



Integrated Assessment of the Nexus: the Case of Hydraulic Fracturing

Project Details

Duration:

Jan 2015- Dec 2018
(36 Months)

Project type:

7th FP Marie Curie
International Outgoing
Fellowship
PIOF-GA-2013-623593

Partners:

Universitat Autònoma
de Barcelona
Yale University

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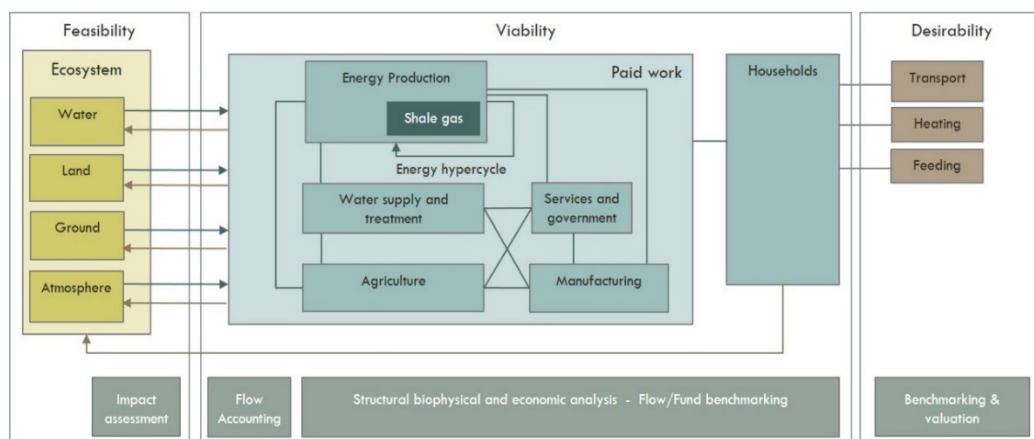
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With enough studies that show both pros and cons at hand, countries look at the development of shale gas as a potential strategy to reach energy security and a low carbon economy. Whether shale gas is a good energy source to reach these objectives is still under assessment .

The IANEX project examined shale gas in Pennsylvania, US, and built scenarios in the EU using a Feasibility-Viability-Desirability assessment with a water-energy nexus perspective and including the stakeholders in the analysis.

Structure of the project divided in three checks (top) and the related methods (bottom)

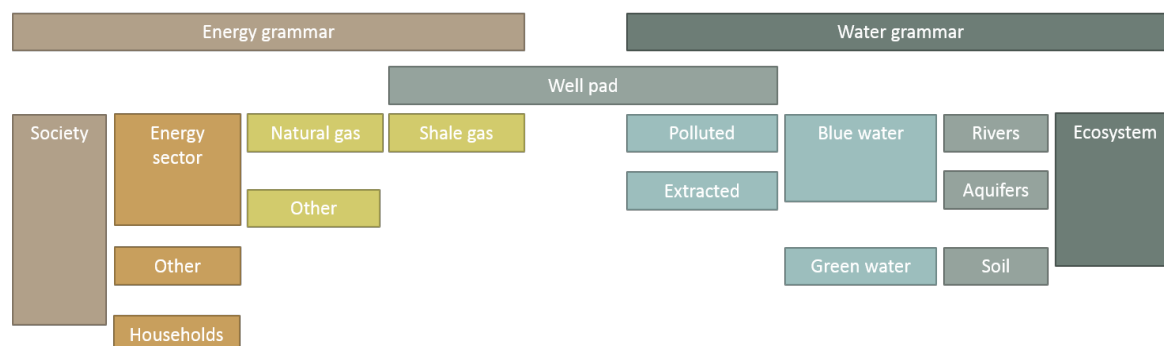


The water-energy nexus, truly interdisciplinary

We combined some principles of Life Cycle Inventory (LCI) with the Multi Scale Integrated Assessment of Socio-Ecological Systems (MuSIASEM) to develop a framework where water and energy system merge in a georeferenced local activity.

This framework involves public participation in the design of the indicators and can be used to assess other fossil and renewable energy sources, water related innovations or policies.

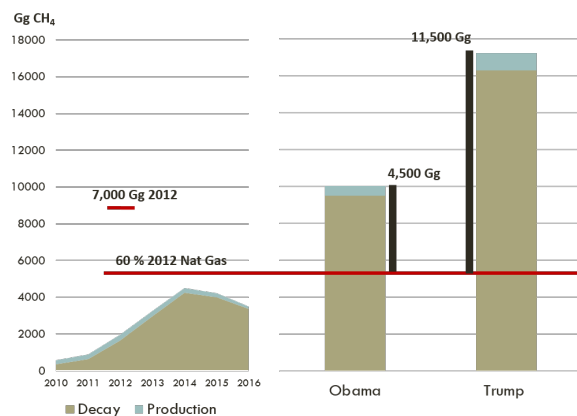
Methods: LCA-MuSIASEM combining levels of analysis with the trace back of the life of the well



Demographics matters

The US natural gas system -main methane emitter- should reduce its emissions about 30% by 2025, following the COP agreement. In IANEX we checked well-demographics to compare the effects of the gas emission policies proposed by President Obama and President Trump. In the Obama scenario the emissions of the Shale gas in Pennsylvania would be 4,500 Gg higher than the allowed for the whole natural gas industry. The Trump scenario, however is 11,500 Gg higher than required .

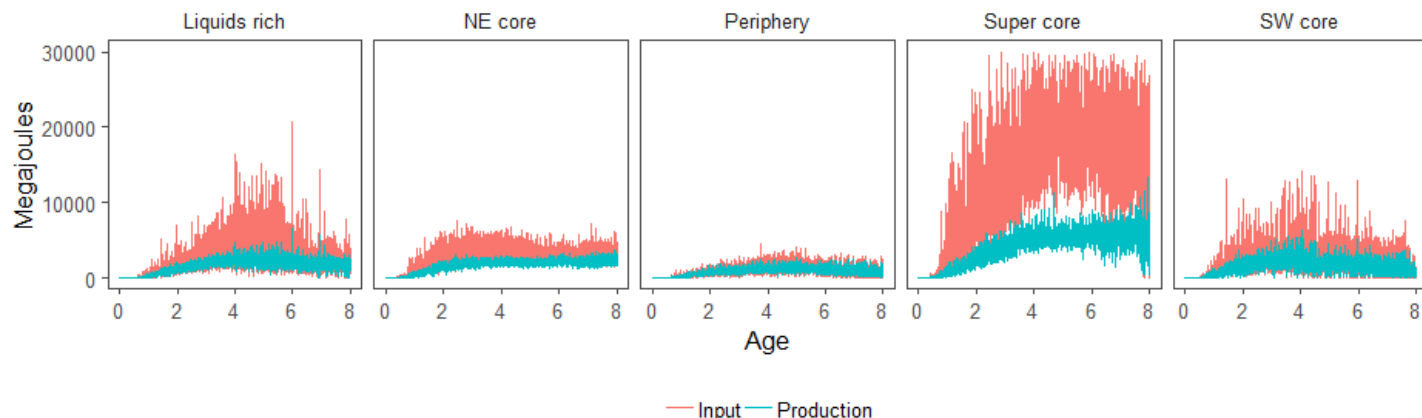
Comparing the Obama and Trump policy using demographics



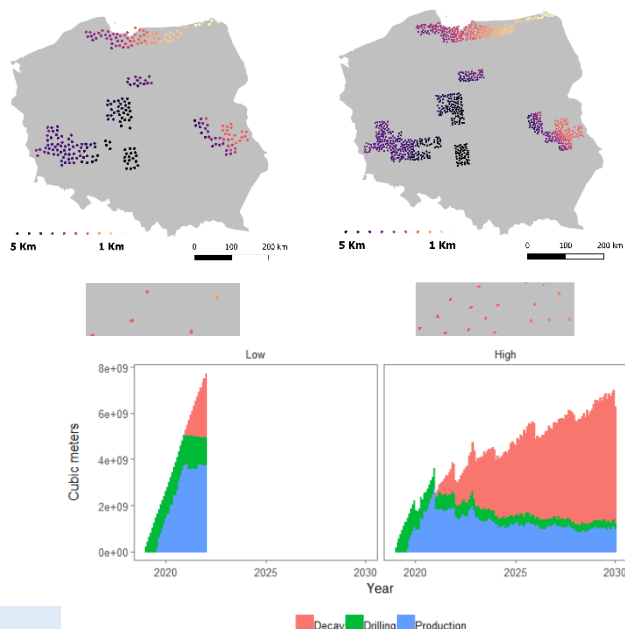
Why shale gas is not a good option

When shale gas wells are studied as a structure, without taking into account that it is an important functional component of a bigger system, some parts of the picture are missing. In IANEX we realized that not even in the most productive regions of Pennsylvania is the shale gas profitable in energy or economic terms.

Functional energy input and net production of shale gas in regions of Pennsylvania by well age



High (left) and low (right) density scenarios for shale gas exploitation in Poland



What about Europe?

With the Groningen fields closing by 2030 and the deterioration of diplomatic relations with Russia the EU faces the decision to reconsider positions on shale gas. However, a case study in Poland tells us that it is difficult to offset the almost 20 billion cubic meter gap the Dutch fields will leave in Europe. A functional scenario analysis of IANEX shows how not even a high density scenario (1.5 billion cubic meters) can help closing the gap and that low density is more productive and less impacting.