

## **SOCIO-ECONOMIC ASSESSMENT OF THE GAS EXTRACTION BY HYDRAULIC FRACTURING IN THE REGION OF MURCIA**

*José M. Martínez-Paz, Francisco Pellicer-Martínez, José Ramón Fernández and Luca Lamonaca*

Instituto Universitario del Agua y el Medioambiente  
Universidad de Murcia.

### **ABSTRACT**

Extraction of unconventional gas through hydraulic fracturing, the so-called “fracking”, consists in the injection at high pressure of fluid, composed by water, sand and chemical products, underneath the land surface (a depth of approx. 2000/3000 meters) in order to free the gas trapped in rocks at low permeability. The first evidence of such technique of extraction dates back to 1946 when it was used in the oil field of Hugoton in Southwest of Kansas, USA. Nonetheless, this technique has been widely developed since the Nineties mainly in the US and Canada.

Nowadays, social and economic benefits of fracking are contrasted with the environmental impacts and risks on public health. On the one hand, fracking can reduce energy dependency, which is very important because the well-known volatility of oil prices, and at the same time, can lead to a drop of energy prices and the creation of employment opportunities. On the other hand, there are environmental risks that often are not properly assessed; these include: it is necessary a large quantity of water, CO<sub>2</sub> emissions, risks of groundwater and soil pollution, and gas leaks. Therefore, before implementing fracking technique, evaluating public perception on fracking and what is its acceptance level within affected communities are essential. Results may indicate if the project must be implemented or forbidden.

In Spain, the main interest in the fracking technique is to reduce its energy dependency. Recently, potential reserve of unconventional gas has been evaluated, indicating that can supply gas in Spain for 39 years. There are no fracking excavation sites yet, but planning permissions for first explorations have been approved for more than 100 areas in order to assess technical and economic viability. In the Murcia region, that is the study case, there are four geographical areas where permissions for exploration for fracking were approved. This region is located in a semiarid river basin (Segura river), where groundwater resources are essential for agriculture; some of these aquifers are also overexploited. The large amount of water required for “fracking” and the risk of groundwater pollution are important issues to consider around exploration sites: syncline of Calasparra, aquifers of Caravaca, Jumilla-Yecla, Cingla, etc. Moreover, this region is a high seismic risk area. So, the perception of developing this technique can worsen because of high sensitivity of the population following the dramatic “Lorca earthquake” of 2011. In summary, groundwater pollution and seismic risk are the major factors to thoroughly explore the implementation of fracking in the Murcia region and the social perception of such technique.

The objective is to assess the degree of knowledge of Murcian inhabitants and their perception of extraction of unconventional gas through fracking. This investigation comprises an analysis of the willingness to pay (WTP) for a moratorium on the implementation of this gas extraction technique; the WTP method is used to determine a monetary value for the perceived risks. For that purpose, a survey was submitted to a sample of households in the region to achieve the research objectives. This survey included questions that tested respondents’ knowledge of fracking technique and perception of climate change; survey also included a Contingent Valuation method for the above mentioned moratorium. This method is widely

employed in environmental economics to determine monetary values of non-market goods or services. Potential consumers are asked to indicate what is the maximum sum of money that are willing to pay for a given goods or services, or the minimum amount of money to avoid something undesired; in the latter case, the amount of money is equivalent to the possibility of compensation for renounce to such good or service.

In this research, relative questions to WTP are formulated under assumption that negative impacts are greater than benefits. Furthermore, there are questions formulated to determine willingness or not willingness to pay for the moratorium (dichotomous WTP: Yes/No question); answers are indicators of the share of the population that oppose fracking. Additionally, total willingness to pay is determined by asking what will be the maximum amount of money that a respondent is willing to increase their energy bills, in a similar way to current fees for the moratorium to put off nuclear power or levies for developing renewable energies.

Findings indicate that Murcian inhabitants have a low degree of knowledge about fracking technique in absolute terms; slightly more than one-third is familiar with this technique and less than one-tenth stated that they have enough knowledge about this topic. However, the latter percentage is similar to a comparable research conducted in US. Furthermore, findings show that population tend to be in favour of implementing fracking, provided that any harm to health and environment will be prevented. Finally, one-fifth refused its implementation in any case in the region, whilst just one-twentieth support fracking in any case. Quantitative analysis indicates that half of population would be willing to pay to avoid such technique. The average amount is approximately 15 € yearly per household to add to energy bill, an extra sum which is very close to current taxes to support other energy policies (nuclear moratorium). Moreover, reasons analysis to be or not be willing to pay led to conclude that public administrations have to adopt a pro-active attitude in order to evaluate the risks on environment and public health derived by fracking. These evaluations are especially important in cases similar to Murcia region, due to the above-mentioned issues of high seismicity and water scarcity.

Additionally, modelling the two WTPs (total and dichotomous) displays other two relevant findings. Firstly, households in areas closer to the sites that could be affected by fracking exhibit a higher level of refusal of its implementation; the possibility of rejection increased by 16%. This “proximity effect” is also identified in similar researches in other countries, such US. Secondly, women are more likely to be opposed to fracking, so “gender” variable is meaningful in our WTP model; such outcome also occurred in North American cities as presented in an extensive research carried out at 2014 that analysed public perception of fracking in the US.

Therefore, although fracking researches suggest that unconventional gas could be economically viable taking into account the possible impacts on environment, economy, individual well-being and public health is priority. In addition, it is essential to be informed of communities’ perception, in the locations where fracking is intended to be developed. Information campaigns, addressed to general society based on robust researches that consider local characteristics, is crucial to encourage public participation. This process enacts a more collaborative governance in order to devise plans for the exploitation (or non-exploitation) of unconventional gas. Indeed, information campaigns developed by civic organisations (so-called NIMBY organisations - Not In My Back Yard) or by energy companies can be biased and/or based on experiences from other geographical areas with very different socio-economic and environmental characteristics that cannot be directly transferred into other regions.