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# Shale Gas and the Environment



By David Hemous, INSEAD Assistant Professor of Economics and Political Science

**The recent shift in energy generation towards shale gas is likely to have an important impact on greenhouse gas emissions and therefore on global warming. However, whether this impact will be positive or negative is much debated.**

The main advantage of shale gas is that it emits much less CO<sub>2</sub> than coal, therefore, every time a new shale gas plant displaces a coal plant, it reduces drastically CO<sub>2</sub> emissions (its carbon content is half that of the average coal, and since new natural gas plants are more energy efficient than the average coal plant, the reduction in CO<sub>2</sub> emissions is even larger).

But whether the development of shale gas is good or not for climate change will depend on the country where it is being developed: in the U.S., the President's Council of Advisors on Science and Technology is urging President Obama to foster the development of shale gas in order to reduce greenhouse gas emissions, so that as shale gas replaces coal, it will be an improvement; however in France, if the development of shale gas replaces nuclear energy, this will increase emissions. Similarly, the development of shale gas in the U.S. could contribute to lower emissions if it allows for an

increase of manufacturing production at the expense of a country that relies a lot on coal (say China), but to increase emissions if the expansion in manufacturing occurs at the expense of a country with cleaner energy than the U.S. In addition, cheap shale gas may also lead to an increase in energy consumption (not displacing any other source), this is particularly true in sectors where gas is the dominant source of energy (such as housing heating).

## **Delaying Clean Tech?**

The biggest concern with shale gas development may rather be its impact on the development of really clean technologies: even if shale gas were only to displace coal, and not increase total energy consumption, the reductions in CO<sub>2</sub> emissions will only be able to delay climate change but not to prevent it. Preventing further detrimental climate change requires the development of near-zero emissions technologies. In the last few years, shale gas production has grown dramatically, while – despite a huge amount of attention devoted to clean tech – wind and solar energy have yet to become a significant share of energy production.

This is not particularly surprising and can be understood through the lens of “directed technical change”: technological innovations tend to be directed towards the sectors with the largest market. Since shale gas is a fossil fuel, it benefits a lot from the technological advances in traditional fossil fuel, and its potential market is very large even in the short-term. As a result, when the price of fossil fuel increased, a lot of innovation efforts were directed towards shale gas exploitation, and it was able to quickly develop and become profitable. On the contrary, wind and solar energy do not benefit from much spillover from fossil fuel technologies, with which they have to compete. Since these technologies are less advanced (they are much more costly to produce), potential incremental innovations in wind and solar power are not likely to capture a large market share and therefore there are not particularly encouraged.

The development of shale gas today is going to further expand the gap between fossil fuel technologies and wind/solar technologies, reducing further the incentive to innovate in those. Furthermore, the development of shale gas technologies may help the development of other non-traditional fossil fuels, which will delay even further the adoption of near zero-emissions technologies. On top of competing for post-innovations market share, shale gas and wind/solar energies have also been competing for government help

in R&D resources, as the development of shale gas was also directly supported by government programmes. This has also delayed the development of wind/solar energy.

Therefore, the development of shale gas may be good news for climate change, but only if it does not come at the expense of the development of really clean technologies. What is the appropriate governmental policy then? Banning shale gas and preventing immediate reduction in greenhouse emissions does not seem wise on economic or environmental grounds; but this can only happen if in the meantime governments support, in a much more decisive manner, the development of really clean technologies. A successful policy would be one in which shale gas were deployed for a temporary period as a bridge between coal and clean technologies.

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