2018, European Environment Agency (<https://www.eea.europa.eu/publications/recent-trends-and-projections-in>) accessed 22 February 2019.

EEA, 2018h, *Renewable energy in Europe — 2018: recent growth and knock-on effects*, EEA Report No 20/2018, European Environment Agency (<https://www.eea.europa.eu/publications/renewable-energy-in-europe-2018>)

accessed 1 September 2019.

EEA, 2018i, *Trends and projections in Europe 2018 — tracking progress towards Europe's climate and energy targets*, EEA Report No 16/2018, European Environment Agency (<https://www.eea.europa.eu/publications/trends-and-projections-in-europe-2018-climate-and-energy>) accessed 4 January 2019.

EEA, 2018j, 'Use of renewable fuels in transport (CSI 037/ TERM 031)', European Environment Agency (<https://www.eea.europa.eu/data-and-maps/indicators/use-of-cleaner-and-alternative-fuels/use-of-cleaner-and-alternative-4>) accessed 12 April 2019.

EEA, 2019, *Adaptation challenges and opportunities for the European energy system: building a climate-resilient low-carbon energy system*, EEA Report No 1/2019, European Environment Agency (<https://www.eea.europa.eu/publications/adaptation-in-energy-system>) accessed 4 December 2019.

EEB, 2015, *Delivering resource-efficient products: How ecodesign can drive a circular economy in Europe*, European Environmental Bureau, Brussels.

EFSA, 2008, 'The EFSA Comprehensive European Food Consumption Database', European Food Safety Authority (<https://www.efsa.europa.eu/en/food-consumption/comprehensive-database>) accessed 19 October 2016.

Ekins, P., et al., 2017, *Resource efficiency: potential and economic implications*, International Resource Panel Report, United Nations Environment Programme ([https://www.resourcepanel.org/sites/default/files/documents/document/media/resource\\_efficiency\\_report\\_march\\_2017\\_web\\_res.pdf](https://www.resourcepanel.org/sites/default/files/documents/document/media/resource_efficiency_report_march_2017_web_res.pdf)) accessed 10 August 2017.

Enerdata, 2019, 'Odyssey, the European energy efficiency project' (<https://odyssey.enerdata.net/database/>) accessed 21 May 2019.

EPSC, 2018, *Geopolitical outlook for Europe: confrontation vs cooperation*, EPSC Brief, European Political Strategy Centre ([https://ec.europa.eu/epsc/sites/epsc/files/epsc\\_brief\\_geopolitical.pdf](https://ec.europa.eu/epsc/sites/epsc/files/epsc_brief_geopolitical.pdf)) accessed 9 June 2018.

EU, 2009, Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009, pp. 16-62).

EU, 2012, Consolidated Version of the Treaty on the Functioning of the European Union (2012/C 326/01).

EU, 2013, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020

'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, pp. 171-200).

EU, 2014, Regulation (EU) No 333/2014 of the European Parliament and of the Council of 11 March 2014 amending Regulation (EC) No 443/2009 to define the modalities for reaching the 2020 target to reduce CO<sub>2</sub> emissions from new passenger cars (OJ L 103, 5.4.2014, pp. 15-21).

EU, 2015, Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable resources (OJ L 239, 15.9.2015, pp. 1-29).

EU, 2018, Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (OJ L 328, 21.12.2018, pp. 82-209).

EUMOFA, 2015, *The EU fish market — 2015 edition*, European Market Observatory for Fisheries and Aquaculture Products, Brussels.

European Parliament, 2015, European Parliament resolution of 15 December 2015 on Towards a European Energy Union (2015/2113(INI)).

Eurostat, 2016a, 'EU trade since 1988 by SITC (DS-018995)' (<http://ec.europa.eu/eurostat/web/international-trade-in-goods/data/database>) accessed 8 December 2016.

Eurostat, 2016b, *Urban Europe — Statistics on cities, towns and suburbs*, Eurostat (<https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-01-16-691>) accessed 6 August 2019.

Eurostat, 2018a, 'Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E)' ([https://ec.europa.eu/eurostat/web/products-datasets/-/sbs\\_na\\_ind\\_r2](https://ec.europa.eu/eurostat/web/products-datasets/-/sbs_na_ind_r2)) accessed 17 January 2019.

Eurostat, 2018b, 'Electricity production, consumption and market overview', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php/Electricity\\_production,\\_consumption\\_and\\_market\\_overview#Market\\_shares](https://ec.europa.eu/eurostat/statistics-explained/index.php/Electricity_production,_consumption_and_market_overview#Market_shares)) accessed 12 April 2019.

Eurostat, 2018c, 'Employment by A\*10 industry breakdowns' ([https://ec.europa.eu/eurostat/web/products-datasets/product?code=nama\\_10\\_a10\\_e](https://ec.europa.eu/eurostat/web/products-datasets/product?code=nama_10_a10_e)) accessed 17 January 2019.

Eurostat, 2018d, 'Energy production and imports', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php/Energy\\_production\\_and\\_imports](https://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_production_and_imports)) accessed 26 September 2018.

Eurostat, 2018e, 'Energy statistics — an overview — final energy consumption', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy\\_statistics\\_-\\_an\\_overview#Final\\_energy\\_consumption](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_statistics_-_an_overview#Final_energy_consumption)) accessed 17 January 2019.

Eurostat, 2018f, 'Final consumption expenditure of households by consumption purpose (COICOP 3 digit)' ([https://ec.europa.eu/eurostat/web/products-datasets/product?code=nama\\_10\\_co3\\_p3](https://ec.europa.eu/eurostat/web/products-datasets/product?code=nama_10_co3_p3)) accessed 17 January 2019.

Eurostat, 2018g, 'Gross value added and income by A\*10 industry breakdowns', Eurostat — Data Explorer ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_a10&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10&lang=en)) accessed 19 October 2018.

Eurostat, 2018h, 'Household consumption by purpose', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Household\\_consumption\\_by\\_purpose#Composition\\_of\\_EU-28\\_household\\_expenditure\\_in\\_2016](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Household_consumption_by_purpose#Composition_of_EU-28_household_expenditure_in_2016)) accessed 17 January 2019.

Eurostat, 2018i, 'How much are households spending on food?' (<https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20181204-1>) accessed 12 April 2019.

Eurostat, 2018j, 'Physical imports and exports', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php/Physical\\_imports\\_and\\_exports#Physical\\_trade\\_by\\_stage\\_of\\_manufacturing](https://ec.europa.eu/eurostat/statistics-explained/index.php/Physical_imports_and_exports#Physical_trade_by_stage_of_manufacturing)) accessed 17 January 2019.

Eurostat, 2018k, 'Renewable energy statistics', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable\\_energy\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable_energy_statistics)) accessed 18 January 2019.

Eurostat, 2018l, 'The EU in the world — living conditions', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=The\\_EU\\_in\\_the\\_world\\_-\\_living\\_conditions#Household\\_income\\_and\\_expenditure](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=The_EU_in_the_world_-_living_conditions#Household_income_and_expenditure)) accessed 10 April 2019.

Eurostat, 2018m, 'The EU in the world - transport - Statistics Explained' ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=The\\_EU\\_in\\_the\\_world\\_-\\_transport](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=The_EU_in_the_world_-_transport)) accessed 17 January 2019.

Eurostat, 2018n, 'Transport', Eurostat — Statistics Explained (<https://ec.europa.eu/eurostat/statistics-explained/index.php/Transport>) accessed 12 April 2019.

Eurostat, 2018o, 'Transportation and storage statistics (NACE Rev. 2)', Eurostat — Statistics Explained ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Transportation\\_and\\_storage\\_statistics\\_-\\_NACE\\_Rev\\_2](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Transportation_and_storage_statistics_-_NACE_Rev_2)) accessed 12 April 2019.

Eurostat, 2019a, 'Final consumption expenditure of households by consumption purpose (COICOP 3 digit)' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama\\_10\\_co3\\_p3&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en)) accessed 21 May 2019.

Eurostat, 2019b, 'Share of EU in world trade' ([https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ext\\_lt\\_introle&lang=en](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ext_lt_introle&lang=en)) accessed 21 May 2019.

FAO, 2014, *Agroecology for food security and nutrition*, Food and Agriculture Organization of the United Nations, Rome.

Font Vivanco, D., et al., 2018, 'Roadmap to rebound: how to address rebound effects from resource efficiency policy', *Sustainability* 10(6), p. 2009 (DOI: 10.3390/su10062009).

Fontaras, G., et al., 2017, 'Fuel consumption and CO<sub>2</sub> emissions from passenger cars in Europe — laboratory versus real-world emissions', *Progress in Energy and Combustion Science* 60, pp. 97-131.

FUSIONS, 2016, *Estimates of European food waste levels*, Swedish Environmental Research Institute (<https://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf>) accessed 2 April 2019.

Galizzi, G. and Venturini, L., 2012, *Economics of innovation: the case of food industry*, Springer Science & Business Media, Berlin.

Geels, F. W., et al., 2012, *Automobility in transition? A socio-technical analysis of sustainable transport*, Routledge, New York.

Giampietro, M., et al., 2009, 'Multi-scale integrated analysis of societal and ecosystem metabolism (MuSiASEM): theoretical concepts and basic rationale', *Energy* 34(3), pp. 313-322 (DOI: 10.1016/j.energy.2008.07.020).

Grossi, L., et al., 2018, 'Electricity market integration and the impact of unilateral policy reforms', *Oxford Economic Papers* 70(3), pp. 799-820 (DOI: 10.1093/oeq/gpy005).

Guerra, E. and Cervero, R., 2011, 'Cost of a ride', *Journal of the American Planning Association* 77(3), pp. 267-290 (DOI: 10.1080/01944363.2011.589767).

Hallmann, C. A., et al., 2017, 'More than 75 percent decline over 27 years in total flying insect biomass in protected areas', *PLoS ONE* 12(10), p. e0185809 (DOI: 10.1371/journal.pone.0185809).

Harding, M., 2014, *The diesel differential: differences in the tax treatment of gasoline and diesel for road use*, OECD Publishing, Paris.

Heinrich Böll Stiftung, et al., 2017, *Konzernatlas Daten und Fakten über die Agrar- und Lebensmittelindustrie*, Berlin,

- Germany (<https://www.boell.de/de/2017/01/10/konzernatlas>) accessed 24 February 2017.
- Hillman, A. J. and Hitt, M. A., 1999, 'Corporate political strategy formulation: a model of approach, participation, and strategy decisions', *Academy of Management Review* 24(4), pp. 825–842.
- HLPE, 2014a, *Critical and emerging issues for food security and nutrition. Note to the Committee on World Food Security*, High Level Panel of Experts on Food Security and Nutrition (<http://www.fao.org/cfs/cfs-hlpe/critical-and-emerging-issues/cei-2014/en/>) accessed 24 July 2019.
- HLPE, 2014b, *Food losses and waste in the context of sustainable food systems. A report by the High Level Panel of Experts on Food Security and Nutrition to the Committee on World Food Security*, High Level Panel of Experts on Food Security and Nutrition (<http://www.fao.org/3/a-i3901e.pdf>) accessed 24 July 2019.
- Hoff, H., 2011, 'Understanding the nexus', conference paper presented at: Bonn2011 Conference: The Water, Energy and Food Security Nexus, 2011.
- IAASTD, 2009, *Agriculture at a crossroads — global summary for decision makers*, International Assessment of Agricultural Knowledge, Science and Technology for Development (<https://www.globalagriculture.org/fileadmin/files/weltagrabericht/IAASTDBerichte/GlobalSDM.pdf>) accessed 4 December 2019.
- ILO, 2015, *Guidelines for a just transitions towards environmentally sustainable economies and societies for all*, International Labour Organization, Geneva.
- IPBES, 2018, *The assessment report on land degradation and restoration*, Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany (<https://www.ipbes.net/assessment-reports/ldr>) accessed 20 March 2019.
- IPCC, et al., 2014, *Climate change 2014: mitigation of climate change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK.
- IPCC, 2018, *Global warming of 1.5 °C*, Intergovernmental Panel on Climate Change (<http://www.ipcc.ch/report/sr15/>) accessed 10 November 2018.
- IPCC and Edenhofer, O., 2012, *Special report on renewable energy sources and climate change mitigation: summary for policymakers and technical summary*, Intergovernmental Panel on Climate Change, Geneva, Switzerland.
- IPES Food, 2016, *Policy Lab 2 — Food environments*, Orientation Paper, International Panel of Experts on Sustainable Food Systems ([http://www.ipes-food.org/\\_img/upload/files/Policy%20Lab%20%20Orientation%20Paper.pdf](http://www.ipes-food.org/_img/upload/files/Policy%20Lab%20%20Orientation%20Paper.pdf)) accessed 18 January 2019.
- IPES Food, 2018, *Towards a common food policy for the EU*, Framing Paper for the EU Food and Farming Forum 2018, International Panel of Experts on Sustainable Food Systems ([http://www.ipes-food.org/\\_img/upload/files/Towards-a-Common-Food-Policy-for-the-EU.pdf](http://www.ipes-food.org/_img/upload/files/Towards-a-Common-Food-Policy-for-the-EU.pdf)) accessed 18 January 2019.
- IPES Food, 2019, *TOWARDS A COMMON FOOD POLICY FOR THE EUROPEAN UNION THE POLICY REFORM AND REALIGNMENT THAT IS REQUIRED TO BUILD SUSTAINABLE FOOD SYSTEMS IN EUROPE*, Working Document, International Panel of Experts on Sustainable Food Systems ([http://www.ipes-food.org/\\_img/upload/files/CFP\\_FullReport.pdf](http://www.ipes-food.org/_img/upload/files/CFP_FullReport.pdf)) accessed 15 May 2019.
- Ivanova, D., et al., 2016, 'Environmental impact assessment of household consumption', *Journal of Industrial Ecology* 20(3), pp. 526-536 (DOI: 10.1111/jiec.12371).
- Jiborn, M., et al., 2018, 'Decoupling or delusion? Measuring emissions displacement in foreign trade', *Global Environmental Change* 49, pp. 27-34.
- Kemp, R., et al., 2018, 'Socio-economic transformations: insights for sustainability', in: *Perspectives on transitions to sustainability*, European Environment Agency.
- Levy, D. L. and Egan, D., 2003, 'A neo-Gramscian approach to corporate political strategy: conflict and accommodation in the climate change negotiations', *Journal of Management Studies* 40(4), pp. 803-829.
- Liere, H., et al., 2017, 'Intersection between biodiversity conservation, agroecology, and ecosystem services', *Agroecology and Sustainable Food Systems* 41(7), pp. 723-760 (DOI: 10.1080/21683565.2017.1330796).
- MAGIC-NEXUS Project, 2018, 'Moving Towards Adaptive Governance in Complexity: Informing Nexus Security' (<https://magic-nexus.eu/project-details>) accessed 18 January 2019.
- Meadows, D. H., 1999, *Leverage points: places to intervene in a system*, The Sustainability Institute, Hartland, VT (<http://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/>) accessed 8 March 2016.
- Meadows, D. H., 2008, *Thinking in systems: a primer*, Chelsea Green Publishing, Dayton, OH.
- Muller, A., et al., 2017, 'Strategies for feeding the world more sustainably with organic agriculture', *Nature Communications* 8(1), p. 1290 (DOI: 10.1038/s41467-017-01410-w).
- Murphy, D. J., 2014, 'The implications of the declining energy return on investment of oil production', *Philosophical Transactions of the Royal Society A: Mathematical, Physical and*

*Engineering Sciences* 372(2006), p. 20130126 (DOI: 10.1098/rsta.2013.0126).

Neville, K. J., et al., 2017, 'Debating unconventional energy: social, political, and economic implications', *Annual Review of Environment and Resources* 42(1), pp. 241-266 (DOI: 10.1146/annurev-environ-102016-061102).

NTNU, 2018, 'Exiobase 3 — environmental footprints — global comparison time series' ([https://environmentalfootprints.org/exiobase\\_3](https://environmentalfootprints.org/exiobase_3)) accessed 17 January 2019.

Nuss, P. and Eckelman, M. J., 2014, 'Life cycle assessment of metals: a scientific synthesis', *PLoS ONE* 9(7) (DOI: <https://doi.org/10.1371/journal.pone.0101298>).

OECD, 2012, *Greenhouse gas emissions and the potential for mitigation from materials management within OECD countries*, Organisation for Economic Co-operation and Development, Paris (<http://www.oecd.org/env/waste/50034735.pdf>) accessed 9 December 2018.

OECD, 2019, 'Value added by activity (indicator)', Organisation for Economic Co-operation and Development (<http://data.oecd.org/natincome/value-added-by-activity.htm>) accessed 17 January 2019.

OECD and EU, 2018, *Health at a glance: Europe 2018*, Organisation for Economic Co-operation and Development; European Union ([https://ec.europa.eu/health/sites/health/files/state/docs/2018\\_healthatglance\\_rep\\_en.pdf](https://ec.europa.eu/health/sites/health/files/state/docs/2018_healthatglance_rep_en.pdf)) accessed 4 December 2019.

OECD/DASTI, 2016, *An OECD horizon scan of megatrends and technology trends in the context of future research policy*, Organisation for Economic Co-operation and Development; Danish Agency for Science, Technology and Innovation (<https://ufm.dk/en/publications/2016/an-oecd-horizon-scan-of-megatrends-and-technology-trends-in-the-context-of-future-research-policy>) accessed 27 August 2018.

OECD/IEA, 2014, 'Electric power consumption (kWh per capita)' (<https://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC>) accessed 17 January 2019.

Olesen, A. S., et al., 2016, *Environmental implications of increased reliance of the EU on biomass from the South East US*, Publications Office of the European Union, Luxembourg.

Oliver, T. H., et al., 2018, 'Overcoming undesirable resilience in the global food system', *Global Sustainability* 1 (DOI: 10.1017/sus.2018.9).

PBL, 2011, *The protein puzzle: the consumption of meat, dairy and fish in the European Union*, Netherlands Environment Assessment Agency, Bilthoven, Netherlands.

Philibert, C. and Pershing, J., 2002, *Beyond Kyoto: energy dynamics and climate stabilisation*, OECD Publishing, Paris.

Ripa, M., et al., 2018, *Decoupling at a glance*, MAGIC Policy Brief (<https://magic-nexus.eu/documents/decoupling-glance>) accessed 18 January 2019.

Sajn, N., 2016, *Electricity 'prosumers'* ([http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/593518/EPRS\\_BRI\(2016\)593518\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/593518/EPRS_BRI(2016)593518_EN.pdf)) accessed 10 April 2019.

Sala, S., et al., 2019, *Indicators and assessment of the environmental impact of EU consumption*, JRC Science for Policy Report, Publications Office of the European Union, Luxembourg (<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/indicators-and-assessment-environmental-impact-eu-consumption>) accessed 6 August 2019.

Sánchez-Bayo, F. and Wyckhuys, K. A. G., 2019, 'Worldwide decline of the entomofauna: a review of its drivers', *Biological Conservation* 232, pp. 8-27 (DOI: 10.1016/j.biocon.2019.01.020).

Scherhauer, S., et al., 2018, 'Environmental impacts of food waste in Europe', *Waste Management* 77, pp. 98-113 (DOI: 10.1016/j.wasman.2018.04.038).

Schwab, K., 2015, 'The Fourth Industrial Revolution', *Foreign Affairs*, 12 December 2015 (<https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution>) accessed 20 March 2019.

Seddon, N., et al., 2019, 'Grounding nature-based climate solutions in sound biodiversity science', *Nature Climate Change* 9(2), p. 84 (DOI: 10.1038/s41558-019-0405-0).

Sheller, M., 2004, 'Automotive emotions: feeling the car', *Theory, Culture and Society* 21(4-5), pp. 221-242.

Smil, V., 2016, 'Examining energy transitions: a dozen insights based on performance', *Energy Research & Social Science* 22, pp. 194-197 (DOI: 10.1016/j.erss.2016.08.017).

Springmann, M., et al., 2018, 'Options for keeping the food system within environmental limits', *Nature* 562(7728), p. 519 (DOI: 10.1038/s41586-018-0594-0).

Stadler, K., et al., 2018, 'Exiobase 3: developing a time series of detailed environmentally extended multi-regional input-output tables', *Journal of Industrial Ecology* 22(3), pp. 502-515 (DOI: 10.1111/jiec.12715).

Stirling, A., 2014, 'Disciplinary dilemma: working across research silos is harder than it looks', *The Guardian*, 11 June 2014 (<https://www.theguardian.com/science/political-science/2014/jun/11/science-policy-research-silos>



interdisciplinarity) accessed 18 January 2019.

Taiebat, M., et al., 2018, 'A review on energy, environmental, and sustainability implications of connected and automated vehicles', *Environmental Science & Technology* 52(20), pp. 11449-11465 (DOI: 10.1021/acs.est.8b00127).

ten Brink, P., et al., 2016, *The health and social benefits of nature and biodiversity protection*, Report to the European Commission, Institute for European Environmental Policy, London/Brussels.

Thøgersen, J., 2018, 'Transport-related lifestyle and environmentally-friendly travel mode choices: a multi-level approach', *Transportation Research Part A: Policy and Practice* 107, pp. 166-186 (DOI: 10.1016/j.tra.2017.11.015).

TNO, 2015, *Energie — en milieu-aspecten van elektrische personenvoertuigen*, TNO, Delft, Netherlands.

Trichopoulou, A., 2009, *Hector — Healthy eating out. Eating out: habits, determinants, and recommendations for consumers and the catering sector*, Final Report to the European Commission.

Tukker, A., et al., 2006, *Environmental impact of products (EIPRO)*, Institute for Prospective Technological Studies, Seville.

Tukker, A., et al., 2010, 'The impacts of household consumption and options for change', *Journal of Industrial Ecology* 14(1), pp. 13-30.

Tukker, A., et al., 2016, 'Environmental and resource footprints in a global context: Europe's structural deficit in resource endowments', *Global Environmental Change* 40, pp. 171-181 (DOI: 10.1016/j.gloenvcha.2016.07.002).

UNDESA, 2018, 'Data query — World urbanization prospects 2018: the 2018 revision', United Nations Department of Economic and Social Affairs (<https://esa.un.org/unpd/wup/DataQuery/>) accessed 28 August 2018.

UNEP, 2016, *Food systems and natural resources. A report of the Working Group on Food Systems of the International Resource Panel*, United Nations Environment Programme, Nairobi.

UNFCCC, 2015, Paris Agreement (Decision 1/CP.21).

Unruh, G. C., 2000, 'Understanding carbon lock-in', *Energy Policy* 28(12), pp. 817-830 (DOI: 10.1016/S0301-4215(00)00070-7).

van Vuuren, D. and Hof, A., 2018, 'Integrated assessment modelling approaches to analysing systemic change', in: *Perspectives on transitions to sustainability*, European

Environment Agency.

Velasco-Fernández, R., et al., 2018, 'Analyzing the energy performance of manufacturing across levels using the end-use matrix', *Energy* 161, pp. 559-572.

Venghaus, S. and Hake, J.-F., 2018, 'Nexus thinking in current EU policies – the interdependencies among food, energy and water resources', *Environmental Science & Policy* 90, pp. 183-192 (DOI: 10.1016/j.envsci.2017.12.014).

Verzijlbergh, R. A., et al., 2017, 'Institutional challenges caused by the integration of renewable energy sources in the European electricity sector', *Renewable and Sustainable Energy Reviews* 75, pp. 660-667 (DOI: 10.1016/j.rser.2016.11.039).

Wallis, P., 2015, 'A nexus of nexuses: systemic governance for climate response', in: Pittock, J. et al. (eds), *Climate, energy and water: managing trade-offs, seizing opportunities*, Cambridge University Press, New York.

WEF, 2011, *Global risks 2011*, An initiative of the Risk Response Network, World Economic Forum, Geneva.

WEF, 2018a, *Fostering effective energy transition: a fact-based framework to support decision-making*, World Economic Forum (<https://www.mckinsey.com/~media/mckinsey/industries/oil%20and%20gas/our%20insights/a%20framework%20for%20fostering%20effective%20energy%20transitions/fostering-effective-energy-transition.ashx>) accessed 26 September 2018.

WEF, 2018b, *The global risks report 2018*, Insight Report, World Economic Forum, Geneva ([http://www3.weforum.org/docs/WEF\\_GRR18\\_Report.pdf](http://www3.weforum.org/docs/WEF_GRR18_Report.pdf)) accessed 17 January 2019.

Wegener, M., 2004, 'Overview of land-use transport models', in: Hensher, D. and Button, K. B. (eds), *Transport geography and spatial systems*, Pergamon/Elsevier Science, Kidlington, pp. 127-146.

Willett, W., et al., 2019, 'Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems', *The Lancet* 393(10170), pp. 447-492 (DOI: 10.1016/S0140-6736(18)31788-4).

Wood, R., et al., 2018, 'Growth in environmental footprints and environmental impacts embodied in trade: resource efficiency indicators from Exiobase3', *Journal of Industrial Ecology* 22(3), pp. 553-564 (DOI: 10.1111/jiec.12735).

World Bank, 2018, 'Households and NPISHs: final consumption expenditure per capita (constant 2010 US\$)' (<https://data.worldbank.org/indicator/NE.CON.PRVT>).

PC.KD?locations=EU-1W) accessed 17 January 2019.

World Bank, 2019, 'GDP (constant 2010 US\$)' (<https://data.worldbank.org/indicator/NY.GDP.MKTP.KD?end=2017&locations=eu&start=1990>) accessed 21 May 2019.

Zijlstra, T. and Avelino, F., 2012, 'A socio-spatial perspective on the car regime', in: Geels, F. et al. (eds), *Automobility in transition? A socio-technical analysis of sustainable transport*, Routledge, New York, pp. 160-179.



## CHAPTER 17 — RESPONDING TO SUSTAINABILITY CHALLENGES

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ADLT, 2019, 'Artisans de la transition | Devenez acteur de la transition écologique' (<https://www.artisansdelatransition.org/>) accessed 9 April 2019.

Aldersgate Group, 2018, *Towards the new normal: increasing investment in the UK's green infrastructure*, Aldersgate Group, London, UK.

Aschemann-Witzel, J. and Zielke, S., 2017, 'Can't buy me green? A review of consumer perceptions of and behavior toward the price of organic food', *Journal of Consumer Affairs* 51(1), pp. 211-251.

Auerswald, P. E. and Branscomb, L. M., 2003, 'Valleys of death and Darwinian seas: financing the invention to innovation transition in the United States', *Journal of Technology Transfer* 28(3-4), pp. 227-239.

Averchenkova, A., et al., 2017, *Trends in climate change legislation*, Edward Elgar Publishing, Cheltenham, UK.

Baeten, G., et al., 1999, 'Politics, institutions and regional restructuring processes: from managed growth to planned fragmentation in the reconversion of Belgium's last coal mining region', *Regional Studies* 33(3), pp. 247-258.

Bergek, A. and Berggren, C., 2014, 'The impact of environmental policy instruments on innovation: a review of energy and automotive industry studies', *Ecological Economics* 106, pp. 112-123.

Berkhout, F., 2006, 'Normative expectations in systems innovation', *Technology Analysis & Strategic Management* 18(3-4), pp. 299-311.

Browder, G., et al., 2019, *Integrating green and gray: creating*

*next generation infrastructure*, World Bank Group and World Resources Institute, Washington, DC.

Campbell, S. and Coenen, L., 2017, *Transitioning beyond coal: lessons from the structural renewal of Europe's old industrial regions*, Centre for Climate Economics & Policy, Crawford School of Public Policy, Australian National University, Canberra.

CCC, 2018, *Reducing UK emissions: 2018 progress report to Parliament*, Committee on Climate Change, London, UK.

Climate KIC, 2015, *Maximising Europe's low carbon activities: moving from individual projects to challenge-led, transition programmes — Birmingham*, EIT Knowledge Innovation Community.

Collingridge, D., 1980, *The social control of technology*, St. Martin's Press, New York.

de Vries, G. W., et al., 2016, 'User-led innovation in civic energy communities', *Environmental Innovation and Societal Transitions* 19, pp. 51-65.

DECC, 2014, *Community energy strategy: people powering change*, Department of Energy and Climate Change, London, UK.

EC, 2010, Communication from the Commission — Europe 2020: a strategy for smart, sustainable and inclusive growth (COM(2010) 2020 final, Brussels, 3.3.2010).

EC, 2011, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A roadmap for moving to a competitive low carbon economy in 2050 (COM(2011) 112 final, Brussels, 8.03.2011).

EC, 2013a, Commission recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations (2013/179/EU, Brussels, 4.5.2013).

EC, 2013b, *Living well, within the limits of our planet: 7th EAP — the new general Union Environment Action Programme to 2020*, European Commission, Brussels, Belgium.

EC, 2014a, 'Public engagement in responsible research and innovation', European Commission — Horizon 2020 (<https://ec.europa.eu/programmes/horizon2020/en/h2020-section/public-engagement-responsible-research-and-innovation>) accessed 12 April 2019.

EC, 2014b, 'Responsible research and innovation', European Commission — Horizon 2020 (<https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>) accessed 20 May 2019.

EC, 2015a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Closing the loop: an EU action plan for the circular economy (COM(2015) 614 final).

EC, 2015b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A framework strategy for a resilient Energy Union with a forward-looking climate change policy (COM(2015) 80 final).

EC, 2016a, *Behavioural insights applied to policy: European report 2016*, Joint Research Centre Report, Publications Office of the European Union, Luxembourg (<http://bookshop.europa.eu/uri?target=EUB:NOTICE:KJNA27726:EN:HTML>) accessed 9 April 2019.

EC, 2016b, *Changing gear in R&I: green growth for jobs and prosperity in the EU*, Report of the European Commission Expert Group 'R&I policy framework for green growth and jobs', Publications Office of the European Union, Luxembourg.

EC, 2017a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Europe on the move: an agenda for a socially fair transition towards clean, competitive and connected mobility for all (COM(2017) 283 final, Brussels, 31.5.2017).

EC, 2017b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Strengthening innovation in Europe's regions: strategies for resilient, inclusive and sustainable growth (COM(2017) 376 final, Brussels, 18.7.2017).

EC, 2017c, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — Investing in a smart, innovative and sustainable industry — a renewed EU Industrial Policy Strategy (COM(2017) 479 final, Brussels, 13.9.2017).

EC, 2017d, *LAB-FAB-APP: investing in the European future we want*, Report of the independent High Level Group on maximising the impact of EU research and innovation programmes, European Commission, Brussels ([http://ec.europa.eu/research/evaluations/pdf/archive/other\\_reports\\_studies\\_and\\_documents/hlg\\_2017\\_report.pdf](http://ec.europa.eu/research/evaluations/pdf/archive/other_reports_studies_and_documents/hlg_2017_report.pdf)) accessed 13 August 2019.

EC, 2017e, 'Public procurement', European Commission — Trade (<http://ec.europa.eu/trade/policy/accessing-markets/public-procurement/>) accessed 15 January 2019.

EC, 2017f, *Text mining for assessing and monitoring environmental risks*, Concept paper, European Commission, Brussels.

EC, 2018a, 'Better regulation toolbox', European Commission ([https://ec.europa.eu/info/better-regulation-toolbox\\_en](https://ec.europa.eu/info/better-regulation-toolbox_en)) accessed 13 November 2018.

EC, 2018b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment (COM(2018) 673 final, Brussels, 11.10.2018).

EC, 2018c, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions — A modern budget for a Union that protects, empowers and defends: the Multiannual Financial Framework for 2021-2027 (COM (2018) 321 final).

EC, 2018d, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions — A renewed European agenda for research and innovation — Europe's chance to shape its future (COM(2018) 306 final, Brussels, 15.5.2018).

EC, 2018e, Communication from the Commission to the European Parliament, the European Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions — Action plan: financing sustainable growth (COM(2018) 97 final).

EC, 2018f, *Financing a sustainable European economy*, Final report of the High-Level Expert Group on Sustainable Finance, European Commission ([https://ec.europa.eu/info/publications/180131-sustainable-finance-report\\_en](https://ec.europa.eu/info/publications/180131-sustainable-finance-report_en)) accessed 2 May 2018.

EC, 2018g, *In-depth analysis in support of the Commission Communication COM(2018) 773: A clean planet for all — a European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy*, European Commission ([https://ec.europa.eu/clima/sites/clima/files/docs/pages/com\\_2018\\_733\\_analysis\\_in\\_support\\_en\\_0.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_analysis_in_support_en_0.pdf)) accessed 3 July 2019.

EC, 2018h, 'Innovation deals', European Commission ([https://ec.europa.eu/info/research-and-innovation/law-and-regulations/innovation-deals\\_en](https://ec.europa.eu/info/research-and-innovation/law-and-regulations/innovation-deals_en)) accessed 8 October 2018.

EC, 2018i, 'Press release — State aid: Commission approves €70 million public support scheme for electric buses and charging infrastructure in Germany', European Commission ([http://europa.eu/rapid/press-release\\_IP-18-1222\\_en.htm](http://europa.eu/rapid/press-release_IP-18-1222_en.htm))

accessed 9 April 2019.

EC, 2018j, Report from the Commission to the European Parliament and the Council — Report on the functioning of the European carbon market (COM(2018) 842 final, Brussels, 17.12.2018).

EC, 2019a, 'Better regulation: why and how', European Commission ([https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how\\_en](https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how_en)) accessed 8 April 2019.

EC, 2019b, 'Greening the European Semester', European Commission — Environment ([http://ec.europa.eu/environment/integration/green\\_semester/index\\_en.htm](http://ec.europa.eu/environment/integration/green_semester/index_en.htm)) accessed 9 April 2019.

EC, 2019c, 'The European Semester', European Commission ([https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester\\_en](https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester_en)) accessed 8 April 2019.

EC, 2019d, *Towards a sustainable Europe by 2030*, Reflection paper, European Commission ([https://ec.europa.eu/commission/sites/beta-political/files/rp\\_sustainable\\_europe\\_30-01\\_en\\_web.pdf](https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf)) accessed 15 May 2019.

EEA, 2001, *Late lessons from early warnings: the precautionary principle 1896-2000*, Environmental issue report No 22/2001, European Environment Agency ([http://www.eea.europa.eu/publications/environmental\\_issue\\_report\\_2001\\_22](http://www.eea.europa.eu/publications/environmental_issue_report_2001_22)) accessed 22 April 2015.

EEA, 2013, *Late lessons from early warnings: science, precaution, innovation*, EEA Report No 1/2013, European Environment Agency.

EEA, 2014, *Resource-efficient green economy and EU policies*, EEA Report No 2/2014, European Environment Agency.

EEA, 2015a, *State of Europe's seas*, EEA Report No 2/2015, European Environment Agency (<http://www.eea.europa.eu/publications/state-of-europes-seas>) accessed 21 August 2019.

EEA, 2015b, *The European environment — state and outlook 2015: assessment of global megatrends*, European Environment Agency.

EEA, 2016a, *Electric vehicles in Europe*, EEA Report No 20/2016, European Environment Agency.

EEA, 2016b, *Environmental indicator report 2016 — in support to the monitoring of the 7th Environment Action Programme*, EEA Report No 30/2016, European Environment Agency.

EEA, 2016c, *Environmental taxation and EU environmental*

*policies*, EEA Report No 17/2016, European Environment Agency, Copenhagen.

EEA, 2018, *Perspectives on transitions to sustainability*, EEA Report No 25/2017, European Environment Agency (<https://www.eea.europa.eu/publications/perspectives-on-transitions-to-sustainability>) accessed 8 June 2019.

EEA, 2019, *Sustainability transitions: policy and practice*, EEA Report No No 09/2019, European Environment Agency.

EEA and Eionet, 2016, *Sustainability transitions: now for the long term*, Eionet Report No 1/2016, European Environment Agency (<https://www.eea.europa.eu/publications/sustainability-transitions-now-for-the>) accessed 6 August 2019.

Ehnert, F., et al., 2018, 'Urban sustainability transitions in a context of multi-level governance: a comparison of four European states', *Environmental Innovation and Societal Transitions* 26, pp. 101-116.

EIB, 2019, 'Natural Capital Financing Facility' (<https://www.eib.org/en/products/blending/ncff/index.htm>) accessed 24 May 2019.

ETC/CCA, et al., 2018, *Social vulnerability to climate change in European cities — state of play in policy and practice*, ETC/CCA Technical Paper No 2018/1, European Topic Centre Climate Change Impacts, Vulnerability and Adaptation.

ETC/SCP, et al., 2015, *Material resource taxation: an analysis for selected material resources*, European Topic Centre on Sustainable Consumption and Production.

Eurostat, 2018, 'Intramural R&D expenditure (GERD) by sectors of performance' ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd\\_e\\_gerdtot&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdtot&lang=en)) accessed 12 November 2018.

Eurostat, 2019, 'Total GBAORD by NABS 2007 socio-economic objectives (ecodp.common.ckan.site\_title)', EU Open Data Portal (<https://data.europa.eu/euodp/data/dataset/n2LptWaf3Hugtt9A7dJsA>) accessed 15 January 2019.

FiBL, 2019, 'FiBL statistics — European data', FiBL Statistics (<https://statistics.fibl.org/europe.html>) accessed 20 May 2019.

FiBL and IFOAM, 2016, *The world of organic agriculture: statistics and emerging trends 2016*, Research Institute of Organic Agriculture and IFOAM — Organics International (<https://www.fibl.org/en/media/media-archive/media-release/article/bio-in-europa-waechst-weiter-biomarkt-bei-ueber-37-milliarden-euro.html>) accessed 20 May 2019.

Forssell, S., 2017, Perspectives on the sustainability promise of alternative food networks, PhD dissertation, University

of Helsinki (<https://helda.helsinki.fi/handle/10138/215614>) accessed 15 January 2019.

Foxon, T., et al., 2008, 'Comparing adaptive management and transition management', *Ökologisches Wirtschaften-Fachzeitschrift* 23(2), pp. 20-22.

GAP, 2019, 'Home page', Global Action Plan (<https://www.globalactionplan.org.uk>) accessed 9 April 2019.

Geels, F. 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), pp. 265-275.

Geels, F. W., 2002, 'Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study', *Research Policy* 31(8-9), pp. 1257-1274 (DOI: 10.1016/S0048-7333(02)00062-8).

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), pp. 999-1016.

Geels, F. W., et al., 2016, 'The enactment of socio-technical transition pathways: a reformulated typology and a comparative multi-level analysis of the German and UK low-carbon electricity transitions (1990-2014)', *Research Policy* 45(4), pp. 896-913.

Geels, F. W., et al., 2017, 'Sociotechnical transitions for deep decarbonization', *Science* 357(6357), pp. 1242-1244 (DOI: 10.1126/science.aao3760).

Geels, F. W. and Johnson, V., 2018, 'Towards a modular and temporal understanding of system diffusion: adoption models and socio-technical theories applied to Austrian biomass district-heating (1979-2013)', *Energy Research & Social Science* 38, pp. 138-153.

Genus, A. and Stirling, A., 2018, 'Collingridge and the dilemma of control: towards responsible and accountable innovation', *Research Policy* 47(1), pp. 61-69.

Göpel, M., 2016, *The great mindshift: how a new economic paradigm and sustainability transformations go hand in hand*, Springer, Dordrecht, Netherlands.

Grin, J., et al., 2010, *Transitions to sustainable development: new directions in the study of long term transformative change*, Routledge, New York.

Grubb, M., et al., 2014, *Planetary economics: energy, climate change and the three domains of sustainable development*, Routledge, London.

Hajer, M., 2011, *The energetic society: in search of a governance philosophy for a clean economy*, PBL, Netherlands Environmental Assessment Agency, The Hague, Netherlands.

Hajer, M., et al., 2015, 'Beyond cockpit-ism: four insights to enhance the transformative potential of the Sustainable Development Goals', *Sustainability* 7(2), pp. 1651-1660 (DOI: 10.3390/su7021651).

Heiskanen, E. and Matchoss, K., 2018, 'Evaluating climate governance experiments: participants' perspectives on low-carbon experiments in Finland', in: Turnheim, B. et al. (eds), *Innovating climate governance: moving beyond experiments*, Cambridge University Press, Cambridge, UK.

Hekkert, M. P., et al., 2007, 'Functions of innovation systems: a new approach for analysing technological change', *Technological forecasting and social change* 74(4), pp. 413-432.

Hossain, M., 2018, 'Grassroots innovation: the state of the art and future perspectives', *Technology in Society* 55, pp. 63-69.

Hughes, L. and Urpelainen, J., 2015, 'Interests, institutions, and climate policy: explaining the choice of policy instruments for the energy sector', *Environmental Science & Policy* 54, pp. 52-63.

ICLEI, 2015, *ICLEI Seoul Strategic Plan 2015-2021: building a world of local actions for a sustainable urban future*, International Council for Local Environmental Initiatives, Local Governments for Sustainability, Bonn, Germany.

IEA, 2018a, 'Electric vehicles', International Energy Agency (<https://www.iea.org/tcep/transport/electricvehicles/>) accessed 20 August 2019.

IEA, 2018b, *Global EV outlook 2018: towards cross-modal electrification*, International Energy Agency, Paris, France.

IEA, 2018c, 'RD&D', International Energy Agency (<https://www.iea.org/statistics/rdd/>) accessed 13 November 2018.

IGBP, et al., 2001, 'The Amsterdam Declaration on global change', conference paper presented at: Global change open science conference on the challenges of a changing Earth, Amsterdam, Netherlands, 13 July 2001, 2001.

IPBES, 2018, *The assessment report on land degradation and restoration*, Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany (<https://www.ipbes.net/assessment-reports/ldr>) accessed 20 March 2019.

IRENA, 2018, *Renewables 2018: global status report*, International Renewable Energy Agency (<http://www.ren21.net/status-of-renewables/global-status-report/>) accessed 20 August 2019.

- IRGC, 2018, *IRGC guidelines for dealing with systemic risks*, International Risk Governance Council (<https://irgc.org/risk-governance/systemic-risks/guidelines-governance-systemic-risks-context-transitions/>) accessed 26 July 2019.
- Kemp, R., et al., 1998, 'Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management', *Technology Analysis & Strategic Management* 10(2), pp. 175-198.
- Kern, F., et al., 2017, 'Policy packaging or policy patching? The development of complex energy efficiency policy mixes', *Energy Research & Social Science* 23, pp. 11-25.
- Kivimaa, P., 2014, 'Government-affiliated intermediary organisations as actors in system-level transitions', *Research Policy* 43(8), pp. 1370-1380.
- Kivimaa, P. and Kern, F., 2016, 'Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions', *Research Policy* 45(1), pp. 205-217.
- KK, 2016, 'Overdragelse af ressort for økologi og videreførelse af mål om 90 % økologi', København Kommune (<https://www.kk.dk/indhold/okonomiudvalgets-modemateriale/27092016/edoc-agenda/4b23b56b-9c7f-4646-8f95-86bf40dae9c4/ebd9f840-7b6b-477a-a933-c8bc2fe2433f>) accessed 25 September 2018.
- Köhler, J., et al., 2019, 'An agenda for sustainability transitions research: state of the art and future directions', *Environmental Innovation and Societal Transitions* 31, pp. 1-32 (DOI: 10.1016/j.eist.2019.01.004).
- Leslie, H. M. and McLeod, K. L., 2007, 'Confronting the challenges of implementing marine ecosystem-based management', *Frontiers in Ecology and the Environment* 5(10), pp. 540-548.
- Maes, J., et al., 2017, *Enhancing resilience of urban ecosystems through green infrastructure (EnRoute)*, Final report, European Commission Joint Research Centre, Ispra, Italy.
- Markard, J., et al., 2012, 'Sustainability transitions: an emerging field of research and its prospects', *Research Policy* 41(6), pp. 955-967 (DOI: 10.1016/j.respol.2012.02.013).
- Mazzucato, M., 2015, 'Innovation, the state and patient capital', *Political Quarterly* 86, pp. 98-118.
- Mazzucato, M., 2018, *Mission-oriented research and innovation in the European Union: a problem-solving approach to fuel innovation-led growth*, European Commission, Brussels, Belgium.
- Mazzucato, M. and Perez, C., 2015, 'Innovation as growth policy: the challenge for Europe', in: Fagerberg, J. et al. (eds), *The triple challenge for Europe: economic development, climate change, and governance*, Oxford University Press, Oxford, UK.
- McLeod, K. and Leslie, H., eds., 2009, *Ecosystem-based management for the oceans*, Island Press, Washington, DC.
- Mission Innovation, 2018, 'Mission Innovation: accelerating the clean energy revolution' (<http://mission-innovation.net/>) accessed 11 October 2018.
- Moore, M.-L., et al., 2015, 'Scaling out, scaling up, scaling deep: strategies of non-profits in advancing systemic social innovation', *Journal of Corporate Citizenship* (58), pp. 67-85.
- Nilsson, M. and Nykvist, B., 2016, 'Governing the electric vehicle transition — near term interventions to support a green energy economy', *Applied Energy* 179, pp. 1360-1371 (DOI: 10.1016/j.apenergy.2016.03.056).
- NOAA, 2018, 'What is ecosystem-based management', National Oceanic and Atmospheric Administration (<https://ecosystems.noaa.gov/EBM101/WhatisEcosystem-BasedManagement.aspx>) accessed 14 December 2018.
- Nurmi, V., et al., 2013, *Cost-benefit analysis of green roofs in urban areas: case study in Helsinki*, Report No 2013:2, Finnish Meteorological Institute ([https://www.luomus.fi/sites/default/files/files/green\\_roof\\_cost\\_benefit\\_analysis\\_raportteja\\_2-2013.pdf](https://www.luomus.fi/sites/default/files/files/green_roof_cost_benefit_analysis_raportteja_2-2013.pdf)) accessed 26 July 2019.
- OECD, 2010, *Taxation, innovation and the environment*, Organisation for Economic Co-operation and Development, Paris.
- OECD, 2015, *Aligning policies for a low-carbon economy*, Organisation for Economic Co-operation and Development, Paris.
- OECD, 2018a, *Financing climate futures: rethinking infrastructure*, Organisation for Economic Co-operation and Development, Paris.
- OECD, 2018b, *Making blended finance work for the Sustainable Development Goals*, Organisation for Economic Co-operation and Development ([https://www.oecd-ilibrary.org/development/making-blended-finance-work-for-the-sustainable-development-goals\\_9789264288768-en](https://www.oecd-ilibrary.org/development/making-blended-finance-work-for-the-sustainable-development-goals_9789264288768-en)) accessed 16 January 2019.
- OECD, 2019, 'Government budget appropriations or outlays for RD' ([https://stats.oecd.org/Index.aspx?DataSetCode=GBAORD\\_NABS2007](https://stats.oecd.org/Index.aspx?DataSetCode=GBAORD_NABS2007)) accessed 15 January 2019.
- Potjer, S. and Hajer, M., 2017, *Learning with cities, learning for cities: the golden opportunity of the Urban Agenda for the EU*, Utrecht University, Utrecht, Netherlands.
- Rademaekers, K., et al., 2017, *Assessing the European clean*

energy finance landscape, with implications for improved macro-energy modelling, European Commission Directorate-General for Energy, Brussels.

Rademaekers, K., et al., 2018, *Environmental potential of the collaborative economy — final report and annexes*, European Commission, Brussels.

Rayment, M., et al., 2009, *The economic benefits of environmental policy*, Final report to the European Commission, European Commission, Brussels.

Raymond, C. M., et al., 2017, 'A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas', *Environmental Science & Policy* 77, pp. 15-24 (DOI: 10.1016/j.envsci.2017.07.008).

Rhodes, R. A. W., 1997, *Understanding governance: policy networks, governance, reflexivity and accountability*, Open University Press, Buckingham, UK.

RISE, 2018, *Mission-oriented research and innovation policy: a RISE perspective*, European Commission Directorate-General for Research and Innovation, Brussels.

Rogge, K. S. and Reichardt, K., 2016, 'Policy mixes for sustainability transitions: an extended concept and framework for analysis', *Research Policy* 45(8), pp. 1620-1635.

Saha, D. and Muro, M., 2017, *Cleantech venture capital: continued declines and narrow geography limit prospects*, Brookings Institution (<https://www.brookings.edu/research/cleantech-venture-capital-continued-declines-and-narrow-geography-limit-prospects/>) accessed 4 September 2018.

Schot, J. and Steinmueller, W. E., 2018, 'Three frames for innovation policy: R&D, systems of innovation and transformative change', *Research Policy* 47(9), pp. 1554-1567.

Science for Environment Policy, 2016, *Identifying emerging risks for environmental policies*, Future Brief 13, European Commission Directorate-General for Environment, Brussels.

Seyfang, G., et al., 2014, 'A grassroots sustainable energy niche? Reflections on community energy in the UK', *Environmental Innovation and Societal Transitions* 13, pp. 21-44.

Seyfang, G. and Smith, A., 2007, 'Grassroots innovations for sustainable development: towards a new research and policy agenda', *Environmental Politics* 16(4), pp. 584-603.

Smith, A., et al., 2005, 'The governance of sustainable socio-technical transitions', *Research Policy* 34(10), pp. 1491-1510.

Smith, A., 2006, 'Green niches in sustainable development: the case of organic food in the United Kingdom', *Environment and Planning C: Government and Policy* 24(3), pp. 439-458.

Smith, A., et al., 2010, 'Innovation studies and sustainability transitions: the allure of the multi-level perspective and its challenges', *Research Policy* 39(4), pp. 435-448 (DOI: 10.1016/j.respol.2010.01.023).

Smith, A., 2012, 'Civil society in sustainable energy transitions', in: Verbong, G. and Loorbach, D. (eds), *Governing the energy transition: reality, illusion, or necessity*, Routledge, New York.

Smith, A. and Raven, R., 2012, 'What is protective space? Reconsidering niches in transitions to sustainability', *Research Policy* 41(6), pp. 1025-1036.

Soares, A. L., et al., 2011, 'Benefits and costs of street trees in Lisbon, Portugal', *Urban Forestry & Urban Greening* 10(2), pp. 69-78.

Sopher, P., 2017, *Early-stage venture capital for energy innovation: financing models, trends and implications for policy*, Insights Series 2017, International Energy Agency, Paris.

Spencer, T., et al., 2018, 'The 1.5 C target and coal sector transition: at the limits of societal feasibility', *Climate Policy* 18(3), pp. 335-351.

Steward, F., 2018, 'Action-oriented perspectives on transitions and system innovation', in: *Perspectives on transitions to sustainability*, European Environment Agency.

Stirling, A., 2015, *Towards innovation democracy? Participation, responsibility and precaution in the politics of science and technology*, STEPS Working Paper No 78, Social, Technological and Environmental Pathways to Sustainability Centre, University of Sussex, Brighton, UK.

Temmes, A., et al., 2014, *Innovation policy options for sustainability transitions in Finnish transport*, Tekes, Helsinki.

TN, 2018, 'Transition networks near me | transition towns', Transition Network (<https://transitionnetwork.org/transition-near-me/>) accessed 4 November 2018.

Toxopeus, H. S. and Polzin, F. H. J., 2017, *Characterizing nature-based solutions from a business model and financing perspective*, Horizon 2020, Utrecht University, Utrecht, Netherlands.

Turnheim, B., et al., 2018, *Innovating climate governance: moving beyond experiments*, Cambridge University Press, Cambridge, UK.

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, pp. 35-49.

Turnheim, B. and Geels, F., 2019, 'Incumbent actors, guided search paths, and landmark projects in infra-system

transitions: rethinking strategic niche management with a case study of French tramway diffusion (1971-2016)', *Research Policy* 48, pp. 1412-1428.

UN, 2018, *Financing for development: progress and prospects 2018*, Report of the Inter-agency Task Force on Financing for Development, United Nations, New York.

UNCTAD, 2014, *World investment Report 2014 — investing in the SDGs: an action plan*, United Nations Conference on Trade and Development, New York and Geneva ([https://unctad.org/en/PublicationsLibrary/wir2014\\_en.pdf](https://unctad.org/en/PublicationsLibrary/wir2014_en.pdf)) accessed 13 August 2019.

UNEP, 2018, *Making waves: aligning the financial system with sustainable development*, United Nations Environment Programme, Nairobi, Kenya.

van Heffen, O., et al., eds., 2000, *Governance in modern society: effects, change and formation of government institutions*, Kluwer Academic Publishers, Dordrecht, Netherlands.

van Vuuren, D. and Hof, A., 2018, 'Integrated assessment modelling approaches to analysing systemic change', in: *Perspectives on transitions to sustainability*, European Environment Agency.

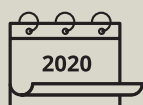
von Oelreich, J. and Milestad, R., 2017, 'Sustainability transformations in the balance: exploring Swedish initiatives challenging the corporate food regime', *European Planning Studies* 25(7), pp. 1129-1146.

Voulvoulis, N., et al., 2017, 'The EU Water Framework Directive: from great expectations to problems with implementation', *Science of the Total Environment* 575, pp. 358-366.

Watts, M., 2017, 'Cities spearhead climate action', *Nature Climate Change* 7(8), p. 537.

Wesseling, J. H., 2016, 'Explaining variance in national electric vehicle policies', *Environmental Innovation and Societal Transitions* 21, pp. 28-38.

World Bank, 2018, 'Gross fixed capital formation (current US\$)', World Bank — Data (<https://data.worldbank.org/indicator/NE.GDI.FTOT.CD>) accessed 13 November 2018.



## CHAPTER 18 — WHERE DO WE GO FROM HERE?

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COWI and Eunomia, 2019, *The costs of not implementing EU environmental law*, European Commission (<http://ec.europa.eu>

[http://ec.europa.eu/environment/eir/pdf/study\\_costs\\_not\\_implementing\\_env\\_law.pdf](http://ec.europa.eu/environment/eir/pdf/study_costs_not_implementing_env_law.pdf)) accessed 13 August 2019.

EC, 2011, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A roadmap for moving to a competitive low carbon economy in 2050 (COM(2011) 112 final, Brussels, 8.03.2011).

EC, 2015, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Closing the loop: an EU action plan for the circular economy (COM(2015) 614 final).

EC, 2018a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment (COM(2018) 673 final, Brussels, 11.10.2018).

EC, 2018b, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank — A clean planet for all: a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final).

EC, 2019, *Towards a sustainable Europe by 2030*, Reflection paper, European Commission ([https://ec.europa.eu/commission/sites/beta-political/files/rp\\_sustainable\\_europe\\_30-01\\_en\\_web.pdf](https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf)) accessed 15 May 2019.

EESC, 2017, 'The EU needs a comprehensive food policy', European Economic and Social Committee (<https://www.eesc.europa.eu/en/news-media/press-releases/eu-needs-comprehensive-food-policy>) accessed 28 November 2018.

IEA and IRENA, 2017, *Perspectives for the energy transition: investment needs for a low-carbon energy system*, International Energy Agency and International Renewable Energy Agency, Paris (<https://www.irena.org/publications/2017/Mar/Perspectives-for-the-energy-transition-Investment-needs-for-a-low-carbon-energy-system>) accessed 13 August 2019.

IPBES, 2019, *Global assessment report on biodiversity and ecosystem services*, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany (<https://www.ipbes.net/global-assessment-report-biodiversity-ecosystem-services>) accessed 6 August 2019.

IPCC, 2018, *Global warming of 1.5 °C*, Intergovernmental Panel on Climate Change (<http://www.ipcc.ch/report/sr15/>) accessed 10 November 2018.



IPES Food, 2018, *Towards a common food policy for the EU*, Framing Paper for the EU Food and Farming Forum 2018, International Panel of Experts on Sustainable Food Systems ([http://www.ipes-food.org/\\_img/upload/files/Towards-a-Common-Food-Policy-for-the-EU.pdf](http://www.ipes-food.org/_img/upload/files/Towards-a-Common-Food-Policy-for-the-EU.pdf)) accessed 18 January 2019.

IRP, 2019, *Global resources outlook 2019: natural resources for the future we want*, Report of the International Resource Panel, United Nations Environment Programme (<http://www.resourcepanel.org/reports/global-resources-outlook>) accessed 20 March 2019.

Landrigan, P. J., et al., 2017, 'The Lancet Commission on pollution and health', *The Lancet* 391(10119), pp. 462-512 (DOI: 10.1016/S0140-6736(17)32345-0).

UN, 1972, Declaration of the United Nations Conference on

the Human Environment (16 June 1972, Stockholm).

UNCTAD, 2014, *World investment Report 2014 — investing in the SDGs: an action plan*, United Nations Conference on Trade and Development, New York and Geneva ([https://unctad.org/en/PublicationsLibrary/wir2014\\_en.pdf](https://unctad.org/en/PublicationsLibrary/wir2014_en.pdf)) accessed 13 August 2019.

UNEP, 2017, *Towards a pollution-free planet*, United Nations Environment Programme, Nairobi, Kenya ([https://wedocs.unep.org/bitstream/handle/20.500.11822/21800/UNEA\\_towardspollution\\_long%20version\\_Web.pdf?sequence=1&isAllowed=y](https://wedocs.unep.org/bitstream/handle/20.500.11822/21800/UNEA_towardspollution_long%20version_Web.pdf?sequence=1&isAllowed=y)) accessed 6 August 2019.

World Bank, 2019, 'Gross capital formation (current US\$)', World Bank — Data (<https://data.worldbank.org/indicator/NE.GDI.TOTL.CD>) accessed 15 May 2019.

European Environment Agency

**The European environment — state and outlook 2020.  
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2019 — 496 pp. — 21 x 29.7 cm

ISBN 978-92-9480-090-9

doi:10.2800/96749

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TH-04-19-541-EN-N  
doi:10.2800/96749



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