BANNING NON-CONVENTIONAL OIL EXTRACTION: WOULD A UNILATERAL MOVE OF THE EU REALLY WORK?

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Overview

The extraction and processing of oil shales and oil sands – commonly defined as non-conventional oil resources – is more energy intensive than the extraction of conventional oil resources. The consumption of one barrel of oil derived from non-conventional resources is thus responsible for more carbon dioxide emissions than the consumption of conventional oil. Emissions from the final use of oil products (e.g. gasoline) is the same, but non-conventional oil has more emissions in both extraction and refining. The European Union (EU) estimates that oil sands lead to 22% more emissions than conventional oil, while according to the International Energy Agency the difference ranges between 0 and 15%, depending on the benchmark conventional oil. The extraction of non-conventional fossil fuel resources also requires more water than the extraction of conventional resources, more chemicals and more disruptive processes that may cause serious environmental damage.
For these reasons there are growing tensions between the advocates of non-conventional fossil extraction on one side and environmental groups, parts of the public opinion and policy makers on the other side. In the United States the decision of building the XL pipeline from Canada to the Gulf of Mexico is in part opposed because of fear of oil spills, but what worries most the opponents is the fear that the new transportation route will unlock dirty non-conventional oil extraction in Alberta. By offering an easy communication between the Canadian tar sands and the refineries in Texas, non-conventional oil could find its way to the global markets.
The EU is very concerned by this prospects. EU regulators want to stigmatize tar sands oil production in Canada by labelling it as a dirty fuel and they expressed the intention to impose a tariff that reflects the social cost of the additional carbon dioxide emissions in the extraction phase . The EU move would be equivalent to a border tax adjustment, as emissions from the extraction phase would still be counted as part of total Canadian emissions.
Scenarios developed for the FP7 project Global-IQ – within which this work has been carried out – show that if population and economic growth continue to follow the trends of the past, global energy demand will substantially increase over the next decades because energy efficiency improvements are not expected to be strong enough to curb total demand. The pressure of a growing demand has the effect of increasing the price of fossil fuels in global market. Higher fossil fuel prices make the extraction of more costly non-conventional sources economically attractive. Non-conventional fossil resources thus play an increasingly important role in supplying a growing amount of energy in future energy demand and supply scenarios. Carbon dioxide emissions grow because both total energy demand and the carbon content per unit of energy (carbon intensity) increase.
How large is the effect of increased use of non-conventional fossil resources on global warming? By how much global temperature in 2100 would change if the use of non-conventional fossil resources was banned globally? What would be the impacts of a ban policy limited to the EU only? In this work we answer those questions.

Methods

The tool adopted in this work is WITCH (World Induced Technical Change Hybrid), a climate-energy-economic IAM, written in the GAMS (General Algebraic Modeling System) language, aimed at studying the socio-economic impacts of climate change throughout the 21st century. We first run an unconstrained reference scenario in order to obtain benchmark results. We then analyze two policy scenarios: in the first one all world countries agree not to use non-conventonal oil, while in the second one we assume that only Europe takes the unilateral measure to ban domestic non-conventional oil extraction and to ban consumption of non-conventional oil extracted elsewhere. The impact of the ban on non-conventional oil is assessed evaluating the effects on global oil demand, on the oil price, on carbon dioxide emissions, on global mean temperature and on aggregate consumption.

Results

A global ban on the use of non-conventional oil leads to a considerable reduction in oil demand (-48% in 2100), thus in carbon dioxide emissions (-20% in 2100), with moderate effects on the global mean temperature increase (which is reduced by 0.3°C, from +4.1°C to +3.8°C, in 2100). However, the policy is not efficient as other tools may achieve the same environmental goal at lower cost: global ban of non-conventional oil costs about 277 USD trillion in lost consumption (cumulative, 2010 to 2100 undiscounted), whereas a global carbon tax calibrated to lead to the same temperature increase would cost 19 USD trillion.

A unilateral ban adopted by the EU only is neither environmental effective nor efficient. The increase of global mean temperature is virtually unchanged at the end of the century, as the reduction of demand from Europe would be almost completely offset by an increase of demand from the other regions, which benefit from the resulting lower oil price. This implies that the cost of limiting non-conventional oil use falls on Europe while the benefit is shared among all other regions because they face less competition in the global oil market.

Conclusions

The study shows that a global ban on the use of non-conventional oil substantially reduces global carbon dioxide emissions, but the policy is not efficient as other tools (e.g. a global carbon tax) may achieve the same environmental goal at lower cost. A unilateral ban of the EU on non-conventional oil has no environmental benefits (global oil demand does not significantly change) and it is expensive for Europe. The key policy message for the EU is that it should not focus on contrasting a specific technology, but rather on promoting the implementation of economy-wide policies to penalize GHG emissions.

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