

SGO 31xx Environment and innovation

To innovate is to develop something new that challenges something that is well-established. Whether an idea, method, product or process, innovations respond to new requirements or needs. They may result from changing markets, transformed perceptions, or new understandings based on the latest science. Although many of the innovations of the Industrial Age introduced great convenience and new opportunities, they often came at a high environmental cost. Innovations in the Information Age have also had environmental consequences, particularly in relation to the use of energy, water and mineral resources. These costs include biodiversity loss, land degradation, changes in water quality and availability, ozone depletion, and anthropogenic climate change. To move towards a sustainable future, new types of innovation are called for — innovations that address the “grand challenges” while also taking into account the environmental and social consequences of new innovations. Can we innovate our way to a diverse, low-carbon, green society?

This course will explore the relationship between innovation and the environment, including the potential to move toward a “green economy”. The role of technological and social innovations in response to problems such as climate change, biodiversity loss, and land use change will be critically assessed. The **first module** of the course presents the new context for innovation in the 21st Century, providing the historical and scientific background of the serious environmental challenges facing society. Diverse perspectives on the role of technology and the future will be presented, ranging from technophobia to Kurzweil’s “singularity”. The **second module** of the course considers new technologies and green innovations as a response to environmental problems. Students will be introduced to innovation studies, including the major approaches in the literature. The institutionalization of innovation will also be discussed, with an emphasis on the role of learning, knowledge, and policy. The **third module** looks at empirical studies of green innovations, including new energy technologies such as wind and solar power. New transportation technologies, “smart cities”, and innovations in the bio-economy, including bio-mimicry, will be discussed. Finally, the **fourth module** will critically assess the potentials and limits of innovations as a response to environmental problems, and discuss the role of social innovation in transformations to sustainability.

The course will consist of both lectures and seminars. In the four seminars, each student will choose an example of an innovation in Norway and assess it from the perspective of its environmental and social impacts, leading to a short paper and presentation. The literature will consist of both articles and book chapters. It is recommended that students have taken either SGO2302 Environment and Society or SGO2200 Economic Globalization and Regional Development, or ideally both courses.

Omfang: 10 forelesninger | perioden 10. januar til ??? Fire seminar — ett til hver modul

Exam: 6 timer skoleeksamen??

Language: Engelsk/norsk

Obligatoriske aktiviteter: Delta på minst tre seminar, presentere tekst på seminar

To be offered each spring term, starting spring 2014

SGO3200
Environment & Innovation
Pensum Spring 2015

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Module 1: The Sustainability Challenge

Altenburg, T. and A. Pegels. 2012. Sustainability-oriented innovation systems – managing the green transformation. *Innovation and Development* 2(1): 5-22.

<http://www.tandfonline.com/doi/full/10.1080/2157930X.2012.664037>

Global Commission on the Economy and Climate. 2014. Better Growth, Better Climate: The New Climate Economy Report (Synthesis Report). www.newclimateeconomy.com/report. (55 pages)

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Hamann, R. 2012. The Business of Development: Revisiting Strategies for a Sustainable Future. Mar-Apr.

http://www.environmentmagazine.org/Archives/Back%20Issues/2012/March-April%202012/sustainable_full.html

Hallegatte, S., Heal, G., Fay, M. And D. Tréguer. 2012. From growth to green growth. VOX Research-based policy analysis and commentary from leading economists.

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http://www.voxeu.org/article/growth-green-growth?keepThis=true&TB_iframe=true&height=650&width=850&caption=europe&quicktabs_tabbed_recent_articles_block=0

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IPCC. 2013. Working Group 1: Summary for Policy Makers. Intergovernmental Panel on Climate Change. (36 pages)

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Holden, E. et al. 2014. Sustainable development: Our Common Future revisited. *Global Environmental Change* 26: 130-139.

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Krumdieck, S. 2013. Transition Engineering: Planning and Building the Sustainable World. *The Futurist* 47(4)

Linnenluecke, M.K. and A. Griffiths. 2013. Firms and Sustainability: Mapping the Intellectual Origins and Structure of the Corporate Sustainability Field. *Global Environmental Change* 23(1): 382-391. (10 pages)

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<http://www.sciencedirect.com/science/article/pii/S095937801200091X>

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Mol, A.P.J. and Spaargaren, G. 2000. Ecological modernisation theory in debate: A review.

Environmental Politics 9(1): 17-49. (23 pages)

<http://www.tandfonline.com/doi/abs/10.1080/09644010008414511>

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Peters, G.P., R.M. Andrew, T. Boden, J.G. Canadell, P. Ciais, C. Le Quéré, G. Marland, M.R. Raupach, and C. Wilson, 2013: The challenge to keep global warming below 2°C. *Nature Climate Change*, 3, 4-6.

Philips, M. (2008). Uneven Development (1984). Neil Smith. in Hubbart, P. et al (red.). Key Texts in Human Geography, Sage. 12 sider

Reid, W.V. et al. 2010. Earth System Science for Global Sustainability: Grand Challenges. Science 330: 916-917.

Rockstrom et al. 2009. A Safe Operating Space for Humanity. Nature 461, 472-475

~~Hamann, R. 2012. The Business of Development: Revisiting Strategies for a Sustainable Future. Mar-Apr.~~

~~http://www.environmentmagazine.org/Archives/Back%20Issues/2012/March-April%202012/sustainable_full.html~~

[Wainwright, J. \(2013\). Climate Leviathan. *Antipode*, 45, 1-22.](#)

[Warner, R. 2010. Ecological modernisation theory: towards a critical ecopolitics of change?](#)

[Environmental Politics 19\(4\): 538-556. \(19 pages\)](#)

<http://www.tandfonline.com/doi/abs/10.1080/09644016.2010.489710>

Module 2: Innovation – the basics

Asheim, B.T. (2005). The Geography of Innovation: Regional Innovation Systems. In Fagerberg, J., Mowery, D.C. and Nelson, R.R. (2005). The Oxford Handbook of Innovation. Oxford, Oxford University Press. (26 sider)

Fagerberg, J. (2005). Innovation: A Guide to the Literature. In Fagerberg, J., Mowery, D.C. and Nelson, R.R. (2005). The Oxford Handbook of Innovation. Oxford, Oxford University Press. (28 sider)

Freeman, C. (1992). A green techno-economic paradigm for the world economy. In Freeman, C – The Economics of Hope. Pinter Publishers, London. 21 sider

[Geels, F.W and Schot, J. \(2007\). Typology of sociotechnical transition pathways. *Research Policy*, 36, 399-417.](#)

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Liu, J. Chaminade, C. Asheim, B. 2013. The Geography and Structure of Global Innovation Networks: A Knowledge Base Perspective. European Planning Studies (published online).

Lundvall, B. Å. and Johnsen, B. (1994). The Learning Economy. Journal of Industry Studies, Vol 1, pp 23-42 (19 sider)

~~[Pralhad, C.K. and Ramaswamy, V. 2003. The New Frontier of Experience Innovation. MIT Sloan Management Review. Summer. <http://sloanreview.mit.edu/article/the-new-frontier-of-experience-innovation/>](#)~~

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Hoogma, R., Kemp, R., Schot, J. og Truffer, B. (2002). Experimenting for Sustainable Transport, Kapittel 1 Technological Fixes. London, Spon Press. 11 sider

Module 3 – Green innovations and transitions in practice

Bain, C. and Selfa, T. (2013). Framing and reframing the environmental risks and economic benefits of ethanol production in Iowa. *Agriculture and Human Values*, 30, 351-364. 13 sider

Berkout, F., Verbong, G., Wieczorek, A. J., Raven, R., Lebel, L. and Bai, X. (2010) Sustainability experiments in Asia: innovations shaping alternative development pathways? *Environmental Science and Policy*, 13, 261-271. 10 sider

Birtchnell, T. and Urry, J. 2013. Fabricating Futures and the Movement of Objects. *Mobilities* 8(3): 388-405.

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Boyd, E., Boykoff, M. and Newell, P. (2011). The "New" Carbon Economy: What's New? *Antipode*, 43, 601-611.

~~Dalal-Clayton, B. 2013. Technology and Innovation for a Green Economy. *Review of European, Comparative & International Environmental Law*. 22(1) 62-67. 5 sider~~

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Falk, J. and C. Ryan. 2007. Inventing a Sustainable Future: Australia and the Challenge of Eco-innovation. *Futures* 39(2/3): 215-229.

Forsman, H. (2013). Environmental Innovations as Sources of Competitive Advantage or Vice Versa? *Business Strategy and the Environment*, 22, 306-320. 14 sider

Gouvea, R., Kasscieh, S. and Montoya, M.J.R. 2013. Using the quadruple helix to design strategies for the green economy. *Technological Forecasting and Social Change* 80(2): 221-230. 10 sider

~~Parag, Y. and D. Strickland. 2011. Personal Carbon Trading: A Radical Policy Option for Reducing Emissions from the Domestic Sector. Jan-Feb. <http://www.environmentmagazine.org/Archives/Back%20Issues/2011/January-February%202011/carbon-trading-full.html>~~

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~~Peters, T. 2011. Nature as Measure: The Biomimicry Guild. *Architectural Design* 81(6): 44-47.~~

Porte, M.E. and Linde (1995). Green and Competitive. *Harvard Business Review*. 10 sider

Reve, T. and Sasson, A. (2012). De framvoksende kunnskapsnæringene – fornybar energi og miljø. Kapittel 10 i boken *Et kunnskapsbasert Norge*. Universitetsforlaget, Oslo. 20 sider.

Rohracher, H. and Späth, P. (2013). The Interplay of Urban Energy Policy and Socio-technical Transitions: The Eco-cities of Graz and Freiburg in Retrospect. *Urban Studies*, 51. (DOI 10.1177/00420980135500360)

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Smith, A. (2007). Translating Sustainability's between Green Niches and Socio-Technical Regimes. *Technology Analysis & Strategic Management*, 19, 4, 427-450. 23 sider

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Späth, P. and Rohracher, H. (2010). "Energy regions": The transformative power of regional discourses on socio-technical futures. *Research Policy*, 39, 449-458.

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Specht, K., Siebert, R., Hartmann, I., Freisinger, U.B., Sawicka, M., Werner, A., Thomaier, S., Henckel, D., Walk, H. and Dierich, A. (2013) Urban agriculture of the future: an overview of sustainability aspects of food production in and on buildings. *Agriculture and Human Values* (published online) 19 sider

Sæther, B. (2000). Continuity and convergence: Reduction of water pollution in the Norwegian pulp and paper industry. *Business Strategy and the Environment*, 9, 390-400. 10 sider

~~Tal, A. 2011. The Desalination Debate—Lessons Learned Thus Far. *Environment: Science and Policy for Sustainable Development* (Sept-Oct).~~

~~<http://www.tandfonline.com/doi/abs/10.1080/00139157.2011.604009>~~

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Ulsrud, K., Winther, T., Palit, D., Rohracher, H. and Sandgren, J. (2011). The Solar Transitions research on solar mini-grids in India: Learning from local cases of innovative socio-technical systems. *Energy for Sustainable Development*, 15, 293-303. 10 sider (115 sider så langt).

Veugelers, R. (2012). Which policy instruments to induce clean innovating? *Research Policy*, 41, 1770-1778.

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Weber, K. and Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change. Combining insights from innovation systems and multi-level perspective in a comprehensive "failures" framework. *Research Policy*, 41, 1037-1047.

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Module 4 – The Social limits of innovation and transformations to sustainability

Benyus, J.M. (no date). A Biomimicry Primer. Available Online:

<http://www.gcf.org.sa/Documents/Janine%20Benyus%201.pdf>

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Bornstein, D. How to Change the World: Social Entrepreneurs and the Power of new Ideas. Oxford (select chapters).

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Gibson-Graham, J.K. and Roelvik, G. (2009). An Economic Ethics for the Anthropocene. *Antipode*, 41, pp. 320-346. 25 sider

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Leach, M., J. Rockström, P. Raskin, I. Scoones, A. C. Stirling, A. Smith, J. Thompson, E. Millstone, A. Ely, E. Arond, C. Folke, and P. Olsson. 2012. Transforming innovation for sustainability. *Ecology and Society* 17(2): 11.

<http://dx.doi.org/10.5751/ES-04933-170211>

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Leismann, K. et al. 2013. Collaborative consumption: Towards a resource-saving consumption culture. *Resources* 2: 184-203.

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Mulgan, G., Tucker, S., Ali, R. and B. Sanders. 2007. Social Innovation: What it is, why it matters and how it can be accelerated. Skoll Centre for Social Entrepreneurship.

<http://eureka.bodleian.ox.ac.uk/761/> (54 pages)

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Sahakian, M. 2013. Complementary currencies: What opportunities for sustainable consumption in times of crisis and beyond? *Sustainability: Science, Practice and Policy* 10(1): 4-13.

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Smith, A. and A. Stirling, 2010: The politics of social-ecological resilience and sustainable socio-technical transitions. *Ecology and Society*, 15(1), 11.

Tjornbo, O. And F.R. Westley. 2012. Game Changers: The Big Green Challenge and the Role of Challenge Grants in Social Innovation. *Journal of Social Entrepreneurship* 3(2) : 166-183.

<http://www.tandfonline.com/doi/full/10.1080/19420676.2012.726007>

[Weinstein, MP et al. 2013. The global sustainability transition: it is more than changing light bulbs. *Sustainability: Science, Practice and Policy* 9\(1\): 4-15.](#)

~~Wainwright, J. (2013). Climate Leviathan. *Antipode*, 45, 1-22.~~

~~Warner, R. 2010. Ecological modernisation theory: towards a critical ecopolitics of change? *Environmental Politics* 19(4): 538-556. (19 pages)~~

~~<http://www.tandfonline.com/doi/abs/10.1080/09644016.2010.489710>~~

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Seminar idea: Movie: *The Singularity*, written, directed, and edited by Doug Wolens, i-maginemedi. 2012. 75 minutes, plus 90 minutes of extended interviews, including Ray Kurzweil. Web site

www.thesingularityfilm.com

<http://www.wfs.org/futurist/2013-issues-futurist/november-december-2013-vol-47-no-6/debating-singularity>

Bell, J.J. 2003. The Singularity. *The Futurist*

<http://www.uiowa.edu/~c044010a/readings/article%2037.pdf>

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Recommended Readings:

Hawken, P. 1993. *The Ecology of Commerce: A Declaration of Sustainability*. NY, Harper Business.

[UNEP, 2011. *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*. www.unep.org/greeneconomy \(632 pages: pdf available at <http://www.grida.no/publications/green-economy/>\)](http://www.unep.org/greeneconomy)

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[Lecture Schedule \(Karen and Bjørnar to revise next week\)](#)

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Lecture 1: **Environmental Change: New challenges for innovation** (IPCC 2013, Peters, 2013, Reid et al. 2010; Rockstrom et al. 2009) KOB

Lecture 2: **Can we innovate our way to sustainability?** (Altenburg and Pegels 2012; Hallegate et al. 2012; Krumdieck 2013; Linnenluecke and Griffiths 2013; Mol and Spaargaren 2000; Hamann 2012)

Lecture 3: Innovation – the basics BS

Lecture 4 Green innovations as corporate challenge BS

Lecture 5 Solar transitions KU

Lecture 6 The geography of green innovations BS

Lecture 7 Guest lecture ?

Lecture 8 Guest lecture?

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Lecture 9: **The role of Social Innovation** (Bornstein, Mulgan et al. 2007; Tjornbo and Westley 2012;

Lecture 10: **Sustainability Transformations** (Leach et al. 2012; Warner 2010; Smith and Stirling 2010; Gibson-Graham and Roelvik 2009.