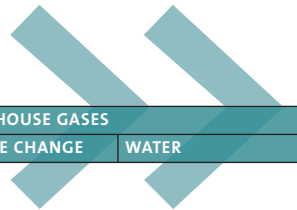


# Shale gas

Unconventional and unwanted:  
the case against shale gas



EXTRACTION		HYDRAULIC FRACTURING	GREENHOUSE GASES	
MILLENNIUM DEVELOPMENT GOALS		EMISSIONS	CLIMATE CHANGE	WATER

extractive industries:  
blessing or **curse**?



# Shale gas

## Unconventional and unwanted: the case against shale gas

Introduction	3	4 Setting a development example?	20
1 Shale gas in Europe	5	4.1 A global resource	20
1.1 What is shale gas, and what is fracking?	5	4.2 The increased risks of environmental and health damage in developing countries	20
1.2 The global and EU potential of shale gas	5		
1.3 What's behind the drive for shale?	6	5 How communities and campaigners are resisting shale gas	22
1.4 Where is shale gas being developed in Europe?	6	5.1 Argentina	22
1.5 Fossil fuel lock-in	8	5.2 Austria	22
		5.3 Bulgaria	23
2 The impacts of shale gas extraction	9	5.4 Czech Republic	23
2.1 Climate impacts	9	5.5 France	23
2.2 Impacts on renewable energy and energy efficiency investments	10	5.6 Germany	23
2.3 Environmental and health impacts	11	5.7 The Netherlands	24
2.4 What do we know about the chemical content of fracking fluids?	12	5.8 Poland	24
2.5 Land contamination and land use	13	5.9 Romania	25
2.6 Effects on the population	14	5.10 South Africa	25
2.7 Air pollution	14	5.11 Sweden	26
2.8 Earthquakes and vibrations	14	5.12 UK	26
		5.13 Ukraine	27
3 Setting the rules for shale gas – is the EU prepared?	15	6 Conclusion – Demands and policy recommendations	28
3.1 Europe seeks to get a grip on shale gas	15	7 References	29
3.2 How does existing EU legislation measure up to shale gas challenges?	16		
3.3 Moving the EU policy framework forward	18		
3.4 Dialogue	19		

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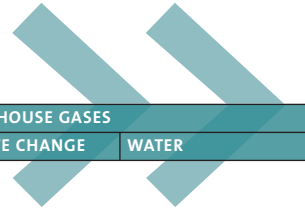
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## Introduction



MILLENNIUM DEVELOPMENT GOALS	EXTRACTION	HYDRAULIC FRACTURING	GREENHOUSE GASES	
		EMISSIONS	CLIMATE CHANGE	WATER

*“In theory there is no difference between theory and practice. In practice there is.”*

Yogi Berra,  
American baseball legend.



A demonstration against shale gas developments in Romania.  
© frack-off

Shale gas and the technology used to extract it – hydraulic fracturing, or ‘fracking’ – has become a great controversy in the last couple of years.

On the one hand, shale gas is promoted as a safe, clean energy source that can help Europe increase its energy security and provide an affordable transition to a low carbon economy. The hype accompanying the entry into Europe of shale gas as a possible energy ‘game changer’ derives from the rapid development of the sector in the US over the last 10 years. Industry sees it as a potential opportunity, with Exxon chief executive Rex Tillerson proclaiming: “The most important thing for people to understand about shale gas is it’s just yet the next big resource opportunity for us.”<sup>1</sup>

But, as the US experience has shown, serious environmental and human health concerns continue to dog shale gas drilling. Chief among these are threats to groundwater quality, concerns about how much water is needed, worries over fracking’s impacts on air quality and its stimulation of earthquakes and its potential impact on climate change, which could be comparable to coal.

There are also concerns about the impact of shale gas on sustainable and clean energy, and more particularly about the pressure it will exert on investments in renewables. Given its high carbon intensity, the scale of expansion and level of investment needed, it is not clear how shale gas could ever be a ‘transition fuel’ as claimed by the industry and its supporters, but that it will instead lock us in to a future of fossil fuel use.

At the same time it is becoming ever clearer that we will exceed the Earth’s ability to absorb greenhouse gases (GHGs) long before we run out of fossil fuels. Meeting the EU’s target of less than two degrees Celsius of global warming depends on burning less than a quarter of the proven reserves of fossil fuels by 2050.<sup>2</sup>

According to the International Energy Agency (IEA), the development of the shale gas industry would put our CO<sub>2</sub> emissions on a “trajectory consistent with a probable temperature rise of more than 3.5 degrees Celsius in the long term”.<sup>3</sup>

This briefing will examine some of the uncertainties around shale gas, including the gaps in existing EU legal and regulatory frameworks, the realities of enforcing an effective regulatory framework, the cost pressures, and the influence of the shale gas lobby. It will also examine the implications of European support for shale gas on the global energy picture, in particular on the impacts in developing countries. In that perspective, this briefing will argue shale gas cannot contribute to the achievement of the Millennium Development Goals, in particular the goal to achieve environmental sustainability.



It also looks at the massive resistance of groups and communities across Europe to shale gas development, which is in strong contradiction with the strong push for this new technology by many EU decision makers. It reviews the US experience to date, compares the situation in the US with that in Europe, and aims to feed into and inform the ongoing European debate on shale gas. Finally it questions how shale gas can fit with the EU's commitment to a low-carbon economy and the agreed aim of almost full decarbonisation of the power sector by 2050.

Intense industry interest in developing shale gas reserves in Europe mean that the picture is changing rapidly. This poses a challenge to the EU's regulatory system. Can it keep up with the speed of shale gas development and ensure the regulatory framework required to protect our environment and our health?

Given the evidence presented in this report and the significant and unacceptable shale gas-related risks, Friends of the Earth Europe argues that there should be an EU-wide moratorium on shale gas, and that all EU member states with known shale gas reserves should issue comprehensive bans on shale gas exploration and extraction.



Caption: Drilling pad in Bulgaria. Each pad requires almost 4 hectares to install all the necessary equipment for extraction.

© foe

# Shale gas in Europe

1



Drill rig working near Divide Creek in Western Colorado. Methane leaked into the creek during drilling activity.  
© tedx

## 1.1 What is shale gas, and what is fracking?

Shale gas, like tight gas or coal bed methane<sup>4</sup>, is a form of unconventional natural gas, largely composed of methane and found in shale rock reservoirs deep underground. It is called 'unconventional' because of the geological context where it is found. Shale is a sedimentary rock formed from compacted mud, clay, and other fine-grained rocks.<sup>5</sup> This makes it harder to extract as shale rock is brittle and non-permeable. As a result a process known as hydraulic fracturing – or 'fracking' – is used.

Fracking involves drilling deep (generally 1,500 to 6,000 metres) into the Earth, vertically and horizontally, and pumping a mix of water, a granular substance such as sand (known as a proppant) and chemicals (including highly carcinogenic benzene and formaldehyde) under high pressure to fracture the shale and force the gas out of pores in the rock into the well. Waste water, contaminated with fracking chemicals and naturally occurring pollutants such as heavy metals, is also returned to the surface.

For each well, production generally depletes after a year or 18 months due to the naturally low concentration of gas. The geology pushes operators to drill new wells around the first one, resulting in a high density of wells. According to the IEA: "whereas onshore conventional fields might require less than one well per ten square kilometres, unconventional fields might need more than one well per square kilometre (km<sup>2</sup>), and up to 10 wells per well- pad, significantly intensifying the impacts of drilling (called cumulative impacts) and completion activities on the environment and local residents".<sup>6</sup>

## 1.2 The global and EU potential of shale gas

While there is an estimated 331 trillion cubic metres (tcm) of unconventional gas worldwide, the amount which can be technically recovered is as yet unclear. This is almost comparable to conventional gas resources (around 421 tcm).<sup>7</sup> The IEA estimates that shale gas reserves represent some 208 tcm of overall unconventional reserves and could represent seven per cent of total global gas supply by 2030.<sup>8</sup>

The US is today the world's leading shale gas producer, with Canada also developing a shale gas industry. In other parts of the world, from the EU to South Africa and from China to Argentina, plans for exploration of shale gas are also in preparation.

Overall, unconventional gas, including shale gas, already accounts for more than half of US domestic gas production and in 2009 the US overtook Russia as the biggest producer of natural gas, thanks to the shale gas boom. As a result, global gas prices have gone down.

In the EU, there are differing views as to the likely viability, acceptance and availability of shale gas, with member states already taking significantly different positions. Some suggest that shale gas could provide Europe with an important bridging fuel, easing the transition to a low carbon economy. But there are major concerns about how this would affect Europe's developing renewables sector, as well as fears about the environmental and health impacts of fracking. There are also big questions about its effect on the climate.

**table 1.1 Remaining technically recoverable natural gas resources by type and region, end 2011 (tcm)**

	Total		Unconventional		
	Conventional	Unconventional	Tight Gas	Shale Gas	Coalbed methane
E.Europe/Eurasia	131	43	10	12	20
Middle East	125	12	8	4	-
Asia/Pacific	35	93	20	57	16
OECD Americas	45	77	12	56	9
Africa	37	37	7	30	0
Latin America	23	48	15	33	-
OECD Europe	24	21	3	16	2
<b>World</b>	<b>421</b>	<b>331</b>	<b>76</b>	<b>208</b>	<b>47</b>

Source: IEA

### 1.3 What's behind the drive for shale?

Many advocates of shale gas are also driven by the possibility of cheaper, more secure energy supplies. European conventional gas production has been in steep decline for several years and is expected to decline by another 30 per cent or more by 2035.<sup>9</sup>

Demand for all fossil fuels, including gas, is predicted to increase substantially over the next few decades unless climate change policies are introduced to curb it.<sup>10</sup> Under a business-as-usual scenario, gas demand will rise by 1.6 per cent annually to 2030<sup>11</sup>, with a considerable share expected to come from unconventional gas.<sup>12</sup>

Countries such as Poland and Bulgaria currently rely heavily on Russia for gas supplies,<sup>13</sup> and are keen to improve their energy security.

Having led the development of shale gas, the US is also keen to reap the benefits. In April 2010 the US launched the Global Shale Gas Initiative to “help countries seeking to utilise their unconventional natural gas resources to identify and develop them safely and economically” by sharing technical expertise and lessons learned on regulation and environmental protection.<sup>14</sup> This has included high level diplomatic efforts to support US companies attempting to break into the European shale sector.<sup>15</sup>

But Europe's shale reserves are geologically different from those found in the US,<sup>16</sup> making extraction more difficult and more expensive.<sup>17</sup> There are also a number of other factors which have led most in the industry to consider the costs of extraction in Europe.<sup>18</sup> Shell's chief executive Peter Voser has said that the development of shale gas in Europe “will be limited as a result of regulation, legislation, high population density and the challenge of obtaining permits.”<sup>19</sup> The International Energy Agency confirmed that applying its ‘safety standards’ “could increase the overall financial cost of development of a typical shale-gas well by an estimated 7%.”<sup>20</sup>

Scepticism about the financial and technical viability of developing and extracting shale gas in Europe is currently widespread, not least among traditional investors<sup>21</sup> as well as within the industry.<sup>22</sup>

### 1.4 Where is shale gas being developed in Europe?

In Europe so far, there have been approximately 30 exploratory drillings (June 2012), more than two thirds of which have been in Poland.<sup>23</sup> Unconventional gas deposits are mostly concentrated in Austria, Bulgaria, Denmark, France, Germany, the Netherlands, Poland, Romania, Sweden and in the UK. Almost half of these resources are thought to be in shale.<sup>24</sup>

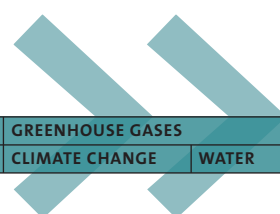
The exact extent of Europe's unconventional gas reserves is unknown, although the IEA has estimated it as 35tcm of “technically recoverable” gas.<sup>25</sup> This is far less than in North America or Russia. If this amount proves to be “economically recoverable” it could replace 40 years of gas imports at current levels.<sup>26</sup> The cost of extraction depends on a number of factors, not least the geology.

Europe's shale hot spots are found in Poland, France and Germany, with some exploration also underway in the UK.

Until recently, Poland was thought to have the largest reserves of shale gas in Europe (29%)<sup>27</sup> and is eager to exploit them. The country relies on Russian gas imports (70%)<sup>28</sup> but Polish Prime Minister Donald Tusk has said that the country's shale gas reserves could provide ‘gas security’ by 2035.

Questions remain about exactly how much shale gas Poland has, with estimates recently dramatically revised down to between 346 and 768 billion cubic metres (bcm), compared to the 5 tcm they were claiming. Accurate estimates are hampered by a reliance on old data.<sup>29</sup>

The Polish government is encouraging exploration through fiscal incentives and more than 100 exploration licences have been approved.<sup>30</sup> Somewhat surprisingly, 25 per cent of these licences have been issued to Russian companies.<sup>31</sup>



HYDRAULIC FRACTURING	GREENHOUSE GASES
EMISSIONS	CLIMATE CHANGE
	WATER

ExxonMobil, Chevron, Halliburton and several other US companies are also involved.<sup>32</sup> 3 Legs Resources, a small firm based on the Isle of Man, is also involved with Chevron.<sup>33</sup>

Poland wants to become a market leader in shale gas for the whole of Europe<sup>34</sup> but Poland's investment in shale – which is unlikely to see any significant production for 10-15 years<sup>35</sup> – will lock the country into an ongoing reliance on fossil fuels.

Yet Poland is committed under the EU Renewable Energy Directive to achieve 15 per cent renewable final energy consumption by 2020 and a 20 per cent by 2030. The Global Wind Energy Council estimates that Poland has the potential for 13GW of wind energy by 2020.<sup>36</sup> But this is unlikely to happen if the country puts its money in shale gas.

Since the re-assessment of the Polish reserves, France is estimated to now have the largest reserves of shale gas in Europe (28%)<sup>37</sup> but has become the first country in Europe to outlaw fracking, following widespread public objections.

Initial exploration licences for shale gas were awarded by the French government in March 2011, but as a result of the extensive public protests, development was put on hold. The French

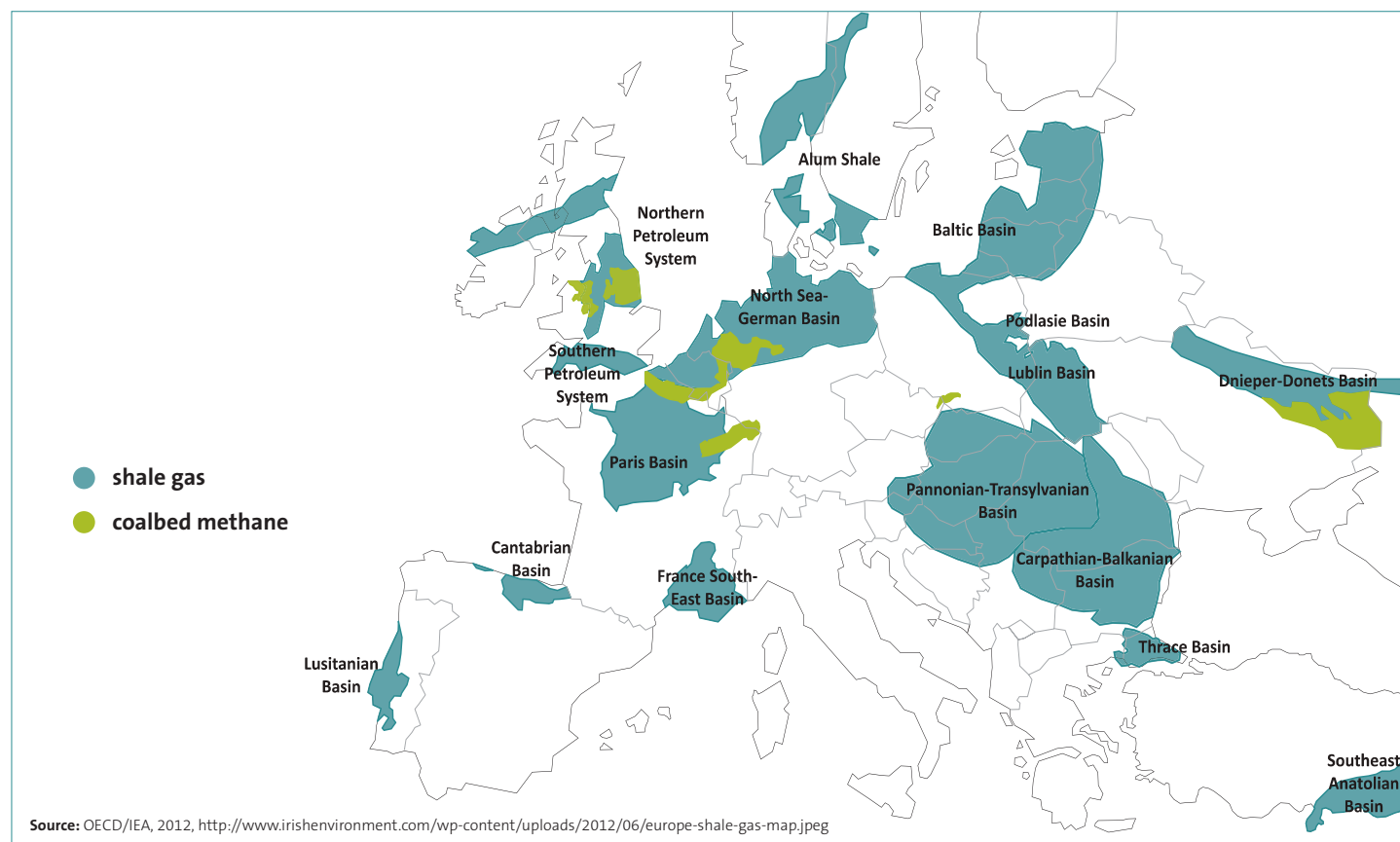
Senate approved a ban on 'fracking' in June 2011.<sup>38</sup> Fracking is however still allowed for scientific testing, and ambiguities in the new law have created concerns that exploration may still be possible, as long as it's not described as 'fracking'.

The French government has announced a commission to assess the environmental risks linked with fracking.<sup>39</sup> Friends of the Earth France has refused to serve on this commission as it has a representational bias in favour of the industry.

Further scepticism about the French government's intentions was fuelled by a symposium held in early 2012 under the auspices of the French prime minister and attended exclusively by companies involved in shale gas exploitation. The topic was: "The French ban on fracking, how to get out?"

Like France, Germany has favourable geological conditions for shale gas, with likely reserves in six of the 16 states, but estimates suggest that only between 0.7 and 2.3 tcm of the gas could be technically extracted.<sup>40</sup> Many major companies are prospecting for shale gas and coal seam gas, including ExxonMobil, Gas de France (GDF Suez), RWE DEA and Wintershall, but there is also strong public opposition.<sup>41</sup>

**figure 1.1** Major unconventional natural gas resources in Europe





ExxonMobil started exploration in 2008 and drilled six wells in Lower Saxony and in North Rhine-Westphalia,<sup>42</sup> with investment plans worth USD 1 billion for the period 2010-2015. But following environmental opposition, a moratorium on shale gas drilling was introduced in North Rhine-Westphalia in March 2011, putting a brake on Exxon's plans. A decision on the future of drilling in the state is expected following the results of a study, published in September 2012<sup>43</sup>, which recommended that no further shale gas related activity should occur until more research have been produced, considering the high risks for the environment this industry can generate.

The German Ministry of Environment has also commissioned a study on the legal implications of shale gas, coal bed methane and fracking, published in August 2012, and which recommended to ban hydraulic fracturing projects near drinking water reservoirs and mineral springs and to conduct environmental impact studies before any new project start.<sup>44</sup>

The UK also has favourable geological conditions for shale gas,<sup>45</sup> although initial attempts to exploit these were brought to a temporary halt after drilling triggered two minor earthquakes in 2011.

Estimates as to the size of the UK's reserves vary widely from between 150 bcm (or 1.5 years' worth of current consumption), and 560 bcm.<sup>46</sup> The reserves are greatest in North West England running in a band under the Pennines from Lancashire to Humberside, with further deposits in south east England, south Wales, central Scotland and Northern Ireland.

Cuadrilla Resources, a US private equity backed firm and one of four companies with a permit to frack shale gas in the UK, claims to have discovered 5.6 trillion cubic metres of gas (approximately 60 years' worth) in Lancashire alone. Uncertainties remain over how much of this is recoverable.<sup>47</sup>

It was Cuadrilla's Lancashire operations which were found to be the likely cause of the two earth tremors<sup>48</sup> and the company suspended operations in May 2011. A report from the UK government in April 2012 established a clear link between fracking and the seismic activity but has perversely been seen as giving a green light for Cuadrilla to recommence its activities (see Chapter 2).

Cuadrilla is also involved in shale gas exploitation in Spain and the Netherlands.<sup>49</sup> Fracking is also underway in Scotland, where Greenpark is exploring for Coal Bed Methane (CBM) at Canonbie in the Scottish Borders. Dart Energy is drilling (using horizontal and vertical techniques, but not fracking) for CBM in central Scotland. All these projects are still at the test stage.

There are also significant developments taking place in the Netherlands, Austria, Romania, Ukraine.

Plans for shale gas in Bulgaria were halted when a moratorium on exploration was introduced in January 2012; a moratorium was declared in Denmark and two-year ban voted in Czech Republic both in June 2012. Shale resources in southern Sweden were being explored by the oil giant, Shell, but a combination of geological reasons and strong local opposition led it to pull out.

### 1.5 Fossil fuel lock-in

Relying on shale gas would lock countries into an ongoing dependence on fossil fuels, requiring a new generation of gas-fired power plants. While carbon capture and storage (CCS) technology could in theory reduce GHG emissions from these plants, it remains unproven, and increasingly looks like an unaffordable technology that would lead to other problems (see box). So rather than providing a transition to a zero-carbon economy, shale gas would perpetuate fossil fuel energy generation in Europe for at least 25 to 40 years.

#### Carbon Capture and Storage, a false solution for capturing methane

Carbon Capture and Storage (CCS) technology involves capturing the carbon dioxide in fossil fuels either before or after combustion, and storing it by injecting it underground at high pressure.

The technology is also touted by shale gas supporters as the solution to the methane emissions associated with fracking. However a growing body of science<sup>50</sup> has highlighted how fracking poses a high risk of causing earthquakes that "would be severe enough to jeopardize the ability to store the gas underground over the long term" making CCS an inappropriate solution.<sup>51</sup> Leakage of gas is also highlighted as a problem of CCS.

Exploiting shale gas in any concerted way across the EU would undoubtedly have consequences for the continent's energy strategy. Given that the industry is likely to take 20 years to take off, the EU would be facing a massive injection of fossil-fuel based energy just when it should be taking every measure available to become 'zero carbon'.

The European Parliament's Committee on Environment, Public Health and Food Safety found in a June 2011 study that "it is very likely that investments in shale gas projects – if at all – might have a short-living impact on gas supply which could be counterproductive, as it would provide the impression of an ensured gas supply at a time when the signal to consumers should be to reduce this dependency by savings, efficiency measures and substitution."<sup>52</sup>

The EU is committed to reducing greenhouse gas emissions to 80-95% below 1990 levels by 2050<sup>53</sup>, so cannot afford a dirty fossil fuel lock-in during such a decisive period for European climate objectives.



# The impacts of shale gas extraction

2

*"This is not a bridge; it's just a rickety pier stretching further out into the fossil fuel lake"*

Bill McKibben



A French protest against shale gas: "Stop all exploration until we get a public debate"  
© foe

Public misgivings about shale gas are clearly on the rise, as witnessed by the growing number of protests. Some within the industry have tried to downplay these concerns, even accusing the public of over-reacting.

Prior to the French ban on fracking in 2011, the director-general of shale gas promoter Total, Christophe de Margerie, said he was "annoyed by the noise" surrounding shale gas, adding: "It's good to talk about the problems this can pose – if one day there are some – but today, there are none".<sup>54</sup>

Such denial is a familiar industry tactic (e.g. tobacco) but fails to address the very real concerns being raised about the impacts of fracking.

Until very recently, the debate at the EU level on the safety of shale gas operations was jeopardized by the radical positions defended by each side (opponents and supporters). However, the new studies produced by the European Commission may put an end to a certain number of arguments supported by shale gas proponents. The recognition of the high risk on people's health and on the environment generated by shale gas activities, the admission of its high carbon-intensity and the identification of numerous gaps in the current EU environmental legislation confirm most of the evidence that the civil society and anti-shale gas groups had brought over the recent months.<sup>55</sup>

Given that shale gas is being promoted as a potential "bridging fuel", one key area of concern, particularly in Europe, is the climate impact of fracking. Shale gas is a fossil fuel which has been widely promoted as being a low carbon alternative. Yet a growing body of evidence suggests this is not the case.

This chapter examines the impacts of shale gas on the climate, as well as looking at the other key areas provoking environmental and health concerns highlighted by experience so far in the US<sup>57</sup> and Europe.

## 2.1 Climate impacts

Proponents of shale gas frequently claim that it offers positive benefits for the climate, and this argument has been used to reinforce the idea that shale gas can provide a suitable transition fuel, allowing us to shift from carbon intensive fossil fuels to a cleaner energy mix. Burning gas in power stations, advocates say, releases roughly half the carbon emissions of coal, making shale gas a more environmentally-friendly option than coal. Some have even referred to shale gas as a "green" source of fuel.<sup>58</sup>

However, the climate challenge we face is so enormous that halving the emissions from coal is not enough. A recent study from the European Commission, produced by DG Clima, confirmed that shale gas activities were more carbon-intensive than conventional gas and oil fuels.<sup>59</sup> The burning of shale gas still releases GHG emissions, adding to the ever-rising levels in the atmosphere, and as such, cannot be considered a low carbon source of energy. But a growing body of evidence suggests that the fracking process also results in considerable GHG emissions, meaning that shale gas could in fact be as damaging to the climate as coal.

In spite of the economic recession, GHG emissions in 2010 were the highest in history, taking atmospheric levels well over the 350 parts per million (ppm) considered necessary to stabilise warming at around 2 degrees.<sup>60</sup> This has severe implications for our energy use as it means that the kind of gradual transition promoted through dependence on gas is no longer an option.

This was illustrated by the IEA which found that a global energy mix high in natural gas would result in atmospheric levels of GHGs reaching 650 ppm CO<sub>2</sub> – leading to catastrophic consequences from the resulting, long term, global temperature rise of more than 3.5 degrees Celsius.

### Climate targets are one thing – here is the bigger climate picture

The climate fight is about the post-2040 world. If we act aggressively now and rapidly deploy low carbon energy sources, we can keep global warming below 1.5°C. But if we delay, through a substantial turn to unconventional fossil fuels such as shale gas, we face the real prospect of 4-5°C global warming in the second half of the century. That, according to Professor Kevin Anderson, director of the Tyndall Centre for Climate Change in Britain, is “incompatible with organised global community, is likely to be beyond ‘adaptation’, is devastating to the majority of ecosystems and has a high probability of not being stable (i.e. 4°C would be an interim temperature on the way to a much higher equilibrium level)”.<sup>61</sup>

While the impact on emissions from gas is cause enough for concern, a growing body of scientific research suggests that relying on shale gas could in fact be as harmful to the climate as reliance on coal. This is because of the levels of methane released during the extraction process.

Gas extraction has long been known to cause some emissions, but these had been considered to be small in the case of shale gas (0.2-2.9 per cent of combustion emissions).<sup>62</sup> New studies however are increasingly finding evidence of emissions of methane, known as ‘fugitive emissions’, caused by ‘flowback’, when the water that is forced into the rock formation during fracking returns to the surface, accompanied by large amounts of methane. Methane is also released through leaks, in processing, and during transportation. These losses can be limited by the use of best technology, but cannot be completely avoided.<sup>63</sup>

Methane is a much more potent GHG than carbon dioxide – it contributes to climate change at a level 32 times greater than carbon dioxide over a 100-year timeframe and over shorter timeframes, its impact is even greater.

Some studies have suggested that between 3.6 and 7.9 per cent of the total gas output of a shale gas well is lost through fugitive methane emissions.<sup>64</sup> This would mean that “compared to coal, the footprint of shale gas is at least 20 per cent greater and perhaps more than twice as great on the 20-year horizon”.<sup>65</sup>

In February 2012, one study that monitored emissions in air samples from a natural gas field near Denver found that about four per cent of the gas was lost to the atmosphere,<sup>66</sup> suggesting climate impacts have been underestimated.<sup>67</sup>

According to the US National Academy of Sciences: “Given limited current evidence, it is likely that leakage at individual natural gas well sites is high enough, when combined with leakage from downstream operations, to make the total leakage exceed the 3.2 per cent threshold beyond which gas becomes at least comparably worse for the climate than coal for at least some period of time.”<sup>68</sup>

Even more recently, a German study on “hydrofracking risk assessment”, resulting from a debate organised and sponsored by ExxonMobil, states that the “global-warming footprint of shale gas extracted at a depth of 1,000 meters is 30% larger, and is twice as large for gas obtained 2,500 meters down, compared to the natural gas currently used in Germany. And as most hydrofracking drills are driven by diesel engines, the hydrofracking process generates carbon dioxide and other air pollutants”.<sup>69</sup>

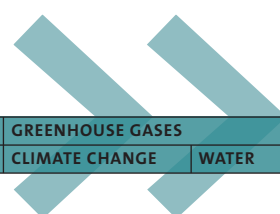
The methane issue is causing concern in the investment community, with an alliance of 200 financial institutions including Scottish Widows, the BBC Pension Trust and US pension, pledging to demand action to reduce the amount of methane which oil and gas companies emit during fracking in June 2012.<sup>70</sup>

## 2.2 Impacts on renewable energy and energy efficiency investments

The impact of support for shale gas on the renewables sector is a key area of concern, given the important role of renewables in meeting EU climate targets. But studies suggest that investing in shale gas would have an adverse effect on the development of renewables. One study looking at US energy scenarios found it would in fact stall the development of the renewables sector.<sup>71</sup>

The IEA similarly found that the impact of falling gas prices as a result of increased shale gas development could threaten the viability of low carbon alternatives and put pressure on government support schemes.<sup>72</sup>

A UK cost comparison between gas and wind power found that investing in offshore wind would generate 17 per cent more electricity compared to the same level of investment in shale gas. If the same amount is invested in onshore wind, it would generate up to twice as much power.<sup>73</sup>



Government enthusiasm for cheap gas risks distracting investors and operators from the real opportunity to develop the renewable sector, guaranteeing long term supply, and to invest in greater energy efficiency, both of which will bring added long-term benefits in terms of jobs. DG Energy acknowledges in its Energy Efficiency Plan 2011 that “the implementation of energy efficiency measures also creates jobs and offers the possibility to retain the current ones at local level, particularly in the construction sector that has been badly affected by the economic crises. It is estimated that up to 2 million jobs can be created or retained because of energy efficiency (this is rather conservative estimation of the direct energy efficiency employment effects and is based on analysis of the results of several EU and national sector specific studies)”.<sup>74</sup>

Respected international institutions such as the IEA have also recognised problems with shale gas in relation to renewable energy. Nobuo Tanaka, executive director of the IEA, said: “While natural gas is the cleanest fossil fuel, it is still a fossil fuel. Its increased use could muscle out low-carbon fuels such as renewables ... an expansion of gas use alone is no panacea for climate change.” This was backed up by Chief economist of the IEA, Fatih Birol, who admitted that “if gas prices come down, that would put a lot of pressure on governments to review their existing renewable energy support policies ... We may see many renewable energy projects put on the shelf.”<sup>75</sup>

While advocates of shale gas argue that it will act as a ‘bridging fuel’, to shift us from our current over-reliance on fossil fuels to a greater use of sustainable renewable energy, recent studies show that, in reality, shale gas could “substitute not for coal but for renewables”, stifling the growing renewable sector and leaving us facing a looming energy gap.<sup>76</sup>



## 2.3 Environmental and health impacts

Shale gas extraction has also been linked to a number of other environmental and health concerns. An EU study from August 2012 states that risks from fracking are high when it comes to groundwater and surface water contamination, water resources, release to air, land take, biodiversity, noise impacts and traffic.

### 2.3.1 Water use

Shale gas extraction requires large volumes of water, potentially putting pressure on water supplies in drilling areas. Each fracking operation can use around 15 million litres of water while wells can be fracked up to 10 times. According to our calculations, the water used for one single well could supply almost 10,000 Europeans for a year.

The level of demand for water is particularly important in areas where water resources are already under pressure, or are likely to come under pressure as a result of climate change. Germany and Poland, which both have significant shale resources, rank amongst the EU countries rating lowest for renewable water resources per capita. Exploration in the UK is taking place in an area where the water supply locally is already considered to be “over abstracted”. The summer drought that ravaged a significant part of the US in 2012 revealed the impact of this demand for water, with some areas in Texas and Kansas forced to stop shale gas activities, while in Pennsylvania, access to river water was forbidden. Elsewhere, operators tried to outbid farmers, offering vast sums to landowners to gain access to water resources.<sup>80</sup>

While fracking is generally considered less water intensive than coal or nuclear, it is unlikely that it will simply substitute either energy source. Instead fracking is likely to create an additional demand for water, especially when the cumulative effects of multiple installations are taken in consideration.

In Colorado, trucks haul fluids over 100 miles into Utah to a large open pit facility.  
© calvin tillman

### 2.3.2 Water contamination

*“You never have control. Fractures will always go into the path of least resistance.”*<sup>81</sup> Mark Miller, chief executive, Cuadrilla

The fracking process involves a number of toxic chemicals, with the amount of water and chemicals required depending on the permeability of the rock. According to the industry, the injected fluid typically contains 98-99.5 per cent water, with the chemical component making up 0.5 – 1.5 per cent.

As a standard shale gas well requires around 15 million litres of water, this means a single fracking project can involve tons of highly toxic chemicals. Full details of these are often not disclosed by operators.

A typical fracking site in the Marcellus Shale in the US is thought to use around 133 tons of chemicals, including hydrogen chloride, ammonium persulfate and potassium hydroxide.<sup>82</sup> Often the full details of the chemicals used are not disclosed. For example, almost half of the chemicals used for fracking at one site in Pennsylvania were unidentified – that could be 65 tons of ‘mystery chemicals’.<sup>83</sup>

The risk is that these chemicals leak into the ground water during the fracking operations as a result of:

- Spills of drilling mud, flow back, leakage from storage ponds or from transportation trucks<sup>84</sup>;
- Leaks or accidents caused by unprofessional handling or old equipment;
- Leaks from inadequate cementing of the wells: industry documents have revealed that 6 per cent of hydraulic fracturing wells fail immediately, and 50 per cent fail over 30 years<sup>85</sup>;
- Leaks underground, either through natural or through artificial fractures or pathways. Most of the fracking fluid remains underground (up to 80 per cent of the input), and studies now show that it can migrate towards natural drinking water supplies (such as aquifers and springs) often in the course of just a few years.<sup>86</sup>

The treatment of the flowback can also result in contamination due to the use of poor water treatment equipment, unable to deal with massive amounts of water polluted by hazardous and toxic chemicals, heavy metals or radioactive compounds. In 2011, it was revealed that millions of litres of irradiated wastewater loaded with toxic chemicals were being dumped into Pennsylvania’s rivers and streams. Most US states require that waste water is disposed of in underground storage wells, but Pennsylvania had allowed drillers to discharge their waste through sewage treatment plants into rivers.

### Official documents show abuses of toxic, irradiated waste water disposal

A 2011 *New York Times* investigation obtained thousands of documents from the US Environmental Protection Agency (EPA) revealing that “wastewater, which is sometimes hauled to sewage plants not designed to treat it and then discharged into rivers that supply drinking water, contains radioactivity at levels higher than previously known, and far higher than the level that federal regulators say is safe for these treatment plants to handle”.<sup>87</sup>

The newspaper also highlighted that currently in the US, “there is no comprehensive federal standard for what constitutes safe levels of radioactivity in drilling wastewater”. Fracking companies have proposed recycling more wastewater as a way of reducing the amount for disposal. However, the amount of wastewater produced in Pennsylvania, for example, is expected to increase even with recycling efforts because, according to industry projections, more than 50,000 new wells are likely to be drilled over the next two decades.

### 2.4 What do we know about the chemical content of fracking fluids?

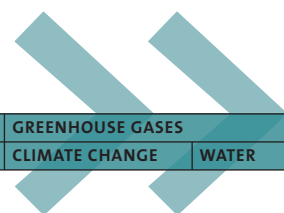
The industry usually downplays the risks related to the chemicals used in the extractive process by saying that these substances are regularly used in domestic cleaning products, in cosmetics and food, and that they do not pose a threat if ingested or inhaled. If that would be true, it is surprising that companies are not disclosing all chemicals being used in fracking.

Moreover, industry data shows that fracking fluids can include chemicals which are officially classified as: carcinogens, mutagens, reproductive toxicants, neurotoxins, allergens, and hormone disruptors, including toxic chemicals such as benzene, toluene, ethylbenzene and xylenes.<sup>88</sup>

In the US, companies are not required by federal law to disclose the chemicals being used for fracking, although 11 states have passed laws or rules requiring drilling companies to reveal some, though not all, of the chemicals they use. Since 2011, some energy companies have voluntarily disclosed some of the chemicals they use on FracFocus, a website run by two groups representing state regulators, but the website still has many holes<sup>89</sup> and, in many cases, the industry has failed to respect its hazardous chemical reporting requirements.<sup>90</sup>

According to chemical expert<sup>91</sup>, fracking fluid can contain as many as 300 chemicals, out of which 40 per cent are endocrine disruptors, known to interfere with the hormone system in animals and humans, and a third of which are suspected carcinogens. Over 60 per cent of the chemicals used can harm the brain and nervous system.





### The ‘Halliburton loophole’

The US Environmental Protection Agency (EPA) cannot regulate the injection of fracking fluids under the Clean Water Act or the Safe Drinking Water Act because the oil and gas industry was given an exemption and allowed to inject known hazardous materials – unchecked – directly into or adjacent to underground drinking water supplies.

This exemption was secured during the final passage of the 2005 US ‘Clean Energy Act’, and it is widely believed that then US vice-president Dick Cheney’s Energy Task Force worked hard – and successfully – to secure the exemptions for the shale gas industry. Cheney has close ties with Halliburton, a company that has major shale gas interests. New legislation is seeking to close the ‘Halliburton loophole’, but the fracking process will remain exempt. The global accounting firm Ernst & Young<sup>92</sup> has warned that: “Investment in shale gas developments may dry up if hydraulic fracturing were to be outlawed or significantly limited...”

The US Environmental Protection Agency (EPA) is currently investigating the impact of fracking on water quality and on public health, following a number of complaints and lawsuits over property devaluation, serious illness, and, in one case, the death of 17 cattle that had consumed leaked fracking fluid.<sup>93</sup> More than 1,000 complaints of drinking water contamination related to fracking have been documented in the US.<sup>94</sup>

There have already been a number of accidents in fracking operations in Europe, including the incident at Söhlingen in Germany in 2007 when groundwater sources were contaminated with benzene and mercury after waste water pipes leaked. Although the authorities were informed, the public did not become aware of the incident until 2011.<sup>95</sup>

Some companies claim advanced fracking techniques could reduce levels of water use by using gel and foam.<sup>96</sup> But such techniques remain at the testing stage and it seems likely that drilling techniques will continue to rely on toxic chemicals. As such, the basic risk of undisclosed chemicals leaching into groundwater and actual water supplies remains.

### 2.5 Land contamination and land use

The drilling and fracking process also inevitably impacts on the landscape, and pollution can affect soil<sup>97</sup> and sub-soil, as a result of contamination from:

- Fracking chemicals, which can create a further toxic risk when mixed with naturally occurring hazardous substances underground;
- Naturally occurring radioactive materials and heavy metals found underground, which can pollute the flowback liquid from the fracking process, or which can build up underground.

As in any extractive resource process, pollution may also result from other aspects of the extraction process, such as tank and pit fires, explosions, well blowouts<sup>98</sup>, transport accidents, leaks and spills of methane gas, natural gas, and chemicals.

#### When things go wrong – Chesapeake’s ‘BP moment’

“In April 2011, a Chesapeake well in Bradford County suffered a massive blowout. It was the onshore, natural gas version of what happened to BP in the Gulf two years ago: a wellhead flange failed, and toxic water gushed uncontrollably from the well for several days before workers were able to bring it under control. Seven families were evacuated from their homes as 10,000 gallons of fracking fluid spilled into surrounding pastures and streams. Pennsylvania fined the company \$250,000 – the highest penalty allowed under state law.” From an investigation published in Rolling Stone magazine, March 2012<sup>99</sup>

Because of the large number of wells used, fracking impacts a vast area.<sup>100</sup> Each well has a number of drill/pump heads, sludge ponds where flowback fracking fluids and water are stored, storage tanks and compressor stations. This has a high visual impact, creates noise pollution and can have implications for local residents, farmers, the natural habitat and biodiversity.

This demand for land could lead to potential conflicts in Europe, where population is more dense than in the US.<sup>101</sup> It could also have significant impacts in parts of the developing world, where competition for land and ‘land grabbing’ is a growing problem.

## 2.6 Effects on the population

High population density in Europe, and the likely proximity of shale wells to population centres, poses a whole range of environmental, health and safety risks: While this may not have been a consideration in parts of the US where the population density is low, it is likely to cause problems in a country such as the Netherlands where there are 1,285 inhabitants per km<sup>2</sup>.

In the US, concerns have surfaced about the socio-economic impacts, with fracking driving severe ‘boom and bust’ cycles in local economies. The arrival of a new well can benefit local economies as a result of the drilling and related activity, but problems can arise when large numbers of migrant workers move into small communities, potentially limiting the opportunities for local workers. The job boom quickly disappears as the wells quickly deplete, the workers leave and the economic bubble bursts.<sup>102</sup> This means that industry employees, generally transient workers with shale development experience, “move from new well to new well as the number of drilled wells increases”.<sup>103</sup>

## 2.7 Air pollution

Evidence of air pollution connected to fracking has been firmly established in the US, including “elevated levels” of benzene,<sup>104</sup> and other potentially toxic petroleum hydrocarbons, including ethylbenzene, toluene and xylene which have been linked to eye irritation, headaches, sore throats, breathing difficulties and a higher risk of cancer.<sup>105</sup>

The main sources of air pollution are generally thought to result from:

- gas flaring from well heads<sup>106</sup>
- leakages from compressor stations where gas is compressed and made ready to transmit in pipelines
- evaporating fracking chemicals (whether before, during or after injection, including from waste water)
- evaporating, or volatilizing, naturally occurring hazardous chemicals from underground.

In April 2012 new EPA regulations on reducing harmful air pollution from the oil and gas industry in the US included specific rules for fracking, although these rules will not come into force until 2015 thanks to industry lobbying.<sup>107</sup>

Air pollution in Europe is already a major problem. It is considered to be responsible for half a million deaths every year.<sup>108</sup>

## 2.8 Earthquakes and vibrations

A number of incidences of seismic activity linked to fracking have been recorded, including minor earthquakes and tremors. These are generally attributed to either the fracking process itself or the injection of fracking wastewater into wells. These links have triggered widespread public concern, and raise safety issues around the risk of local residential and infrastructure damage. Seismic activity can also contribute to water contamination, as it opens up new cracks in the rock.

There has been a more than four-fold increase in earthquakes of magnitude three and greater in central US since 2008. According to the Ohio Department of Natural Resources, these events have been “almost certainly” caused by the use of underground wells to dispose of waste water produced by fracking.<sup>109</sup> The wastewater is thought to lubricate fault lines, causing them to slip.

In April and May 2011, Cuadrilla Resources, the company carrying out fracking at Preese Hall, Lancashire, suspended exploration following two earthquakes with magnitudes of 1.5 and 2.3. Experts investigating the quakes stated that they may have occurred as a result of the fracking process.<sup>110</sup> An independent scientific report commissioned by the British government confirmed that “the earthquake activity was caused by direct fluid injection” during the fracking process<sup>111</sup> and conceded that it was not possible “to categorically reject the possibility of further quakes”.<sup>112</sup> However it concluded that operators could resume fracking operations, as long as they were effectively regulated, despite the obvious understatement of the risks generated by the earthquakes (such as the impacts on wells’ integrity, deformation of well casings, likely to create leakages).



Water cannons are used to increase evaporation of fracking fluid at some plants, contributing to air pollution.

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# Setting the rules for shale gas – is the EU prepared?

3

**Given the potential impacts of shale gas developments, there is a clear need for a regulatory framework in order to protect the public and the environment from the impacts of pollution. Such a framework does not currently exist in the US, although there is a bill before the Senate, and the industry is regulated at the State level. This has led to different standards being applied at operations across the United States, with some States, such as Vermont, opting to impose a ban on fracking.<sup>113</sup>**

In Europe, responsibility for energy strategy is determined by individual member states and, as in the US, we have seen various responses, with outright fracking bans in Bulgaria and France, and regional moratoria in Germany, to strong support for shale gas in Poland and Ukraine. A precautionary approach has also been taken in the Czech Republic, Denmark and Romania, where legislation to introduce moratoriums is being prepared. In the Netherlands, the Dutch government has put shale gas drilling on hold while the environmental risks are investigated; in Austria, oil and gas company OMV has put its plans to drill for shale gas on hold pending a comprehensive environmental study by the Federal Environmental Agency.<sup>114</sup>

There is currently no specific EU-wide legislative framework in place for the exploration or exploitation of unconventional gas.

Shale gas drilling in EU member states is however subject to more general EU treaties and directives, including the EU Treaty (Article 191, Treaty on the Functioning of the European Union) which places the precautionary principle at the heart of environmental policy-making within the EU, alongside the principle that the polluter pays.

Shale gas development is also covered by existing mining and hydrocarbon legislation and licensing regimes. A number of existing EU directives, including the Water Framework Directive, the Environmental Impact Assessment Directive, the mining Waste Directive and the REACH directive on chemical safety, have implications for the fracking process but do not always reflect the specific impacts of shale gas, as it was very recently recognised by DG Environment(see below).<sup>115</sup>

Therefore, what is at stake in Europe is the extent to which EU-wide environmental and other relevant policies could be used to regulate shale gas.

Experience shows that shale gas activities can generate serious environmental cross-border issues that cannot be solved with inconsistent and potentially conflicting legislation at the national level. The EU may not have the authority to set an EU-wide ban on shale gas activities, but it is the institutions' duty to take a leading role in this legislative process and make sure the precautionary principle is applied properly. It is indeed crucial not to replicate the US example (legislating only once the environmental impacts have been felt) and to ensure that every European country uses consistent adequate standards to regulate, prevent and monitor these risky industrial activities.

## 3.1 Europe seeks to get a grip on shale gas

Early signs from the European Union have triggered concerns that the environmental risks posed by shale gas would be downplayed. A communication issued by the Commission in February 2011 appeared to support the development of shale gas, although it also highlighted the role of environmental legislation. "In order to further enhance its security of supply the EU's potential for sustainable extraction and use of conventional and unconventional (e.g. shale gas, oil shale) fossil fuel resources should be assessed, in accordance with existing legislation on environment protection," it read.<sup>116</sup>

The Polish EU presidency in the second half of 2011 strongly promoted shale gas, seeking to make exploitation “a common European project”.<sup>117</sup> The Polish presidency did not however focus on the need for common EU rules and standards to govern shale gas development

However in September 2011, the European Energy Commissioner Günther Oettinger stated that, in the face of environmental concerns, the Commission intended to draft EU-wide rules on tapping shale gas reserves, adding that: “I think we’ll get a high level of acceptance when we have the same, European common standards, a high level of safety and security and quality for environmental interests. We will bring some proposals to our member states maybe in the spring next year.” No such proposals have appeared to date.

#### Europe’s legislative response so far

1. A report for the European Parliament’s Committee on Environment, Public Health and Food Safety, submitted to the Commission in June 2011,<sup>118</sup> called for “consideration to be given to developing a new directive at European level regulating all issues in this area comprehensively”. The report also recommended that “all chemicals to be used should be disclosed publicly, the number of allowed chemicals should be restricted and its use should be monitored.”
2. The European Parliament hosted hearings on shale gas in October 2011, resulting in its industry and environment committees deciding to draft separate ‘own-initiative’ reports on shale gas. Polish MEP Boluslaw Sonik, the appointed rapporteur for the environment committee, argued in his draft report that the risks related to shale gas extraction could be contained through preventative measures. He recommended that shale gas development in EU countries should be regulated by national authorities with the European Commission acting as a monitor. The Committee discussions on the draft since April 2012 revealed sharply polarised views among committee members.
3. European Climate Action Commissioner Connie Hedegaard has commented: “I would not be inclined toward a moratorium based on what I have heard so far,” adding that appropriate legislation already exists in Europe to ensure compliance with the environment in relation to the exploration of shale gas.<sup>119</sup>
4. In a note to the chair of the European Parliament’s ENVI committee in January 2012, Janez Potocnik, European Environment Commissioner, confirmed that despite the many serious risks inherent in shale activities, “the European Commission considers that unconventional hydrocarbon projects involving the combined use of advances

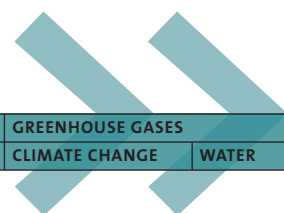
#### 3.2 How does existing EU legislation measure up to the shale gas challenges?

During the first half of 2012, various officials from the European Commission repeatedly communicated about how the current EU regulatory framework was adequately covering all shale gas related activities. However, the European Commission, through its recent study produced by DG Environment, significantly reviewed its position in September 2012. It specifically highlighted a list of gaps and uncertainties in the current EU environmental legislation and confirmed that shale gas activities were obviously not adequately covered by the EU regulatory framework.<sup>123</sup>

These are the main gaps in the European legislation which were allegedly covering shale gas operations:

- technological processes such as horizontal drilling and high volume hydraulic fracking, notably shale gas exploration and exploitation activities, are covered by EU environmental legislation from the planning until the cessation”.<sup>120</sup>
5. The European Commission’s Energy Roadmap 2050 identified shale gas and other unconventional gas sources as “potential important new sources of supply in or around Europe” for reducing carbon emissions from the energy sector.
6. A report<sup>121</sup> released in January 2012, produced for the Commission by the Belgian law firm Philippe & Partners, concluded that there was no need for more environmental legislation concerning fracking during the exploration phase. Looking at the situation in Sweden, Poland, France and Germany, and not including climate change legislation, the report found that: “Neither on the European level nor on the national level have we noticed significant gaps in the current legislative framework, when it comes to regulating the current level of shale gas activities”. This comes as no surprise, as Philippe & Partners has many oil and gas companies as important clients and advises “in the context of a business-oriented environment” according to its own website.
7. More recently however a Commission official, speaking in April 2012, said there were six further reports in the pipeline related to various aspects of shale gas development that may have a bearing on the Commission’s position.
8. In September 2012, new studies produced by the European Commission (from DG Clima and DG Environment in particular) seriously challenged previous statements of EU officials, pointing out the carbon-intensity of the shale gas activities, its high risk for people and environment, and the numerous gaps in the EU legislation allegedly covering its specificities.<sup>122</sup>





## Water Framework Directive (WFD)

Article 11(3) (j) of the Water Framework Directive prohibits “direct discharges of pollutants into groundwater”. Only the “injection of water containing substances resulting from the operations for exploration and extraction of hydrocarbons or mining activities” is allowed as long as “such injections shall not contain substances other than those resulting from the above operations”. In other words, this prohibits the injection of water mixed with other substances than those naturally occurring in the underground. In this respect, chemicals cannot then be used for fracking operations.

While there is currently no coherent and comprehensive regulatory approach across the EU regarding the use of such deep-well injections, recent presentations by Commission officials have confirmed that deep-well injection of fracking fluids is not authorised under WFD,<sup>124</sup> but a clear European legislative framework on this issue is missing.

There are also issues concerning the implementation of the WFD in member states. Poland, for example, has not implemented this directive, and was recently reprimanded by Commissioner Potocnik for its failure to establish a national monitoring programme on the health of its surface waters and groundwater.<sup>125</sup>

## The Environmental Impact Assessment (EIA) Directive

The present EU-legislative framework on environmental impact assessments only requires an assessment to be carried out for drilling wells when the production rate of the well in question exceeds 500,000 m<sup>3</sup> per day. As each shale gas well typically produce 250,000 m<sup>3</sup> per day at the initial stages, and rapidly declining to less than 100,000 m<sup>3</sup> per day, this means that shale gas operations are not covered by this directive and, consequently, do not benefit from a compulsory EIA prior to any new project.<sup>126</sup>

Because the legislation applies to wells individually and doesn't take in consideration the cumulative impacts of multiple installations and high well density, peculiar to the shale gas activities, it seems ill-suited to the task of regulating shale gas drilling as it fails to take into consideration the level of risk inherent in the extraction process.

Also, as no definition of deep drilling is provided in the Annex 2, the exploration phase is not identified as “surface industrial installations for the extraction of coal, petroleum, natural gas and ores, as well as bituminous shale”, which once again prevent shale gas exploration operations from compulsory EIAs.

Given the complexity and risky nature of fracking, this would seem to be a clear gap in the EIA regime. In its July 2012 resolution on the EU water legislation, the European Parliament conceded that this gap needed to be filled, stating that “regarding the significant risks to both surface and groundwater posed by shale gas exploration and extraction, Commission [should] ensure that such activities are covered by the Environmental Impact Assessment Directive”.<sup>127</sup>

## European Waste Directive (EWD) and Mining Waste Directive (MWD)

Permits for mining waste management and other waste from drilling for shale gas should be integrated into the main authorisation procedures under the EWD and the MWD. The components of fracking fluids are not explicitly recognised as ‘hazardous waste’ by the EWD as it currently stands. Their inclusion would help to ensure that stricter waste regulation was applied to fracking fluids so as to guarantee safe and controlled disposal. This is perhaps particularly urgent, given that a case of illegal dumping of fracking fluids has already been reported in a Polish village.

Treating fracking fluids as hazardous waste can both help to limit unsafe disposal and ensure that all fracking fluids are treated at specialised wastewater disposal plants.

### Illegal wastewater dumping in Poland

The problems of dealing with the heavily polluted flowback generated by shale drilling have already been seen with reports of illegal waste dumping in the village of Głębino, Pomerania.<sup>128</sup> Fracking fluids from a shale gas site operated by BNK Petroleum Inc, were directly disposed in a gravel pit. As a result, groundwater was contaminated. The local authorities had previously indicated that the gravel pit was not suitable for the disposal of fracking fluids and had suggested a different location. Test results from the Regional Inspection of Environmental Protection, made available in April 2012, showed that barium levels were well above the norm.

## Environmental Liability Directive (ELD)

The Environmental Liability Directive seeks to prevent environmental damage, particularly damage to water resources and land contamination which presents a threat to human health, and makes operators financially liable for threats of or actual damage (also called the ‘polluter pays principle’). It does not however explicitly refer to shale gas operations, and should be amended to ensure that the principles of this directive are also applicable to shale gas damage, which is not the case at the moment, as stated by the DG Environment study. For example:

- Operations that use the fracking technique under Annex III of the ELD would ensure that strict – i.e. not fault-based – liability applies to shale gas activities.
- Shale gas operators should be obliged to provide compulsory financial security or insurance requirements in case of environmental damage and negative impacts on human and animal health linked to their activities, in line with article 14 of the ELD. Currently the wording of article 14 allows member states to make such financial security optional for shale gas operators: member states “shall take measures to encourage financial security instruments”. This needs to be tightened.
- The burden of proof should be reversed for shale gas operators, where, in view of the nature of any disturbance and its adverse effects, other possible causes and any other circumstances, the balance of probability indicates that shale gas operations were the cause of certain environmental damage. Given the evidence and the many incidents with shale gas wells in the US, it should be up to shale gas operators to prove that there is no causal link between their operations and any environmental damage.

### REACH legislation

EU legislation on the Registration Evaluation, Authorisation and Restriction of Chemicals (REACH) applies to the use of chemical substances in any industrial process. Operators, who want to keep their chemical use confidential, as in the case of most fracking operators, are required to conduct their own assessment of the chemicals and report this to the European Chemicals Agency.

As companies involved in fracking have not disclosed an exhaustive and detailed list of the chemicals used for each project, it is impossible to assess the environmental and health risks from exploitation and exploration (including full life cycle impacts).

In September 2011, an official from the Commission said that no company had registered any of the 10 chemicals typically used for shale gas extraction for that use under the EU’s REACH legislation.<sup>129</sup>

The different deadlines and requirements in the REACH legislation mean that the information about chemicals is not automatically available to the public and, indeed REACH controls on fracking will not come into force until November 2013.

### Nature protection

Existing legislation designed to protect areas which are particularly important for biodiversity may also prove relevant to the development of shale gas in Europe. In this context, both Natura 2000 sites which are protected areas under EU law and UN protected areas which are covered by national environment laws should be protected against the development of fracking sites.

The European Environment Agency has mapped these sites in in Germany, the Netherlands and Poland in relation to the main shale gas reserves.

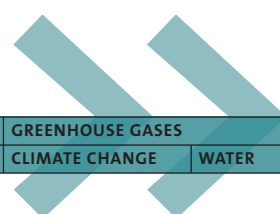
According to an influential study on shale gas, the existence of these ‘no-go’ areas is a key problem: “These environmental regulations present a tremendous challenge to unconventional gas drilling and supply chain infrastructure building in these areas.”<sup>130</sup>

Recent case history however suggests that the Commission will stand by tough enforcement of these protection zones, providing important lessons that can be applied to shale gas.<sup>131</sup> This is all the more relevant as cases of violation of Natura 2000 protected areas for shale gas prospection (in Poland in particular) have already been reported,<sup>132</sup> which shows the difficulty of controlling and monitoring the implementation of this legislation.

### 3.3 Moving the EU policy framework forward

In order to address the current gap in EU-level legislation on shale gas fracking, European NGOs, including Friends of the Earth Europe, Food and Water Europe, Health and Environment Alliance, are calling for a European Commission ‘Green Paper’ to assess the impacts of fracking activities not covered by existing EU regulations. Such a consultation would require the full public participation of all relevant stakeholders and should include an assessment of the practices of shale gas companies that might not be in accordance with current EU policies and legislations.

While the shale gas sector in the EU is currently in its infancy, Poland hopes that fracking will begin on a commercial scale in 2015. Once commercial scale activity begins, it could be too late to monitor all the chemicals being used and then rush in EU-wide legislation, particularly given the time taken to draft legislation and reach consensus and approval within the EU’s various bodies. In contrast to the situation in the US, the EU has the opportunity to act now, in a timely fashion.



HYDRAULIC FRACTURING	GREENHOUSE GASES	
EMISSIONS	CLIMATE CHANGE	WATER

Industry appears to view public concern about the environmental and health impacts of shale gas as “obstacles”. Indeed the environmental impacts, and the possible imposition of tighter regulation is the elephant in the room for shale gas developers weighing the cost and time implications of their potential investments.

Indeed the industry has produced a study arguing for less regulation: “The factors constraining the choice of drilling locations and scale of operations are primarily of a regulatory nature. Therefore only reforms of the environmental and E&P [exploration and production] frameworks allowing more operational flexibility can solve the problem of lack of space in Europe.”<sup>133</sup>

### 3.4 Dialogue

In the 2012 EU budget,<sup>134</sup> EUR 200,000 has been allocated to fund pilot projects aimed at catalysing public debate in the EU on shale gas. The Budget document states that: “A public debate on shale gas, its merits and negative effects, has started in Europe, but it is not always based on concrete knowledge and information. It is important, therefore, to start a citizens’ dialogue and information campaign before industrial production begins ... Such dialogues should include national authorities, local communities, the general public, businesses and NGOs.”

Public consultation is an essential ingredient of any future Green Paper and this funding is crucial. An exchange of views on all aspects of shale gas and what it implies for European countries is required. To date, there has been no consistent process in Europe that properly includes citizens and communities in decision-making related to shale gas, shale oil or coal bed methane. The free and fully-informed consent of local communities has not been applied for most fracking projects prior to either the exploration or exploitation phases, as DG Energy has acknowledged.<sup>135</sup> Local communities should be granted a place at the heart of any such discussions and the right to say “no” to shale gas development.

The issue of trust between local communities and the industry has become even more apparent with the ‘frackademia’ controversies that have appeared in reaction to the first scientific results explaining the potential risks related to the shale gas activities. Cases of gas companies funding University research to prove their case have started to blossom, generating biased and financial ties between scientists or researchers and drilling operators.<sup>136</sup>

Of course, these proposed EU funded fora are no replacement for the mandatory involvement of the public in the planning process for shale gas wells, and this requires the revision of EIA legislation at the EU level.



Shale gas drilling platform. © gaz lubelski



# Setting a development example?

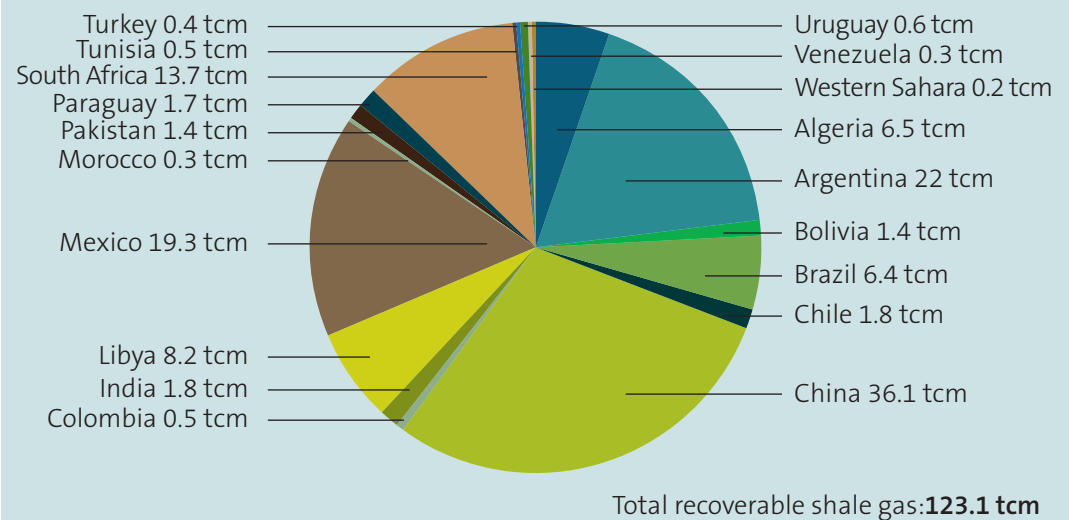
# 4

Shale gas presents a number of serious climate, environment and health risks which are already difficult to mitigate in Northern countries. Expanding shale gas development in Southern countries, particularly in those countries which may have weaker political and environmental governance frameworks, risks increasing global reliance on fossil fuels, as well as increasing climate changing GHG emissions, and posing a serious risk to local communities and the environment.

## 4.1 A global resource

The potential for shale gas developments is not only being explored in Europe, but also in parts of the developing world. Shale gas reserves have been identified in Algeria, Libya, Morocco, Tunisia, South Africa, Argentina, Brazil, Bolivia, Chile, Colombia, Mexico, Paraguay, Uruguay, Venezuela, India, Pakistan and China.<sup>137</sup> While many of these reserves haven't yet been exploited, exploration is actively underway in China (where companies such as Shell have already started to invest on a massive scale<sup>138</sup>) and parts of South America, particularly Argentina.

**figure 4.1 Technically Recoverable Shale Gas Resources by Country<sup>139</sup>**  
(Reserves in trillions of cubic meter)



## 4.2 The increased risks of environmental and health damage in developing countries

While reducing energy poverty in the developing world is a global priority, supported through the Millennium Development Goals (MDGs), there is also a commitment to achieving environmental sustainability under MDG 7. As a signatory to the MDGs, the EU is committed to supporting the achievement of this goal.



The risks of EU support for shale gas exploitation in developing countries has already been recognised by the European Parliament's Committee on Development, which has called for a resolution recognising the serious sustainability concerns of shale gas, in particular the impacts on global climate goals; the impacts on water-scarce regions and the potential to affect food and water security; and the way in which shale gas developments may drive land grabbing.<sup>141</sup>

The high risk of water contamination generated by a water-intensive activity can easily become a major issue in a context of general severe water scarcity. As pointed out by the Committee on Development, this could seriously jeopardize the achievement of the "MDG 7 targets concerning access to clean water and food security".

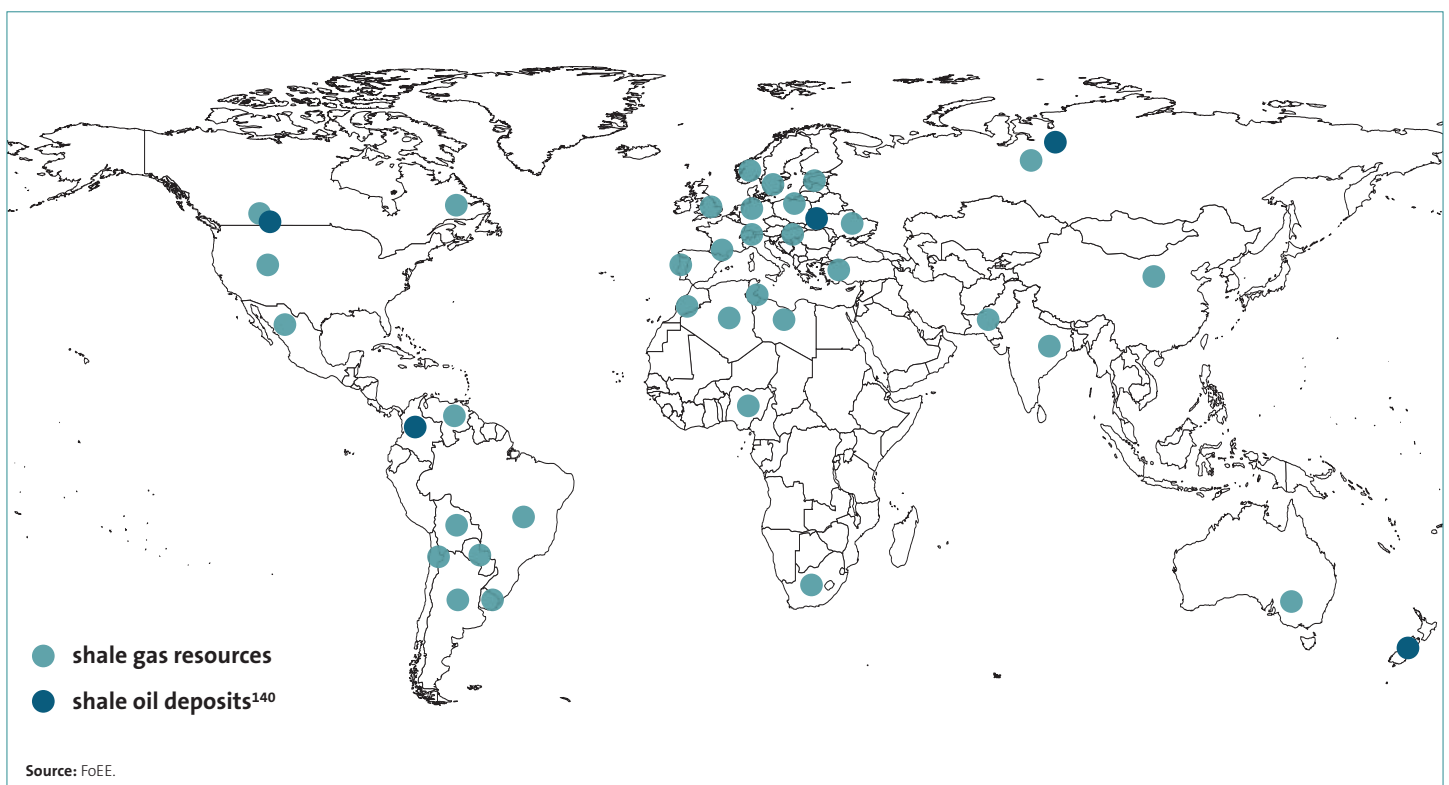
The serious impacts on health, environment and climate generated by the fracking process in North America and to the first reported cases of accidents in Europe, raise serious concerns about how the shale gas industry would behave in developing countries. Experience shows that risks can significantly increase in countries where the capacity for implementing and enforcing environmental and health

protection is generally lower. It is likely, based on the experience of industry behaviour in other fuel related activities, that it will contribute to further environmental degradation, corruption, human rights violation, or social conflicts and that it is unlikely to contribute to poverty reduction.

Numerous previous cases<sup>143</sup> show that there is a high risk that European unconventional oil and gas companies "operate to different safety standards world-wide" as recognised by the European Parliament's Committee on Development. That's why it is key that European companies involved in shale gas operations in developing countries employ responsible industry standards wherever they operate; and why the Commission should identify new options for strengthening legally binding standards on the responsibilities and liabilities of transnational corporations with regard to social and environmental rights and possible means of implementation.

The EU has already acknowledged that it is not enough to consider sustainable development in Europe in isolation, but that this also requires "a concern for and active engagement in the sustainable development of the rest of the planet".<sup>144</sup>

**figure 4.2 Global potential of shale resources**



MILLENNIUM DEVELOPMENT GOALS	EXTRACTION	HYDRAULIC FRACTURING	GREENHOUSE GASES	
		EMISSIONS	CLIMATE CHANGE	WATER

# How communities and campaigners are resisting shale gas

5

Proposals to exploit shale gas have met with widespread opposition from the general public across the European Union, and beyond. Local communities have fought to stop local drilling activity, often with success. Many national governments have also expressed reservations about the exploitation of shale gas, with some introducing moratoria in response to concerns about the environmental impacts and the safety of drilling. This chapter provides a summary of some of the countries where communities are campaigning against shale gas. While not comprehensive, it shows the extent of the opposition which should sound a clear political warning to those within the European Union who see shale gas as an energy solution.

## 5.1 Argentina

According to data released by the US EIA in April 2011, Argentina ranks third globally (behind the US and China) with close to 22 tcm of technically recoverable shale gas resources, with more than half of that in the Neuquén Basin on the western side of the country. The country has aspirations to be a “global leader” in shale gas, which it sees as essential for meeting Argentine energy needs. The country relies heavily on fossil fuels.

There are around 100 wells established in Argentina, with a mix of national and international companies involved, including Argentina’s re-nationalised YPF (formerly a subsidiary of Repsol), ExxonMobil, Chevron, Total S.A, Petrobras and Apache.

Government support for shale gas development has been shown through subsidies and incentives for gas companies. The companies are also putting pressure on the government to increase state-controlled gas prices – including for domestic consumers, to create the “appropriate conditions” to develop unconventional reserves.

Public opposition, particularly in indigenous territories, has been suppressed by the authorities.<sup>145</sup>

One shale gas basin – Chaco-Paranaense, which extends into Brazil, Uruguay, Paraguay and Bolivia, but with most of the territory in Argentina – contains one of the world’s most important fresh water reservoirs, the Guaraní Aquifer. The renationalisation of gas company YPF is thought to be linked to shale gas as the government seeks greater energy sovereignty, as stated in the bill which took back control of the company.<sup>146</sup>

### More information:

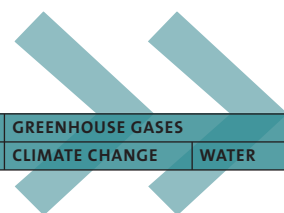
Observatorio Petrolero Sur: <http://www.opsur.org.ar/>

## 5.2 Austria

In Austria plans by the oil and gas company OMV to explore shale gas resources in Lower Austria in summer 2012 were stalled as a result of strong opposition from local people and from environmental organisations. The Austrian government as yet has no clear position on shale gas: the Environment Ministry is opposed, while the Economic Ministry is in favour. A legislative ban on fracking is thought to be unlikely, despite calls by many Austrian environmental groups. An amendment to the national environmental impact assessment law to cover shale gas is underway. In May 2012 a petition against shale gas, launched by local citizens’ group WeinviertelstattGasviertel, was lodged in the Austrian parliament. However, in September 2012, after Austria adopted a new law binding companies to detailed environmental inspection before each new project, OMV stopped activities in the country because it was no longer economically viable.

### For more information:

<http://www.weinviertelstattgasviertel.at/>



### 5.3 Bulgaria

In January 2012, Bulgaria banned exploration for shale oil and gas using fracking after widespread protests.<sup>147</sup> According to initial estimates, Bulgaria may have significant shale gas reserves of up to 1 tcm. Anti-shale activists have warned that fracking may poison underground waters, trigger earthquakes and pose serious hazards to public health. In June 2012 the ban on fracking was eased by the Bulgarian parliament, making it easier to allow exploration for conventional natural gas. Bulgaria's Economy and Energy Minister Delyan Dobrev said the change would not allow hydraulic fracturing for shale gas.

**For more information:** A 30 minute film, 'The Fracturing of Public Opinion: Bulgaria's Fracking Controversy', introduces the main issues associated with potential fracking in Bulgaria. Available at:

<http://bit.ly/SZioIH>

**For more information:**

<http://www.climatebg.org/>

### 5.4 Czech Republic

Draft legislation to introduce a two-year moratorium on shale gas exploration in the Czech Republic is currently moving through the Czech parliament.<sup>148</sup> The issue came to a head in 2012. BasGasEnergia Czech, a subsidiary of Australia-based Hutton Energy, had applied for a licence to conduct exploration work over an area of nearly 800 square kilometres in northeast Bohemia, not far from Prague. Following protests from locals (led by the Stop HF coalition, representing more than 400,000 citizens) concerned about potential environmental damage and the threat of contamination to underground water tables, Czech environment minister Tomáš Chalupa cancelled the provisional exploration licence in April 2012. BasGasEnergia Czech can reapply but, according to the minister, must "sufficiently take into account the basic public interest, which is the protection of waters, nature and the landscape".

**For more information:**

<http://www.ne-plyn.hys.cz/>

### 5.5 France

The French Senate approved a ban on "fracking" in June 2011<sup>149</sup> (see chapter 1) and more than 200 groups have organised against shale gas (see map on link below). Even with the fracking ban still in place, activism and vigilance remains high. A national umbrella coalition was created in January 2011, gathering representatives of local citizens' groups and of national environmental groups. A monthly meeting of the coalition takes place to plan strategy and future activities, and there is an emphasis on regularly informing the population.

Large demonstrations have taken place, including in Villeneuve-de-Berg (Aveyron) with between 15,000 and 20,000 people in a village of 3,000 inhabitants. A national day against shale gas was organised in April 2011 with demonstrations in more than 15 French cities. In total there were nearly 30,000 demonstrators.

In January 2012, a parallel symposium attracted more than 400 participants in response to an official symposium attended by industry representatives and politicians.

Friends of the Earth France is opposed to all unconventional oil and gas, and therefore against all exploration or exploitation of shale gas or oil, regardless of the extraction method, in France or elsewhere. The climate impact of shale gas, as well as all other related impacts, means that these resources should stay in the ground.

**For more information :**

Friends of the Earth France:

<http://www.amisdelaterre.org/Gaz-et-huiles-de-schiste.html>

Website of the French coalition of citizen groups against shale gas: <http://stopgazdeschiste.org/>

Map of French groups against shale gas:

<http://bit.ly/Ofxn9N>

### 5.6 Germany

There is strong public opposition to shale gas development in Germany. Earlier this year, BNK Petroleum announced that it would like to drill in Thuringen and Sachsen-Anhalt. Protests started immediately and Thuringen has announced a moratorium.

Across the country there are currently around 25 to 30 groups focusing on shale gas developments. Some groups are working to prohibit gas drilling in nature reserves, for example at Chiemsee in Bavaria, and others are directly confronting fracking-related benzene contamination in Lower Saxony.

In November 2011, the federal state of North Rhine-Westphalia (NRW) decided to stop all the drilling operations implying the use of fracking techniques until further studies clarified the risks created by the extraction process.<sup>150</sup> The study, published in August 2012, recommended that, considering the too numerous risks and unclarified issues, the NRW government should not grant any permission until further investigation have been carried out.

The current national government seems quite receptive to the arguments given by anti-fracking coalition as the Environment Minister Norbert Röttgen and the Economy Minister Philipp Rösler recently agreed to oppose the controversial process for the time being.<sup>151</sup>

### For more information:

Friends of the Earth Germany's:  
[www.bund-nrw.de/fracking](http://www.bund-nrw.de/fracking)

Website of groups campaigning against shale gas:  
<http://www.gegen-gasbohren.de> or  
<http://www.unkonventionelle-gasfoerderung.de/>

### 5.7 The Netherlands

Light fracking for conventional gas has taken place in the Netherlands, but has not been used for shale gas or coal bed methane. Fracking is currently on hold in the Netherlands pending the results of a government study, expected beginning 2013 at the earliest.

Several exploration permits for both shale gas and coal bed methane have been granted, but a first permit for test drilling was turned down in October 2011 after a court case brought by local people and one of the main Dutch banks. The company, Cuadrilla, wanted to drill some 200 metres from a data hub owned by Rabobank that deals with all the digital financial traffic in the south of Holland.<sup>152</sup> No new drilling is expected before mid-2013.

The recently ousted Dutch government regarded shale gas as important for the country's energy mix, and allowed fracking under national mining laws. Explorational drilling has been exempted from environmental impact assessment requirements. While national environmental regulation is generally strong, critics have raised concerns about its applicability and relevance to fracking.

Several local protest groups have organised around proposed drill sites, lobbying their local councils and joining in a wider national protest movement against shale gas. Hundreds of protesters have gathered at the Dutch parliament during debates on shale gas, attracting media attention. Friends of the Earth Netherlands, Milieudefensie, is conducting research on shale gas with local groups and supports a nationwide moratorium on shale gas exploration and extraction.

### For more information:

The Schaliegasvrij Nederland website ([www.schaliegasvrij.nl](http://www.schaliegasvrij.nl)) pools together the resources of local and environmental groups.

See also: Milieudefensie factsheet on shale gas:  
<http://www.milieudefensie.nl/publicaties/factsheets/factsheet-risicos-onconventioneel-gas>

### 5.8 Poland

Poland has been one of the most enthusiastic European supporters of shale gas due to its dependence on gas imports from Russia<sup>153</sup> and growing demand for energy supply. It is arguably the biggest focus for shale gas in all of Europe though early high resource estimates were recently found widely over enthusiastic. While several Polish MEPs in Brussels are leading the country's lobbying efforts in the EU to prevent development of any EU wide legislation on shale gas, the Polish government – directly or through friendly think tanks – has organised, in the last two years, dozens of lobby events in Europe's capital and in Warsaw.

Presumably much of the industry research was undertaken behind closed doors anticipating the wave of public scrutiny, with little transparency at the expense of public debate and the right to access information.<sup>155</sup>

There is no special environmental law concerning shale gas in Poland. The Polish Ministry of the Environment does not see any need for that. The existing rules require a case-by-case analysis of any major project. If there are thousands of shale gas wells, the Polish government will have thousands of rulings to make on fracking materials, environmental impact, and effects on local communities.<sup>156</sup>

High population density in Poland and locations of drillings in rural areas means that villagers are the group that directly faces the country's shale gas drive. In a number of cases, villagers oppose testing, drilling, wildcatting, and production of shale gas in their communities; however local authorities and government to a large extent ignore their complaints and exclude them from discussions on shale gas exploration and its environmental impacts.

Some environmental groups in Poland, such as CEE Bankwatch and EkoUnia, are pushing to restrict hydraulic fracturing; however, the Polish government has to large extent ignored NGO complaints, which it often accuses of only being hidden lobby obstacles organised by Gazprom or Russia.

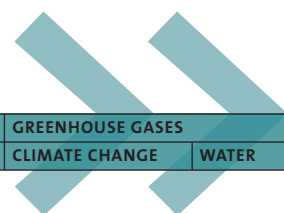
On the national level, only recently, one of the opposition political parties the Ruch Palikota (RP) started to extend some form of support to the anti-shale gas movement by providing information, training and legal advice.<sup>157</sup>

The local protests in Poland concentrate in the Pomorskie and Lubelskie regions.<sup>158</sup>

### More information:

<http://www.eko-unia.org.pl/ekounia/>





## 5.9 Romania

Shale gas controversies have shot to prominence in 2012, with a moratorium on fracking announced in May. This has not yet passed into law, but a decision is expected after parliamentary elections in autumn 2012. Romania has no specific legislation in place to cover shale gas, and there have been false claims from the National Agency for Mineral Resources that no EU country can legally differentiate between conventional and unconventional gas resources.

Photo: “Stop shale gas exploitation through hydraulic fracturing! We are not the wild west of American investors”. Anti-shale gas protestors in the streets of Bucharest, March 2012.

Shale gas has been promoted in Romania as a means of improving national energy security and a way to decrease the country’s dependency on Russian imports (by 10%). Chevron is the main shale gas player having already won licenses to explore and exploit four different areas, mainly on the coastal perimeters of Vama Veche, Adamclisi and Costinesti, in the Dobrogea region close to the Black Sea Coast and in the Barlad region. Fracking here poses a direct threat to a region with fragile ecosystems, historic heritage and tourism. This region has recently been found to have a greater seismic risk than previously thought – small tremors induced by fracking could therefore lead to a devastating earthquake.

Chevron had been planning to drill its first exploration well in the second half of 2012, but this has been put on hold following the moratorium and public pressure. Protests kicked off in March 2012 in Bucharest as Chevron representatives and government officials held a behind closed doors meeting to discuss fracking activities.

More protests and marches in Barlad, Bucharest, Constanta, Cluj and other cities followed with almost 5,000 people marching in Barlad. On May 1, protesters organised demos in Vama Veche on the Black Sea coast, collecting 12,000 signatures in support of a draft law to ban fracking. They want enforcement of the moratorium, proper legislation to be enacted along with an environmental report, and also more transparency in the agreements between the state and foreign companies.

### More information:

Frack-Off Romania:  
<http://www.facebook.com/#!/groups/frackoffromania/>

Local community from Barlad (9000 members):  
<http://www.facebook.com/groups/antifrackingbarlad/>

Dobrogea Group (5900 members):  
<http://www.facebook.com/groups/frackoffdobrogea/>



“Stop shale gas exploitation through hydraulic fracturing! We are not the wild west of American investors”. Anti-shale gas protestors in the streets of Bucharest, March 2012.  
 © foe

## 5.10 South Africa

In South Africa, Shell and several other large energy companies are looking to drill thousands of natural gas wells in the environmentally sensitive, arid Karoo region. The Treasure Karoo Action Group says that 52 per cent of the Karoo land area (20 per cent of South Africa’s land) is at risk from the development. Shale gas explorations in KwaZulu-Natal also raised major concerns as it is one of the South African Provinces with the biggest water reserves. Opponents, such as the KwaZulu-Natal Agricultural Union, flagged up the highly risky impacts such operations can have on drinking water and food security.<sup>159</sup>

Following a number of protests, including from farmers concerned over potential impacts on water supply,<sup>160</sup> a moratorium on fracking was endorsed by the government in April 2011, but lifted on 7 September 2012.<sup>161</sup> Shell and the other companies wanting to explore in the area will now have to submit environmental reports before fracking licences are issued.<sup>162</sup> But experts say that the process is not stringent enough and that serious concerns remain about the impact on groundwater as well as the facilities for handling hazardous waste. The Karoo area is notably home to the threatened black rhino.<sup>163</sup> Protestors have said that they will challenge licenses in court, if needed.

South African oil company Sasol put its shale gas plans on hold last year. The anti-fracking group, Treasure the Karoo Action Group, has pledged to challenge fracking licences through the courts.

### More information:

Friends of the Earth South Africa:  
<http://www.groundwork.org.za>

### 5.11 Sweden

In May 2008 Shell Exploration and Production AB (a subsidiary of Royal Dutch Shell) was granted an exploration permit for 2250 square kilometres (km<sup>2</sup>) in the densely populated province of Scania. Three exploration drillings were carried out but in March 2011 Shell abandoned the project, stating that there was insufficient shale gas. Massive protests and an unfavourable political climate are also likely to have played a part. Several Swedish members of parliament had submitted proposals for changes to the mineral law (which governs gas extraction), which could have hindered further development, and 18,000 signatures were collected by the local protest group Heaven or sHell. The exploration permit expired in May 2011.

Gripen Gas AB has permits for over 400 km<sup>2</sup> of exploration in Sweden, with seven permits for Östergötland and five for the island of Öland. No drilling permits have been issued here so far. Local political parties oppose exploration of gas on the island. Gripen Gas has asked for meetings with local political leaders to discuss their activities and possible test drillings. Two companies also have exploration permits for shale oil on the island of Gotland.

Following pressure from MPs from different parties, the Swedish government announced a review of the national mineral law in September 2011, and is due to present findings in October 2012. The inquiry is also investigating whether applicants should be required to obtain an exploration permit to inform the public of the proposed work. The review aims to develop the regulatory framework so that landowners, affected people and municipalities can be better informed about what an exploration entails. The inquiry is not instructed to make any suggestions which could hinder shale gas exploration or extraction.

Protests have been underway for some time, with the first dedicated NGO – Heaven or sHell – established in Scania in 2009. The group cooperates and shares its knowledge and experience with a local action group on Öland (AMFÖ), monitors developments regarding the politics and commercial activities related to shale gas, and contributes to the European network against shale gas.

#### For more information:

Heaven or sHell's website: <http://heavenorshell.se>

AMFÖ also has a Facebook group (at <https://www.facebook.com/groups/236301353080949/>)

### 5.12 UK

Shale gas development in the UK was temporarily halted following the earthquakes in Lancashire (see chapter 1). While many experts agreed on saying that UK's reserves were smaller than first thought and could be un-economical to extract,<sup>164</sup> a study from the Royal Society and the Royal Academy of Engineering<sup>165</sup> investigated on the earthquakes in Lancashire and concluded that fracking operations should be allowed to resume in the U.K. as long as "robust" measures are adopted to safeguard against future risks. However, it also mentions that even small tremors cause deformation of well casings, which we know is usually at the origin of methane and fracking fluid leakage that can potentially contaminate soils, aquifers and air.

A variety of groups – both local community groups at risk from shale gas projects and other groups – continue to advocate against fracking taking place. Fracking is currently controlled by a regulatory patchwork: local authorities supposedly check air quality, the Health and Safety Executive inspects well construction and the Environment Agency (EA) assesses any impact on water supplies, leaving gaps and questions.

Friends of the Earth (England, Wales and Northern Ireland) believes that concerns about the current regulatory system need to be addressed, including:

- The requirement for an Environmental Impact Assessment – currently only activities on sites covering an area of one hectare or more have to be screened to see whether an EIA is needed. Cuadrilla Resources has got round this by having sites covering an area of 0.99 hectares.
- The ability of the EA and other regulatory bodies to cope with the potential expansion of shale gas drilling. The EA says its systems are adequate, based on dealing with one drilling site. But will it be able to deal with potentially dozens of wells or more?

Friends of the Earth believes that there are serious concerns about the environmental impacts of the extraction of shale gas and supports a moratorium on further shale gas extraction and exploration in the UK.

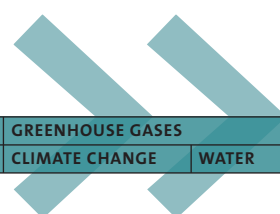
#### For more information:

Briefing from Friends of the Earth England, Wales and Northern Ireland:

[www.foe.co.uk/resource/briefings/shale\\_gas.pdf](http://www.foe.co.uk/resource/briefings/shale_gas.pdf)

Frack-Off Coalition: <http://frack-off.org.uk/>





### 5.13 Ukraine

Ukraine is believed to have the fourth largest shale gas resources in Europe, behind France, Norway and Poland. According to the US EIA, it has 1,200 bcm of technically recoverable shale gas reserves. In May 2012, the Ukrainian government concluded two product sharing agreements (PSAs) for shale gas exploration at the Olesskay field in western Ukraine and the Yuzivska field in eastern Ukraine, awarded to Chevron and Shell respectively.<sup>166</sup> The two companies will form partnerships with Nadra, a state mineral resource company.

There have been no community protests so far mainly due to a lack of specific information on where the mines will be situated. Environmental organisations such as Environment-People-Law (EPL) have been monitoring the development of shale gas in Ukraine since early 2011. EPL does not oppose shale gas development, provided it is done properly. However, the group is highly sceptical about whether the national regulatory framework can deal with fracking, considering the high levels of corruption and abuse of environmental law that frequently occur.

Ukrainian environmental legislation does not have any specific requirements for shale gas development. Activities that might affect water resources are regulated by the Water Code. However, in 2011 Ukraine abolished its environmental impact assessment (EIA) procedure and currently there is no legislative framework in place for EIA either for prospective shale gas development, or for any other planned activity which may adversely impact the environment. This means there is no public participation in decisions permitting such activities.

EPL also maintains that the basic environmental data show that the high density of population as well as a constant shortage of water resources simply does not allow for safe development of shale gas for those communities located near to the reserves.

The Ukrainian government is in favour of shale gas development as it hopes to attract foreign investment and substantial revenues for the state budget and certain public companies.

**For more information:**

<http://epl.org.ua/en/environment/shale-gas/>



Green MEPs and anti-fracking activists pose with fracking flavoured water outside the European Parliament.

# Conclusions – Demands and policy recommendations

6

As documented recently by the European Commission, fracking is a high-risk carbon-intensive activity that impacts human health and the wider environment. Evidence – including from inside the industry – shows that the extraction process is prone to accidents, and that these pose a serious threat to the environment and to water supplies. Leaks of methane and highly toxic, carcinogenic chemicals from the process are almost unavoidable, directly impacting the quality of the air, water and soil, posing a serious risk to human health.

Many of these effects are not only local or just temporary. They can be felt regionally and even globally and over generations in the case of water contamination or air pollution. People around the world are increasingly aware of the potential impacts of shale gas development, and started to resist project in countries such as South Africa, Bulgaria, France, the US, Argentina and Czech Republic. Affected communities should be included in a full debate about impacts of shale gas, with the option to say ‘no’ to any project. Many governments have started to realise that and moratoriums have been installed in a number of places.

Friends of the Earth Europe and other environmental organisations believe that, on a fundamental level, fracking for unconventional fuels runs counter to the EU’s commitment to achieving a high level of environmental protection, as enshrined in Article 37 of the Charter on Fundamental Rights.

Furthermore, article 35 of the Treaty commits the EU to ensuring a high level of human health protection in all of the Union’s policies and activities. The EU is tasked with developing environmental policies based on “the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay” (Article 191, Treaty on the Functioning of the European Union).

Considering the strong risks and serious negative impacts of shale gas and the lack of sufficient regulation and protection mechanisms, we believe that the development of such gas within the EU runs counter to EU Treaty obligations.

We also believe that because of the current ‘shale gas hype’, a basic fact is in danger of being overlooked or pushed to the margins of the debate: shale gas is a fossil fuel. In order to limit global warming below 1.5 degrees Celsius, and thereby prevent dangerous climate change, fossil fuels must be phased out as quickly as possible. Renewable energy and energy savings provide the only viable path to an environmentally sustainable and healthy future. Exploiting unconventional fossil fuels such as shale gas, shale oil and coal bed methane will significantly contribute to increase total greenhouse gas emissions and will increase the world’s dependency on fossil fuels. It will also hamper the development of a renewable energy sector and investments in energy efficiency.

The industry has so far failed to address the specific concerns described in this report. Fracking techniques remain the only option to extract this resource, and there is little evidence that attempts to limit or even contain the risks of hydraulic fracturing can work.

At a time when policy makers are discussing the energy policies we should develop for the next 20 to 30 years, within the context of climate change, Europe cannot afford to lock us in another dirty fossil fuel cycle that would most certainly jeopardize the climate objectives set for 2050.

Because of all these unacceptable risks, because of the risk posed by the competition for investment in renewables and energy efficiency policies, because of the obvious inadequacy of the current European environmental and other relevant legislation and because of the inevitable impacts on environment, health and climate, we believe that no further shale gas activities should proceed. We call on all member states to suspend all ongoing activities, to revoke existing permits, and to place a ban on any new shale gas projects, whether exploration or exploitation.

We also call on the EU, its member states and European financial institutions to cease providing financial or political support to shale gas development projects. Any financial and political assistance provided to shale gas projects in countries in the Global South should be redirected towards the production and promotion of renewable energy sources and energy saving, in line with the Millennium Development Goals.





# References

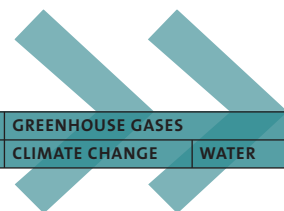
# 7

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- 3 International Energy Agency (IEA), May 2012, 'Golden Rules for a Golden Age of Gas', p.91 (<http://www.worldenergyoutlook.org/goldenrules/>)
- 4 See Friends of the Earth Scotland report on coal bed methane (April 2012): [http://www.foe-scotland.org.uk/sites/files/Unconventional\\_GasandFracking\\_briefingApril2012.pdf](http://www.foe-scotland.org.uk/sites/files/Unconventional_GasandFracking_briefingApril2012.pdf)
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- 9 'Shale Gas Goes Global', September 2010, Christina L. Madden, Carnegie Council (<http://www.policyinnovations.org/ideas/briefings/data/000186>)
- 10 International Energy Agency (IEA), May 2012, 'Golden Rules for a Golden Age of Gas' (<http://www.worldenergyoutlook.org/goldenrules/>)
- 11 International Energy Agency (IEA), World Energy Outlook 2010, p. 63, Box 1.1 "Summary of fossil-fuel consumption subsidy assumptions by scenario". The IEA describes several possible scenarios for fossil fuel demand to 2035. The first is where countries follow 'business as usual' energy policies, which the IEA calls the "current policies scenario". The "new policies scenario", "takes account of the broad policy commitments that have already been announced and assumes cautious implementation of national pledges to reduce greenhouse-gas emissions by 2020 and to reform fossil-fuel subsidies". The third scenario would arise if countries were to put into place measures to keep carbon emissions in the atmosphere at 450 parts per million, which would entail "the near-universal removal of fossil-fuel consumption subsidies"
- 12 Ibid. p. 179. In the 450 scenario, demand will rise by "0.5% per year, peaking in the late 2020s"
- 13 Ibid. The definition of "unconventional gas" includes shale gas, coal bed methane and tight gas. The IEA sees "around 35% of the global increase in gas production in [the new policies] scenario com[ing] from such unconventional sources"
- 14 'Shale Gas Goes Global', September 2010, Christina L. Madden, Carnegie Council (<http://www.policyinnovations.org/ideas/briefings/data/000186>)
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- 16 <http://www.state.gov/s/ciea/gsg/>
- 17 For example, Bulgaria: <http://www.euractiv.com/energy/us-tells-bulgaria-shale-gas-safe-news-510616>
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	HYDRAULIC FRACTURING	GREENHOUSE GASES	
	EMISSIONS	CLIMATE CHANGE	WATER

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