



The NEXUS concept for a resource efficient Europe: challenges for energy modelling

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Floor Brouwer in co-operation action
with work package leads

WUR-LEI

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Nexus approach

- Analytical
 - Systematic process of **scientific inquiry** explicitly focusing on bio-physical, socio-economic and policy interactions (synergies and trade-offs) across sectors, with end goal of sustainable and integrated management of natural resources
- Governance
 - **Approach to (cross-sectoral) decision making and planning** that takes an explicit focus on interactions (synergies and trade-offs) between policy goals and instruments across sectors to enhance **policy coherence**



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Challenge for resource efficiency in Europe

- Achieving resource efficiency is a challenge. It requires exploitation of synergies and mitigation of trade-offs across water, energy, food, climate and land. Implementations needs the active participation among government, the private sector, academia and civil society. Nexus concept will support this.
- Resource efficiency is supported by knowledge on how Nexus sectors operate: how to create synergies in the energy sector with water, food, land and climate?



Main question addressed by the 12 SIM4Nexus case studies

Does the goal of becoming a fossil-free nation interfere with some of the national environmental objectives such as sustainable development of water and forest resources ?

Is it possible to enlarge energy self-supply, by widening the use of renewable energy sources in Latvia ?

What can be the role of biomass in the Dutch transition to a low-carbon economy by 2050?

Does the landscape structure dominated by monoculture-like crop areas in some of the lower parts and its alterations by energy production affect the water cycle in an unfavorable way?

What are the Nexus issues at the global scale ?



The Nexus and a transition to a low-carbon economy in Europe



Azerbaijan's transition to a low-carbon economy and the Nexus



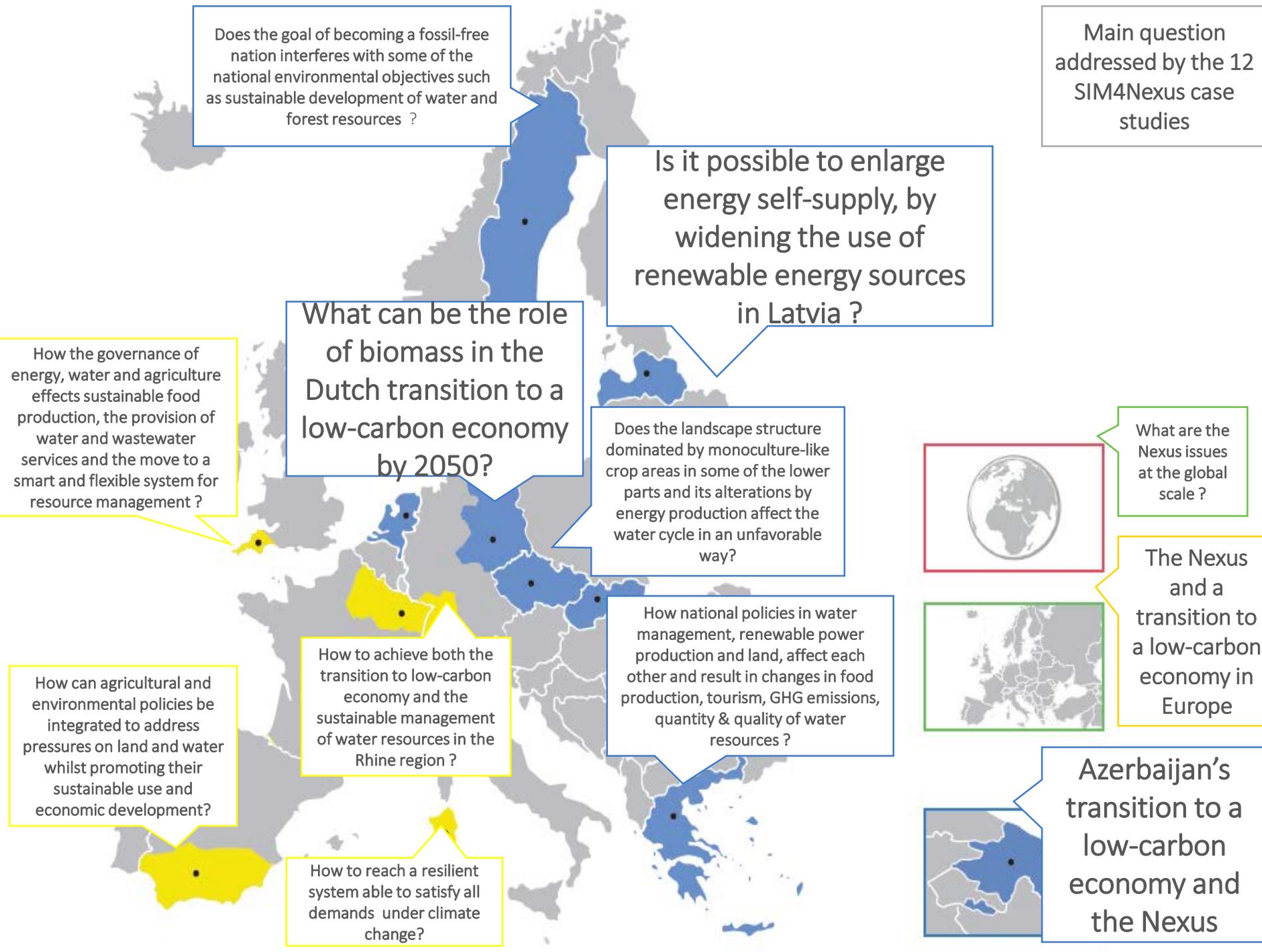
How national policies in water management, renewable power production and land, affect each other and result in changes in food production, tourism, GHG emissions, quantity & quality of water resources ?

How to achieve both the transition to low-carbon economy and the sustainable management of water resources in the Rhine region ?

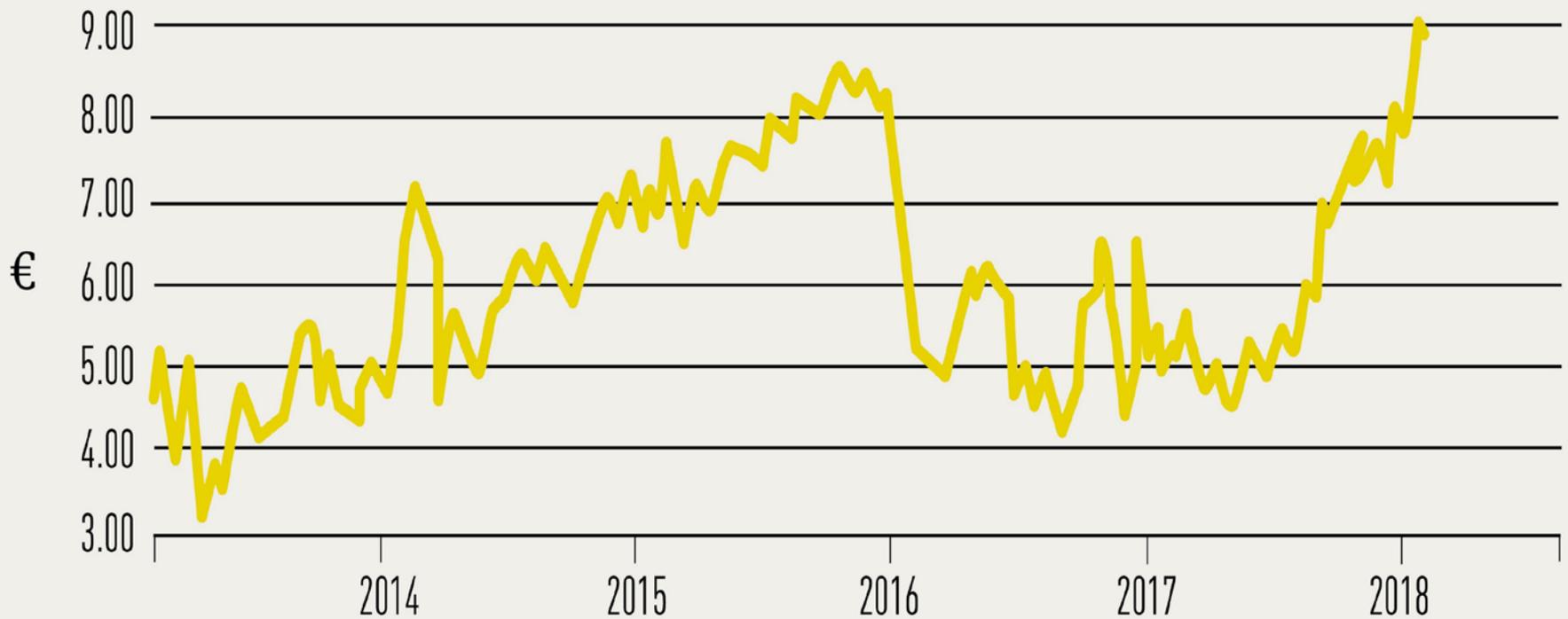
How to reach a resilient system able to satisfy all demands under climate change?

How can agricultural and environmental policies be integrated to address pressures on land and water whilst promoting their sustainable use and economic development?

How the governance of energy, water and agriculture affects sustainable food production, the provision of water and wastewater services and the move to a smart and flexible system for resource management ?

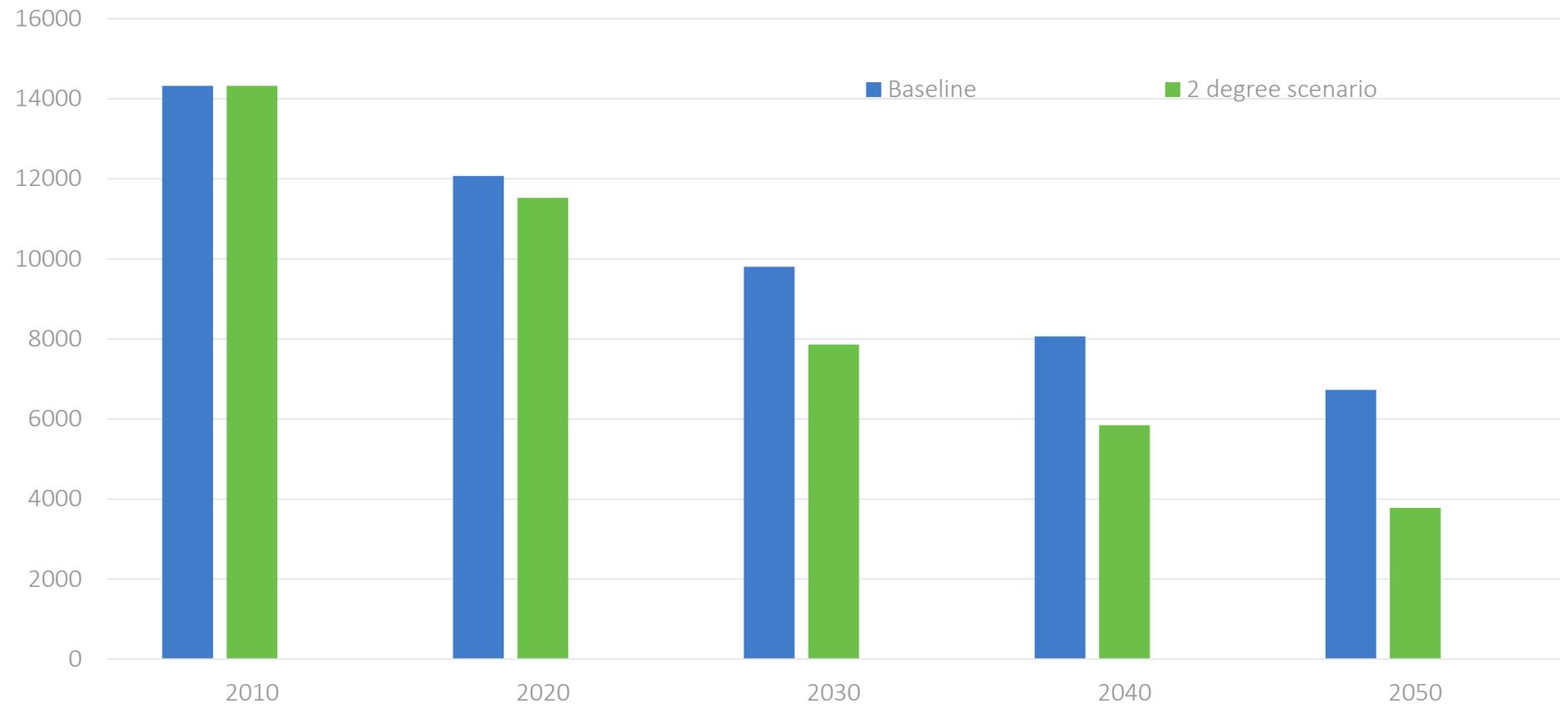


Carbon prices in Europe are still very low (<https://bit.ly/2wz62ik>)



Energy-related CO2 emissions (mT CO2) (source: E3ME)

Diagrammtitel



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Energy in a circular economy

New technologies for (non-) renewable energy

Adopt renewable energy

Savings through efficiency measures

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Circular economy – outcome is increased resource efficiency

- Investments in a circular economy could be positive (economic growth and overall employment) through the investments in energy efficiency, support for renewables and a lower dependency on fossil fuel imports (e.g. macro economic models including E3ME model)
- Competitiveness of material intensive sectors (e.g. extraction of resources, certain manufacturing) will decline and sectors (e.g. waste management, recycling, services) will probably expand.



Modelling the circular economy

- **Economy-wide** modelling is important because of spill-over and interaction effects between sectors are involved. There are structural shifts across sectors and regions
- **Dynamic modelling** is preferred because circular economy does occur with ICT shifts and resource use changes



Source (OECD)

- McCarthy, A., R. Dellink and R. Bibas (2018), "The Macroeconomics of the Circular Economy Transition: A Critical Review of Modelling Approaches", *OECD Environment Working Papers*, No. 130, OECD Publishing, Paris, <https://doi.org/10.1787/af983f9a-en>.



Concluding remarks for today

- Demonstrate a long-term (50 years) integrated policy approach to business planning and education tool for use with local educators, considering resilience, environmental protection and low-carbon development
- We are now at the stage of the Nexus research where methods and frameworks for understanding trade-offs and synergies across Nexus sectors are being developed and implemented.



Thanks for your attention!

For further information please consult
www.sim4nexus.eu,
follow us at @SIM4NEXUS
Floor.brouwer@wur.nl



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