



EU cofin Project Annual Report 2018

The EU projects that receive co-finance from the top sectors must submit an annual report on their technical and financial progress. This format is to be used for reporting the technical progress. The report must be submitted by 15 February 2019 to Hans van der Kolk

General information	
TKI Number of the project	AF-EU-16006
Title	SIM4NEXUS Sustainable Integrated Management FOR the NEXUS of water-land-food-energy-climate for a resource-efficient Europe
project leader WR (name + e-mail address)	Floor Brouwer Floor.brouwer@wur.nl
Address project website	https://www.sim4nexus.eu/
Start date	01-06-2016
End date	31-05-2020

Short description/aim project (this information can be published on a website of the TKI/Topsectors)

Land, food, energy, water and climate are interconnected, comprising a coherent system (the 'Nexus'), dominated by complexity and feedback. The integrated management of the Nexus is critical to secure the efficient and sustainable use of resources. Barriers to a resource efficient Europe are policy inconsistencies and incoherence, knowledge gaps, especially regarding integration methodologies and tools for the Nexus, and knowledge and technology lock-ins. SIM4NEXUS will develop innovative methodologies to address these barriers, by building on well-known and scientifically established existing "thematic" models, simulating different components/"themes" of the Nexus and by developing: (a) novel complexity science methodologies and approaches for integrating the outputs of the thematic models; (b) a Geoplatform for seamless integration of public domain data and metadata for decision and policy making; (c) a Knowledge Elicitation Engine for integrating strategies at different spatial and temporal scales with top down and bottom up learning process, discovering new and emergent knowledge, in the form of unknown relations between the Nexus components and policies/strategies; (d) a web-based Serious Game for multiple users, as an enhanced interactive visualisation tool, providing an immersive experience to decision- and policy-makers. The Serious Game will assist the users (as players) in better understanding and visualising policies at various geo-/spatial scales and from a holistic point of view, towards a better scientific understanding of the Nexus. The Serious Game will be validated (applied, tested, verified and used) via ten Case Studies ranging from regional to national level. Two further Strategic Serious Games at European and Global levels will also be developed for demonstration, education and further exploitation purposes, accompanied by a robust business plan and IPR framework, for taking advantage of the post-project situation and business potential.

Planning and progress Is the project going according to plan? Are there any substantive bottlenecks? If yes, please explain with a brief description of the current situation

The project is going according to plan. There are no substantive bottlenecks

Highlights and deliverables in 2018 / so far (this information can be published on a website of the TKI/Topsectors)

Our work on the Nexus advanced the state-of-the-art in Nexus research. Progress is made to develop a stepwise methodological assessment framework of the Nexus. A glossary is produced

of terms related to the science of the nexus. So far, the assessment framework consolidates a process which enables the integrated assessment of resources towards resource efficiency and a low carbon future. This is achieved by the strong focus given to policy analysis and coherence of the nexus, and its sound incorporation in the quantification analysis. Related to the nexus assessment framework, SIM4NEXUS also launched a process to consolidate nexus innovations that span three main categories: technology, policy and society.

The work on policy coherence at European and international scales continued to focus on nexus-relevant policies in the transboundary, national and regional case studies. All national case studies regard the transition to a low carbon economy as driver of change in the other nexus sectors. A common focus of the regional cases is water, energy and agriculture. Both transboundary cases are clustered around the theme of water, with a prevalent focus on its relation to land use in the case of Germany-Czech Republic-Slovakia and on biodiversity conservation in the case of Germany-France. The European case is targeted at a low-carbon economy, while the global case does link the Nexus to achieving the Sustainable Development Goals.

The work on Serious Games advanced. The public version of the online prototype of the Serious Game (the "work in progress: design, model and data will change" message in it): <http://visualcraftsman.x10host.com/policy-cards2/sim4nexus-alpha1.0.html> . It is minimalist in the realm of explanation as it is mostly for demonstration purpose in front of an audience at this stage.

Number of delivered products in 2018 (in an appendix, please provide the titles and/or description of the products or a link to the products on public websites)			
Academic articles	Reports	Articles in journals	Introductions/workshops
15			7
Titles/ description of the most important products in 2018 (5 at max) and their target group			

Appendix: Names of the products or a link to the products on a public website including the link to the project summary on Kennisonline

Deliverables: <https://www.sim4nexus.eu/page.php?wert=Deliverables>

Publications: <https://www.sim4nexus.eu/page.php?wert=Publications>

Link naar samenvatting Kennis Online: <https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksprojecten-LNV/Expertisegebieden/kennisonline/AF-EU-16006-Sim4Nexus-1.htm>

List of publications 2018

Author	Year	Titel	Magazine	DOI
Florian Humpenöder, Alexander Popp, Benjamin Leon Bodirsky, Isabelle Weindl, Anne Biewald, Hermann Lotze-Campen, Jan Philipp Dietrich, David Klein, Ulrich Kreidenweis, Christoph Müller, Susanne Rolinski and Miodrag Stevanovic	2018	Large-scale bioenergy production: how to resolve sustainability trade-offs?	IOP Publishing Ltd	https://doi.org/10.1088/1748-9326/aa9e3b
Janez Sušnik, Chengzi Chew, Xavier Domingo, Simone Mereu, Antonio Trabucco, Barry Evans, Lydia Vamvakeridou-Lyroudia, Dragan A. Savic, Chrysi Laspidou and Floor Brouwer	2018	Multi-Stakeholder Development of a Serious Game to Explore the Water-Energy-Food-Land-Climate Nexus: The SIM4NEXUS Approach	Water 2018, 10(2), 139	https://doi.org/10.1088/1748-9326/aa9e3b
Sara Masia, Janez Sušnik, Serena Marras, Simone Mereu, Donatella Spano and Antonio Trabucco	2018	Assessment of Irrigated Agriculture Vulnerability under Climate Change in Southern Italy	Water 2018, 10(2), 209	https://doi.org/10.3390/w10020209
Jean-Francois Mercure, Hector Pollitt, Neil R. Edwards, Philip B. Holden, Unnada Chewprech, Pablo Salas, Aileen Lam, Florian Knobloch, Jorge E. Vinuales	2018	Environmental impact assessment for climate change policy with the simulation-based integrated assessment model E3ME-FTT-GENIE	Energy Strategy Reviews; Volume 20, April 2018, Pages 195-208	https://doi.org/10.1016/j.esr.2018.03.003
Nikolaos Mellios, Jason F. L. Koopman and Chrysi Laspidou	2018	Virtual Crop Water Export Analysis: The Case of Greece at River Basin District Level	Geosciences 2018, 8(5), 161	https://doi.org/10.3390/geosciences8050161
Pilar Martinez, Maria Blanco and Bente Castro-Campos	2018	The Water-Energy-Food Nexus: A Fuzzy-Cognitive Mapping Approach to Support Nexus-Compliant Policies in Andalusia (Spain)	Water 2018, 10(5), 664	https://doi.org/10.3390/w10050664
Floor Brouwer, Georgios Avgerinopoulos, Dora Fazekas, Chrysi Laspidou, Jean-Francois Mercure, Hector Pollitt, Eunice Pereira Ramos, Mark Howells	2018	Energy modelling and the Nexus concept	Energy Strategy Reviews; Volume 19, January 2018, Pages 1-6	https://doi.org/10.1016/j.esr.2017.10.005
Janez Sušnik	2018	Data-driven quantification of the global water-energy-food system	Resources, Conservation and Recycling; Volume 133, June 2018, Pages 179-190	https://doi.org/10.1016/j.resconrec.2018.02.023
Chrysi S. Laspidou, Dimitrios T. Kofinas, Nikolaos K. Mellio and Maria Witmer	2018	Modelling the Water-Energy-Food-Land Use-Climate Nexus: The Nexus Tree Approach	Proceedings 2018, 2, 617	doi:10.3390/proceedings2110617
Antonio Trabucco, Janez Sušnik, Lydia Vamvakeridou-Lyroudia, Barry Evans, Sara Masia, Maria Blanco, Roberto Roson, Martina Sartori, Eva Alexandri,	2018	Water-Food-Energy Nexus under Climate Change in Sardinia	Proceedings 2018, 2, 609	doi:10.3390/proceedings2110609

Floor Brouwer, Donatella Spano, Alfonso Damiano, Andrea Viridis, Giovanni Sistu, Daniele Pulino, Vania Statzu, Fabio Madau, Elisabetta Strazzera and Simone Mereu				
Petra Hesslerová, Hanna Huryňa, Jan Pokorný, Jan Procházka	2018	The effect of forest disturbance on landscape temperature	Ecological Engineering 120 (2018) 345–354	https://doi.org/10.1016/j.ecoleng.2018.06.011
Tomoko Hasegawa, Shinichiro Fujimori, Petr Havlík, Hugo Valin, Benjamin Leon Bodirsky, Jonathan C. Doelman, Thomas Fellmann, Page Kyle, Jason F. L. Koopman, Hermann Lotze-Campen, Daniel Mason-D’Croz, Yuki Ochi, Ignacio Pérez Domínguez, Elke Stehfest, Timothy B. Sulser, Andrzej Tabeau, Kiyoshi Takahashi, Jun’ya Takakura, Hans van Meijl, Willem-Jan van Zeist, Keith Wiebe & Peter Witzke	2018	Risk of increased food insecurity under stringent global climate change mitigation policy	Nature climate change 8 (2018) 699–703	https://doi.org/10.1038/s41558-018-0230-x
Marco Springmann, Michael Clark, Daniel Mason-D’Croz, Keith Wiebe, Benjamin Leon Bodirsky, Luis Lassaletta, Wim de Vries, Sonja J. Vermeulen, Mario Herrero, Kimberly M. Carlson, Malin Jonell, Max Troell, Fabrice DeClerck, Line J. Gordon, Rami Zurayk, Peter Scarborough, Mike Rayner, Brent Loken, Jess Fanzo, H. Charles J. Godfray, David Tilman, Johan Rockström & Walter Willett	2018	Options for keeping the food system within environmental limits	Nature 562 (2018) 519–525	https://doi.org/10.1038/s41586-018-0594-0
Anders Arvesen, Gunnar Luderer, Michaja Pehl, Benjamin Leon Bodirsky, Edgar G. Hertwich	2018	Deriving life cycle assessment coefficients for application in integrated assessment modelling	Environmental Modelling & Software 99 (2018) 111–125	https://doi.org/10.1016/j.envsoft.2017.09.010
Floor Brouwer, Lydia Vamvakeridou-Lyroudia, Eva Alexandri, Ingrida Bremere, Matthew Griffey, Vincent Linderhof	2018	The Nexus Concept Integrating Energy and Resource Efficiency for Policy Assessments: A Comparative Approach from Three Cases	Sustainability	https://www.mdpi.com/2071-1050/10/12/4860