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"Energy (in)security": Stakeholder Concerns Regarding Hydraulic Fracturing and Shale Gas Extraction in Ireland

Mémoire de fin d'Etudes présenté par
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Abstract

This study focuses on the proposed use of hydraulic fracturing in Ireland, when a decision on this matter is imminent. Hydraulic fracturing is hailed as the technique that will change the face of energy into the future. This is largely due to its enabling the extraction of unconventional hydrocarbons, including shale gas, that were previously uneconomical. It examines the process of hydraulic fracturing before analysing how and why this technique could be applied in Ireland in order to achieve the aims of energy policy, namely ensuring security of supply, competitiveness, and sound environmental performance. On this matter, it concludes that natural gas will continue to have a strategically important role in Ireland's energy mix for decades to come, from which stems the interest in shale gas.

It then assesses the extent to which hydraulic fracturing would be acceptable and/or desirable in the current climate from the perspective of a range of leading stakeholders: the Government, the petroleum industry, and the local communities. It outlines the primary concerns of these stakeholders, and the specific challenges they face: regulatory, fiscal, economic, technical, social, environmental and health-related. It concludes that the decision-makers will be required to address the decision on hydraulic fracturing from both moral and pragmatic standpoints, incorporating the myriad different concerns of each party to the conflict. On this basis, and where appropriate, certain recommendations are made for ways in which to approach these concerns and adequately take them into due consideration when a decision is being made.

Résumé

Cette étude se focalise sur les perspectives de développement de la fracturation hydraulique en Irlande, à la veille d'une décision gouvernementale sur cette question. La fracturation hydraulique a été décrite comme un technique susceptible de changera à l'avenir et pour toujours le visage du monde énergétique. Cette assertion est justifiée par le fait qu'elle permet d'extraire des ressources énergétiques carbonées, dont le gaz de schiste, qui n'étaient pas intéressantes du point de vue économique auparavant. Cette étude aborde le processus de la fracturation hydraulique avant d'analyser comment et pourquoi elle pourrait s'appliquer à l'Irlande afin d'atteindre les objectifs de la politique énergétique du pays, à savoir la sécurité d'approvisionnement énergétique, la compétitivité, et la conformité aux exigences en matière de protection de l'environnement. L'étude conclut en premier lieu que le gaz naturel constituera un élément de grande portée stratégique dans le mix énergétique irlandais dans les prochaines décennies, d'où l'importance d'examiner les perspectives du gaz de schiste.

L'étude examine ensuite dans quelle mesure la fracturation hydraulique peut se considérer acceptable et/ou désirable dans le contexte socioéconomique actuel du pays, et selon la perspective des différentes parties prenantes clé, à savoir le gouvernement, l'industrie pétrolière, et les collectivités locales. Elle souligne leurs principales inquiétudes et les défis qu'elles affrontent, qu'ils soient propres à la régulation ou de nature fiscale, économique, technique, sociale, environnementale ou sanitaire. L'étude démontre la nécessité d'intégrer dans les décisions portant sur la fracturation hydraulique des réalités morale et économique, ainsi que les multiples et divers intérêts de chaque partie prenante. Quand cela a été jugé judicieux, certaines mesures ont été envisagées afin d'éventuellement améliorer la façon dont ces enjeux sont abordés. Des moyens de les prendre en compte ont été à cet effet proposés de manière à ce que toutes les parties prenantes soient satisfaites lors de la prise de décision, ainsi qu'à son issu.

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List of Acronyms

- **ABP** (An Bord Pleanála, the Irish Planning Board)
- **ALARP** (as low as reasonably practicable)
- **BEP** (Better Energy Programme)
- **BGE** (Bord Gáis Energy)
- **BOP** (blow-out preventer)
- **CAG** (Common Arrangements for Gas)
- **CAO** (Compulsory Acquisition Order)
- **CER** (Commission for Energy Regulation)
- **CHP** (combined heat and power)
- **CSR** (corporate social responsibility)
- **DCENR** (Department of Communications, Energy and Natural Resources)
- **DECLG** (Department of the Environment, Community and Local Government)
- **E&P** (exploration and production)
- **EC** (European Commission)
- **EP** (European Parliament)
- **EPA** (Environmental Protection Agency)
- **EROEI** (energy return on energy invested)
- **ESB** (Electricity Supply Board)
- **EU** (European Union)
- **GDS** (Grid Development Strategy)
- **GEAI** (Good Energies Alliance Ireland)
- **GHG** (greenhouse gas)
- **IEA** (International Energy Agency)
- **IWEA** (Irish Wind Energy Association)
- **LNG** (liquid natural gas)
- **NDP** (National Development Plan)
- **NOW** (National Offshore Wind Association of Ireland
- **NSS** (National Spatial Strategy)
- **OPEC** (Organisation of the Petroleum Exporting Countries)
- **PAD** (Petroleum Affairs Division)
- **REFIT** (Renewable Energy Feed-In Tariff)
- **RPC** (Resources Protection Campaign)
- **SAC** (Special Area of Conservation)
- **SEAI** (Sustainable Energy Authority of Ireland)
- **SEM** (Single Electricity Market)
- **SER** (sources of renewable energy)
- **SLO** (social license to operate)
- **SME** (small to medium enterprises)
- **tcf** (trillion cubic feet)
- **TFC** (total final consumption)
- **TPES** (total primary energy supply)
- **UFF** (unconventional fossil fuel)
- **UGEE** (unconventional gas exploration and extraction)
- **WFD** (Water Framework Directive)

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INTRODUCTION

Ireland has reached a crossroads, the crucial moment when the Government will decide on the future of their energy supply. One branch would signify a precursor to a paradigm shift, the adherence to a sustainable energy model achieved through embracing energy transition, and a progressive abandonment of fossil fuels. The alternate path represents the continuation of the current model, whose sustainability has been called into question across the world – that of unusually high dependence on imported fossil fuels. The Government is asking itself: do we want to legislate for hydraulic fracturing for shale gas extraction? Yet this question cannot be answered without first addressing the underlying questions, both moral and technical, of whether or not this is a desirable choice.

Hydraulic fracturing, or fracking, precipitates an impassioned debate, necessitating the consideration of a web of interrelated factors. Pivotal amongst these are the actors implicated in both the decision and the consequences thereof, in other words, the key stakeholders. Each of the relevant parties by definition stands to be affected by a potential positive decision on fracking, though these effects will differ greatly across the spectrum: there will be 'winners and losers'. Yet what is to be gained by some will not be lost by the others; on a micro level, communities and lifestyles would be profoundly, irreversibly changed in the name of greater energy security for the entirety of the country. Similarly, substituting dirtier fossil fuels with natural gas could bring benefits for the climate on a macro level, and these will depend on how much we are willing to invest (socially and economically) at the present time in order to reduce the effects of climate change and promote intergenerational justice.

The stakes are high.

On the eve of the last general election, before even considering how or when to take a decision on a national policy on fracking, licensing options permitting preliminary exploration for shale gas were issued. The incumbent Minister of Energy did not retain office, and the views of his successor proved inconsistent with his clear support of the prospect of exploiting shale gas. At present, the Government has imposed a *de facto* moratorium on fracking.

Yet it continues to show interest in exploiting unconventional fossil fuels, and as such in 2013, the Environmental Protection Agency invited calls to tender for the offer of funding from both the EPA Strive Programme and the Department of Environment to conduct detailed research on the use of Unconventional Gas Exploration and Extraction in Ireland, in particular with regard to the use of fracking technology. The final results of the study are expected in 2015.

The study does not strictly constitute a Strategic Environmental Assessment, due to the absence of a government plan, policy, or project upon which to base one. Public interest, and concern, regarding the basis upon which the decision will be made in the future is therefore heightened, primarily due to the fear that not all stakeholders' concerns will be adequately addressed by a predominantly technical study. This dissertation therefore seeks to identify the key stakeholders in a decision on fracking in Ireland, what their specific concerns are, and finally how these can be addressed in the event of a positive decision on fracking in Ireland.

METHODOLOGY

The breadth of the chosen angle for this dissertation was a cause of much concern, and thus required making certain methodological decisions in order to be narrowed down. The methodology comprised desktop research, site visits, and personal interviews. Appreciating the need for a multi-stakeholder approach to analysing the potential impacts of fracking, three key perspectives were chosen for the primary focus of this research: those of the Government, the developers, and the community stakeholders. It is recognised that this is a non-exhaustive list and unfortunately, the many varied groups and individuals who have a stake in fracking cannot all be considered within the framework of this study, but would form the basis of a much larger and comprehensive study into stakeholder engagement regarding fracking in Ireland.

Initially, desktop research was undertaken in order to address the engineering, geological and technical challenges of fracking, and open a more theoretical discussion of unconventional hydrocarbons. The same method was used to investigate the intricacies of the Irish Government and the agencies relevant to this paper. It was subsequently logical to assess existing energy policy in order to analyse whether fracking would fit conveniently within the existing set of principles upon which this policy is based.

Following this, members of the relevant government Departments were contacted so that data, opinions and inferences contained within the publicly available documents could be verified. Upon kind acceptance of my request, the opportunity was taken to interview them, insofar as they were willing and at liberty to respond, regarding the protocol to be followed; the prospects for regulatory change; the challenges that the Government faces; the wide-ranging socio-economic and political issues that they seek to address, as well as which of the factors would bear most weight in the decision on fracking. On this last point, no comment could be given.

The EPA, though a major stakeholder, was not in a position to offer any opinions on their views on the prospects for fracking, due to their being involved in the forthcoming study into fracking in Ireland. The two main developers interested in pursuing fracking in Ireland (should a

decision permit shale gas production), Tamboran and Enegi Oil, "thanked me for my interest" but declined to comment. The developers' perspective presented in this document therefore comes from sources external to potential fracking operations, but who nonetheless have been involved in the previous natural gas development in Ireland that serves as an explanatory case study. Their co-operation is deeply appreciated, and their wishes to remain anonymous have been respected.

Finally, an angle from which to approach the community stakeholder perspective was selected, on the basis of recommendations from other interviewees. Though two separate geographical areas within the Republic of Ireland – and indeed others on the island of Ireland who have not been the focus of this research – have been targeted for potential fracking, the decision was taken to focus on the Lough Allen basin. This is the area in which Tamboran have been issued licensing options, which makes them the focus of the operator's perspective not obtained through interview. The Lough Allen basin was the location of the site visit conducted to the areas in which potential fracking would take place, the source of an impressive and dedicated interest group, and the community who welcomed my interest in their position. The residents of Manorhamilton in North Leitrim were incredibly generous with their time, resources and honesty, and their contribution cannot be understated.

This paper dealt with environmental concerns inasmuch as they impact upon the identified stakeholders and their relative weight in the decision. Though it would have been extremely worthwhile, from a personal, philosophical and academic point of view to discuss different branches of environmental thought and the extent to which fracking could be permissible from anthropocentric or ecocentric perspectives, this unfortunately fell without the scope of this research. They are only briefly touched upon when discussing the classification of opposition to fracking in Ireland.

In essence, the methodology included desktop research, personal and telephone interviews, and site visits. The interviewees are limited in number due to the choice to focus on the depth of their concerns and be able to analyse prospects for mitigation, as well of course as being limited to those who consented to take part in the study, and therefore shaped the decision. This study is intended to demonstrate the specific considerations of what is at stake for the Irish economy and its citizens both prior to and following a hypothetical positive decision on fracking.

CHAPTER ONE: HYDRAULIC FRACTURING AND UNCONVENTIONAL HYDROCARBONS

"A promising industry", or a "false promise of plenty"[1]? Recent examples of unconventional gas exploration and extraction UGEE, in North America in particular, lend weight to the argument that the industry is indeed promising, from a purely economic perspective, at least in the short-term. Yet the methods required in order to extract unconventional hydrocarbons have been the source of much controversy, and are said to be promising more than they can deliver. This first chapter will therefore outline some of the geotechnical aspects of unconventional hydrocarbons, as well as the process of fracking itself. Thereafter, a discussion of unconventional fossil fuels and the recent 'fracking revolution' will deal with some of the concerns arising from the nature of UGEE and the consequences of this revolution thus far.

1.1 Unconventional Natural Gas

"Perhaps the most important new type of petroleum applications in decades"[2], there are three principal types of unconventional gas resources. The International Energy Agency (IEA) identifies these as shale gas, coalbed methane and tight gas.[3] Shale gas can be defined as the gas contained within sedimentary rock formations called shales, typically "rich in organic matter" as well as mud, silt and clay[4] and "characterised by low permeability"[5], which restricts the possible filtration or migration of the gas through the rock. Chemically, it is predominantly methane (CH_4), and this is the product that developers are interested in harnessing, though gases such as carbon dioxide (CO_2), hydrogen sulphide (H_2S) and radon (Rn) are also present in shale[6]. Given that "isotropic and homogeneous rocks seldom occur in nature", shale formations tend to be anisotropic and therefore their thermal, mechanical, physical etc. properties will vary depending on direction, and will not display qualitative symmetry along their planes[7]. Ireland's Northwest

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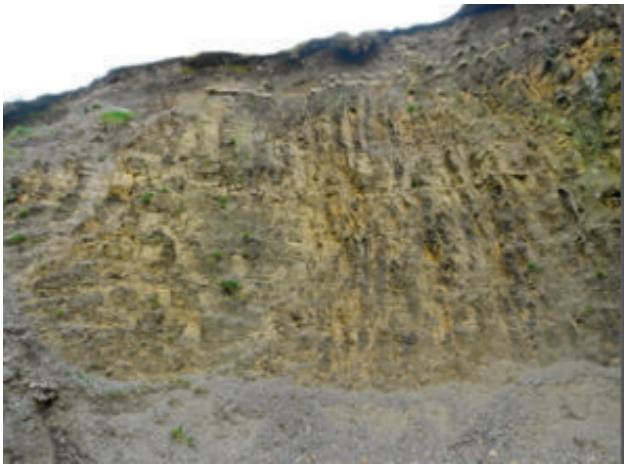
[1] Heinberg, Richard (2013). *Snake Oil: How Fracking's false promise of plenty imperils out future*. Post Carbon Institute:
[2] Marongiu-Porcu, Matteo, Economides, Michael J., and Holditch, Stephen A. (2013) "Economic and physical optimization of hydraulic fracturing" in *Journal of Natural Gas Science and Engineering*, vol 14 pp 91-107, p 91
[3] International Energy Agency (2012b). *Golden Rules for a Golden Age of Gas*. PDF online < http://www.worldenergyoutlook.org/media/weowebsite/2012/goldenrules/WEO2012_GoldenRulesReport.pdf > p 18
[4] The Royal Society and the Royal Academy of Engineering (2012). *Shale Gas Extraction in the UK: A review of Hydraulic Fracturing.* PDF online < http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/projects/shale-gas/2012-06-28-Shale-gas.pdf > p 9
[5] International Energy Agency (2012b) p 18
[6] Beemster, Brigit, and Beemster, Ron (ed.) (2011). *Report on the effects of shale gas extraction by means of hydraulic fracturing in the Republic of Ireland*. Fracking Research and Information Centre: Sligo. PDF online < http://www.frackingresearch.org/report.pdf > p 7
[7] Det Norske Veritas AS (2013). *Risk Management of Shale Gas Developments and Operations.* PDF online < https://exchange.dnv.com/publishing/Codes/currentpdf.asp?file=RP-U301.pdf > p 30

Carboniferous basin shale is featured in Figure 1, where the distinct layers of rock are clearly visible, including protruding elements of the upper sandstone stratum.

Figure 1: Northwest Carboniferous Basin Shale



Source: O'Halloran, Orla (28-4-2014)

Coalbed methane, or coal seam methane, refers to the gas trapped within a relatively thick layer of coal. Tight gas is an umbrella term that encompasses gases contained within layers of rock of a permeability ($\pm 10^{-9}$ Darcy or <0.1 millidarcies[8]) that does not permit extraction without the aid of technologies that enhance the flow of this gas.

Conventional gas or oil wells can produce without the aid of this supplementary stimulus (until they have reached maturity), as the internal pressure is sufficient; by contrast unconventional gases require induced pressurisation. Unconventional gas resources are by definition more difficult to extract and require the use of advanced technology.

How can shale deposits be identified, and equally how can natural gas trapped within low porosity rock be made to flow? The first of these questions is the most easily answered of the two, owing to the prevalence of shale rock throughout the world; given what is known about the formation of shale throughout history, and finally its current distribution across the Earth's crust, it is possible to 'infer' where gas deposits are likely to be located. Striking shale gas is thus usually achieved just through drilling wells[9].

In response to the second question, "shale formations […] can be made commercial only through the massive application of multiple hydraulic fracturing in horizontal wells"[10]. The matter of extraction is therefore rather more elaborate - once identified, hydraulic fracturing is used sequentially to extract the gas from its underground deposits (often, but not exclusively, several kilometres below the surface) and generally requires the directional drilling of a vast numbers of wells. The low permeability of the rock in shale gas fields and resultant restricted flow of the gas itself dictate that the density of wells required in the extraction will be much

[8] Alberta Geological Survey (2013). *What is Shale Gas?* Online < http://www.ags.gov.ab.ca/energy/shale-gas/ > accessed 11-3-2014
[9] International Energy Agency (2012b) p 22
[10] Marongiu-Porcu *et al* (2013) p 91

greater than what is necessary for conventional gas fields, as each well can necessarily yield a lesser amount of the desired product.

Despite the recent surge in criticism of unconventional fossil fuel (UFF) extraction, the required techniques are not a recent innovation, and have in fact been employed since the 1940s. These are namely the aforementioned particularly prevalent techniques – hydraulic fracturing and directional, or horizontal, drilling. Fracking, this "extremely seasoned and tested technology used in over of 1.2 million wells since […] 1947"[11], has been used in the exploitation of conventional oil and gas deposits in the European Union (EU) and throughout the world, and is only now being applied to tap into fields of unconventional gas. Section 1.2 will give an overview of the process.

1.2 How to Frack a Well

"Hydraulic fracturing is the use of fluid and material to create or restore small fractures in a formation in order to stimulate production from new and existing oil and gas wells"[12]. The following inferences can be made on the basis of this definition:

1. Fracking does not simply create, but also re-opens fissures that previously existed
2. Fracking is an established technique used to prolong the life of wells in mature (conventional) oil or gas wells that are beginning to dry up and require extra stimulation
3. The combination of fluid and material is necessarily dependent on the specific type of shale rock formation and is subsequently not universal.

Fracking for shale gas, whilst not considered overly complicated from an engineering perspective, is nevertheless a multi-faceted process requiring many preconditions and, of course, many risk and environmental impact assessments (details regarding regulating and licensing can be found in section 3.3 below). Fracking for shale gas, as distinct from fracking conventional gas wells, is designed for the sole purpose of overcoming the natural low permeability of the shale bed and allowing the gas itself to flow into the bored well, and therefore to 'produce'[13]. Once the site has been chosen, a drilling platform is put in place, in preparation for drilling the wellbore. Increasingly, multiple wells are being drilled from single pads, in order to minimise the environmental impact of wellboring[14].

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[11] Sonik, Bugosław (2013). *Report on the environmental impacts of shale gas and shale oil extraction activities (2011/2308(INI))*. European Parliament, Committee on the Environment, Public Health and Food Safety (25-9-2013). PDF online < http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A7-2012-0283&language=EN >, p 15

[12] Frac Focus: Chemical Disclosure Registry (2014). *Hydraulic Fracturing: The Process*. Online < http://fracfocus.org/hydraulic-fracturing-how-it-works/hydraulic-fracturing-process > accessed 18-1-2014

[13] The Royal Society and the Royal Academy of Engineering (2012) p 9

[14] International Energy Agency (2012b) p 23

1.2.1 Drilling

A drilling rig is installed on site at the drill pad, and erected vertically. Drilling will commence, to a target depth of approximately 3500m (depending on the specific properties of the shale), generally extending well below the depth of the aquifer (see Figure 2 below). At depths of close to 2000m, directional drilling is often undertaken, with the purpose of maximising surface area access to the stratum of shale where gas is found, and the prospect of tapping into sweet spots. The horizontal well, as distinct from the vertical well, is extremely narrow, with a diameter of approximately 8.5 inches.

The well design process conducted beforehand must make previsions for ensuring the protection of both the aquifer, which is penetrated and crossed by the drilling process, and the surrounding environment[15]. Well casings, generally several layers of concentric steel tubes, are inserted into the borehole, and grouted into place using cement in order to seal the well entirely from surrounding rock formations, and prevent any well leakage or cross-contamination from either fracking fluids (see section 1.2.2 for further details on fracking fluids) or 'drilling mud'. Drilling mud, a combination of fluids that can be water-based, oil-based or gaseous, facilitates drilling, and its purpose is to provide hydrostatic pressure that prevents drilling arisings from entering the well bore. It can also counteract any collapsing[16]. The wellbore must then be lined with casings, which are multiple in order to optimise risk minimisation:

- **Cellar**: holds the blow-out preventer (BOP) close to the surface which plays a role in pressure regulation
- **Conductor casing**: extends to a depth of 30m below the surface to provide support for the drill bit in areas of the subsurface that are potentially unstable and softer closer to the surface
- **Surface casing**: protects surface groundwater from any damage caused by drilling. It will also prevent blow-out of drilling mud at the surface. It extends from the surface and therefore runs parallel to the conductor casing
- **Intermediate casing**: this extends nearly the whole length of the well, ending only once the target formation has been reached. Its purpose is to isolate highly pressurised areas of the well deeper down from the more superficial sections closer to the surface.
- **Production casing**: the longest of all well casings, it extends from the surface (generally) to the production zone and to the furthest point of the well itself. The grouting is gas-tight, so the casing needs to be perforated to allow gas and fluid to flow. A perforation gun is loaded into the horizontal section of the well, unleashing "small

[15] United Kingdom Onshore Operators Group (2013a). *Shale gas and well guidelines*. PDF online <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/185935/UKOOGShaleGasWellGuidelines.pdf >

[16] ARUP (7-10-2013). Private interview

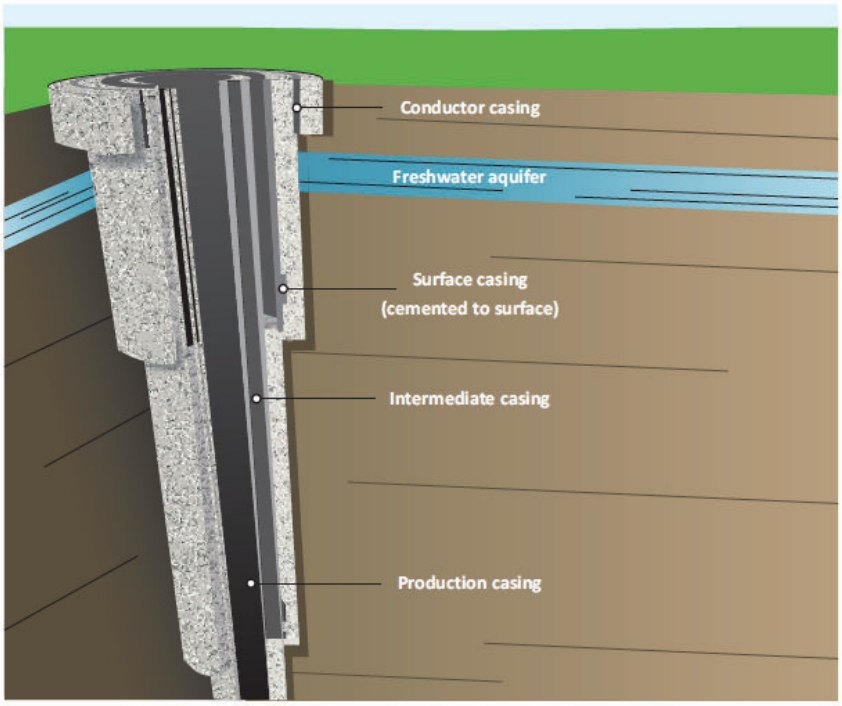
explosive charges"[17] that puncture holes in the production casing, and penetrate the target rock formation external to the well. The well then needs to be flushed out with acid to remove debris.

Finally, the well must be fitted with production tubing, which contrary to the casing, hangs freely within the well and is not grouted into place. Production tubing "is used to deliver and extract fracture induction fluid" and "provides an extraction conduit for flow-back fluid"[18]. This means that the fluid containing the shale gas can also be extracted through this inner tubing. The entire process can take between one and three months, depending on the types of casing appropriate to the site, and the depth of the well[19]. Once the well has been drilled, the drilling rig is dismantled and removed.

The integrity of the well, which minimises the risk of contamination and leaking, is largely dependent on the casing, and must be ensured through rigorous testing. The European Parliament (EP) has also recognised that "the main concern regarding groundwater contamination is often well integrity in terms of the quality of its casing and cementing and its ability to resist the high pressure of the liquid injected"[20], and indeed, even the Environmental Protection Agency (EPA) reported in 2012 that the "current opinion shared by several agencies is that all scientifically documented cases of ground water contamination associated with fracking are related to poor well casings and their cements, or from leakages of fluid at the surface […] rather than from the fracking process itself"[21]. Testing is thus essential, and can take several forms, either testing the density of the grout, the cement bonding, or indeed, the more practical pressure tests, to ensure the well and casing will both withstand the onslaught of fracking.

[17] Heinberg (2013) p 42
[18] ARUP (2013)
[19] Cuadrilla Resources (2014b). *Well Design*. Video online < http://www.youtube.com/watch?v=cTyYC3II9yk > accessed 11-3-14
[20] Sonik (2013) p 10
[21] Healy, Dave (2012). *Hydraulic fracturing or 'fracking': A Short Summary of Current Knowledge and Potential Environmental Impacts*. Environmental Protection Agency Ireland. PDF online < http://www.epa.ie/pubs/reports/research/sss/UniAberdeen_FrackingReport.pdf > p 11

Figure 2: Typical Well Design



Source: International Energy Agency (2012b)

1.2.2 Fracture Induction

Fracture induction is the use of hydraulic fracturing techniques to create new, or widen existing, fractures in the shale. With the well drilled, the casings installed and the necessary perforations made along the horizontal well, the next step is the fracking itself, and subsequent collection of back-flow fluids and natural gas.

Hydraulic fracturing by definition requires the use of a water-based fluid, known as fracking fluid. Fracking fluid commonly is comprised of 99.95% water mixed with sand, plus lubricants, detergents, and biocides[22]. The sand is referred to as a proppant, and will serve to 'prop up' the fractures induced by the injection of the fluid. The biocides and detergents are used to reduce any bacterial proliferation, and the lubricant facilitates the flow of the mixture[23]. Typically, 1,100 – 2,200m^3 of fracking fluid is needed for each 100-150m section[24], and over its lifetime, a well can require the injection of 1200 tonnes of sand, 150 tonnes of chemicals and 20,000m^3 of water[25], though more conservative estimates put this figure at 9,000-13,500m^3 [26].

[22] Cuadrilla Resources (2014a). *Hydraulic Fracturing*. Online < http://www.cuadrillaresources.com/what-we-do/hydraulic-fracturing/ > accessed 11-3-2014
[23] Dessus, Benjamin (2013). "Que penser de l'affaire des gaz de schiste" in *Les Cahiers de Global Chance. Des questions qui fâchent : contribution au débat national sur la transition énergétique*, vol 33, pp 90-101, p 91
[24] O'Sullivan, Jack (2014). "The Oil Industry and the Environment", in Hobbs, Eddie; Sherlock, Dominic; and Slevin, Amanda (ed.) (2014). *Own Our Oil: The Fight for Irish Economic Freedom*, Liberties Press: Dublin, pp 67-117, p 103
[25] Dessus (2013) p 91
[26] MIT (2011). *The future of Natural Gas*. PDF online < http://mitei.mit.edu/system/files/NaturalGas_Report.pdf > p 51

The fluid is pumped into the well at high pressure, and then permeates the surrounding target rock through the perforations in the production casing. Under this pressure, the fractures can extend up to hundreds of metres around the well casing, and remain 'open' due to the presence of proppants, without which the fractures would close when the pressure forcing them open is removed. This is known as flow-back – once the fractures have been opened, gas can 'escape' into the well, and is pumped back to the surface with the fluids, releasing the pressure that was forcing the fractures open. Over the course of several days, the flow-back fluid to hydrocarbon ratio will diminish, until essentially only hydrocarbons flow up from the well.

The introductory paragraphs of this chapter made reference to multiple hydraulic fracturing, also known as multi-stage fracking, credited with being the technique that ensures commercial viability in onshore shale gas developments. Essentially, fracking starts at the furthermost point of the horizontal well, and takes place along ±100m stages, roughly 20 times, for spurts of 2-3 hours. Tapping horizontal wells also ensures that the "gas-bearing formations are completely isolated from other strata penetrated by the well"[27]. The well will produce hydrocarbons and waste streams, both of which need to be piped from the site to processing plants in order to retrieve the gas and safely treat the waste. Production can last up to 30 years, but is concentrated in the first few, after which very little recovery is possible and production steeply declines.

Despite claims that fracking can be operated in a way that is "safe if properly conducted" and minimises not only risk to workers, groundwater, aquifers and surrounding environment; water consumption; truck journeys and the use of chemicals[28], public opinion remains highly polarised. In order to assess exactly why this process, not dissimilar from that required in extracting conventional hydrocarbons, is the source of so much discord, we will briefly assess the development and results of fracking in North America.

1.3 The Recent "boom" and its Consequences

"The shale gas genie is out of the bottle"[29]. The IEA has even announced a new "Golden Age of Gas" to come, which promises numerous advantages compared with the current energy system. At a time of global economic downturn, what exactly are the promises that new unconventional energy resources can offer? Industry experts and academics are staunchly divided on this point, each highlighting facts that prove contradictory to those maintained by the other camp. Fracking for shale gas has proven beneficial for the economy, and indirectly for society, and could entail some (mild) environmental benefits, but these tend to be the short-

[27] International Energy Agency (2012b) p 27
[28] Spokesperson for Tamboran, quoted in Melia, Paul (2014). "Fracking: are the benefits worth potential pitfalls?" in *The Irish Independent* (3-3-2014)
[29] Johnson, Corey, and Boersma, Tim (2013). "Energy (in)security in Poland: the case of shale gas", in *Energy Policy*, vol 53, pp 389-399

term benefits upon which arguably myopic supporters focus and is not wholly representative of the effects of the recent boom.

"Gas will be critical until at least 2030 or 2035"[30] and there is an argument for the "positive role that natural gas can play in a low-carbon future"[31] that must be considered with due diligence. Interestingly, coal-to-gas substitution has contributed to the US's remarkable decrease in greenhouse gas (GHG) emissions over the past five years, with the country registering a 450 million tonne reduction is total emissions – a rate which far exceeds any other country's efforts in the field of GHG emissions reductions[32]. If it were possible to replicate the conditions under which the fracking boom has taken off in the US, the likelihood would be that the same benefits could be reaped here in Europe.

However this represents only a small proportion of the sum of emissions in the US, which totalled 6,702 million tonnes ($C0_2$ equivalent) in 2011[33]. Equally, emission reductions targets met through the substitution of one fossil fuel for another represent the lesser of two evils and do not make long-term headway towards energy transition or weaning ourselves off fossil fuels. Furthermore, reducing GHG emissions does not fully address the matter of air pollution from other aspects of fracking operations such as vehicular transport and drilling. Indeed, a landmark ruling on 30th April 2014 awarded $3 million to a family in the Texas Barnett shale for damages caused by exposure to chemicals, particles and other air pollution as a result of "natural gas extraction operations" including fracking[34].

Clearly the risks involved in fracking do not always remain theoretical. The US, being a global leader in fracking and producing 89% of the world's unconventional gas[35], has also born the brunt of the more sinister effects of fracking that have prompted so much criticism of the process. Though the journalist, rather than the scientist, is now instrumental in informing public opinion, the sensationalism of readily available information about fracking can be quite confronting and must be treated with caution. Extremism notwithstanding, some of the most negative geological, social and environmental effects of fracking are exemplified by the US experience. At the time of writing, approximately 20,000 wells have been drilled and fracked. An increase in the instance of earthquakes has been reported, with experts linking these to fracking. On April 11th 2014, *Time* magazine reported that the tremors felt in March 2014 in Ohio were "likely the result of the injection of sand and water that occurs during the hydraulic fracturing

[30] Sonik (2013) p 15
[31] Brownstein, Mark (2013). "Safer Fracking", in *Technology Review*, vol 116 n° 1, pp 10-11
[32] The Economist (2012). "Fracking great: the promised shale gas revolution can do the environment more good than harm", in *The Economist,* vol 403 n° 8787, p 20
[33] US Environmental Protection Agency (2013). *U.S. Greenhouse Gas Emissions*. PDF online < http://www.epa.gov/climatechange/pdfs/print_us-ghg-emissions-2013.pdf > p 1
[34] Hurley, Bruce; Robertson, C. Brannon, and Taber, Elizabeth (2014). "'Hydraulic fracturing' verdict in Texas state court – Texas family recovers $3 million based on nuisance theory", in *Lexology* (30-4-2014). Online < http://www.lexology.com/library/detail.aspx?g=8116d0e0-c818-46d2-937f-ad7ab98b4f44 >
[35] International Energy Agency (2013)

[…] process", and further that fracking-induced earthquakes have also been felt in Oklahoma and British Columbia (CAN)[36].

Amongst the scores of accounts of personal, property and environmental damage can be cited, *inter alia*, truck journeys causing noise and air pollution 24 hours a day; the frenzied and haphazard building of housing, schools, hospitals and other amenities necessary to accommodate the throngs of new, temporary workers that come to settle around shale plays (only to be abandoned not long after by these transient populations); rampant prostitution and alcoholism; groundwater contamination due to insufficient grouting and well casings, and quantities so high of methane in drinking water that it can be ignited.

The principal cause for concern from a landowner/local community perspective is the case of water pollution due to fracking and the chemicals used (local community concerns are dealt with in Chapter 4). Fracking fluid has been the cause of much controversy in places where fracking is already in practice, particularly in the USA where the market is deregulated, primarily because its chemical composition is often undisclosed. This is due to its being considered proprietary or a 'trade secret' and full disclosure of the chemical make-up could provide any competitor with the necessary information to directly compete with those who have invested – sometimes millions – in researching the cocktail of chemicals necessary[37]. Full disclosure would be required in Ireland under the Aarhus Convention, which would go a certain way to allaying the valid fears of local communities, and society in the broader sense, regarding potential pollution to underground drinking water supplies.

A study conducted by The Endocrine Disruption Exchange (TEDX) in 2011 cited a list of over 350 (of the 632) chemicals used during natural gas operations and analysed their potential human health impact. A summary of the findings is as follows:

- ➔ Sensory organs, respiratory and gastrointestinal systems are risk from 75% of the chemicals
- ➔ The immune, cardiovascular and central nervous systems as well as the kidneys are threatened by 40-50%
- ➔ The endocrine system could be affected by 37%
- ➔ 25% are carcinogenic or mutagens.[38]

The study was led by Theo Colborn, a renowned endocrinologist who has advised the US and Canadian governments on the threats that certain environmental laws pose to human health. Many of the aforementioned health problems are chronic illnesses, that only express

[36] Frizell, Sam (2014). "Geologists: Fracking Likely Cause of Ohio Earthquakes" in *Time* (12-4-2014). Online < http://time.com/60363/fracking-earthquakes-ohio/ >
[37] Healy, Dave (2012) p 14
[38] Colborn, Theo; Kwiatkowski, Carol; Scultz, Kim, and Bachran, Mary (2011). "Natural Gas Operations from a Public Health Perspective" in *Human and Ecological Risk Assessment: An International Journal*, vol 17 n° 5, pp 1039-1056, p 1045

themselves over the long-term, sometimes many years after exposure, making the causal link between the chemical and its side effect difficult to establish and rather tenuous. The slow onset of illnesses means that currently, with high-volume fracking only being practised over the past decade, studies of the long-term health effects cannot yet be conducted, though previous studies have proven the toxicity of many of the chemicals used in fracking fluid. Even with adequate well casings, there is high risk of exposure for workers, and the possibility of accidents such as spills or blowouts that could release these chemicals in varying quantities and concentrations into the surrounding environment. Anecdotal accounts of water contamination are abundant, showing flames leaping from kitchen faucets, and discoloured, acidic and pungent water flowing from taps. According to the award-winning documentary *Gasland*, even certain developers refuse to drink the tap water in areas of shale gas development in the US. These stories not only bring to light the damage already done, but also the fact that the oil and gas industry is clearly aware that water contamination is a reality. This is the trade-off for the great reduction in gas prices, the 'security of supply for 200 years', and the catapulting of the US to producer status.

The world famous American ideals of "free markets and limited government"[39] provide a framework in which economic development trumps environmental health concerns. As an example, the infamous Halliburton Loophole, introduced by Dick Cheney during the Bush Administration, excuses fracking operations from monitoring under the Safe Drinking Water Act (1974). It is self-evident how water can become contaminated within this vacuum of accountability, where pollution is unregulated and unsanctioned. But the water supply issue is one that requires treatment with acumen, because evidence is varied. The alleged contamination does not appear to be supported by scientific studies that have been conducted in the USA[40]; but these studies have been carried out by the oil and gas industry, whose obvious stake in the success and positive interest in fracking does not require elaboration.

In Europe, the logical, and indeed the legal response to the uncertainty regarding the effects of the chemicals would be to act so as to ensure that these phenomena are prevented *just in case* they are the direct result of fracking. Subsequently, full disclosure should be obligatory, in order that operators be held accountable for any damages and/or contamination as a product of their operations. This polluter-pays requirement would send the message in no uncertain terms that operators will be held responsible for damages, and as such, confidence in the safety of the technique amongst non-industry stakeholders can be fostered.

Recent activity within Europe, such as the exploratory drilling undertaken by Cuadrilla in Lancashire in the United Kingdom, would seem to suggest that not all fracking operations

[39] Rove, Karl (2014). "David Koch and Charles Koch" in *Time* (5-5-2014).
[40] Edwards, Blaine D.; Shepherd, E. James, and Deutsch, Nick (2011). "Hydraulic fracturing: protecting against legal and regulatory risk" in *Oil and Gas Journal*, vol 109, n° 15, pp 22-30, p 24

carry this same risk or cause this same damage[41], and that natural gas can be safely extracted if appropriate and adequate risk management schemes are put into place[42]. Furthermore, the geographical and topographical characteristics of the surface surrounding shale plays has a significant effect on the manner in which these operations are conducted, and furthermore the manner in which workers will be brought in to fill the required jobs. Not all shale gas plays will be situated in small remote areas that require long-distance travel by truck, nor will nearby towns always be overwhelmed in terms of medical, schooling and other services. That said, fracking operations in the UK had to be halted after two earthquakes, measuring 1.5 and 2.5 on the Richter scale, were recorded in 2011, though industry experts assert that tremors of this magnitude are "by no means uncommon in the UK"[43]. These very contradictory reports of the real-life successes and dangers have undoubtedly prompted the attacks on fracking that have led to the process being "generally mistrusted, if not misunderstood"[44] amongst the wider public.

1.4 Discussion

Exploiting various new forms of unconventional hydrocarbons may be considered 'a promising industry', but when it comes to discussing the future of energy and the prospects for a transition away from hydrocarbon to renewable energy, it appears evident that embarking on the development of shale gas does not conveniently fit into our understanding of the concept. Aiming to effect a successful transit from fossil fuels to renewable energy resources should not, logically, include vast investment in infrastructure that exploits reserves of natural gas and oil.

Yet shale gas has been portrayed as a game-changer, a transition fuel, a solution. Fracking however has been portrayed in much more a negative light, and any adequate assessment would need to weigh the merits of both these inextricably linked concepts - the purpose of the study currently being conducted by the EPA. A recent UNEP report quite logically highlights the fact that proponents of unconventional natural gas are basing part of their argument on a comparison of natural gas with coal[45]. However, coal, one of the most polluting of all fossil fuels, represented only 10.1% of global total final consumption (TFC) in 2011, and its use and share in TFC have been in decline since the 1970s[46]. Comparing natural gas to coal therefore seems inappropriate. The possibility for reducing carbon emissions through coal-to-

[41] Allan, Matthew (2013). "Fracking", in *Investor's Chronicles* (15-2-2013). Online < http://www.investorschronicle.co.uk/2013/02/14/commodities/fracking-CLhQDb5cvoZhJia5kOSyfL/article.html >
[42] The Economist (2012)
[43] Willis Global Energy (2012). *All fracked up? Just how concerned should energy insurers be about hydraulic fracturing?* PDF online < http://www.willis.com/Documents/Publications/Industries/Energy/10396_EMR%202012_Complete.pdf > p 21
[44] Allan (2013)
[45] UNEP Global Environmental Alert Service (2013). "Gas Fracking: Can we safely squeeze the rocks?" in *Environmental Development*, vol 6, pp 86-99, p87
[46] International Energy Agency (2013). *Key World Energy Statistics*. PDF online < http://www.iea.org/publications/freepublications/publication/KeyWorld2013.pdf > p 28

gas substitution is indeed real, but what if it were not coal-to-gas but wind-to-gas substitution? Total carbon emissions would not be reduced but would evidently be increased. The relative merits of this substitution appear drastically weakened when compared with cleaner energy sources, and this raises the issue of industry greenwashing, which paints natural gas as a clean fuel, without clarifying that this is only true in relation to coal.

Comparing natural gas to the sick man of energy does not say much to argue the benefits of natural gas, as the only conclusion to be drawn is that 'it could be worse'. Nor does it suggest that globally we are aiming to move towards a phasing out of fossil fuels, and indeed suggests that we are only making a symbolic effort, driven by the need to feed our fossil fuel habit, when in fact conventional wisdom and the finite nature of planet Earth show that petroleum products are not a lasting option. Would it not be more effective, to reach long-term goals of energy independence and sustainable energy systems, to compare natural gas to a more sustainable final objective, renewable energy, and see that it is simply not viable if we are to avoid "a "comeback" of fossil fuels"[47]?

1.5 Conclusion

When UGEE is an emerging industry and a decision on its future is about to be made, how are stakeholders to separate fact from fiction? To distinguish between industry propaganda based on heavily glamorised success stories, from the compelling counterarguments that portray the risks and highlight dangers? How do people really form their own opinions and gain reliable information about the specific impacts they themselves will face? The website Energy From Shale claims that "there are only two sides in this debate: those who want our oil and natural resources developed in a safe and responsible way; and those that do not want our oil and natural resources developed at all"[48]. If this were the case, a qualification of "responsible" would be required, and we could expect to see an absence of damage caused due as a result of this new revolution.

If the benefits of the so-called fracking revolution do constitute "false promises of plenty", could it be true that shale gas is nothing more than snake oil, providing obvious benefits in the immediate, but masking the unknown, long-term effects? The oil and gas industry and the Irish Government continue to show interest in UGEE despite the consequences that the North Americans have suffered. The context is different and the idea is only being entertained for the time being, in the absence of conclusive data that would allow the Government to make a well-informed decision. If the physical engineering works involved in shale gas extraction do not greatly differ from those required for conventional oil or gas extraction, the question is not

[47] UNEP (2013) p 97
[48] Energy From Shale (2013). *Shale gas Economics: Extracting from domestic oil reserves*. Online < http://www.energyfromshale.org/hydraulic-fracturing/shale-gas > accessed 13-11-2013

whether or not fracking is possible, but whether choosing this path would be the right choice for the energy future of the country. The following chapter will therefore assess current Irish energy policy and the prospects for incorporating fracking into it.

CHAPTER TWO: THE STATUS QUO

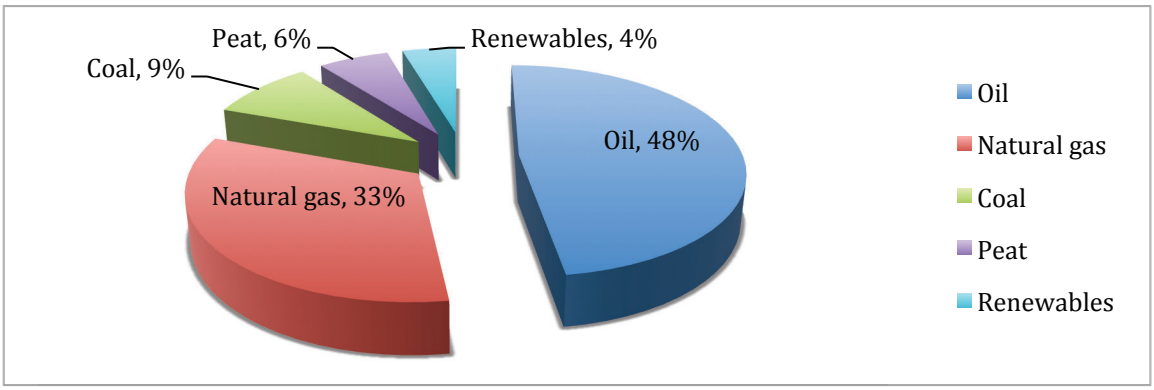
When conducting an assessment of energy in Ireland, it is relevant to consider why fracking has come to the fore of the discussions on future energy policy. In order to do this, we must ask ourselves; what are the specifics of the ways in which energy is produced, obtained and used (addressing consumption, indigenous onshore and offshore production, importation, efficiency) that make the idea so displeasing to some, and yet so appealing to others? Furthermore, we will assess current energy policy to ascertain the likelihood that a green light on fracking would be consistent with the underlying priorities for energy in Ireland. Essentially, we will discuss the status quo of energy in Ireland, what the policies entail and where, or how, fracking would fit into this picture.

2.1 Energy Overview

"Ireland has the third-highest share of oil in the energy mix among IEA member countries"[49]. Some of the more generous observers state that Ireland has an interesting fuel mix, which allows for lesser dependence on one sole energy vector. The truth of the matter however, is that Ireland is "one of the most fossil fuel dependent economies"[50], relying 95% on coal, oil and natural gas[51] (2010 data), and furthermore, owing to its biogeological constitution, has a relatively small amount of indigenous fuel reserves, prompting the importation of over 92% of its fossil fuel requirements[52]. This is surely not consistent with the three objectives of energy policy that the European Union and the Irish Government have set for the country, namely security of supply, environmental considerations and climate change, and competitiveness. In fact, across all three of these so-called pillars, Ireland is a poor performer. Before analysing the implications of the current system for this crucial period in which decisions regarding fracking are to be made, we will first expose the realities of energy supply and consumption across the different energy vectors and sectors in Ireland.

[49] International Energy Agency (2012a). *Energy Policies of IEA Countries. Ireland. 2012 Review*. PDF online < http://www.iea.org/publications/freepublications/publication/IRELAND2012_free.pdf > p 17
[50] Forfás (2010). *The Irish Energy Tetralemma. A framework for fuel choices in Ireland.* PDF online < http://www.forfas.ie/media/forfas130810-irish_energy_tetralemma-a_framework_for_fuel_choices_in_ireland.pdf > p 5
[51] International Energy Agency (2012a) p 17
[52] Ibid. p 10

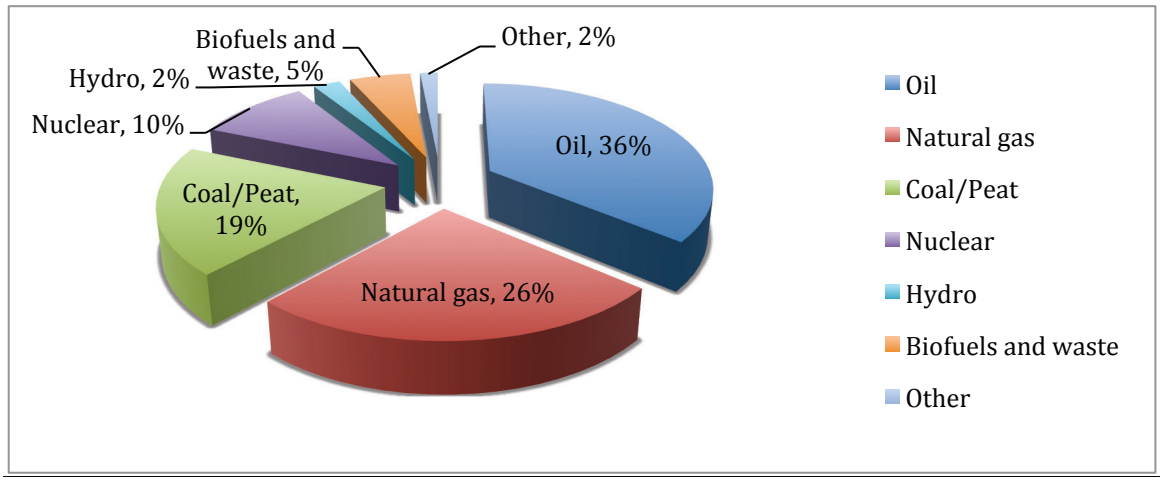
Figure 3: Total Primary Energy Supply (TPES) in Ireland 2010



Source: data sourced from International Energy Agency (2012a) p 17

The data in Figure 3 show that fossil fuels remain the largest source of primary energy by a very substantial margin. With renewables (classified in this data as wind, biofuels and waste) representing only 4.6% of TPES, the Government has in recent years taken "commendable" steps to increase the share of renewables, investing heavily in plans to increase the share to 40% in electricity production by 2020; one of the highest, and most ambitious targets for renewable energy in the world (see section 2.2). Due to an import rate of over 92% for its fossil fuels, the remaining >7% are indigenous fossil fuels. Inland production (namely peat, biofuels, natural gas and wind) accounts for merely 14% of TPES, leaving the country in a very vulnerable position, relying ±75% on imported primary energy supply. Of this indigenous production, ±50% is accounted for by peat, whereas wind, biofuels and natural gas represent ±16% each[53].

Figure 4: TPES in the OEDC Members 2012



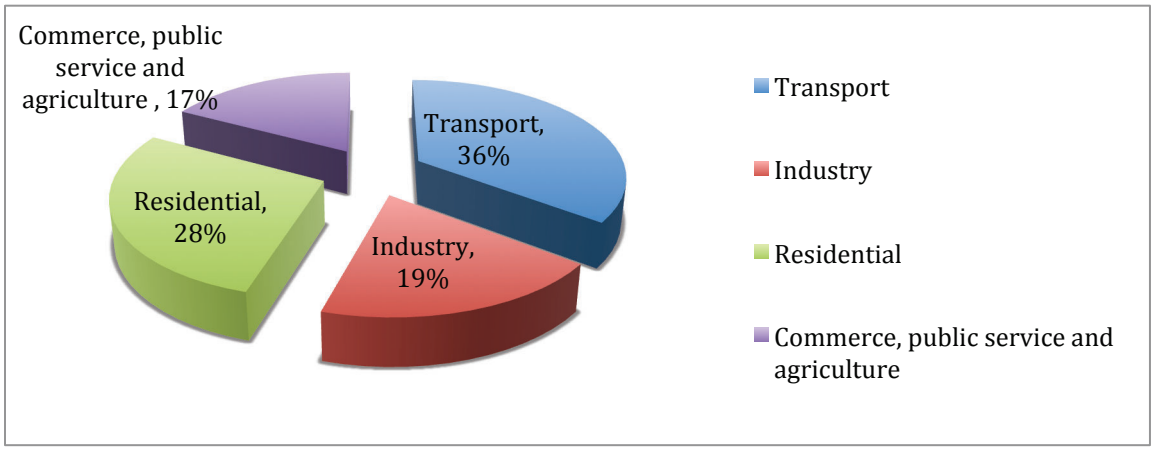
Source: data sourced from International Energy Agency (2013) p 7

[53] International Energy Agency (2012a) p 17

By comparison, the OEDC average, shown in Figure 4, presents a slightly lesser dependence on fossil fuels, and a more varied energy mix[54]. In this sense, Ireland is a below-average performer when it comes to carbon-based energy vector consumption.

Primary energy is distributed very unevenly across the many sectors, with transport and household consumption (primarily for heat) showing the highest rates. Figure 5 shows final energy use in Ireland for 2010:

Figure 5: Total Final Consumption (TFC) in Ireland Across Sectors (2010)



Source: data sourced from International Energy Agency (2012a) p 18

Ireland's public and private transport consumption is exceptionally high, due to many factors, not least of which is that being an island nation, air travel is necessary, and therefore fuel consumption in the form of kerosene is particularly weighty (kerosene accounted for 32.4% of transport TFC in 2011[55]. See Appendix 1 for a flow diagram of energy consumption in transport). However, transport energy consumption is high due to a combination of factors. One is the fact that Ireland has the "lowest share of electrified railway lines in the entire EU"[56] and road transport is much greater as a result. In addition, as part of the National Development Plans (NDPs) 2000-2006 and 2007-2013, there have been major improvements to the national road network, with investments to the tune of €17.6 billion coming from the European Union (EU) Regional Development Fund and Trans-European Network of Transport, as well as the Irish Government. Extensive improvements have also meant that personal vehicular transport has

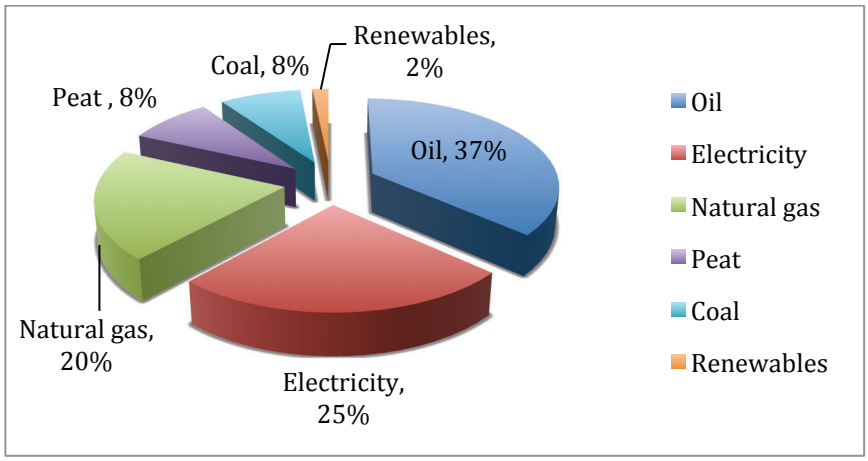
[54] Where 'Other' is mentioned, this "includes geothermal, solar, heat, wind, etc." according to the IEA source. It is also noteworthy that TPES excludes electricity trading data.
[55] Percentage calculated from data in Howley, Martin, and Holland, Mary (2013). *Energy in Ireland. Key Statistics 2013.* Sustainable Energy Authority of Ireland (11-2013). PDF online < http://www.seai.ie/Publications/Statistics_Publications/Energy_in_Ireland/Energy-in-Ireland-Key-Statistics-2013.pdf >
p 6
[56] European Commission Representation in Ireland (2014). *Commission Publishes first EU Transport Scoreboard* (10-4-2014). Online < http://ec.europa.eu/ireland/press_office/news_of_the_day/eu-transport-scoreboard_en.htm >

greatly increased, with private road transport accounting for 45.6% of transport TFC, whilst public buses represented only 3.8% and rail travel 0.9%[57].

Public transport systems within, as distinct from between, urban areas are virtually non-existent outside the capital city of Dublin. In a temperate maritime climate in which rainfall can exceed 2000mm per year and rain can be expected up to 225 days of the year[58], walking and cycling are not always a viable option. The latest census data show that people living in 'urban areas' (of >1500 people) is 62.0% of the population[59], though this figure represents scarcely more than a very small town or village. There is thus little or no justification for establishing a public transport system in all 'urban areas', as such an endeavour would surely make a negative profit. Equally, those living in small urban areas have to commute to larger urban centres in order to work. A large proportion of citizens therefore rely on personal vehicles in order to get around, and transport therefore represents a very significant share of TFC in Ireland.

Turning our attention now towards the second largest in terms of energy consumption, let us consider the residential sector. Energy consumption in this sector is primarily for heating, lighting, hot water, cooking, cleaning, washing, drying, cooling and entertainment. Oil, electricity and natural gas make up the three primary sources of energy consumed in the residential sector[60]. Figure 6 shows a breakdown of the distribution of these energy vectors in TFC, and a flow diagram can be found in Appendix 2.

Figure 6: TFC in the Residential Sector 2011



Source: data sourced from Dennehy and Howley (2013)

[57] Ibid.
[58] The Irish Meteorological Service Online (2014). *Rainfall*. Online < http://www.met.ie/climate/rainfall.asp > accessed 20-3-2014
[59] An Phríomh-Oifig Staidrimh (2012). *This is Ireland. Highlights from the 2011 Census, Part 1.* PDF online < http://www.cso.ie/en/media/csoie/census/documents/census2011pdr/Census,2011,Highlights,Part,1,web,72dpi.pdf > p 13
[60] Dennehy, Emer, and Howley, Martin (2013). *Energy in the Residential Sector. 2013 Report*. Sustainable Energy Authority of Ireland, September 2013. PDF online < http://www.seai.ie/Publications/Statistics_Publications/EPSSU_Publications/Energy-in-the-Residential-Sector-2013.pdf > p 9

Met Éireann, the Irish meteorological service, classifies the typical heating season in Ireland as October to May, and reports that the number of heating Degree Days can exceed 450 in December[61]. In 2010, 44% of primary energy consumed was converted into heat[62]. The 2011 census reported that oil and natural gas contributed 43.8% and 33.4% respectively to the central heating systems in the 97% of households equipped with such systems[63]. To combat this substantial energy use for household heating, the Government put into place the Better Energy Programme (BEP), which was conceived in order to increase energy efficiency in homes and improve their insulation. In the period between 2011 and 2013, 250,000 Irish homes (or 1/6th) were retrofitted with attic and wall insulation materials. Equally, the BEP concurrently saw the Government invest €100 million to upgrade the energy systems of 87,000 homes to combat the fact that Ireland has one of the highest rates of domestic consumption in the EU 27[64]. In total, €37 billion has been committed to the BEP, with an estimated 32,000 homes being treated and the support of 3,000 local jobs.

In the context of a severe economic downturn and subsequent increase in fuel poverty, these measures represent not only a step towards long-term energy efficiency, but also a significant and conciliatory carrot to offer the Irish people after the heavy burden of paying off the €85 billion EU/IMF bailout fund; increased levies; the introduction of household water charges and homeowner taxes, as well as other austerity measures. Fuel poverty has reached such an extent that the Government has taken steps to enforce rules that disallow forcible disconnections of Electricity Supply Board (ESB) and Bord Gáis Energy (BGE) customers. Energy policy will be reviewed in greater detail in section 2.2.

Because it is an important indigenous resource, it is of interest to examine the role of peat in this equation. Representing only marginally more than coal at 8.4% of residential TFC, peat is a specific case because it is historically an important source of household heating. Bord na Móna, a semi-state company that came into existence with the Turf Development Act of 1946, harvests and manufactures turf into peat briquettes for private use. They are by no means though the sole operators; cutting turf in boglands has always been a common method of procuring heat-giving materials, and privately, many landowners continue this practice today. However, various national and European laws, such as the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, have imposed the classification of Special Area of Conservation (SAC) on many boglands, and the traditional

[61] Irish Weather Network (2014). *Degree Days*. Online < http://www.irlweather.com/wxdegreesummary.php?PHPSESSID=8809ec9c9b63f132f323393f5bf3d3fb > accessed 20-3-2014
[62] International Energy Agency (2012a) p 18
[63] An Phríomh-Oifig Staidrimh (2012)
[64] Leahy, Eimear, and Lyons, Sean (2010). "Energy use and appliance ownership in Ireland" in *Energy Policy*, vol 38, pp 4265-4279, p 4271

practice of cutting and harvesting turf is therefore outlawed in all areas forming part of the Natura 2000 network. For many in rural Ireland, and particularly in midland areas, this has not only contributed to fuel poverty but also seen people's livelihoods compromised. Energy is therefore a polemic issue at present, as communities see their way of life altered by Government decisions on energy policy and infrastructure. This will be dealt with in greater detail in section 4.6.

Of particular interest for the purposes of this research is the natural gas share of TPES and TFC. Shale gas, if exploited in Ireland, has the potential to replace dirtier fossil fuels such as coal and oil in the energy mix, and in addition offers a way in which to reduce the worryingly high dependence on importation. Figure 3 shows that 33% of TPES is accounted for by natural gas, a higher rate than the average amongst members of the OEDC. Figure 6 points to the 20% of residential energy consumption accounted for by natural gas, and as we have seen, a large proportion of this is for household heating. Natural gas also accounts for 49.1% of primary energy input for the production of electricity[65]. Predictions are that the energy demand overall will remain stable in the coming years[66], an argument corroborated by the EP who predict that gas will be critical for at least another 20 years[67]. To recap, natural gas plays a vital role, and represents the following:

- ➔ 33% of TPES
- ➔ 49.1% of primary energy input for electricity production
- ➔ 20% of residential TFC

Figure 7: Gas Distribution Network

Source: RPS Group (2008). Corrib Environmental Impact Statement Summary. RPS Group: Cork, p 4

Nevertheless, as depicted in Figure 7, natural gas is not provided to every home or business in the country, despite BGE's investment in pipelines and distribution infrastructure (see Appendix 3 for further detail). Imported gas comes into Ireland via one sole pipeline, running from Moffat in Scotland, as natural gas in Ireland is sourced from The Russian Federation or the North Sea and supplied via interconnectors from Great Britain. Further details will be provided below in section 2.2.2.1.

Natural gas is therefore a matter of great importance to the functioning of the Irish economy, fuelling industry, goods and services, residences, and electricity production. In the following

[65] Howley and Holland (2013) p 8
[66] International Energy Agency (2012a) p 16
[67] Sonik (2013) p 15

section, we will assess how the Irish Government, its affiliated agencies and other bodies formulate an energy policy, taking into account the need to secure supply, and provide for growing demand, within the framework of an environmental impact compliant with European and national legislation.

2.2 Irish Energy Policy

"The truth is that Ireland doesn't have a strategy, no set of guiding principles from which everything else is grounded, merely a pricing policy that allows Irish assets to be exploited for a handful of coloured beans"[68]. These harsh words from Eddie Hobbs came just in advance of the launch of the long-awaited Energy Green Paper on May 12th 2014, for which the public consultation period has also opened. After this period, Irish energy policy is published in Energy White Papers, the last of which was issued in 2007. To say that times have changed would be a gross understatement; most of what was enshrined in the 2007 White Paper was based on forecasts that are at best, out of date, and at worst, completely irrelevant.

Ireland's energy policy is thus being updated and modified, in order to reflect the changing needs of an evolving economic and social environment. Could it really be true then that there is no strategy? An examination of existing policy relating to indigenous energy and natural resources tends to support this assertion, considering policies are generally furtively thrown together in reaction to, rather than in anticipation of broader societal and economic changes, and has traditionally been "developed on an ad hoc basis"[69]. A set of guiding principles can indeed be identified, yet there is often discrepancy between theory and practice.

2.2.1 Background

There are three bodies that are responsible for the devising and delivering of Ireland's energy policy: the Department of Communications, Energy and Natural Resources (DCENR); the Commission for Energy Regulation (CER); and the Sustainable Energy Authority of Ireland (SEAI).

It is perhaps the absence of roles defined in a sufficiently clear manner that prompted Mr Hobbs to utter his scathing remark, and the subsequent overlapping of perceived jurisdiction, or, conversely, the complete abdication of responsibility from one or more of the three bodies, in an ill-defined regulatory space. When unfortunate incidents arise, the political culture of shirking accountability, and nothing short of "some good old-fashioned Irish corruption"[70] prevails. A wealth of examples of wrongdoing have come to light in recent years, from elected

[68] Hobbs, Eddie (2014). "Wake up, Ireland: multinationals are set to give us very little for our own oil" in *The Irish Sunday Independent* (2-3-2014)
[69] Campbell, Padhraig (2014). "Without a shot being fired" in Hobbs *et al*, *Own Our Oil: The Fight for Irish Economic Freedom,* pp 17-38, p 18
[70] Hobbs *et al*, p8

representatives accepting bribes, to widespread clientelism and State favours[71], to 'wink and a nod' reciprocity agreements that cover up corruption or malpractice, to alleged illegal zoning of land for development, right down to ignoring protocol and disregarding regulations. Topically, and as an example, we can cite the flouting of regulations determining the roll-out of energy infrastructure during the Corrib Natural Gas Development (see section 3.4 below). Suffice to say that the Irish Government has less than covered itself in glory, managing only to paint a quasi-imperceptible moral gloss over what is unmistakeably a scandalous tabloid-style recent history. During the Celtic Tiger boom years, regulation was seen (by some) as an obstacle to development, and so gave way to liberalisation. In fact, the Government's Energy White Paper 2007 explicitly called for a "lighter regulated environment"[72]. In parallel, monitoring and enforcement caved to facilitate evermore growth, and fuel greed. And when times were good, this was not questioned.

With the extremity of the crisis that hit after 2008, policymaking bodies have been forced to rethink their unfailing belief in the *toujours plus* economic philosophy. Confidence in these three bodies will be essential for any party interested in dealing with Ireland in the energy sector, and so a 'clean-up operation' of regulation has begun. Indeed, the economic crisis has taken a significant toll on the risk premium that is associated with Ireland, meaning that investment in a capital-intensive industry such as the energy industry is less attractive for many developers, despite oil prices remaining high since the onset of this recession[73]. In the energy sector, difficult decisions will need to be made over the coming years, and assertive leadership displaying commitment to convictions will necessarily accompany this process. The three aforementioned bodies, operating on government, independent and advisory levels, will need to harmonise their priorities and formulate a coherent energy policy[74], consistent with socioeconomic conditions and predictions, in order to attain the "social licence" to incorporate major infrastructural works that facilitate fracking into a national policy.

2.2.2 Policy in Review

The 2007 White Paper is predicated on a three-pillar approach incorporating similar values to those enshrined in the three axes of sustainable development. In this sense, then

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[71] Rossa Phelan, Diarmiud (2014). "Can the State sell the Nation?" in Hobbs *et al*, pp 120-128, p 121

[72] Department of Communications, Marine and Natural Resources (2007). *Delivering a Sustainable Energy Future for Ireland*. PDF online <http://www.seai.ie/About_Energy/Energy_Policy/European_Union_Drivers/EnergyWhitePaper12March2007.pdf > p 47

[73] Energy Institute Republic of Ireland (2011). *Making decisions: Irish energy policy in review*. PDF online < http://www.energyinst.org/_uploads/documents/EIPolicyReview-Final.pdf > p 6 and Fitz Gerald, John (2011). *A review of Irish Energy Policy*. Research Series 21. The Economic and Social Research Institute: Dublin. PDF online < http://www.esri.ie/UserFiles/publications/RS21.pdf > p 1

[74] International Energy Agency (2012a) p 12

Taoiseach[75] Bertie Ahern's statement that "energy policy and environmental policy are seen as two sides of the same coin"[76] is of a certain value (even if the DCENR and the Department of the Environment, Community and Local Government (DECLG) were and remain two separate entities). The three pillars of energy policy are guaranteeing security of supply; meeting environmental targets and ensuring competitiveness. A reductionist definition of energy policy can thus be described as striving to meet energy demand with a sustainable, secure supply at prices that guarantee Ireland is competitive.

As with the trilemma of sustainable development, trade-offs between the three pillars are expected[77]. Being "challenging, ambitious and farsighted"[78] were cited as three of the objectives for this policy; yet ultimately, according to a 2009 review of the policy, it fell short of these objectives, being too idealistic rather than "evidence based" and "reluctant to accept […] that fossil fuels will dominate world energy supplies for the next two decades"[79]. This serves to corroborate the assertion that the Government's intentions are not always consistent with reality. In keeping with protocol, an Energy Green Paper was released into the public domain in advance and a consultation period allowed for the submission of comments to the Department, which numbered greater than 100, to ensure an "open and participative"[80] policymaking process. This section will identify the key aims of the energy policy outlined in the White Paper, with particular focus on those relevant to natural gas and exploitation of indigenous resources, in order to ascertain whether or not the ideals expressed in the paper condone or condemn fracking. However, it is noteworthy that nowhere in the White Paper is either shale gas or UFF mentioned.

2.2.2.1 Energy Security

The first pillar of energy policy relates to the security of energy supply. There has always been an emphasis on contingency planning, as the Government is painfully aware of its vulnerability to interruption of oil and particularly gas supply, with over 90% of its supply being imported, as well as to the volatility of import prices. Indeed, as we have already seen, there is only one onshore pipeline in Scotland supplying gas (albeit through three under-sea pipelines) from the UK into Ireland. This issue is now of growing concern with the mounting crisis in

[75] Taoiseach refers to the Irish Prime Minister
[76] Department of Communications, Marine and Natural Resources (2007) p 3.
[77] Forfás (2010). *The Irish Energy Tetralemma. A framework for fuel choices in Ireland.* PDF online < http://www.forfas.ie/media/forfas130810-irish_energy_tetralemma-a_framework_for_fuel_choices_in_ireland.pdf > p 4
[78] Department of Communications, Marine and Natural Resources (2007) p 3
[79] Irish Academy of Engineering (2009). *Review of Irish Energy Policy, 2009.* PDF online < www.iae.ie/publications/publication/review-of-irelands-energy-policy-june-2009/document/ > p 23
[80] Department of Communications, Marine and Natural Resources (2007) p 13

Russia and Ukraine. Though this is undoubtedly a political rather than a technical issue affecting supply, it is no less real.

Russian hegemony in terms of European gas supply is a long-established reality. According to Eurostat (2012), Russian gas supplies 31.8% of the EU's total natural gas imports[81]. Realists call this "energy imperialism", whereby energy is not seen as a commodity like any other, but as a weapon[82]. "Weaponization" of energy is a dangerous game for Russia who, despite retaining the power to turn off the taps and isolate 'hostile' European States from its gas supply, has an economy heavily dependent on the sale of this gas. Maintaining relations with its trading partners is therefore a strategic consideration for Russia – if the sanctions currently threatened by the West included a moratorium on imported gas from Russia, she would be completely stripped of her power. For the supply can only be considered power where there is demand to be satisfied.

Gazprom is already bowing to pressure to reduce the long length of its contract terms and couple natural gas prices to those of oil and other petroleum products[83], signifying an acceptance of the loosening of its stranglehold on the European gas market. But if Russia continues to demand higher gas prices from its transit countries, one of which is Ukraine, and the latter (who depends on Russian gas for 79% of its natural gas requirement[84]) continues to refuse, the repercussions for the supply of gas en route to Western Europe from Russia could be large-scale[85]. In light of these issues regarding gas supply, it seems politically pertinent that energy policy provides for a maximum use of indigenous resources, especially natural gas in the short to medium term, in order to optimise energy security.

Compounding the issue of dependence on imports is the fact energy security, insofar as it guarantees the functioning of the economy, is coupled with a reliable supply of electricity. "With gas accounting for over 50 per cent of all electricity generated, secure supplies of gas are synonymous with securing the supply of electricity"[86]. As with most economies moving towards a tertiary or services-based model, electricity is an essential component. The economic costs of an interruption, temporary or prolonged, would be "catastrophic" for Ireland, forcing the closure of business and putting lives at risk[87], and must therefore be planned for within energy policy.

In 2007, the anticipation of the coming on stream of gas from the Corrib field contributed to the focus on developing national indigenous resources of gas in order to secure supply. The

[81] Kropatcheva, Elena (2014). "He who has the pipeline calls the tune? Russia's energy power against the background of the shale 'revolutions'" in *Energy Policy*, vol 66 pp 1-10, p 2
[82] Ibid.
[83] Ibid. p 4
[84] Biglin, Mert (2009). "Geopolitics of natural gas demand: Supplies from Russia, Caspian and the Middle East" in *Energy Policy*, vol 37, pp 4482-4492, p 4485
[85] Nagayama, Daisuke, and Horita, Masahide (2014). "A network game analysis of strategic interactions in the international trade of Russian gas through Ukraine and Belarus" in *Energy Economics*, vol 43, pp 89-101, p 99
[86] Fitz Gerald (2011) p 40
[87] Ibid. p 41

alternative would be to increase storage capacity or compression facilities at the terminal in Scotland, but this would imply trying to influence activities to this effect in the neighbouring UK, upon whose infrastructure (and therefore planning system) Ireland is dependent and yet can exert no control. This would surely contribute to security of supply for Ireland, but measures on home soil such as the development of indigenous natural gas fields are considered more politically logical, and what's more can offer economic benefits for the country. Whilst not explicitly mentioned, it can be deduced from this strategic aim that because the development of domestic gas supply is high on the agenda for the country, UGEE may have an important role to play for the future of energy security, as supplies, for geopolitical as well as physical reasons, become uncertain into the future. Supplies of domestic or European shale gas could render the issue of external dependence "of little concern"[88].

The regulatory framework (discussed further in section 3.3.2) was to be strengthened by the 2007 White Paper, conferring responsibility for the safety of hydrocarbon exploration, production and upstream safety to the CER. It also set up the National Oil Reserves Agency as an independent statutory body which would oversee the adequacy of provisions and reserves in case of significant interruption of supply. Logically, the policy also covers commitment to several of the EU's imposed regulations, such as Regulation (EU) No. 994/2010 of the European Parliament and the Council concerning measures to safeguard gas supply. This Regulation is intended to mimic the existing policy regarding security of oil supply, and make provisions for burden sharing in the event of a severe interruption of supply[89]. In the event of major disruption, supplies will be shared equitably amongst Member States, on the proviso that a sufficient stock is kept in storage should this kind of acute shortage arise. In general, oil is stocked in crude oil form[90], rather than as refined product, due to the somatic nature of crude oil relative to its products. The disadvantage of this however is the relatively unequal and somewhat arbitrary distribution of refineries; with the future of Ireland's one refinery at Whitegate uncertain, the continuation of this practice could result in not more but less security of supply, as a usable vector is unavailable. However, in relation to natural gas, the benefits of sharing equitably in times of crisis are crucial to Ireland given its high dependence on the product. Discussions between the UK and Ireland on gas sharing in emergency situations started as early as the 2010-2011 period in order that the highest level of energy security be reached[91].

Concrete pledges contained within the policy to secure gas and electricity supplies include the investment of over €1.25 billion in strategic infrastructure, to cover improved gas interconnection and strategic reserve capacity, which should greatly improve prospects for

[88] Ibid. p 43
[89] Official Journal of the European Union (2010). *Regulations: Regulation (EU) No 994/2010* (12-11-2010). PDF online < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:295:0001:0022:EN:PDF >
[90] Fitz Gerald (2011), p 22
[91] Ibid. p 21

security of supply in the long term. The North-South and East-West electricity interconnectors were to be delivered by 2011, with transfer capacities of 680 and 500MW respectively. Cooperation with semi-state company EirGrid produced a Grid Development Strategy (GDS), designed to plan improvements in the electricity transmission network for the 2008-2025 period. The GridLink project, expected to be granted planning permission in the coming 18 months, is the most evident outcome of the GDS, and is a planned 400kV overhead electricity transmission system to cover a 200km stretch of land from the north east to the south west of the country. EirGrid is said to invest €500 million in the provision of this essential strategic infrastructure, which will improve electricity supply to businesses and homes in rural areas and cities alike.

Developing indigenous gas resources is indisputably an attractive and cogent manner in which to secure both gas and by proxy electricity supply. Given that these resources are in the form of shale gas, a strong argument in favour of permission of fracking has started to form. By contrast, the Irish Academy of Engineering has proposed a list of four methods *other* than the exploitation of unconventional hydrocarbons that could ensure a more secure energy supply[92], and call into question the pressing 'need' to exploit domestic shale gas:

1. **Reinforce the Scottish onshore system**: because 90% of Irish gas comes through Moffat, it is of crucial importance that the Scottish supply system be improved and secured. Enhancing their capacity would have a positive effect on Irish security of supply further downstream.
2. **Develop Liquid Natural Gas (LNG) import facilities**: 20% of natural gas imported in Europe comes in the form of LNG, and prices are competitive in comparison with other hydrocarbons. Import terminals already exist in many countries in Europe, indicating that there is already a developed market in LNG to be tapped (BE, ES, FR, NL, PT and UK all already possess import terminals). The proposed development of a LNG terminal at Shannon could have up to four storage tanks, and this would increase the diversity of supply. In fact planning permission was granted for this development in 2009 but a High Court commercial dispute over gas pricing has halted construction. An LNG storage facility would allow for LNG to be imported from the Middle East, or potentially the US, by ship, and has the distinct advantage over its gaseous counterpart of not needing to be piped, which reduces the need for infrastructural works. The disadvantage is of course that storage of LNG carries more technical risk due to the need to decompress it and convert it into gas. This is contingent upon the price of the gas globally (see section 3.2).

[92] Irish Academy of Engineering (2013). *Policy Advisory. The Future of Oil and Gas in Ireland.* PDF online < www.iae.ie/publications/publication/policy-advisory-the-future-of-oil-and-gas-in-irela/document/ > pp 7-8

3. **Increase gas storage**: currently, storage capacity for natural gas stands at a sufficiency to cover 17 days' needs. By comparison, the UK, although only keeping a supply stock of enough for 16 days, is not in as precarious a position as Ireland because their offshore North Sea developments ensure a certain supply (though production is declining), and storage is therefore not necessary to the same extent. Installing additional compression capacities at the Kinsale storage facility in Cork would increase the capacity by 20 days of supply. In addition, Islandmagee Storage Limited was granted permission to build a natural gas storage facility in County Antrim (Northern Ireland). Energy within the island of Ireland remains a cross-border issue, and the one of the White Paper's chief deliverables was the Single Electricity Market (SEM) for the island. There are plans in 2014 to expand on the success of the SEM by complementing it with a gas equivalent, the Common Arrangements for Gas (CAG) framework, which is however indicative of a desire to develop Irish gas.
4. **Increase stocks of secondary fuel for gas-fired power stations**: this would ensure that greater amounts of 'back-up' fuel are stored in power stations themselves rather than at purpose-built storage facilities that may be at some distance from the power generation facility, and ultimately require being piped onto location. It would increase the security of supply without having to increase generic gas storage facilities. In other words, this is a cheaper alternative to option 3.

Irrespective of these reserve options, UGEE and indigenous shale gas development remain two of the most promising solutions for not only securing energy supply, but also guaranteeing a certain amount of satisfaction in becoming more self-sufficient and energy independent. There are also irresistible prospects for boosting the national economy should a sufficiency of gas be produced, and the resultant reduction in gas prices for consumers. The Government stands to gain considerably in terms of security of supply, which as we have demonstrated is currently precarious and dependent on several factors (geopolitical, infrastructural, economic). It therefore sees the development of national resources in oil and gas as a vital strategic interest, and should these resources transpire to be unconventional rather than conventional, the desired benefits would remain the same; it is only the externalities that would be different as a result.

2.2.2.2 Sustainable Energy and Environment

The second pillar underpinning energy policy is commitment to securing a sustainable energy future for Ireland and combining this with achieving environmental targets. Section 2.1 already outlined the BEP and commitment to energy efficiency stemming from the NDPs,

therefore this section will focus on specific targets, renewable energy policy, and environmental policy relevant to natural gas.

Ireland's renewable GHG emission reductions policy is seen as one of the most challenging in Europe[93], and the targets set out in the energy sector are nothing if not ambitious. Initially, a 30% share of electricity from renewable energy sources was proposed, but during the public consultation period, this was considered too low. Taking account of various submissions proposing higher targets, the final aim was set for a 40% renewables share in electricity production by 2020. Over the period of the contemporary NDP, €267 million was to be invested in the sustainable energy sector, with 4,000 MW of wind energy capacity to be installed in order to contribute to meeting this target.

Wind energy is the champion of Irish renewable energy, providing (as of December 2013) 18% of Ireland's electricity. "The wind energy sector directly employs around 3,400 people. In addition, the SEAI estimates that €255 million in gas imports was avoided by wind energy in 2012 alone"[94]. Startlingly though, the share of wind in overall energy use in 2012 was just 2.6%[95]. The Irish Wind Energy Association (IWEA) reports an onshore installed capacity of 2632 MW on the island of Ireland, spread unevenly over Northern Ireland (NI) and the Republic, with the combined number of wind farms totalling 210[96] (see Appendix 4 for a county wind energy map). Offshore capacity is considerably less, though it is in development, with just one 500 MW project under construction off the East coast. The National Offshore Wind Association of Ireland (NOW) claims to have several companies under its supervision that are in various stages of the permitting process, expecting to develop 2600 MW of offshore wind energy by 2020[97]. The anticipated investment required amounts to €8 billion in this same period according to NOW. Not only will this contribute to achieving the targets for renewable energy, but also the EU's GHG emission reduction targets. Ireland has pledged to cut its CO_2 emissions by 33% before 2020, and the IWEA remains confident that the potential reductions of 2.7 million tonnes of CO_2 as a result of wind farms on the island will go a long way to achieving this goal[98]. Further energy savings are to be made through a strategy to reduce public sector energy consumption by 33% by 2020, and incentives such as the Renewable Energy Feed-In Tariff (REFIT) instated.

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[93] Leahy and Lyons (2010) p 4265

[94] Department of Communications, Energy and Natural Resources (2014). *Government priorities for the year ahead – Minister Rabbitte* (5-3-2014) Online < http://www.dcenr.gov.ie/Corporate+Units/Press+Room/Speeches/2014/Government+Priorities+for+the+Year+Ahead+-+Minister+Rabbitte.htm >

[95] Howley and Holland (2013) p 5

[96] Irish Wind Energy Association (2014b). *Wind Statistics*. Online < http://www.iwea.com/_windenergy_onshore > accessed 10-3-2014. The IWEA reported in 2014 that 2080 MW of the installed capacity is locate din the Republic of Ireland, with the remaining 552 MW in Northern Ireland.

[97] National Offshore Wind Association of Ireland (2014). *Offshore Wind Ireland*. Online < http://www.nowireland.ie/offshore-wind-ireland.html > accessed 25-3-14

[98] Irish Wind Energy Association (2014b)

In order to address the responsibility of the agriculture, transport and enterprise sectors, the National Bioenergy Action Plan was to be implemented as part of the NDP. Biofuels for transport, which represented 33% of TFC and is 99% dependent on fossil fuels, were to be developed with part of the €670 million in funds allocated to investment in renewable technologies. Cogniscent of the fact that domestic supply resources may be limited as they would be in direct competition with agriculture, research was to be carried out into the potential use of agricultural waste for biofuels, in conjunction with the waste-to-energy research projects. Ensuring that bioenergy resources are not over-exploited, and that renewable resources are not consumed at a rate that surpasses their natural regeneration, is something we will have to wait for the next White Paper to guarantee. To a much lesser extent, provisions were made for harnessing solar and ocean power, and for integrating combined heat and power (CHP) systems into relevant sectors. 800 MW of CHP, predominantly biomass-fuelled, is the target for 2020[99].

Finally, the White Paper commits to reinforcing back-up capacity in light of the unreliable nature of renewables. Because "natural gas is best suited as a back-up for renewables"[100], investing in gas for improving back-up capacity contributes to solving the issues of security of supply and of meeting environmental targets simultaneously – using indigenous natural gas to produce electricity when the wind resource is unavailable is a measure that would encourage fewer GHG emissions, considering it has the lowest carbon content of any fossil fuel, and emits 22% less CO_2 than oil, and 40% less than coal (for the equivalent thermal output)[101].

A strong argument for further development of natural gas is a recurrent theme throughout the 2007 Paper. This is due to two inextricably linked factors: its versatility and the high share in the fuel mix. The IEA itself even advises that "steps must be taken to […] explore prospective shale gas reserves"[102] as a way for the Government to achieve its energy policy targets. The targets for environmental protection and energy efficiency, which of course go hand in hand, are nothing if not bold. Yet the role of natural gas in achieving these targets is limited in comparison to the contribution it could make to security of supply issues. In terms of environmental considerations, natural gas can only be considered a short-term substitute for coal or oil as a back-up generation source for when supply of electricity through renewables is not sufficient. It can therefore be seen as just another temporary measure that will fill an immediate need but cannot ensure a long-term low-emission energy system. The unfortunate truth is that decision-makers tend to think on timescales relative only to the next election, and can therefore be lacking in long-term vision and also out of synchrony with environmental and biophysical realities.

[99] Department of Communications, Marine and natural Resources (2007) p 36
[100] Irish Academy of Engineering (2013) p 1
[101] Ibid. p 5
[102] International Energy Agency (2012a) p 11

2.2.2.3 Competitiveness

The third pillar relates to the competitiveness of energy. Not only is the average household consumer subject to high energy costs with comparison to the rest of the EU, but there is a significant effect of these high prices on both SMEs and industry in its broader context. The implications for the competitiveness of Irish manufactured produce are therefore far-reaching, and when coupled with what were some of the highest wages in Europe at the time of the White Paper's publication, the competitiveness of exported Irish goods was in quite considerable jeopardy. An All-Island Energy Framework and the completion of the SEM were important considerations, and the possible integration of the Irish energy market with not only the UK but the rest of mainland Europe was a strategy that became central to addressing the issue of competitiveness.

The Paper calls for total integration of the findings of a report commissioned from Deloitte on the reformation of the electricity sector. These included the liberalisation of the electricity (and gas) markets; price regulation that more accurately reflects the evolution of the market price of energy; and the protection of consumers both from rising electricity costs, and the potential for falling into fuel poverty. The State commits €161 million in fuel allowance schemes in order to assist those who cannot afford their gas and electricity bills, as well as other measures mentioned in section 2.1 regarding tackling fuel poverty. In order to encourage greater competition, the ESB was to see its market share reduced forcibly to 40%, whilst Bord na Móna and BGE were to be encouraged to increase their share in power generation[103]. The policy also pledged to ensure that suppliers other than ESB were sold the output of power generation plants throughout the country. In essence, the all-island SEM, together with the NI authorities and the CER were to regulate competition in the electricity sector and so ensure a more affordable supply.

Natural gas is seen as a key component of a national plan to make energy more competitive, not only for business but also for household consumers. The same can be said however of any indigenous renewable resource, such as wind power, because the innate utility lies in its being a national rather than imported resource. Earlier it was mentioned that wind power prevented €255 million in gas imports; these costs would also have been prevented had domestic gas or oil been sufficient. Large-scale production of indigenous natural gas has the potential to lower energy costs in Ireland, thereby increasing the competitiveness of exported goods and is seen as an integral part of the competitiveness strategy.

[103] Department of Communications, Marine and Natural Resources (2007) p 48

2.3 Conclusion

Although it may seem counter-intuitive, there is a long-term role for natural gas in a national energy strategy that has set itself impressively high goals for energy efficiency, sustainability, and GHG emission reductions. It must be remembered though that this role is considerably lesser when issues of sustainability are taken into account. Nevertheless, throughout the White Paper, constant commitments to improvements across all three pillars of energy policy were contingent upon a supply of natural gas, from indigenous resources, contributing to a reduction in the use of 'dirtier' fossil fuels and enabling a reduction in energy prices. The temptation to exploit Irish shale gas therefore becomes quasi-irresistible, despite the evident changes to the situation between 2007 and the time of writing.

The White Paper reflects the country's continued commitment to renewable energy, and the role for natural gas within the framework of a slow transition to a fuel mix more favourable to clean renewable energy is enshrined within the paper. The predominant emphasis, and arguably strongest impetus for shale gas exploitation, is on energy security and steps towards self-sufficiency that typify the interconnectedness of the three pillars of energy policy. In this sense, the assertion that no guiding principles can be identified is unfounded, despite the sometimes unrealistic nature of the policy overall. However, the White Paper does not set out a clear set of concrete actions constituting a roadmap to a distinct vision for a defined future energy system, and rather pours money into certain projects that may not necessarily combine to form a cohesive model.

It is clear though that natural gas will be crucial for decades to come and can be utilised in order to carry out functions that achieve targets across all three of the pillars supporting Irish energy policy. The following chapters will discuss the concerns with respect to fracking being undertaken in order to achieve the aims of indigenous natural gas development. They will also deal with their potential solutions from the perspective of Government-developer-local stakeholder relations.

CHAPTER THREE: THE GOVERNMENT AND THE DEVELOPERS

The Irish Government and the developers who wish to invest in UGEE in Ireland are two of the most powerful stakeholders in the energy trilemma. Should fracking be permitted, they would have several common aims, both striving for positive outcomes to the developments, and a mutually beneficial financial gain as a result. They are dependent on each other for optimising benefits and maximising success. This success is contingent upon the issues that will be discussed in this chapter, namely the gas resources in Ireland, the potential for their extraction, the criteria to be met in order for licensing to be granted, and the economics of the international oil and gas business. We will start by assessing shale gas in Ireland and developments up to the present day, before looking into the geographical, economic and regulatory hurdles that the Government and developers face; the feasibility or attraction of the current system, and their bearing on a decision regarding fracking.

3.1 Shale Gas in Ireland

"Ireland contains potentially thousands of [...] gas-bearing zones"[104]. With an offshore area of 660,000 square kilometres, and a land area of 84,400 square kilometres, resources are promising. Identifying potential gas-bearing zones onshore being much easier due to acquired geological knowledge about the location of shale (see section 1.1), offshore shale gas has not yet been developed[105]. Shale is present in both the Clare basin in the Republic of Ireland, and in the Northwest Carboniferous basin (the Lough Allen area), which straddles the border. Counties likely to be affected by a positive decision on fracking are Fermanagh in NI, and Cavan, Leitrim, Rosscommon and Sligo in the Republic. Figure 11 (page 37) shows the location of different shale formations in NI and the Republic, and further details of the Lough Allen basin project area, upon which the majority of this research focuses, can be found in Appendices 6, 8 and 9. This section will present the current data on resources, their location, the estimated reserves, and current licensing.

[104] Campbell (2014) p 22

[105] According to the *Irish Independent,* UK-based company Nebula has been issued a license for UGEE in the Irish Sea, and should the exploration and ensuing assessments prove successful, it would constitute the first offshore shale gas development
in the world. Webb, Nick (2014). "UK's Nebula gets license to explore Irish sea fracking" in *Irish Independent* (16-2-2014). Online < http://www.independent.ie/business/irish/uks-nebula-gets-licence-to-explore-irish-sea-fracking-30012998.html >

3.1.1 Local Geography – Lough Allen Basin

The Lough Allen basin, in the north west of the country, is the area of focus for this chapter due to its being the region of the site visit for the purposes of conducting interviews with local community representatives. Interviewees very kindly took the time to accompany us to the sites and to certain vantage points from which the areas designated for potential fracking developments are clearly visible. As mentioned in section 1.2, technical decisions must be tailored to properties of the shale in question, thus the site visit was an essential tool in coming to terms with the specific properties of the shale and the landscape of the targeted zone.

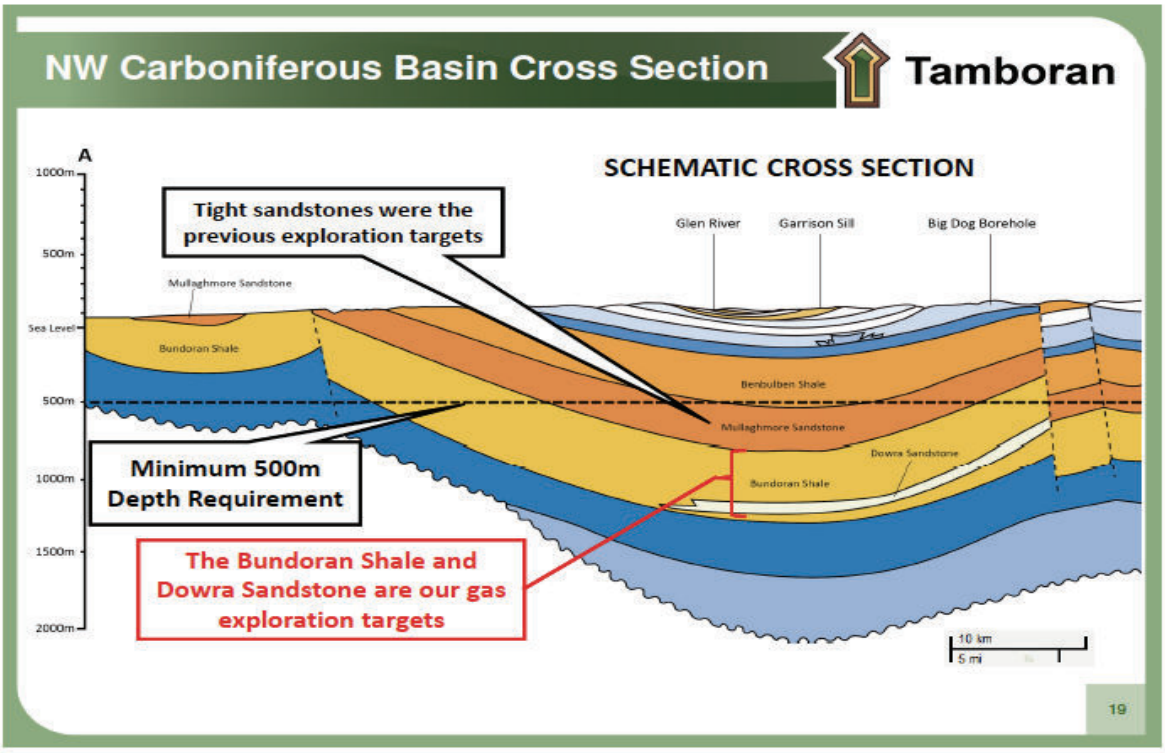
The specific geology of the Lough Allen basin is such that the shale strata are located at a much shallower depth than on other continents. The shale rock itself is even visible above ground at low elevation in North Leitrim:

Figure 8: Protruding Shale Formation in North Leitrim

Source: O'Halloran (2014)

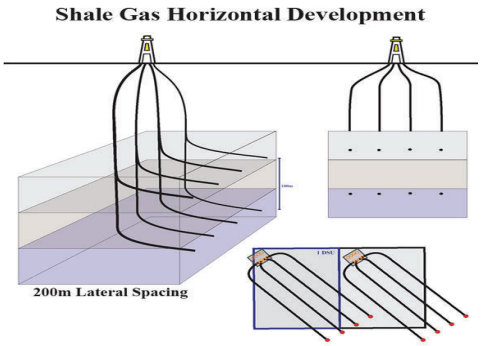
As a result, drilling to the standard depth of 2000-3500m will not be necessary in order to reach the gas-bearing shale formations. Figure 9 overleaf shows a cross-section of the Northwest Carboniferous basin and outlines the zones Tamboran has targeted for fracking. The shallow shale strata dictate that a minimum depth of 500m will be necessary to reach the Benbulben shale. A sandstone layer separates this from the target Bundoran shale which extends to a depth of approximately 1200m.

Figure 9: Northwest Carboniferous Basin Cross-section



Source: Tamboran (2012) p 19

Figure 10: Directional Drilling



Mitchell, Eddie (2014) p 5

The shale strata are thicker in the Northwest basin than in other shale plays that Tamboran has exploited, which has further implications for the drilling methods required. The Bundoran shale is approximately 400m thick, meaning wells can be drilled not only in parallel along the horizontal planes, but also staggered at different depths. An example is featured in Figure 10.

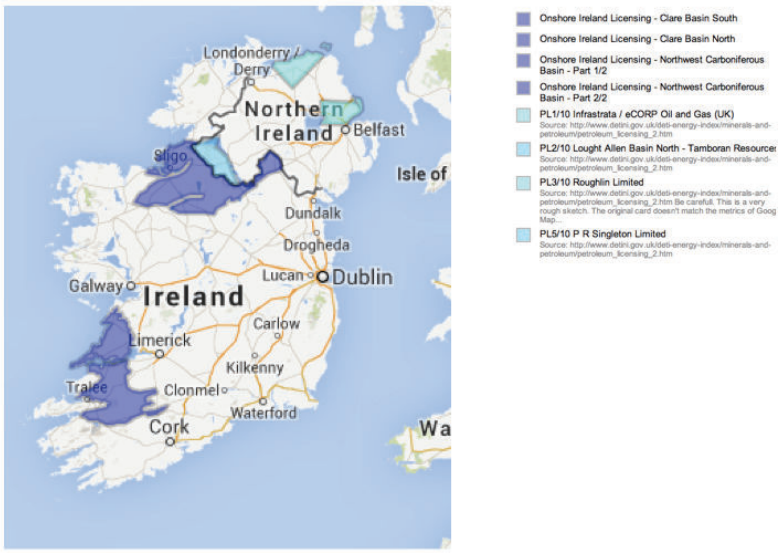
The shallowness of the shale signifies an unusual proximity of the shale strata to the aquifers. The purity of the aquifers and contamination of water sources is a primary concern amongst community stakeholders (see Chapter 4). The basin plays host to Lough Allen itself (pictured in Figure 14, page 71), the northernmost of the three main lakes on the River Shannon, which rises just to the north of the lake. With fracking taking place closer to the surface than is habitual, the risk of contamination of the lakes is also real. This is an issue of concern, given that the sedimentary rock bases that support the lakes are by nature permeable; the process of fracking, whose very purpose is to increase permeability, could imbalance the natural exchanges with the surrounding environment and thus compromise the integrity of the

lake. Properties including the porosity, permeability, thickness, internal pressure, and variation along its planes must be taken into account when deciding whether or not the rocks can be "safely squeezed". These specific geographical considerations are due to be thoroughly analysed in the forthcoming EPA study, which is heavily geared towards investigation into the geology of the zones targeted for fracking.

3.1.2 Licenses

In 2011, three companies were issued onshore petroleum licensing options by the Petroleum Affairs Division (PAD) of the DCENR, which allowed them to undertake desktop research and to dig exploratory wells of up to 200m in depth, for a period of two years. This permitted them to carry out technical and geological studies that would ascertain the commercial viability of the shale and assess whether or not prospective wells would produce. Figure 11 shows the locations of the shale on the island and the areas for which these licensing options were granted.

Figure 11: Island Shale Formation Locations and Licensing



Source: DCENR (2011)

Licensing options confine licensees to a specific work programme. It includes "delineation of prospective areas, the quantification of their gas potential, the identification of potential drilling targets, and the identification of optimal well design"[106] and is undertaken during a two-year period. Licensing options issued in 2011 were to the following:

➔ **Enegi Oil**: the Canadian-based company was issued an exploratory option in the Clare basin in County Clare, which covers an area of approximately 495km^2. Enegi Oil claimed

[106] Enegi Oil (2012). "ON11/1", in *Enegi Oil*. Online < http://www.enegioil.com/on11.php > accessed 1-4-14

that the Clare basin is within the same fault system trend as its other prospects in Newfoundland, Canada, and is therefore organically rich, and likely to contain viable quantities of gas. The results of an independent study carried out by Fugro Robertson as part of this licensing option estimated that 3.6 trillion cubic feet (tcf) were the likely resources, based on an average porosity of 7%[107]. When the licensing option expired in February 2013, Enegi Oil applied to the PAD for an exploration license, which would allow more detailed exploration and drilling.

- ➔ **Tamboran**: the Australian-based company was granted a licensing option covering an area of 986km^2 in the Northwest Carboniferous basin. Tamboran claims that there are 2.2 tcf of proven gas reserves in the basin. This is compared to the 2.5 tcf estimated to be in the Barnett shale in Texas, USA; a geological formation many times greater than the size of Ireland itself[108]. Representatives we contacted from Tamboran surprisingly declined requests for interview about their future operations after the lapse of its license in 2013, but as was widely expected they have also applied for an exploration license – pending of course the publication of the EPA's study.
- ➔ **LANGCO (The Lough Allen Natural Gas Company):** the only Irish company to be awarded a licensing option, LANGCO is also, notably, the only company to have abstained from expanding its presence. On completion of its work in the Northwest Carboniferous basin, LANGO has not applied for an exploration license.

Based on the outcome of their licensing options, two of the three companies have applied for further licenses and await the publication of the EPA report and the decision by the Minister on whether or not fracking will be permitted. The results of this preliminary work, particularly those presented by Tamboran, raise the questions of the clarity of the information provided to both the Government and the public regarding their findings. The next section will therefore deal briefly with the issue of resources and reserves.

3.1.3 Resources and Reserves

When assessing these data it is essential that the distinction between resources and reserves be highlighted, and equally that one is not compared with the other. Shale gas *resources* are an estimation of the total endowment of hydrocarbon in the shale. The *reserves* to which Tamboran refers are the proportion of the total endowment which is recoverable with existing technology and in the current economic climate (at a reasonable cost). These data represent just some of the greatly differing examples of the estimates surrounding potential resources of shale

[107] Natural Gas Europe (2013). "Ireland: Enegi seeks shale gas exploration license" in *Natural gas Europe (*21-2-2013). Online < http://www.naturalgaseurope.com/enegi-oil-ireland-clare-basin-shale-gas-exploration-license >
[108] Fracking Ireland (2012). "Leitrim has $55bn gas reserves, Tamboran claims" in *Fracking Ireland* (1-2-2012). Online < https://sites.google.com/site/frackingireland/leitrim-has-55bn-gas-reserves-tamboran-claims >

gas around Ireland. Tamboran currently claim that proven reserves in the Lough Allen basin amount to 2.2 tcf of natural gas. The 2.2 tcf would equate to 12 years' supply according to *The Irish Times* or 20 years' supply according to *The Irish Independent*'s current data[109]. And with the amount of money being invested in energy efficiency measures, these figures could even be improved upon.

The abundance of misleading statistics makes accurately assessing the reserves nigh on impossible, and indeed, the source of the information is another factor that has a bearing on the accuracy of the figures. 'Cornucopian' industry representatives are likely to overestimate reserves, and quote enormous resource figures in order to 'sell' the idea of producing. "Official agencies […] have overestimated […] production and underestimated prices consistently for the past decade"[110] with not even the IEA providing reliable accuracy in its forecasts across these criteria. For example:

- ➔ Predicted reserves located in the US Marcellus Shale were downgraded by 80% by the US Geological Survey compared with the figures provided by industry
- ➔ The British Geological Survey claim that the recoverable reserves in the Lancashire shale are only 1/400th of what industry previously predicted[111]
- ➔ Estimates from Tamboran in 2012 were 10 to 20 or more tcf[112].

A serious consideration for Government decision-makers, as key stakeholders in the decision on fracking, is the asymmetric relationship between themselves and those who control the data. The nature of the business is such that estimates must be relied upon in order to predict the economic viability of UGEE. Unfortunately, those with the technical know-how (those in the industry) are the only people capable of producing the figures upon which decision makers (or investors) are reliant – a position of unequivocal power. Cynics suggest it is also in the interest of those with the knowledge-power to overestimate resources and reserves in order to bolster faith in an industry that is coming under increasing criticism because of the its previous safety record (the Deepwater Horizon wounds have not yet healed) and mounting concerns over GHG emissions and climate change.

The local geology and the status of licensing in Ireland form part of the web of interconnected considerations that will have to be taken into account. These are some of the elements that would make fracking *possible* in Ireland, but not necessarily *desirable.* The DCENR will have to consider whether or not the benefits of the efforts required will outweigh the pitfalls, and their logical starting point is to assess the potential economic benefits.

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[109] Melia (2014)
[110] Heinberg (2013) p 11
[111] Shale Gas Research Ireland (2014). *Agri-Food Study*. Online < http://shalegasresearchireland.wordpress.com/ > accessed 1-4-2014
[112] Natural Gas Europe (2012). "Tamboran Resources: The Luck of the Irish" in *Natural Gas Europe* (24-1-2012). Online < http://www.naturalgaseurope.com/tamboran-resources-shale-gas-exploration-ireland >

3.2 Frackonomics

"Who would have guessed in 1980 that during the next three decades the best return on federal investment in energy innovation would come not from work on [...] photovoltaic cells but form work on horizontal drilling and hydraulic fracturing [...] of shale deposits?"[113] Although referring to the situation in the US, Smil is here reminding us of the remarkable economic success of the fracking boom in North America despite widespread scepticism. The statement is also testament to the changeable and dependent nature of the industry as a whole, whose success cannot always be predicted, and that relies upon the data for a host of dependent variables, political and economic alike. This section will outline some of the key variables and assess briefly the preconditions for the economic success of fracking.

3.2.1 Energy Prices

Drilling is an extremely expensive undertaking; therefore exploiting shale gas can only be economical when the market dictates the end product can be sold at a high price. Unfortunately, it takes energy to produce energy, and these high prices will mean higher capital expenditure. An ideal scenario would see cheap energy invested in order to produce an energy vector that sells at a high price. This has several effects upon the economic viability of fracking operations, because energy prices directly affect not only the cost of the investment, but the profit made thereafter. Some argue that this makes shale gas uncompetitive; an assertion that could be applied to any fossil fuel extraction operation.

Operators are hoping for a high ratio of energy return on energy invested (EROEI). This rate is likely to decrease exponentially over the lifetime of a well: as production naturally declines with the depletion of the reserves, the energy return is weaker. In parallel, the difficulty of extracting the gas requires a significant energy investment, which increases over the life of the well as production declines. An EROEI rate destined to decrease should indicate that by extracting UFF, we are not 'onto a winner', and perhaps that our money could be better invested in alternative energies[114]. This is not only for the economic benefit of the operators but for the benefit of the future sustainable energy system that we know we must one day achieve.

Frackonomics have been described by Heinberg as a treadmill to hell; in other words, a cycle governed by positive feedback, and yet full of contradiction. For example, as demand increases, gas prices can also increase. This is generally accompanied by renewed interest in UGEE, considering the return on investment will be greater. Yet as production increases, supply can increase and prices can come down. Recent developments not only in shale gas production but also in LNG production indicate, *inter alia*, that downward pressure on gas prices can be

[113] Smil, Vaclav (2014). "The long, slow rise of solar and wind" in *Scientific American*, vol 310 n° 1 January 2014 pp 42-47, p 47
[114] Heinberg (2013) p 31

exerted globally. If investments in fracking cannot be amortised due to market saturation of natural gas, or indeed due to insufficient storage for natural gas, the benefits of fracking will be greatly reduced.

3.2.1.1 International Considerations

An expensive operation such as fracking, which is subject to the law of diminishing returns, is only commercially viable as long as gas prices remain high. This undoubtedly calls into question the long-term utility of investing in shale gas production. However, the increasing interconnected nature of the global oil industry has other implications for the attraction of shale gas to stakeholders. One is the fact that demand is global and the allure of foreign markets may be stronger than that of the domestic.

If prices are low in the US, and high in Asia due to rising demand, it is likely the US will export its gas. Indeed, current market prices show that Japan will pay $16 per Mmbtu, whereas the domestic price in the US is just $3 for the same unit[115]. European average import prices also indicate a differential to a factor of at least 3 compared with US prices. As emerging economies' demand grows, India and China could become enormous markets for gas, and potentially pay much more than what the domestic market in the US demands. Exporting would become inevitable. Gas is so abundant in the US now that downward pressure on prices has been unstoppable, and the price has hit such a trough that coal is now comparatively more expensive. This completely undermines the argument for energy security, given that stocks would be exported rather than retained for domestic use. The same fate could befall Ireland if shale gas reserves prove prevalent enough to be exported, and indeed the export of natural gas whose development was justified by the need for energy security would only become the symbol of State exploitation of resources in order to generate immediate revenue. The long-term energy security argument would constitute little more than smoke and mirrors.

Furthermore, the low gas prices in the US are driving a wedge into the competitiveness of European industry. Chapter 2 showed that one of the goals of Irish energy policy is competitiveness; and in our understanding, this is in terms of the consumer price of energy, and of the exported goods requiring said energy for production. The US has secured an enviable competitive advantage for exported products as a result of its abundant domestic gas supply, to the extent that Germany admits it cannot contend with cheap American pharmaceuticals[116]. It follows therefore that reserves and domestic production will need to be substantial in order for

[115] British Petroleum (2014). *Natural Gas Prices*. Online < http://www.bp.com/en/global/corporate/about-bp/energy-economics/statistical-review-of-world-energy-2013/review-by-energy-type/natural-gas/natural-gas-prices.html > accessed 10-4-14

[116] Irish Academy of Engineering (2013) p 16

supply to be sufficient for prices to come down. Once this is the case, Irish exports, and indeed most industry will once again become competitive.

3.2.1.2. Petro-politics

The price of the gas will determine whether or not the gas is destined for export or for the domestic market, but also has considerable bearing on the politics of a producing country. Countries that rely greatly on exports, such as the members of the Organisation of the Petroleum Exporting Countries (OPEC), are in a position of insecurity according to petro-political theorists such as Terry Lynn Karl and Thad Dunning, exponents of the resource curse theory. The 'paradox of plenty' correlates resource-rich countries and autocracy, and is another example of a positive feedback cycle. The more a country's GDP depends on the rent from natural resources, the more the ruling elites refuse to concede democracy because the idea of redistributing the wealth produced by the sale of oil and gas is wholly unappealing. Not only is this continually reinforced, but the ruling elites also have the resources with which to retain power[117]. If "the price of oil and the pace of freedom move in opposite directions"[118], a country wishing to exploit indigenous oil and gas resources must ensure that economic rents do not come at the expense of either the diversity of its economy, or the investment in the State itself as a whole. This leaves the economies vulnerable.

If for example, an economy experiences a bust or indeed any faltering in the stability of its former affluence, the previously attractive investment in UGEE will be retracted. Equally if prices dramatically drop, the expected revenue from the sale of such natural resources will be unattained, and where State-owned companies are stakeholders, the national economy can be seriously adversely affected (this is also a function of the level of dependence of the economy on natural resources). The volatility of the international oil industry breeds extreme vulnerability within economies dependent upon it, and reliance on this system does little for those seeking energy security.

3.2.1.3 The Effect on Irish Industry

The industries likely to be adversely affected by large-scale fracking are those which require land, and cannot be outsourced or relocated to another county – food and drinks, and tourism. Representing 11.1% of total exports, 8.6% of employment, and 7.1% of the economy's GVA[119], the agri-food and drink sector is one that simply cannot be ignored when commenting

[117] Dunning, Thad (2008). *Crude Democracy: Natural Resource Wealth and Political Regimes*, Cambridge University Press : Cambridge

[118] Friedman, Thomas (2006). "The First Law of Petropolitis" in *Foreign Policy* (1-5-2006). Online < http://www.foreignpolicy.com/articles/2006/04/25/the_first_law_of_petropolitics >

[119] Bord Bia (2014). *Factsheet on the Irish Agriculture and Food & Drink sector*. Online < http://www.bordbia.ie/industryinfo/agri/pages/default.aspx > accessed 2-4-14

on the economic implications of fracking. The Irish agri-food business has an internationally recognised reputation, which would be threatened by any proposed shale development in the northwest of the country. In the same vein, the tourist industry confronts developers with similar challenges. There were nearly 7 million tourists visiting Ireland in 2012 (this is more than the population of the country). The industry is worth approximately €5.4 billion a year and supports 200,000 jobs[120]. In addition, the west coast boasts an impressive array of rural attractions from north to south, and the two main geological tourist attractions in Ireland are both situated in County Clare, where licensing options have been issued. In Leitrim, outdoor adventure sports bring in considerable revenue and represent one of the two greatest industries in the area, together with agriculture. The effect on the extensive revenue from tourism is not difficult to envisage, and any plan to further develop the shale gas industry would be irresponsible if it did not factor the effects on tourism into the equation.

Even a brief look into frackonomics suggests that UGEE constitutes a sizable risk. Economic success such as that which has been displayed by the US is unlikely to be replicated in Europe, let alone in Ireland, as a result of the sheer scale of the operations in the US, where shale is more prevalent, space abundant, and crucially, regulation less restricting. Success is not guaranteed, and indeed is only likely over the lifetime of the reserve, which itself is an estimate (albeit an educated one), and subject to modification dependent on technological capacities, strategic geopolitical developments, international markets, and finally upon gas prices. The Government as a key stakeholder has therefore to take into account the dramatically unreliable nature of UGEE, and the likelihood that it could decimate revenue from tourism and agriculture.

In order to avoid the trap of only thinking as far ahead as the next election, it is essential that the Government formulate a long-term *vision* and set out a roadmap accordingly, rather than implementing short-term policies that do not ultimately realise this aim and conform to no guiding or overarching theory. Other actors with a high stake in the future of energy for Ireland cannot function within an invisible framework, and as such, no confidence in the Government can be fostered. In order for economic success to be achieved, the State must directly engage relevant agencies such as Fáilte Ireland and the Irish Farmers' Association (IFA) in advance of implementation, if not at the very stage of policy planning (further details in Chapter 4).

3.3 The Regulatory and Fiscal Regimes

"Royal Dutch Shell operates in many countries all across the globe, and the regulatory regime in Ireland was the most complicated we had ever seen"[121]. These words, uttered by an

[120] Fáilte Ireland (2013). *Tourism Facts 2012*. PDF online < http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/3_General_SurveysReports/Tourism_Facts_2012.pdf?ext=.pdf >

[121] Shell (10-4-14) Private interview

interviewee who has personal experience with battling the gauntlet that is the regulatory regime, are telling of its convolution. The national regulatory regime dictates the protocol for any petroleum development in Ireland, and if this quote is to be believed, the regime leaves a lot to be desired. By all accounts it is an unnecessarily complex and confusing regime, controlled by a myriad of different State agencies, whose jurisdiction over different aspects of licensing becomes blurred, leading to situations in which operators can be in breach of the terms of their conflicting licenses. For industry stakeholders, this is one of, if not the most important consideration when considering Ireland in order to invest. This section will analyse the current fiscal, regulatory and licensing systems with a view to discussing the impact it has on the Government's decision on whether or not to permit fracking for shale gas, and developers' decisions to invest.

3.3.1 The Fiscal Regime

At present, Minister for CENR Pat Rabbitte has instated an "unspoken moratorium on fracking"[122], feeling that the Department is not in possession of sufficient, scientifically accurate information to be able to confidently, and competently, make a decision on whether or not it should be permissible. He is determined that no hydraulic fracturing will take place on Irish soil before at least 2016, when the EPA study into the impacts thereof is expected to be complete. Incidentally, Minister Rabbitte has been active in issues concerning natural resource extraction and the fiscal policies pertaining to it since the start of his career. He was regarded as "the driving force" behind the Resources Protection Campaign (RPC), which was comprised of a group of activists who recognised the unfair hand being dealt to the Irish State by the taxation regime in the early 1970s, which made revenue from natural resource exploitation minimal. However the regime has been subject to multiple modifications over time, with the result that Wood Mackenzie has recently been commissioned to produce a study on the fitness-for-purpose of the current regime in advance of further decisions regarding natural resource extraction.

In the 1970s, then Minister Justin Keating made reforms tailored towards reversing the situation so it worked more in Ireland's favour. These were a momentous step towards 'owning our own oil'. Keating had been a keen admirer of the Norwegian model, in which Statoil, a State-owned company, was responsible for all exploration and production (E&P) operations, and the State was the prime beneficiary of all natural resource (oil and gas) related profit. Hydrocarbon development/taxation based on this model was what he aimed to emulate. He thus made the necessary changes to the taxation regime which would see a 50% corporation tax on profits; a 'no cost to the State' 50% half-share in any potential discovery, and finally production royalties of anywhere between 8 and 16%. Oil companies were to use Irish employees, and avail of local

[122] PAD (27-3-14). Private interview

goods and services rather than importing their own staff. These measures were generally welcomed, and were designed to allow Ireland to reap as much of the benefits of their own natural resource base as possible. However, those more inclined towards pessimism saw these as measures that would only discourage foreign developers – necessary in the absence of a State-owned body – and oil and gas multinationals from investing in Ireland, as they were poised to see a smaller return on their upfront investment. Figure 12 (page 49) compares the current model to UK and Norwegian fiscal models.

The Keating reforms were overturned by Minister Ray Burke in a successive Government in the late 1980s, and a return to low taxation on profits and production loyalties was installed. The situation was exacerbated by Energy Minister Bobby Molloy and Finance Minister Bertie Ahern's 1992 halving of the tax rate to 25%, and full write-offs of any costs (what can also be considered 'expenses' as well as service costs) were to be guaranteed going back 25 years. See Appendix 6 for details of policy reform and major discoveries. This kind of economic rent exploitation was seen as "a matter for emerging Africa"[123] and other developing economies, and as a betrayal of the Nation by the State, not least because the measures, which should have encouraged grater uptake in drilling, failed in this very aim. This left lesser profits for the Irish State and diminishing interest in E&P, and worst of all, gave the impression that the Government was prepared to 'sell out'.

The fiscal regime is therefore very attractive to prospective investors, offering generous benefits at minimal cost – just 0-15% Profit Resource Rent Tax depending on the profitability of the field. Perhaps it is true that the "pricing policy […] allows Irish assets to be exploited for a handful of coloured beans"[124], but this is not to say that changes cannot be made. When the Wood Mackenzie report is published, it is highly likely that the regime will be tightened in an attempt to strike the illusive balance of safeguarding as much profit for the Irish economy as possible, whilst providing attractive incentives for operators. Having not followed the Norwegian model, Ireland does not have a State-owned oil and gas company that would automatically be in charge of operations, and attracting foreign or multinational company investment is one of the most fundamental considerations of this policy. The DCENR will need to assess quite keenly the chances that a more appropriate fiscal regime could be a magnet for investment, and simultaneously avoid a regime so generous that we would be better off leaving it in the ground.

[123] Hobbs *et al* (2014) p 8
[124] Hobbs, Eddie (2014). "Wake up, Ireland: multinationals are set to give us very little for our own oil" in *The Irish Sunday Independent* (2-3-2014)

3.3.2 The Regulatory Regime

The regulation of oil and gas production in Ireland is a subject of profound complexity. Two principal issues are to be examined when considering the regulatory regime: who will make the ultimate decision about whether or not fracking for shale gas will be permitted (and on what basis), and what would a developer have to do in order to be granted permission? Once these questions are answered we can more confidently assess the implications of this regime on relevant stakeholders.

When the EPA study is published, it is expected that the Minister for CENR will be in possession of sufficient, accurate scientific evidence in order to be satisfied of *the safety* of fracking. This will be a comprehensive study encompassing all aspects of the human, built and natural environment that are likely to affect and be affected by fracking, and the extent to which this impact can be judged *acceptable*. However, this information is a necessary but not sufficient condition in order for the Minister to decide whether or not the Government is going to "buy into the idea of fracking"[125].

The current application of the Precautionary Principle is to be commended – there is a *de facto* moratorium on shale gas fracking in place in anticipation of scientific certainty – but the Minister should also take this principle one step further. In his seminal 1979 text, Hans Jonas posited the theory that political decisions must be made upstream of scientific applications, and the technical possibility to apply a specific technology should not engender the political will to do so[126]. In other words, if it transpires that the EPA considers that fracking for shale gas can be operated in a way that does not cause unacceptable harm to the human and natural environment, the Minister is not obliged, on this basis, to issue licenses for production. Ultimately, the choice is whether or not Ireland *wants* fracking.

Given that the EPA is not the only impetus behind this decision, what can we identify as other contributing factors? It is above all a highly politicised decision, and some would argue, to its detriment[127]. Because the State is the legal owner of natural resources (pursuant to the Petroleum and Other Minerals Development Act, 1960), it is the State that will decide whether or not to develop them, and indeed to lease them to Tamboran, Enegi or other interested external developers. These developers, and they alone, are driving the entire shale gas industry in Ireland. As we discussed in Chapter 2, energy policy within the country makes no mention of a long-term vision that includes shale gas exploitation, or indeed any other unconventional hydrocarbon extraction. The pressure being applied to the DCENR comes solely from external sources hoping to convince the Government that UGEE is safe, beneficial, and perhaps necessary,

[125] CER (15-4-2014) Private interview
[126] Jonas, Hans (1979). *The Imperative of Responsibility: In Search of an Ethics for the Technological Age.* University of Chicago Press: Chicago
[127] Flanagan, Dermot (2014). "Planning and Environmental Regulatory Regime" in Hobbs *et al* pp 213-227, p 226

so as to avail of a generous fiscal regime which, in its current state, stands them in good stead to make a not insignificant profit.

In addition, at the time of writing, local and European Parliamentary elections are imminent. This has two serious repercussions for decision-makers: the first is that no declarations of opinion pertaining to fracking are likely to be made in advance of this; and the second is that the new MEPs elected may exert an influence over the work of EU Technical Working Group on Environmental Aspects of Unconventional Fossil Fuels, in Particular Shale Gas, which convened for the first time in January 2012 and discussed technical, environmental, regulatory and best practice aspects of fracking in the EU. One of the issues raised during this first meeting was the lack of cohesive legislation governing fracking. An interesting parallel can therefore be drawn between the EU and Irish legal frameworks: neither has any provision for *shale gas practices* specifically.

It seems the Irish Government has been trying to fit the new procedures involved in UGEE into existing legislation, without any forward planning in relation to fracking for shale gas as such; simply put, they were hoping that the EU Directives that help shape Irish regulatory law would cover all bases, and that no overhaul of the current regulatory regime would have to be made. Equally, some of the EU legislation that circumscribes this regime include the:

- ➔ EIA Directive 85/337/EEC,
- ➔ SEA Directive 2001/42/EC,
- ➔ Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH),
- ➔ Mining Waste Directive 2006/21/EC (in relation to flowback water),
- ➔ Environmental Liability Directive 2004/35/EC, and
- ➔ Water Framework Directive 2000/60/EC.

This splintered array of legislation reflects the manifold impacts of UGEE on the environment and the technical complexity of fracking. The equally fragmented licensing and regulatory framework in Ireland are further testament to this, and a direct result of the lack of real preparedness for fracking. Table 1 below represents the necessary licenses required in order to move to production, the relevant issuing bodies and their roles. Before applications for licensing commence, a detailed plan, supported by an EIS, must be submitted, and the application would be subject to an EIA. A public consultation phase follows, after which the licenses can be applied for.

Table 1: Licensing Regime

License	Description	Issuing body	Authority
Planning consent	The permission to build any necessary constructions in the proposed site	An Bord Pleanála	ABP is the authority that issues planning permission for physical development, and strategic infrastructure development
IPPC license	Industrial emissions license. Controls and aims to reduce emissions to air, water and land, including noise; to reduce waste and use energy efficiently	Environmental Protection Agency	The EPA has regulatory control for onshore activities and is competent for technical administrative decision-making. It controls emissions-based environmental pollution
Safety Approval License and Gas Act Consent	Planned development must be assessed and considered 'safe' based on ALARP conditions	CER	Pursuant to the Petroleum Safety Act 2010, the PAD has transferred safety regulation authority to the CER.
A Petroleum lease	Permit in order to develop oil/gas when a commercial discovery is made	Minister of the DCENR/PAD	The PAD is the licensing authority within the DCENR responsible for petroleum affairs. Its role is to promote E&P whilst ensuring their safety and minimising their impact.
Gas Pipeline Consent	Permit to build necessary gas pipelines for transmission of gas	Minister of the DCENR/PAD	

The above table shows that a minimum of five licenses, obtained from four different bodies, is required, and often the DECLG must also issue a permit. Many of these bodies act as consultees for each other, with the EPA advising the PAD, and so on. The interrelations between these bodies make for a unique and unusually tangled system that prospective developers are required to navigate and to comply with, which testimony reveals is no mean feat. Developers are required to obtain every one of the mentioned licenses, and the chance that four out of the five will be granted, thereby vetoing the project for all intents and purposes, is very real. This constitutes an enormous risk for developers, and in fact could be extremely off-putting for the smaller, less experienced companies who do not have the weight of previous international experience and legal expertise that bigger multinationals boast. This is one of the highest hurdles for companies expressing interest in Irish oil and gas. A report commissioned by

Providence Resources plc in 2013[128] analysed the Irish oil and gas industry and confronted it with more successful models across Europe, concluding that investment in Ireland is much less attractive than both the UK and Norway:

Figure 12: The Relative Attractiveness of Ireland to the Oil and Gas Industry

	Investment Criteria	Ireland	Norway	UK
1	What is the likelihood of making a commercial discovery?			
2	Is the planning and regulatory regime conducive to doing business?			
3	What are the likely exploration and development costs?			
4	What annual tax rates will apply to profits?			
5	How stable is the fiscal regime?			
6	Will the State underwrite my risk in any way?			

Source: PriceWaterhouseCoopers (2013)

The table shows that across a range of different investment criteria, Ireland is unattractive for 50% thereof, and only attractive in terms of its generous taxation policy. Furthermore, PwC claims that the probability of making a commercial discovery is 1 in 32[129]. The non-technical regulatory risk impacts upon two of the primary stakeholders in any oil and gas development, the developer and the Government. Should this framework be considered a barrier to production, the developer will be discouraged from applying for licenses, and the Government will lose the opportunity to develop its natural resources. This begs the question - why make it so difficult?

If the Government were honestly committed to hydrocarbon development, as an analysis of the White Paper tends to suggest, licensing laws would surely be streamlined in order to attract business, given that no national company would have automatic rights to produce. This is particularly true in light of the very slim chances that a commercial discovery could be made. As a direct result of this framework, reluctance to commercially develop natural resources could be inferred by potential developers who would otherwise be interested in the Irish market, making investment opportunities paltry.

Proof that the existing framework could be daunting to the point of repellent will come to light over the next years, if the EPA study satisfies the Minister that fracking can be operated in a safe manner and permits are granted. As we saw in section 3.1.2, Tamboran was issued a

[128] PriceWaterhouseCoopers (2013). *Making the most of our natural resources*. PDF online < http://www.providenceresources.com/uploads/pwcoilandgasreport-final-may2013.pdf >
[129] Ibid. p 7

licensing option that spans the ROI-NI border, and is therefore going to have to coordinate with the regulatory authorities on both sides of the border to make sure that all boxes are ticked before undertaking production. It may prove to be the case that Tamboran does not embroil itself in the Irish licensing framework, opting instead for production only north of the border. Their decision would be telling of the extent to which this regime is an obstacle: firstly, if they decided to obtain licenses from both NI and ROI, it would be a sign that they expect to raise a substantial profit – in other words, that the endeavour is 'worth the effort'. In itself, this suggests that gas prices are expected to remain high. Secondly, the decision not to drill in ROI would demonstrate that the regime is harming Ireland's chances for real investment and development that would lead towards a more secure energy system.

Nevertheless, previous examples of oil and gas development both prove and disprove the theory that the regulatory framework is a deterrent. By way of example, we will address the discovery in 1996 of the Corrib gas field (see Appendix 5), which attracted the interest of Shell and Enterprise, who felt these barriers were not insurmountable and succeeded in obtaining the relevant licenses, proceeding to develop the field. Gas is due to come on stream in 2015, nearly 20 years after its discovery. There is much to be learnt from this experience, detailed in the coming section, which should be taken into consideration when the Government is making a decision on the permissible - or otherwise - nature of fracking.

3.4 The Corrib Natural Gas Development

"If a company finds gas, the company will own it"[130]. Beemster and Beemster claim that the oil companies will own any oil or gas found as a result of exploration licenses, but the Irish Constitution does in fact confer ownership over all natural resources upon the State itself, though they shall be controlled by the Government[131]. Whilst the 1922 Constitution classified rights to natural resources as fundamental, and as such inalienable, the 1937 Constitution reinforced State power over these resources, by classifying them as rights of the State rather than of the people. Whilst arguments that this is unlawful are strong[132], it would not be unreasonable for a State grappling with its newfound independence to amend legislation. A pertinent example are the changes in taxation and regulation (see section 3.3) throughout the second half of the 20th Century that culminated in the intense feeling of resentment towards the Government following the Corrib incident.

In 1996, gas was discovered in the Corrib field near Rossport, County Mayo, off the north west coast of Ireland (see Appendix 7). Planning permits for the pipelines and for an onshore

[130] Beemster and Beemster (2011) p 42
[131] Salafia, Vincent (2014). "Resource Nationalism and the Public Trust Doctrine" in Hobbs *et al*, pp 129-168, pp 149-150
[132] Ibid. p 150

processing plant were granted in 2002 and 2004, after numerous appeals and recommendations for alternative routes for the pipeline were made. Opposition to the development was fierce, and campaigns against the pipeline were mounted in order that people's property would not be traversed, and so that the offshore rig would not interfere with local fishing, both subsistence and professional. Such was the extent of the protests that in 2005, Shell, who had a 46% controlling stake in the consortium of developers, took out an injunction against five protestors in the Rossport area, who refused to comply and were later jailed for contempt of court.

In the years building up to this event, numerous oral hearings between ABP and Shell's top management culminated in the imposition of Compulsory Acquisition Orders (CAOs) for lands belonging to people who would not consent to the proposed raw-gas pipeline spanning their property. The use of *eminent domain,* the seizure of private property in the name of a greater public good, was generally reserved for national roads or other essential strategic infrastructure projects. CAOs had never previously been issued on behalf of a private company, and suffice to say that the extent of public outrage at the subsequent injunction against protestors was heavily underestimated by the State, Shell and the other members of the consortium such as Statoil[133].

What followed was a successful campaign of public pressure, with nationwide protests demanding justice for the imprisoned 'Rossport 5', but Shell stood its ground. The Corrib gas pipe was a divisive subject for many, as those personally affected by CAOs and those for whom the treatment of residents of County Mayo was unacceptable took up arms against the State's continued support of the multinationals who were perceived to be exploiting the small communities unable to take on the might of these companies. In response, a certain TD[134] and friends and family of the convicted, equally appalled by this situation, travelled to Norway to meet with Statoil bosses and impress upon them the severity of the backlash against the imprisonment of the Rossport 5. It was not until this point that one of Statoil's vice-presidents convened meetings with government stakeholders in Ireland and Shell lifted its injunction.

Further examples of mismanagement in this debacle are abundant. "Very little official investigation" has been made into incidents in which protestors were violently beaten by security guards, attacked during sit-down peaceful protests by the Gardaí[135], or in one of the most extreme cases, had their fishing vessels hijacked and sunk by 'unknown' assailants. This is the kind of image that the Irish oil and gas industry projects to potential developers; that of a heavily dissenting population and a Government who is unwilling to defend them, succeeded by

[133] Members of the Corrib consortium were Statoil, Saga, Marathon, and previously Enterprise Energy Ireland Ltd. (formerly Enterprise Oil), whose controlling share was bought out by Shell in 2002.
[134] TD stands for Teachta Dála, translated as a member of the Irish parliament
[135] Gardaí are members of An Garda Síochána, the Irish police force

troublesome and disruptive clashes between these key stakeholders. Corrib was a poison chalice.

The State's support of private enterprise may seem attractive to big oil companies, who have by all accounts been given a free hand in Ireland since the second half of the 20th century. Yet the loss of image suffered not only by Shell in this fiasco, in the midst of its already controversial conduct in Nigeria's Ogoniland region, but also by Statoil, who came under attack from public opinion over "disgracing itself due to their involvement in the Corrib project"[136] was significant. This, coupled with the fact that ABP and the DCENR battled over confused (and confusing) jurisdiction over planning and licensing permission, amounted to what was undoubtedly a very fragmented form of regulation. In turn, Shell was virtually incapable of complying with regulations, and this reinforced the opponents' ammunition against the multinational, given they could find shortcomings on their part in several different areas.

Overall, the debacle has culminated in suspicion, if not downright mistrust of the regulatory regime on the part of potential developers. "Ireland's reputation amongst the international oil and gas industry has suffered considerable damage as a result'"[137]. To this day there are ongoing protests and dissent from the public regarding this development, whose initial design both onshore and at sea was considered too experimental, bordering on the dangerous. "Shell loves a big, technical, engineering challenge"[138] and Corrib presented just that. The planned development was a sub-sea facility and pipeline leading to the coast and continuing into an onshore segment leading to a gas terminal, with appropriate Landfall Valve Installations (LVI) to ensure the reduction of the pressure of the gas in the onshore pipeline to 144 bars[139]. The proposed route for the pipeline was the cause of considerable controversy, with the highest regard in the decision being paid to the price of the construction rather than the concerns, voiced officially through submissions and demonstrated in public, of the local community, who would eventually see themselves issued with CAOs at best, imprisoned at worst.

And if all this were not enough, permission was granted before the EIA had even been completed. Needless to say, licensing and regulatory laws were severely lacking, and the likelihood that big oil companies will be attracted by the possibility of working within this disjointed framework in the future seems highly unlikely. There is no doubt that this affair was mismanaged on the part of nearly all who were involved, but it does highlight one of the most basic prerequisites for interest in dealing with Ireland in the oil and gas industry that will form part of the Government and developers' considerations: a trustworthy, effective regulatory regime.

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[136] Campbell (2014) p 33
[137] Irish Academy of Engineering (2013) p 15
[138] Shell (2014)
[139] RPS Group (2008). *Corrib Environmental Impact Statement Summary*. RPS Group: Cork, p 5

This case typifies the problems that can arise when a developer has to operate within a piecemeal and fragmented framework, and thus appropriate local stakeholder engagement cannot be effectively planned from the outset. When considering improvements to this regime in order for stakeholders such as developers and local communities to be satisfied, several measures can be identified:

- ➔ **Streamlining the regulatory framework**: part of the consortium's downfall related to the fact that licensing seemed to overlap, and operators were attacked from one side for infringement of licensing conditions attached to permits issued by another. The innate inefficiency of the system should be evidence enough for its persistence to be called into question. Were there to be one *competent authority* regulating all permits necessary for fracking, or at least greater transparency for the operators, efficiency would be drastically improved, and with it would come trust and an improved attractiveness of the country for investment.
- ➔ **Legislative coherence**: the regulatory problem is the upshot of a lack of forward planning on behalf of the Government. Where fracking is concerned, a clear opinion on the practice must be expressed, and legislation to circumscribe in place *before* further licenses are issued to either Tamboran or Enegi. Trying to fit these new procedures into the old legislation in order to avoid addressing the underlying problem of an assortment of licensing authorities is failing to improve upon an outdated and insufficiently integrated system. It can also be regarded as irresponsible and unsafe.
- ➔ **Regulatory disclosure**: full transparency regarding what precisely the development entails, and the safety measures to be put in place is essential to reassuring non-industry stakeholders. In the case of fracking, the regulated disclosure of chemical constituents of fracking fluids (as discussed in section 1.3) will allay fears of contamination, and even encourage minimal use of chemicals. In turn this would instil more faith in the operators. The unknown inspires fear and drives people to believe the worst, which heightens the perceptions of danger. Full disclosure of planned development is one way of vanquishing the fear inspired by the unknown.
- ➔ **Timely stakeholder engagement:** the multi-way clashes between operators, local communities and the Government during the Corrib development were the result of briefing, consultation and engagement activities considered too little too late. This process must be considered from a multitude of perspectives, including those of the developers and the local communities, and crucially, must be in advance of any applications in order to be considered legitimate.

In sum, regulatory and financial risks are some of the significant risks that operators and the Government both face. For operators, the focus has traditionally been on managing the technical risks, with non-technical risk being generally considered small fry for big multinationals, and easier to manage and overcome because of the sheer power that they retain[140]. However, there remain several other non-technical risks to be addressed from an operator's point of view, inextricably linked with the Government. The first is its political stability. A country in the throes of revolution, nearing general elections, or in dictatorship represents a politically (more) volatile situation in which the regime cannot be trusted not to undergo fundamental changes. For example, there is a risk in some countries that natural resources could be nationalised once removed from the ground. This risk can only realistically be avoiding by choosing not to invest in at-risk countries, and Ireland is not considered to be a political risk.

Secondly, and as we have seen throughout this chapter, the fiscal risk is more present in Ireland, and it is difficult to manage from an operator's perspective because it is – and should be – wholly out of their hands. The fiscal terms were tightened in the 1970s only for these reforms to be overturned after. The risk for the operator is that unforeseen royalties or taxes on profit will be levied when an operator moves to production. The risk of imposed production-sharing arrangements is also very real, and any or all of these risks in various combinations would both damage the reputation of the country as a place to do business, and create obstacles for developers by imposing terms *a posteriori* to which they did not agree. The economic benefits for the Government can be astounding – if they get it right, i.e. if the legislative and fiscal framework is appropriate. These benefits are "not readily quantifiable when using publicly available information"[141] but would include a hike of the taxes on rent to approximately 65%, and essentially emulating the Norwegian model. On publication of the Wood Mackenzie report, it is a real possibility that the current fiscal terms will be made more beneficial to the Government and less attractive to the developers. Striking a balance so as not to discourage investment will therefore be a crucial consideration for the Government.

3.5 Conclusion

The Irish Government and the industry developers they will need to attract should fracking be permitted face a strikingly intricate system of barriers. For the Government, the considerations seem to be primarily economic, and will impact upon the success of industry, the competitiveness of exported produce, the support and faith of the people it represents and ultimately the stability of the country. The fiscal and regulatory regimes are important

[140] Shell (2014)
[141] Hobbs *et al*, p 228

considerations for the Government and will need to be reviewed, if not updated, in great detail before any decision on fracking can be made. The developers will be facing equally pertinent questions, and having assessed the viability of Irish shale gas, will have to decide whether or not the regime in place is attractive enough for them to consider investing in Ireland. However, arguably the most important consideration for the Government will not be a simple cost-benefit analysis or strategy for facilitating fracking, but an examination of the collective conscience, and the question of whether or not fracking is really in line with the overall goals for energy policy, or simply being tenuously covered by it. Given all that is at stake, the crux of the matter is whether fracking is at all desirable.

CHAPTER FOUR: COMMUNITY STAKEHOLDERS

Community stakeholders face challenges that starkly contrast with those of the Government and the developers. These include the acquisition of technical knowledge, and the great many barriers to feeling equally represented in a group of energy stakeholders that could contain intimidating multinationals and the Government. Yet they too are powerful, and their consent, approval and most importantly trust, must not only be earned but also sustained over the duration of the project. "If a company were to […] think it's possible to earn [it], and then it's static and you've got it for all time, they've missed the point"[142].

A vital component of any development is that a maximum of stakeholders reach a maximum degree of satisfaction, therefore it is also in the best interests of those previously discussed that community stakeholders play as important a role in planning as possible. This chapter seeks to discuss the community concerns associated with shale gas fracking in Ireland. Equally, we will seek to identify what their views on fracking are and why, by means of social research and interviews, before making some recommendations as to how these crucial stakeholders can be more meaningfully engaged. However, several clarifications must be made before entering into the debate on the relative merits/drawbacks of fracking for local communities, not least of which is *who are the community stakeholders?*

4.1 Stakeholders

"Stakeholders are those groups who have a stake in or claim on [a company]"[143]. They are a varied array of individuals or groups that have different and competing rights. The discussion of the role of the national Government and that of the prospective developers addressed the issues they face as stakeholders, as they are the most readily identifiable: he who wishes to develop and he who has the power to grant permission. In the coalition of stakeholders that could (or should) be formed when decisions on energy are being taken, it is rather more difficult to identify the 'other' stakeholders – those whose stake may be minimal, those who are not personally affected but who hold strong opinions, those whose property is likely to be affected, those whose community, friends or family are likely to be affected, and the list could go on. Which of these is a 'legitimate' stakeholder, and where can the line be drawn?

"According to Freeman's (1984) influential definition, stakeholders are those who can affect, or be affected by, the organisation's activities. More loosely, they are simply those who have

[142] Anonymous respondent, quoted in Parsons, Richard; Lacey, Justine; and Moffat, Kieren (2014). "Maintaining legitimacy of a contested practice: How the minerals industry understands its 'social license to operate'" in *Resources Policy,* vol 41, pp 83-90 p 87

[143] Freeman, R. Edward (1984). *Strategic Management: A Stakeholder Approach.* Cambridge University Press: Cambridge, p 39

an interest in the organisation (Kaler, 2003) and their 'management' can be seen to represent an effort to manage perceptions of legitimacy (Banerjee, 2000). Managers may distinguish between 'primary' and 'secondary' stakeholders (Carroll and Buchholtz, 2006), while Mitchell et al. (1997) offer a typology in which stakeholders have varying levels of 'salience'".[144]

Parsons *et al* offer this amalgamation of definitions of stakeholders in a synthetic yet broad description of the target group. Taken at face value, this definition dictates that anyone who wants to can be considered a stakeholder, as the entry criteria include an 'interest' in the company. What is of greater remark is the distinction between primary and secondary stakeholders, or in plainer terms, the degree of influence over the project that any one of these may exert. This style of 'stakeholder mapping' is considered an integral part of the forward planning necessary in advance of any development[145].

Firstly, stakeholders can come forward and identify themselves as fitting the floating description. Alternatively, there are those who "can affect, or be affected" by the project unbeknownst to them, and can therefore be more difficult to engage; indeed it is nearly to the benefit of the developer *not* to as discussions and decisions become impracticable when too many points of view are considered. There are also those who object to a project on principle – be it environmental, social, economic – and who are not local. These can pose a risk both for the local community and for the developers, due to their potential to:

- ➔ Organise and rally support for themselves more successfully than local community objectors, creating or escalating an unmanageable or troublesome situation
- ➔ Hijack any local opposition protests and so obscure the concerns of the legitimate local stakeholders.

One of the contributing factors in the escalation of tumult during the Corrib affair was the fact that Greenpeace and other grassroots environmental organisations hijacked the local opposition in order to instigate a wider anti-Shell, anti-fossil-fuel, anti-governmental movement that became less about the needs of the local population, and more a national and indeed international campaign mounted against big business. This of course did not contribute to justice for the local community and constituted a major inconvenience for Shell. There is little that anyone can do to prevent interest groups from expressing their opinions regarding a development that may be taking place at a distance, or even in a foreign country, but one could question the legitimacy of their offense on behalf of a community of locals who may *or may not* be opposed to the development in the first place. The expression of these views could perhaps be better directed towards the policy-makers, given that they are the manifestation of an objection to the policy that allows the project to go ahead, rather than to the company

[144] Parsons *et al* (2014) p 85
[145] Shell (2014)

responsible for the project. These groups must ensure that the their political agenda does not eclipse the locals' concerns. Nevertheless, these interest groups are lacking neither power nor capability of exerting significant influence over a project, and therefore they still constitute stakeholders.

Any meaningful stakeholder management plan cannot be conceived of without having first clearly defined these stakeholders. One of the crucial components of a successful development will be the possibility to gain the trust of the relevant stakeholders to obtain the infamous social license to operate, and so avoid clashes further down the line. Identifying who the stakeholders are is clearly a complex process and therefore would probably best be decided on a case-by-case basis so that none falls through the cracks of an already fragmented regime. If this were completed in advance, with open minds, integrity, and a *genuine* will to take all parties' views into account[146], it would be most effective. For the purpose of the interviews conducted for this paper, local stakeholders have been defined along the same lines they generally are when conducting EIAs – those within the relevant Electoral District as defined by the Central Statistics Office.

This chapter focuses on local community stakeholders including localised interest groups, such as Love Leitrim and the Good Energies Alliance Ireland (GEAI), on the basis of their highly valued co-operation. It is recognised that the list is non-exhaustive and unfortunately many of the wide-ranging categories of stakeholder fall without the scope of this report. Others will only briefly be mentioned in the context of community stakeholders, including the Irish Farmers' Association (IFA), EPA, the National Trust An Taisce, and Fáilte Ireland in the context of the common interests and stakes they share with local communities. The analysis of their role and stakes in planned fracking is more speculative and much less detailed. This chapter will nonetheless touch upon the concerns they raise, the reasons underlying them and will make some suggestions for co-operation with other stakeholders.

4.2 The 'Social License to Operate'

"If you don't have the trust of the community, then you've got no chance of retaining your social license to operate"[147]. Because this is only a vaguely defined concept, there is great divergence in the definitions of social license. In general, a developer's vision will tend to be narrower than that of an average citizen. It will without doubt be easier for a developer to obtain a social license to operate (SLO) if the range of those whose approval is needed is not broad, just as local residents prefer that as diverse a sample of people as is possible are allowed to voice their opinions in the decision-making process in order to display the varied concerns of these

[146] Shell (2014)
[147] Parsons *et al* (2014) p 87

citizens – which can incorporate much more than local stakeholders. Thus an SLO can be granted on either national, regional or solely local levels, the latter being the crucial one, and the subsequent levels can be considered outer rings of the nexus, usually governed by the regulatory and official operational licensing systems[148].

An SLO is an intangible acceptance of a company's actions, and will only be 'granted' should there be reasonable congruency between what the community stakeholders expect, and the reality of the developers' actions. An SLO is not a written or binding document, it is an abstract, but nonetheless real form of arriving at pacific agreement. Once operational licenses are granted, the company must obtain the SLO of its own accord; the licensing authority will not be held accountable for any manifestation of protest in relation to the company's actions downstream, nor will they be bound to intervene on behalf of the licensee. The notion can be measured on a binary or sliding scale; for example, an SLO is granted or not, but the extent to which the community *tolerates* a company pursuing its actions is not equivalent to *approving* of them, nor supporting them. Notions of "benefit, wellbeing, respect and fairness"[149] also come into the frame, and will go great distance into encouraging greater acceptance. In sum, "various dimensions of legitimacy" shape SLOs.

If the definition of a stakeholder is broadened beyond the local community and those directly affected by potential operations, to include the entirety of society and the Nation as a whole, then it is much less likely that a social license will exist, as a nationwide anti-fracking movement would surely be capable of exerting sufficient pressure on operational licensing bodies and impose an official (as distinct from the *de facto*) ban. Indeed, Parsons *et al* contend that obtaining social license is much more difficult for UGEE, as one of their survey participants outlined: with "things like coal seam gas, the expectations are much higher within the community of what you may need to achieve in terms of social license"[150] purely because of the controversy attached to the technologies involved in its exploitation. Their study suggests that it is something that must be "continually renewed" with every decision throughout the development project, and that in fact can very easily be 'revoked'.

There are even those who feel that a social license, when taking into account only local communities, is void because these can be 'paid off' or recompensed in order to attain the social license (inasmuch as this equates to tolerance), and this would not fundamentally, or morally, legitimise the actions of the developer in the eyes of the community. The drive to obtain a social license has to come from within a company and therefore cannot be imposed, despite this being in the best interests of each and every stakeholder, given its being synonymous with a peaceful coexistence between operators and 'others'.

[148] Ibid. p 86
[149] Ibid. p 84
[150] Ibid.

An SLO represents bottom-up legitimacy, whereas related concepts such as Corporate Social Responsibility (CSR) are top-down, and motivated by companies themselves seeking to promote their environmental or socio-political credentials; like an alternative form of certification or labelling. CSR and SLOs have been dismissed as tools that industry employs in order to legitimise any contested projects and pacify external opponents. Furthermore they have been labelled concepts that curtail local stakeholder and community interests[151] by suggesting that their actions have already been deemed legitimate; though by whom and to what extent, it is not always clear. Crucially, such concepts do not lend any credence to the frequently associated assumption that the development they have planned is *desirable*; they only indicate that it will be *tolerated*.

An SLO will evidently play a decisive role in the process of approving fracking, and could symbolically be taken as a subsequent authorisation to be added to the list drawn up in Table 1. Even when stakeholders have been identified, they will not all necessarily express the same views, and more importantly, their stance will be shaped by their personal circumstances and dictated by their specific role within the community. The SLO is therefore a complicated license to obtain due to the underlying variation in stakeholders, their convictions and attitudes towards fracking. The following section will address some of the theory behind the perception of risk that undoubtedly characterises attitudes towards developments such as fracking and the possibility for SLOs.

4.3 Theory

"Hearing about drilling for gas is like hearing about how sausage is made"[152]: it may be unpleasant, but one works on the premise that the end justifies the means. Tamboran CEO Richard Moorman, known for his *very* relaxed approach to technical concerns, is evidently aware of the emotional responses to fracking in Ireland that developers are likely to receive, and considers it a personal aim that any misconceptions or uncomfortable detail be explained to local stakeholders coherently and in an understandable way. A previous reference was made to fear of the unknown, and nowhere is this clearer than in social science research into attitudes towards fracking. Whilst fracking has been labelled "misunderstood" and "mistrusted", it may be more accurately described as a process with which the general public is unfamiliar, which according to this theory would go some distance towards explaining the general 'mistrust'. If Moorman's testimony is accurate, it will just 'take a bit of getting used to'.

[151] Ibid.
[152] Natural Gas Europe (2012)

In their 2014 study, Boudet *et al* concluded that, in a large-n representative sample of US citizens, the "white male effect" would dictate attitudes towards the risks of fracking. This means white males would tend to have a lower perception of risk and therefore be more accepting of new and potentially dangerous technologies, whether they are well- or little-informed of them[153]. Conversely, white females tend to display more post-material and ecocentric (as distinct from anthropocentric) environmentalist values, on a graduated scale with age[154], wealth[155], religion[156], education[157], democratic beliefs[158], family size[159] and evidently local environmental pollution as independent variables.

The "human development sequence"[160] explains in detail a channel through which ecocentrism may develop. In essence, Inglehart and Welzel forward "an emancipative theory" through which self-actualisation, as a product of increased education and resulting value evolution, is the outcome of the emancipation of the lower classes from the pre-modern authoritarian power of the ruling capitalists, in a post-industrial society. It also agrees that the satisfaction of material needs yields post-egocentrism, which fuels support for causes such as feminism, civil rights and environmentalism. On this basis, we can expect to encounter significant environmentalism – a conduit to anti-fracking feeling – in Ireland, being that it meets the criteria of a 'wealthy democracy', has one of Europe's highest birth rates and average family sizes, and a State religion that enshrines Christian doctrine into law.

Objectors can be divided into two sub-sets: those who disagree with fracking on ecocentric grounds, and those whose basis is anthropocentric. If, as Kingsnorth contends, there is "a clear distinction between the compromised, anthropocentric mess which mainstream environmentalism has become, and the ecocentric politics which it could, and ought to, be"[161], then objection to fracking is likely to be a simple case of NIMBY syndrome, rather than founded upon deep-ecological values that would promote protecting the environment from the potential damages of fracking purely because it is considered 'the right thing to do'. However, the highly organised opposition to fracking in Ireland is by no means formulating its values on the basis of a fear of the unknown, quite the contrary: the movement is extremely well-informed.

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153 Boudet, Hilary; Clark, Christopher; Budgen, Dylan; Maibach, Edward; Roser-Renouf, Connie; Lieserowitz, Anthony (2014). ""Fracking" controversy and communication: using national survey data to understand public perceptions of hydraulic fracturing" in *Energy Policy*, vol 65 pp. 57-67, p 59

154 Rice, Gillian (2006). "Pro-Environmental behaviour in Egypt: Is there a Role for Islamic Environmental Ethics?" in *Journal of Business Ethics,* 65:4, pp 373-390

155 Przeworski, Adam; Alvarez, Michael .E; Cheibub, José Antonio; and Limongi, Fernando (2000). *Democracy and Development: Political Institutions and Well-Being in the World, 1950-1990*, Cambridge University Press: New York

156 Rice (2006)

157 Inglehart, Ronald, and Welzel, Christian (2005). *Modernization, Cultural Change and Democracy: the Human Development Sequence*, Cambridge University Press: Cambridge

158 Przeworski *et al* (2000)

159 Rose, Fred (1997). "Towards a Class-Cultural Theory of Social Movements: Reinterpreting New Social Movements" in *Sociological Forum*, 12:3, pp 461-494

160 Inglehart and Welzel (2005)

161 Kingsnorth, Paul (2010). "From ecocide to ecocentrism: a response" in *OpenDemocracy* (14-9-2010). Online < http://www.opendemocracy.net/paul-kingsnorth/from-ecocide-to-ecocentrism-response-to-andrew-dobson >

4.4 Characterising Opposition

"Alternative views are not wrong"[162]. When conducting interviews with fracking opponents in County Leitrim (the Lough Allen basin), we were prepared for NIMBY syndrome to be a very present component of anti-fracking feeling. Whilst objectors freely admitted their negative interest in fracking was only sparked when the area was targeted, it became apparent that the reasons for which local communities were anti-fracking were myriad and inter-related, and – critically – founded upon well-researched scientific concern, as opposed to a simple outright rejection on the grounds that it would be taking place in the vicinity of their homes.

Labelling objectors NIMBYs is reductionist, and only serves to stigmatise them, paint them as opponents to progress or troublemakers. It implies they do not fundamentally object to the development, but prefer for the project to take place elsewhere, and hence be 'someone else's problem'. In many ways, it is a misleadingly pejorative term, which implies that it is wrong that an individual, or group of individuals, don't want to become the sacrificial lambs, the collateral damage or bear the burden in order that the rest of society reap the benefits without having to suffer the same discomfort. If "support/opposition is informed by perception of positive or negative impacts"[163], it holds logically that proximity would be a driver of opposition. Is this not more of a truism than a stance to be scorned? Under what circumstances would anybody actually *want* wells drilled and fracking – or indeed any other industrial development – taking place in close proximity to their home?

Suffice to say that it is not beyond the bounds of reason for locals to object to fracking in the vicinity of their homes; indeed it is perfectly understandable, if not inherent in human nature itself to protect one's own interests. Yet resisting fracking in the vicinity of your home and being pro-development are not two mutually exclusive stances: the GEAI along with other regional groups naturally support local development and jobs for the community, but there is not direct pathway between this and being pro-fracking. Communities retain the right to choose the qualitative aspect of this development, and thus do not accept fracking purely on the basis that it potentially represents an opportunity for industrial development and jobs – particularly in a very rural, peripheral part of an already peripheral country[164]. Objection runs much deeper than a fickle case of monetary compensation or the promise of a job; it extends well beyond the eponymous word plays 'don't frack with us', 'what the frack', 'frack off' or 'no fracking way' that, whilst catchy, can serve to downplay the severity of genuine concerns, and eclipse to a certain extent the reasons for which the communities are anti-fracking.

[162] IFA (11-4-2014) Private interview
[163] Boudet *et al* (2014) p 60
[164] CER (2014)

The two sub-sets of opponents mentioned earlier – anthropocentric and ecocentric – can be loosely translated into the following categories respectively, subsequent to interviews with locals in North Leitrim and research into broader society:

1. Those who object to fracking because of the personal damage they stand to face (generally members of the local community)
2. Those who object to fracking on principle, irrespective of their locality (both members of the local community and members of the larger public who are not necessarily living in one of the areas where fracking is proposed).

Within these groups, several sub-categories can be identified, each pertaining to a different strand of antipathy based on:

- ➔ Health risks
- ➔ Climate change concerns
- ➔ Technical concerns (including the use of chemicals, flowback water, blowouts, seismicity, etc.)
- ➔ Resultant pollution (including noise, air, land, water)
- ➔ Landscape scarring
- ➔ Cultural heritage and lifestyle detriment, or the loss of a traditional way of life
- ➔ The loss of local industry
- ➔ The capacity of authorities to carry out the risk assessments correctly

Some of these carried more weight than others amongst locals, namely health risks, pollution, and the effects on local industry and lifestyles. It was common for a multitude of the aforementioned concerns to serve as a frame for anti-fracking sentiment in North Leitrim, which is further proof of the extensive knowledge of interest groups in terms of the geotechnical aspects and wider societal, legal, economic, environmental implications of a positive decision on fracking. Equally striking was the fact that in Manorhamilton, a town at the epicentre of the fracking project proposal by Tamboran and the town visited for the purpose of research, (see Appendices 8 and 9) the whole community is engaged in the movement; it is far from being driven by renegades. The streets are littered with signs demanding 'Farming not Fracking', or 'Tourism not Fracking' and awareness about the potential effects of fracking in the Lough Allen basin is evidently exceptionally high. Interviewees spoke of the research their friends and neighbours were conducting on the economic implications, risk management, water quality and

Figure 13: Anti-fracking Signage in North Leitrim

Source: O'Halloran (2014)

so on, to be shared in local information nights; of the meetings they had held with Government officials and Tamboran's former CEO Richard Moorman, and of addresses to the Oireachtas[165]. Again, this is proof, if it were needed, of the seriousness of the local communities, and their relentless dedication to becoming informed. Interviewees also recognised the lessons to be learnt from Corrib, and have made it their business to avoid being hoodwinked by widely mistrusted industry spokesmen who come to Manorhamilton to engage with locals, promising, jobs, development and compensation.

4.5 The Compensation Dilemma

"What would you do with money? If you sold the sun that's out there in the evening, how could you buy it back again? Money can't buy fresh air. Money can't buy clean water. Money is no good to us"[166]. This respondent's sentiment typifies much of the opposition to fracking within Ireland, and was echoed in the discourse of many of the interviewees. What exactly would money be trying to compensate for? Which of the effects of fracking can we expect to offset through the provision of funds? What could money do to rectify the environmental risks and externalities? Is money even an appropriate measurement of the value of some of the things that are threatened by fracking, such as landscapes, views, peace or the local way of life? Is it just the "geological fluke"[167] that Pomeranz spoke of in *The Great Divergence* that shales with large gas deposits are located within sparsely populated rural farming communities? Or is it that these communities are preyed upon by developers because opposition will be smaller, and they will be more likely to accept fracking if funds are provided?

Compensation is a contentious and divisive issue, which can create chasms within communities, can obscure deeper concerns, and shroud issues that cannot be dealt with financially. Yet it is a logical instrument to use in order to make up for personal discomfort and inconvenience, and in many cases, a necessary one. Indeed, it is a *sine qua non* of many penal codes and a tenet of environmental law that damages must be repaired. When the damage is accidental, this is a welcome recompense; however when the damage is planned in advance and your consent is sought, the ways in which compensation should be conceived of might alter dramatically, and indeed compensation may fall well short of the mark. This next section will assess some of the issues to be considered when planning for compensation of local communities because of fracking.

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[165] The Oireachtas, or Houses of the Oireachtas, refers to the Houses of Parliament

[166] Anonymus interviewee, quoted in Killian, Sheila (2010). ""No accounting for these people": Shell in Ireland and accounting language" in *Critical Perspectives on Accounting*, vol 21 pp 711-723, p 717

[167] Author unspecified (2013). "Get fracking", in *Petroleum Economist*, July/August 2013 and Pomeranz, Kenneth (2000). *The Great Divergence: China, Europe and the Making of the World Economy*. Princeton University Press.

4.5.1 Personal Compensation

One of the first questions to assess is that of personal compensation; the idea that individual landowners within a community could receive direct personal compensation because of fracking taking place on their land. This depends on the legal context that frames exploitation of natural resources. As we have already seen, these are the property of the State, and therefore individual landowners cannot sell rights to minerals in the subsoil beneath their land. This renders personal compensation, such as there has been in the US, officially absent. Whereas in the US, a landowner can be offered a sum of money at the discretion of the developer to lease his land and/or mineral rights to this developer, this is not possible in Ireland. Conversely, where a wind turbine has been installed on a farmer's land, personal compensation amounting up to €10,000 has been paid in the past. With fracking, this is not the case, and there are a great many positive results of this legislation, not least of which is that the concerns of locals cannot be silenced through the provision of funds.

"There is, in fact, an active distrust on the part of some local protestors for purely financial measures of value, linked to the offers of compensation"[168]. It is clear that for some, the prospect of great personal financial gain could be enough to convince objectors to acquiesce, but those who accept these payments do not instantly become supporters of fracking in and of itself; they simply cease to be openly hostile to the localised development. In some cases, they may continue to object, but consider that the personal gains outweigh the personal inconvenience, and do not comment further on the process itself. In either scenario, the likelihood is that an individual was made an offer he couldn't refuse, rather than being a conscious supporter of fracking actively seeking it in their backyard. With this gain out of the question, what amount of money would render the potential side effects discussed previously 'worth it'? Furthermore, how should it be administered?

In order to address these questions, both local opposition and potential developers have endeavoured to be as well informed as possible about what fracking in North Leitrim would entail. The quote that opened section 4.3 is representative of Moorman's contention that "addressing emotional issues with technical issues doesn't work"[169], and by all accounts, he has abided by this principle. Although Tamboran representatives declined our requests for interview, Moorman (when he was CEO) made regular contact with members of the GEAI, and offered them truthful, measured answers to all queries, dedicating time and energy to responding accurately[170]. Moorman was honest and consistent with the more transparent

[168] Killian (2010) p 717
[169] Moorman, Richard (2012). *Discussion at the Joint Oireachtas Committee on Transport and Communications – Hydraulic Fracturing Discussion* (4-4-2012). Video online < http://goodenergiesalliance.com/2012/10/25/discussion-at-the-joint-oireachtas-committee-the-complete-video-online/ >
[170] Mitchell, Eddie (28-4-2014) Private interview

approach that has been favoured in light of the events of the Corrib affair so that local opposition has become more involved in the process.

Much of the opposition movement that we had the opportunity to meet, embodied by the work of the GEAI and the Love Leitrim campaign, has been shaped by the deeper understanding of 'what is coming' as a result of detailed technical information provided by Moorman to activists such as Eddie Mitchell. Meeting him in his home in North Leitrim, we learnt of the dual and antagonistic effect of being provided with such information: it both fuels and allays community concerns. For example, Moorman provided Mitchell with an excel sheet breaking down the finances of the proposed fracking operations. This document included the sum of Tamboran's planned contribution to local development by means of a development fund, which would see an extraordinary (and indeed inconceivable) amount of money donated to the community of North Leitrim – an attractive prospect; nearly enough to convince opponents that they could live with fracking. But only nearly.

When Tamboran actually offered €20,000 to one local group, their acceptance saw them ostracised from the community to the extent that they made pains to pay the money back. Quite clearly, no sum of money will be sufficient to overcome the nasty division of the community that ensues, thus the technical language of finance "not only fails as a communications medium, but systematically serves one limited set of stakeholders"[171]. Power relations within the coalition of stakeholders could be severely unbalanced by the different perceptions of whether certain risks are 'worth it' economically, if indeed economics is an appropriate language in which to assess whether the project is 'worth it'. This raises the issue of community cohesion and also begs the question of whether or not these risks are manageable, due to the monopolisation of technical knowledge by the potential developers, and is precisely the kind of thing that Mitchell and his colleagues are trying to counter.

4.5.2 The Knowledge Lever

The 'decolonisation' of knowledge is a key aspect that shapes the arguments and concerns of those who will see themselves directly affected by production[172]. The Rossport community had a perceived imperialist power imposed on them that started to dictate the activities of their small community. The residents had to educate themselves "about gas pipelines and pipeline pressure, water pollution and the practices of multinational corporations"[173], all of which were foreign to them at the time. The story is a telling example of the dichotomies of modernity, with "clash[ing] views about the importance of place and

[171] Killian (2010) p 712
[172] Gilmartin, Mary (2009). "Border thinking: Rossport, Shell and the Political Geographies of a Gas Pipeline" in *Political Geography,* vol 28 n°5 pp. 274-282, p 277
[173] Ibid. p 278

community, about definitions of progress and development", and their dissociation from industrial development and economic growth.

Protestors were labelled as backward or opponents of modernity, rather than victims of a profit-driven State in cahoots with industry multinationals, for whom they believed "Profit is all. People or the environment doesn't even come into the equation. Money for them is all and they'd nearly think how could it not be money"[174] that would pacify this and other communities? The lack of understanding and overuse of specialised accounting language by industry representatives only broadens the chasm between the two different understandings of the situation at hand. Democratisation of knowledge cannot be achieved when one party to the dispute retains a maximum of control over this information, expressed particularly through their sharing it with local stakeholders, and ultimately the way this language is used can become an indicator of how the balance can be tipped in favour of one party.

This unequal power balance manifests itself in a lack of self-confidence on the part of local stakeholders. A 'national inferiority complex', deeply engrained as a result of a colonial past and history of subjugation, even meant that qualified geographers amongst the Rossport 5 began to doubt their assessment of the plans for the pipeline as dubious, brushing aside their convictions by assuming "they [the developers] knew more"[175]. The echoes of landlordism, and feeling of inferiority that is its hangover are evidently still widespread.

This sentiment is reinforced by the reality that multinationals tend to be faceless, and therefore difficult to communicate with; there is always a spokesperson, a rank-and-file delegate and never someone in command. People feel that big businesses are untouchable, and not even the Government or the EPA, should they even wish to, could restrain them. The feeling of powerlessness is exacerbated when people are continually explained matters in terms of money, and they start to believe that it is linked to corruption, and there will always be strings attached.

The same strong sense of unstoppable invasion is present in the anti-fracking movement in North Leitrim, where a primary concern is the death of a way of life that has both sustained, and been maintained in, rural Ireland for centuries, which is directly threatened by the perceived re-colonisation of the land through fracking.

4.6 Land and Identity

"Poverty is understood as the destruction of community rather than financial deprivation"[176]. This further corroborates the assertions that monetary compensation can play no part in ameliorating the impoverishment of the local community identity. Poverty becomes a qualitative issue that can be used to describe a community culturally, and has little to do with

[174] Corduff, Mary, quoted in Gilmartin (2009) p 278
[175] Ó Seighin, Micheál, quoted in Gilmartin (2009) p 278
[176] Killian (2010) p 717

money. But as Gilmartin rightly points out, monetary compensation cannot fulfil its designated role of actually *compensating* for "undermining the social identity of the people"[177]. The loss of livelihood as a result of development can be, in part, recompensed monetarily, but this only covers income, and cannot replace the lifestyle to which 'livelihood', in the sense of earning a living, is linked. In the case of this and many other small communities, a profession was often chosen on the basis of family business, the place itself, and a strong emotional attachment to the area. The "border thinking" of which Gilmartin speaks is the idea that emotion cannot be extricated from place, and therefore no amount of compensation can make up for irreversibly changing a landscape – or the traditional practices that feed from it – which is people's home; a 'space of experience' marked by memory.

As an example, the emotional response to land use and communities' respect for natural cycles has been documented by Killian's assessment of compensation for the protection of nesting birds. Residents of the West of Ireland displayed their deep-ecological views through refusing to avail of government grants issued to those who take steps to protect endangered nesting birds during the summer months, seeing no need to be paid in order to protect them; they would do it anyway, on the basis that "the birds were there first" and their distinctive call evokes childhood memories of summers. They actively disagreed with the idea that a seemingly 'random' value could be attributed to the birds and paid to residents for their protection. The investment of time and effort to improve quality is testament to locals' understanding of what "the right thing to do" for the land is, and is not merely something that will one day 'pay off'.

In the same vein, there is a profound scepticism regarding the prospects for local development promised by the industrialisation of the rural parts of North Leitrim. In reality, rather than being NIMBY and anti-development, the GEAI and Love Leitrim are concerned for the retrograde development that may ensue if fracking goes ahead. Interviewees expressed their fears that should shale gas in the Lough Allen basin go to production, a whole host of residents of the rural community would be effectively forced to relocate elsewhere, feeling that staying in an area fraught with fracking was simply not an option. Many vowed they would "definitely leave"[178] if Tamboran is given a production license, and raised concerns for the future development of the sparsely populated rural area, that has already fallen victim to population degrowth due to recent global and local phenomena such as:

- ➔ **Rural exodus**. Throughout the 20th and 21st centuries, the urban population has been growing, finally surpassing the rural population on a global scale in 2009. The renowned economic boom of the Celtic Tiger years also saw much of the rural population of Ireland flock to cities in search of better-paid employment.

[177] Gilmartin (2009) p 278
[178] Mitchell, Olivia (28-4-2014). Private interview

- ➔ **The economic and financial crisis**. Ireland has suffered badly since the onset of the global economic downturn, and Leitrim, as this 'peripheral' region traditionally sustained by small-scale agriculture and adventure tourism, has been particularly hit by unemployment and the failure of small businesses, to the extent that many have fled the region in recent years.
- ➔ **Emigration.** Linked to the crisis, emigration is a phenomenon that is causing much of rural Ireland to become an aged society. Young people rarely settle in rural areas, particularly after leaving them to pursue further education, with the result that elderly generations and families with young children are all that remain. With one Irish person leaving the country "every six minutes"[179], there is a wave of emigration that has contributed to a nationwide preoccupation with the decimation of rural communities, their traditions and ways of life. Policies that aim to preserve this culture and attract younger people back into rural communities are in direct competition then with an energy policy poised to allow fracking.

There is real fear that "no one will ever want to live here anymore, and certainly no one will move here"[180] amongst current residents of Manorhamilton, and that the Lough Allen basin, an area of natural beauty and numerous SACs, will become deserted. As a result it will become exceedingly difficult to attract new investment back into the area. With the reduced population will come the stagnation of the local farming industry, which typifies the connection of the people with land and lifestyle. As one of the industries earlier identified as economically crucial to Ireland and that cannot be relocated, farming is a factor that will have to be given considerate thought. IFA representatives spoke of the inadequacy of developers in dealing with farming communities thus far, as well as with the IFA itself. Fracking is a national issue that directly affects the IFA given that it will take place in rural agricultural areas, yet formal briefing about developers' or government plans has never taken place[181], the inference being that the plans are relatively piecemeal and that true comprehension of the roles of the IFA and other stakeholders is lacking. The overwhelming result is the sense that "passion and emotion are being ignored"[182].

4.6.1 Tourism

The second of the two land-specific industries we identified earlier is tourism. The tourist industry in Ireland is predicated on a healthy, green environment, and a survey by Fáilte Ireland concluded that the following are reasons for which tourism thrives in the country:

[179] Smyth, Jamie. (2013) "One Irish Person Emigrates Every Six Minutes", *Financial Times* (29-8-2013). Online < http://www.ft.com/cms/s/0/d27e950a-10bf-11e3-b291-00144feabdc0.html#axzz2hK2VS681 >
[180] Mitchell, Olivia (2014)
[181] IFA (11-4-2014). Private interview.
[182] Ibid.

- ➔ Beautiful scenery
- ➔ Unspoilt environment
- ➔ Nature, wildlife, flora
- ➔ Interesting history and culture
- ➔ Friendly and hospitable people
- ➔ Good range of natural attractions[183]

Outdoor adventure pursuits including hiking, kayaking, horse riding, nature walks, golf, camping, historical trails and Lough Allen itself are the basis of tourism in Leitrim, and are dependent on a clean environment. It is noteworthy that the word 'unspoilt' is not only the tagline of Leitrim Tourism, but also the foundation of Ireland's international reputation as a tourist destination. Tourist amenities and activities are likely to be severely disrupted by the ancillary effects of fracking, in particular the manifold increase in the volume of traffic (and therefore noise) expected as part of the fracking process. The effect on tourism is expected to be similar to that on the local community, in the sense that the attraction of the region will be diminished by the presence of drilling pads and residual apparatus. The peace and serenity of the area that is crucial to its thriving eco-tourist industry would be tainted by fracking operations, to the extent that one local eco-lodge owner predicts a bleak future for tourism in the area, and feels it "just simply couldn't survive"[184] a wave of fracking. The very idea that areas of natural beauty would be subject to fracking is also a psychological barrier for tourists, and the industrialisation of the 'unspoilt' landscape will undoubtedly undermine the natural beauty and scenic landscapes of Leitrim upon which tourism relies.

4.6.2 Landscape Scarring

"Nobody wants to open the curtains and see a drill sticking out like a sore thumb in the landscape"[185]. The unwelcome spectre of drilling pads on the rolling hilly landscapes of North Leitrim would be blotches on the patchwork canvas of the rural landscape. If the attraction of the countryside stems from its unspoilt character, the presence of industrial equipment can only represent an irreparable and permanent scar to the landscape. The following are photographs of some of the proposed sites of the Lough Allen basin targeted for drill pads.

[183] Fáilte Ireland (2011). *Guidelines on the treatment of tourism in an environmental impact statement*. PDF online < http://www.yellowriverwindfarm.com/files/EisAppendices/Appendix%20F%20-%20Statutory%20&%20Non-statutory%20Consultees/02.%20F%C3%A1ilte%20Ireland%20EIS%20and%20Tourism%20Guidelines%202011.pdf >
[184] Eco-lodge owner (27-4-2014). Private interview
[185] Ibid.

Figure 14: View of Lough Allen

Source: O'Halloran (2014)

Figure 15: Valley Landscape of Lough Allen basin

Source: O'Halloran (2014)

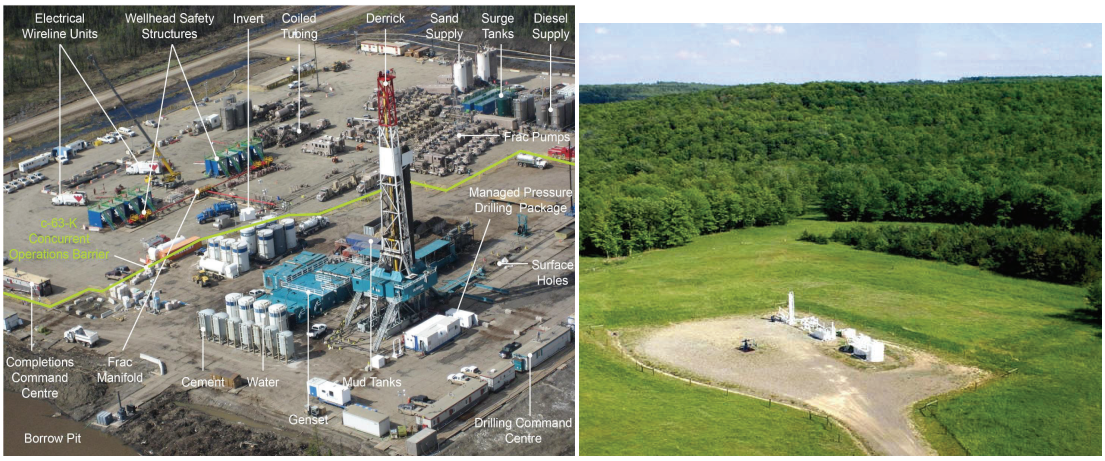
LANGCO managing director Dr Keeley said in 2011 that under no circumstances would "deep drilling" in a beauty spot take place: "It would never be considered, nor would it be allowed to [and] rightly so"[186]. Interestingly, LANGCO did not apply for further licenses on completion of the work programme of its licensing option, perhaps on this basis. Residents and tourists alike avail of the unspoilt scenery of Leitrim year-round. Drill pads and machinery

[186] McCreevey, Ronan (2011). "Gas drilling permits for Lough Allen area given" in *The Irish Times* (21-2-2011). Online < http://www.irishtimes.com/newspaper/ireland/2011/0221/1224290427180.html >

would irrevocably blemish the completely unindustrialised landscapes pictured above, where there is simply nothing, permanently.

However, Tamboran contend that after the multi-stage fracking has finished, there is very little aesthetic intrusion on the landscape, as the majority of the apparatus can be dismantled, and what remains is minimal. Figure 16 shows an example of the difference between operational and post-operational phases.

Figure 16: Operational Drilling Pad and Aftermath, Canada



Source: Mitchell, Eddie (2012)

Despite the relatively small amount of remaining equipment, it is only small *relative* to with operational phase, and residents worry how much of the landscape will be tainted by the appearance of the machinery in the post-operational phase. There is widespread feeling that the landscape shouldn't be altered at all, irrespective of the magnitude of this change. Furthermore, the necessity for the wells already contested, there is the issue of the quantity of wells necessary. As mentioned in section 1.1, the number of wells necessary in order to produce a maximum of natural gas is much larger than for conventional fossil fuel wells. According to figures provided to GEAI by Tamboran, it can be calculated that the landscape scarring would be such that:

- ➔ There is one well per square mile on average
- ➔ One well is visible within 800m of any vantage point in North Leitrim
- ➔ The quantity of wells would be the equivalent of every farmer in North Leitrim having a well on his property.

There are very few possibilities for mitigation of landscape scarring, making it yet another example of whether or not it can be justified in the name of the prospective benefits. Local communities ask themselves where the line will be drawn, when the fracking will stop, how many wells there are likely to be in total over the course of any policy that permits fracking,

and just how much "getting used to" is to be required of them. Simultaneously, decision-makers should be questioning whether the destruction of a landscape boasting SACs and unspoilt scenery is conscionable, to what extent they are prepared for it to be altered, and if, ultimately, the benefits will outweigh the costs.

The real sense of attachment that people in rural Ireland feel to the land, and the sense of belonging that it brings, cannot be understated. These are the cornerstones of rural communities, whose livelihood depends on the use of the land, be it for tourism or farming. The prospects of fracking therefore signify danger for the continuity of the way of life that the land provides. Real, powerful opposition to fracking on this basis cannot be discounted, and can certainly not be silenced through payment, thus a sensitive and empathetic approach to these concerns is vitally important when assessing community stakeholders' concerns.

4.7 Health Concerns

"We're not after another repeat of Hinkley"[187]. Concerns over the health impact of fracking are primordial, and amplified by the absence of a proper SEA. As the previous chapters showed, ground and surface water contamination is possible due to the risk that well casings may be insufficient, and fugitive methane may contaminate the supply. In addition, there are risks from the chemicals used in the fracking fluid, flowback water containing radioelements, and proliferation of chronic respiratory illnesses such as asthma due to the resultant air pollution (see section 1.3). Despite regulations imposing reducing risk to ALARP levels – a questionable standard given that it is inherently vague and does not curb risky operations outright, but suggests that a certain (not quantified) level of risk is acceptable provided 'reasonable' measures to reduce it have been implemented – health concerns are always considered a high risk.

Holistic health impact assessments, an integral part of any comprehensive SEA, have not so far been conducted. Indeed, an SEA should by definition pertain to a plan, policy or programme. In the absence of a defined and specific plan, policy or programme for fracking (given that no decision has been made) an SEA has not been envisaged. It is perhaps even too late for an SEA, given that licensing options and preparatory studies have already been conducted. In essence the Government would be trying to conduct preliminary impact assessments retrospectively. The study that the EPA will undertake is not an SEA, and even a casual glance at the terms of reference issued demonstrates that seismicity, geology and technical aspects are its focus. An SEA would study the long-term *cumulative* impacts of fracking, and this usually includes secondary and indirect impacts that, in conjunction with external

[187] McGarrigle, Brendan (16-3-2014). Private Interview.

factors, can instigate significant changes on the surrounding human, built and natural environments. Anti-fracking campaigners are therefore capitalising on the fact that protocol should be (but has not been) followed, at the right time, so that risks to their personal health and safety can be adequately assessed and mitigation proposed to minimise this risk.

High-volume fracking for shale gas being still at its inception, the EU has yet to issue rules to govern the practice. The Lisbon Treaty guarantees the right to independence in terms of energy policy for EU Member States, thus the EU has only published *guidelines,* in the form of the Recommendations document that "invites Member States to follow minimum principles when applying or adapting their legislation applicable to hydrocarbons exploration or production using high volume hydraulic fracturing"[188]. When interviewed, Eddie Mitchell suggested that in order for fears regarding health impacts to be assuaged, an SEA should become a compulsory step in the process of adapting national legislation to adequately frame processes relating to high-volume fracking. Indeed, the SEA Directive already makes provisions for hydrocarbon extraction, but given that *high-volume* fracking is still in its infancy in Europe, there is little that obliges any Member State to conduct a full SEA.

With health risks being a primary concern for local community stakeholders, a compulsory health impact assessment as an integral part of an SEA would go some distance to putting worried minds at ease. Ideally, a health impact assessment would be conducted separately from the SEA. The lack of a health impact assessment has been pinpointed by community stakeholders as the key concern, given that "the technical risk we kind of assume is manageable"[189] and by all accounts, objection is founded upon the real risks to the human environment – namely human health and way of life.

The specificities of the shale in Ireland, as discussed in Chapter 3, are chiefly responsible for the exacerbation of health concerns, at least regarding water, within communities. The shallower but thicker shale strata in the Lough Allen basin will require different drilling and fracking, which will take place at a necessarily lesser depth than the average 2000m. According to figures provided by Tamboran (and accessed through the GEAI), drilling would take place to a minimum depth of only 700m, meaning that initial horizontal wells would be much closer to the aquifer. As aquifer contamination is the primary concern amongst community objectors, the adverse effects on the quality of the soil, impacting thereafter on local agriculture, which nationally is a multimillion Euro industry, are of grave concern.

In addition, the project area (see Appendices 8 and 9) is relatively close to the Shannon Estuary and other significant waterways, which are earmarked for supplying Dublin with water into the future, and therefore its purity is particularly worrying. Those with a stake in the quality

[188] European Commission (2014a). *Environmental aspects on unconventional fossil fuels*. Online < http://ec.europa.eu/environment/integration/energy/unconventional_en.htm > accessed 29-4-2014
[189] IFA (11-4-2014)

of the water increase exponentially. Equally, under the conditions of the WFD, the quality of waterways is due to be improved by 2015 rather than degraded, and any potential threat jeopardises Ireland's chances of meeting this target. Access to this information does little to persuade local dissenters that fracking can actually be carried out in a manner that does not imply harm to health, the local environment or the economy, and in actual fact directly threatens it.

However, further information can contribute to allaying certain fears regarding groundwater contamination. Pursuant to a declaration effective as of 1st September 2011, Tamboran has committed to fracking without chemicals, using only water and proppant in its fracking fluid, which evidently greatly reduces the risk of contamination. Given that this has never been done (successfully) before, there is understandably a heightened element of concern amongst locals due to the experimental nature of this technique. Further magnifying this issue is the fact that Tamboran is not a household name that evokes trust and confidence. Again, it is clear that where one problem is overcome, another may be created as a result.

In light of the numerous, myriad barriers to be overcome before a plan for fracking would be acceptable for all stakeholders, it does not seem unreasonable that many county councils have taken it upon themselves to simply ban fracking. Thought it is as yet unclear whether County Development Plans that ban fracking can undercut a future NDP that permits it. But entities like the GEAI are not recalcitrant or unreasonable and claim to be lobbying for "a ban…unless independent scientific studies verify that it can be undertaken sustainably and will result in no environmental, social or economic harm"[190]. This implies community groups are approaching the prospect of fracking with an open mind – the inference being that should the other side do the same, certain protocol be followed, and certain measures taken, there is possibility for pacific acceptance of fracking.

Currently, many of the key stakeholder concerns are being interpreted in both economic and non-monetary fashions, and at times at cross-purposes, making communication that is clear and effective between parties to the dispute difficult. Such situations can lead to a complete breakdown in dialogue, and it is generally at this point that dissent escalates into protest and civil disobedience. For developers, the SLO and the community issue are a critical element of any project, into which much time and energy need to be dedicated in order to incorporate the needs of both sides and attain the somewhat illusive mutually beneficial management plan. Community concerns about landscape, lifestyle, health and environment need not be addressed adequately for the benefit of all parties, and the prospect of their being considered powerful enough to veto should be taken seriously. In light of the outcome of the interviews, the following can be

[190] GEAI (2014). *Our View*. Online < http://goodenergiesalliance.com/our-view/ > accessed 1-5-2014

identified as necessary measures in order to reassure community stakeholders, should fracking be permitted, that everything is being done to satisfy their needs:

- ➔ **A more accurate definition of local stakeholders**: given the inherent difficulty in arriving at an adequate universal definition of local stakeholders, it is advisable that an independent body assess this on a case-by-case basis in advance of any applications for planning or licensing.
- ➔ **Addressing technical issues in layman's terms**: explaining in full precisely what is involved, avoiding industry-specific language. For example, if the risk is low, compare this risk to something understandable, "such as the risk of being struck by lightning"[191].
- ➔ **Adopt a show-and-tell approach**: as part of the community engagement scheme at Corrib, several local residents were taken to The Netherlands in order to be shown how gas pipelines actually look in practice, when they are fully constructed and operational. Farmers in NL who had pipelines running 30m from their back door encountered Irish opponents to the pipeline in Mayo, and explained to them how little disruption there was to their daily lives due to the presence of the pipeline, and how minimal they perceived the risk to be. In addition, the construction site was open to locals on Saturdays so that they might come and see the construction in operation. Displaying professionalism, cleanliness, safety and environmental protection openly to the local population also assists in reducing their perception of risk, and therefore their fears.
- ➔ **Instate an adequate complaints system**: locals should have the opportunity, should fracking go to production, to voice complaints openly and without reprisal. If nighttime noise levels are a disturbance, an easy-to-use complaint system should be in operation in which each complaint is dealt with promptly and personally, and a reply sent to the plaintiff. Actively taking people's concerns into account throughout the duration of production will renew the SLO.
- ➔ **Ensure as many jobs for locals as possible**: many multinationals are accused of promising jobs for locals and 'selling' this as justification for their planned development, yet often bring their own employees onto the site. Especially in rural communities hard-hit by recession, local job creation is an effective means of "bringing the community with you"[192] and establishing a symbiotic relationship.
- ➔ **Conduct the appropriate studies**: faith in the regulatory system is flagging, and as such, it will be difficult for community (and indeed other) stakeholders to overcome the fear that corners may be cut in order to facilitate natural resource exploitation. Assurance that the required health and environmental impact assessments are

[191] Shell (2014)
[192] CER (2014)

conducted in advance of any decisions is thus an essential part of easing fears over personal health and safety, and local environmental damage, particularly where so much of local industry and livelihood depend on environmental quality being high.

4.8 Conclusion

In summary, there are many ways in which community concerns can be addressed both before and after a decision on fracking is taken. Firstly, the burden of proof relating to the safety of fracking should remain on operators, who can demonstrate in advance of any licensing applications, that concerns over this matter are unfounded. Secondly, local communities – including local industry – should be briefed on any potential plans well in advance of application, in a common language. Thirdly, they should be genuinely consulted: their submissions should be appropriately and adequately dealt with, if not as a common courtesy then as proof that industry is not riding roughshod over their backs. In short, it is necessary for greater openness and transparency in order to foster the trust and confidence necessary for stakeholders to feel they are on an equal footing.

It is important to recall that community concerns cannot be filtered down to a binary risk-benefit discourse; a reductionist attitude such as this will only overlook real threats to the lifestyles, land and identity that are at the core of community concern. The web of factors that exemplifies community concerns is complex, and spun around issues of identity, monopolisation of knowledge, the language, threats to traditional ways of life, the destruction of the land, and the compromise of local industries dependent upon it. Dealing with community stakeholders should not consist of simply finding a tipping point, and blindly assuming that 'everybody has their price'. The power of an SLO cannot be underestimated, and a post-materialist approach to concerns must be adopted so that decisions are not purely money-driven, and the vital questions of whether or not fracking is conscionable and desirable given due consideration.

CONCLUSIONS

This paper sought to address the primary considerations for key energy stakeholders in Ireland both prior to and following a potential positive decision on fracking. These considerations were divided amongst the:

- ➔ Technical and engineering aspects of fracking
- ➔ (Potential) effects of large-scale high-volume fracking
- ➔ Perceived need for, and undeniable benefits of exploiting indigenous natural gas; in this case, natural gas trapped within strata of sedimentary shale
- ➔ Barriers to fracking from the perspective of developers who have chosen to consider Ireland for shale gas development
- ➔ Political barriers such as regulation and aspects of taxation that would need to be addressed from the Government's perspective
- ➔ Social and health concerns of the communities whose local area is targeted for fracking, and
- ➔ the more philosophical questions of whether or not the technical possibility to deploy fracking engenders the political will to do so.

These issues are all judged critical considerations in order for the decision on fracking to be made based on the most comprehensive knowledge base; for an eventual positive decision to be enacted in a symbiotic manner causing minimal damage and securing the most benefits for stakeholders, and so that the decision would ultimately be taken with good conscience.

In relation to the technical challenges of fracking, industry representatives and literature alike were in agreement on the possibility that shale gas could move to production in a manner ensuring that risks conform to ALARP standards. As this risk is never zero, so the impact of fracking can never be zero, and indeed can prove difficult to quantify. Conversely, evidence from the North American experience of high-volume fracking indicates that even if the risk of accidents happening can be reduced to a minimum, the consequences if the risks are realised present quite considerable hazards to both the natural environment, communities and human health. As a result, the more pertinent question is what risk we are prepared to accept when considering permitting fracking.

The acceptance of this risk – entwined with the extent to which Ireland may or may not require fracking in order to meet demand, secure supply and gain energy independence – is an important consideration for energy policy-makers. The pillars of energy security, competitiveness and environmental protection, that seem to support the relatively *ad hoc* Irish energy policy, all indicate that indigenous natural gas exploitation is in line with the tenets of this policy. Yet it is also clear that the Directives, Regulations and current laws that govern

energy policy and practices were never developed with fracking in mind, and thus no provision is made for its development. As a result it appears that the perceived need to capitalise on natural resources, that bring economic benefit, could be used to justify fracking despite the fact that in regulatory, fiscal, and psychological terms, the country is not ready to accept it. An honest examination of this regime will be necessary when considering permitting fracking.

These regulatory and fiscal considerations are of paramount importance for the Government and the developers alike when thinking about Ireland as a country in which to do business. If the Government decides that it will allow fracking, considerable changes to the current regime seem likely. These changes would probably render the regime less advantageous for foreign developers, but ultimately, these two key stakeholders will be working in parallel to achieve the common goal of successful development. A careful balance will have to be struck in order that the Government and the developers are both satisfied.

Whilst on the brink of a decision on the prospect of fracking, local communities are a key factor for the Government to take into serious consideration upstream of this decision, and the developers to provide for downstream. The site visits and interviews conducted overwhelmingly showed that 'fracktivism' in Ireland is both highly organised and extremely knowledgeable. Their concerns for health, safety and livelihoods are often overlooked by decision-makers due to their cavalier, 'one-for-all' mentality, which on occasion sees local communities being sacrificed for the greater good. There is much to be learnt from past experience in energy infrastructure decisions in Ireland, most notably that the current ways in which local stakeholder concerns are managed is wholly inadequate. The extent of the impact on local communities needs to be duly considered before a decision can be made, and should the outcome of this decision prove unfavourable for them, their trust must be earned and maintained and genuine efforts made to protect their interests throughout production.

Perhaps the biggest challenge at this critical time stems from the political culture itself. Across the board of those involved in energy infrastructure, there is a lack of joined-up thinking. With elections on the horizon, no one wants to be responsible for making what will likely be an unpopular decision with the public – a symptom of an underlying instinct to shirk accountability. There is also no defined long-term vision for Ireland's energy future; there is only reactionary planning on the basis of independent propositions for development of energy infrastructure. Policy is developed only in response, with no provisions made until proposals are on the table – a symptom of an underlying instinct to work in retrograde.

A coalition of energy stakeholders, who take into account the myriad of varied and valid concerns regarding fracking, should possess both the technical and non-technical decision-making skills necessary for a decision to be made with integrity. Thereafter, a coherent strategy making provisions for best practice and adequate stakeholder engagement must be drawn up. It

is only when each of the parties to the conflict has been equally represented that all issues can be discussed from all angles, and peaceful confidence in the decision, whatever it transpires to be, can be fostered.

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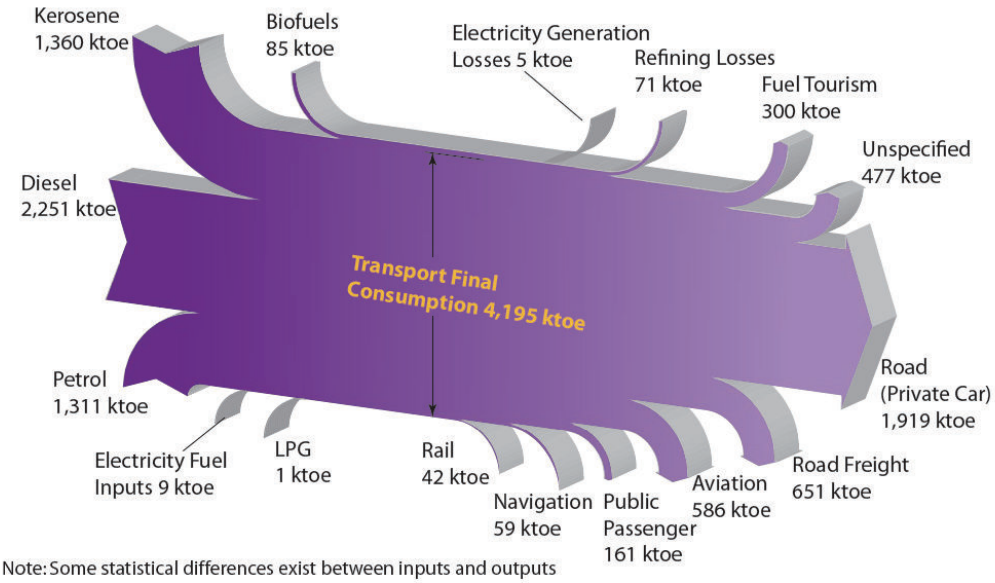
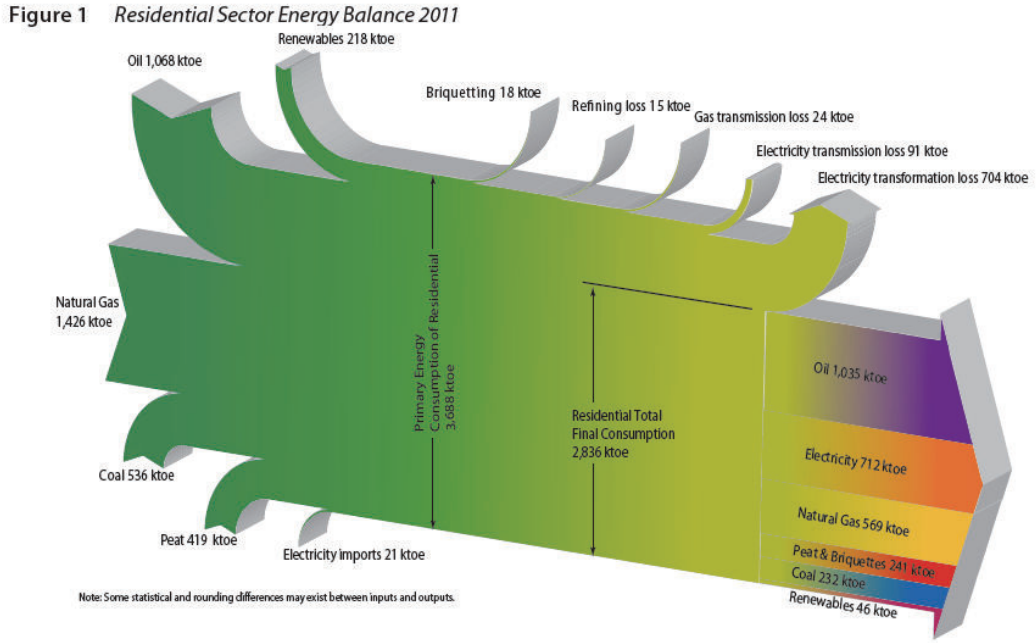
Appendices

Appendix 1: Flow Diagram Transport



Source: Howley and Holland (2013) p 6

Appendix 2: Energy Consumption in the Residential Sector

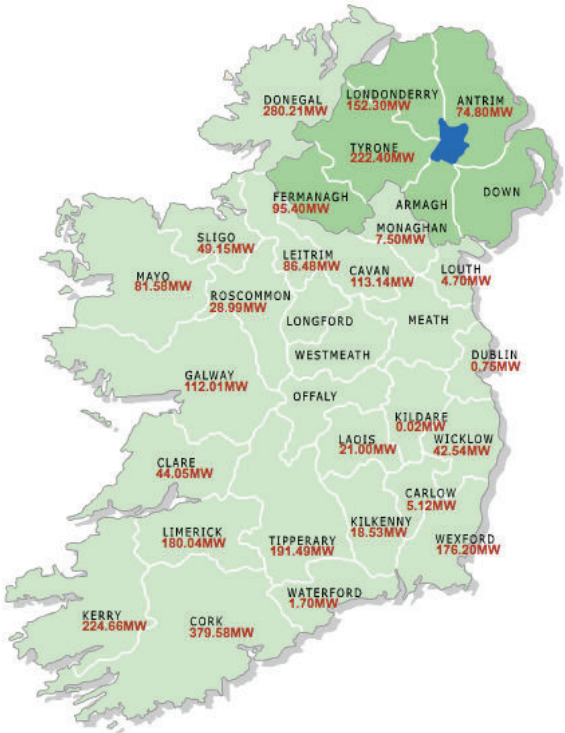


Source: Dennehy and Howley (2013) p 10

Appendix 3: Island Gas Pipeline Infrastructure

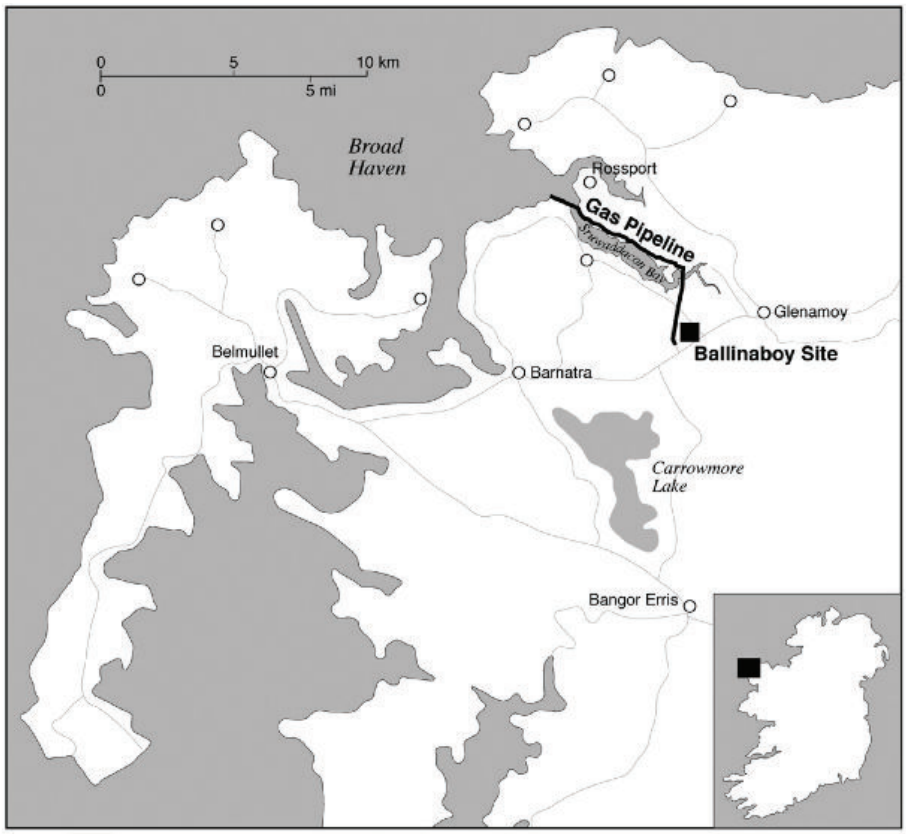
Source: Bord Gáis (2011). Gas Supplies. Natural gas in Ireland. Online < http://www.bordgais.ie/annualreport2010/gas_supplies.html > accessed 8-4-2014. Scale not provided

Appendix 4: County Wind Energy Map



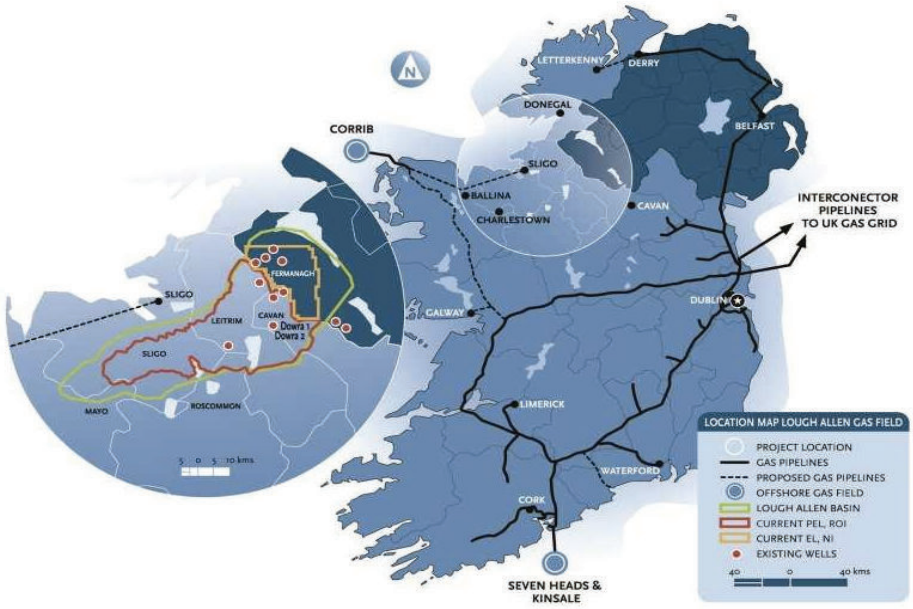
Source: Irish Wind Energy Association (2014a). County Wind Map. Online < http://www.iwea.com/windfarmsinireland > accessed 10-3-2014. Scale not provided

Appendix 5: Rossport, the Erris Peninsula and the Corrib Gas Pipe Route



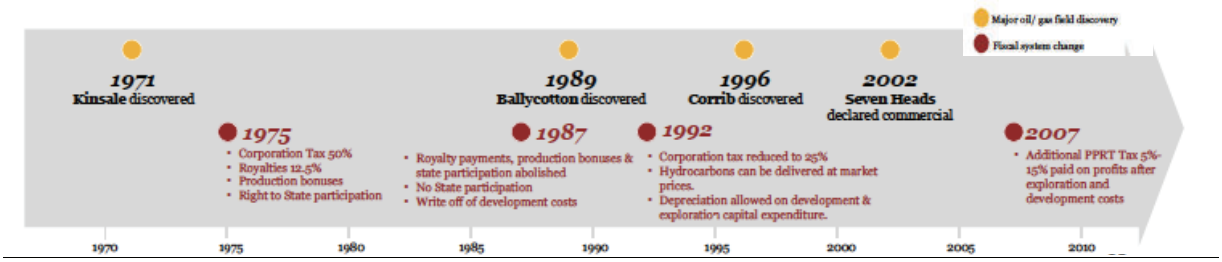
Source: Gilmartin (2009) p 275

Appendix 6: Lough Allen Basin Location Map



Source: Fracking Ireland (2012)

Appendix 7: Policy Reform and Discoveries

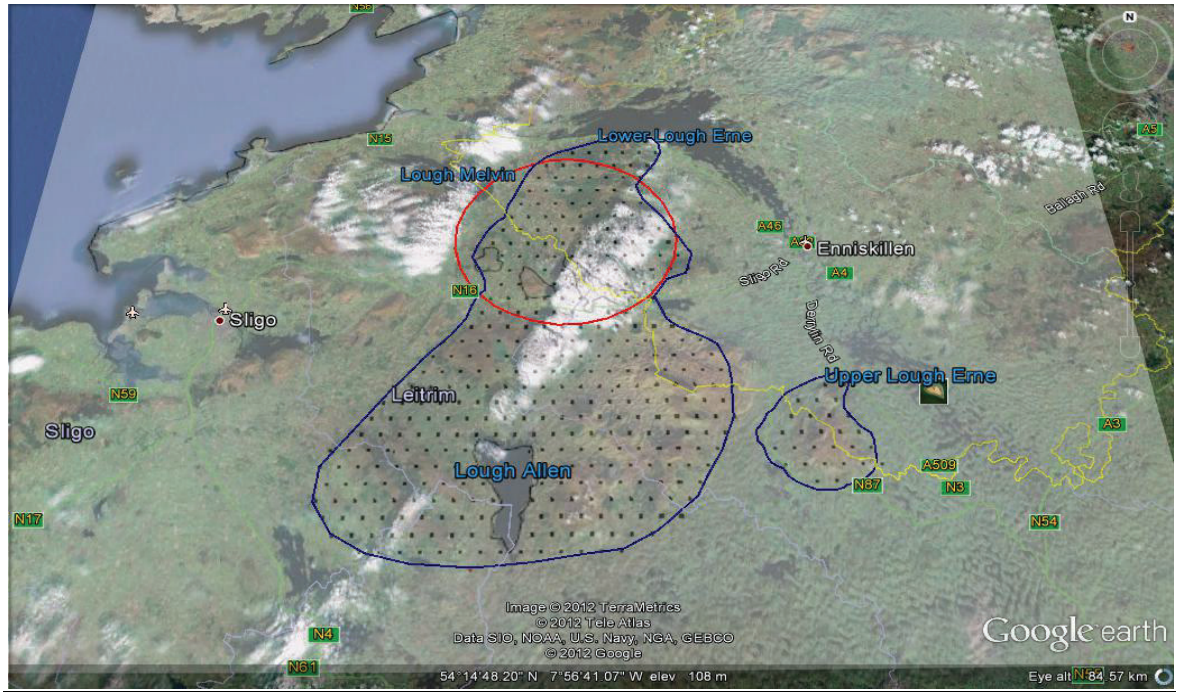


Source: Price Waterhouse Coopers (2013) p 25

Appendix 8: North Leitrim Local Area Map

Source: Mitchell, Eddie (2014)

Appendix 9: Project Area Drill Projection



Source: Mitchell, Eddie (2012)

The red boundary delineates the area selected for the first 3000 wells to be drilled (100,000 acres) and the blue boundary the possible future development of the basin with 9000 wells (280,000 acres). The dots represent future wells, spaced evenly (to scale) of the average number of wells in the area – roughly, one well per square mile. In reality the wells will be in clusters around 7 acre well pads, distributed in an uneven manner across the basin. *This is an approximation, created by Eddie Mitchell of GEAI, on the basis of data given to him through direct correspondence between himself and Richard Moorman. The scale was not provided.*