RECOMMENDATIONS ON WELL SITE INFRASTRUCTURE AND TRANSPORT

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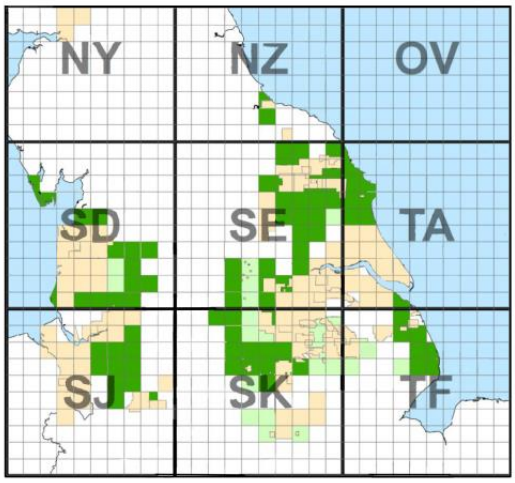
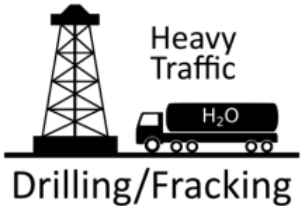


Onshore licence blocks within the UK

All shale gas well sites have a footprint

Existing infrastructure within densely populated countries restricts resource extraction



Background

The rapid growth of shale gas developments within the US and now the possibility of developments within Europe have raised concerns on the impact of well site infrastructure and transport required for shale gas extraction. Our aims:

- Determine the likely footprint of a fracking site and the optimum lateral length that limits disruption on the surface but maximize technically recoverable reserves.
- Assess the probability of surface spills of fracking related fluids.
- Determine the impact of surface transportation operations.
- Review the risks of shale gas to biodiversity and ecosystems.

Study

- From measuring conventional well pads in the UK an average surface footprint was calculated, using this value along with varying setback distances and lateral lengths the carrying capacity was determined.
- Data from the Colorado Oil and Gas Commission (COGCC) and Texas Railroad Commission (TRC) were assessed to determine the probability of spills onsite.
- Milk and fuel tanker incidents in the UK were analysed as an analogue to determine the probability of a spill offsite.
- Transport impacts were reviewed and existing models extended to consider the impact of shale gas development.
- Impacts on habitats were reviewed based upon US data and information from analogue industries in Europe.

Results

- The carrying capacity of a license block decreases as setback distances and lateral length increases.
- Longer laterals generally allow for more gas to be recovered, however, in some more crowded license blocks well pads with shorter laterals will yield more.
- The rate of reported crude oil spills recorded by the TRC and the COGCC is increasing.
- Based on milk tanker data a development of 100, 10 well, well-pads each well with 1 lateral and with truck movements focused over the first two years of drilling would be approximately 4-12 incidents a year, with the likelihood of a spill being between 3-8.
- A new version of the Newcastle Traffic Impact Model has been developed (http://research.ncl.ac.uk/uhtim).

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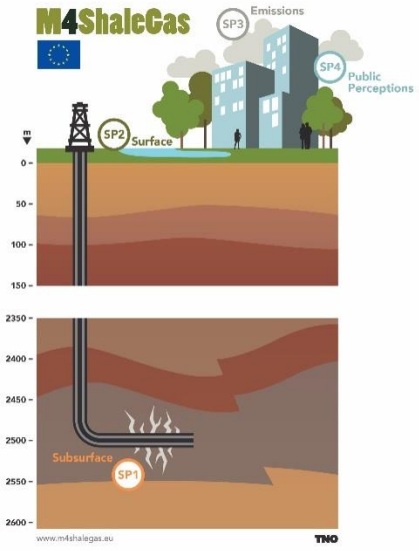
Science-basedRecommendations

- Multi-well pads, i.e. pads with multiple wells, should be encouraged as they not only increase regulatory efficiency for operators but also reduces surface disturbance.
- The use of existing roads and right of ways should also be encouraged, as this can reduce additional surface footprint and cumulative impacts on the landscape.
- Appropriate drilling rigs and the most up to date drilling technology should be used, so drilling is efficient and minimally obstructive as possible.
- Sensible setbacks (eg. 150 m or more) need to be established and enforced to protect public safety, in addition to ecological, historical, cultural, recreational and aesthetic resources.
- Developments in areas already disturbed should be encouraged, an optimal location for wells pads and associated facilities would be industrial parks designed for this type of industrial activity, and/or in close proximity to major roads designed to handle frequent heavy goods transportation.
- A comprehensive planning process to assess the cumulative impacts of multiple shale gas developments should occur pre-development.
- In general multi-well pads with long laterals reduce the cumulative surface footprint and generate more gas reserves, however, this is not always the case. License block need to be assessed on a site by site basis to determine the most appropriate lateral length.
- It must be considered that surface spills and leaks will occur but these will not be out of line with existing transport systems (eg. milk or oils) and the industry should design safety systems and training as used for oil tankers.
- The traffic impacts are likely to be local rather than national, although care should be taken to consider cumulative effects that would occur as the number of well pads expands.

The Project

M4ShaleGas examines the potential environmental impacts and risks related to **shale gas** exploration and exploitation in Europe with the goal to build a technical and social knowledge base on best practices and innovative approaches for **m**easuring, **m**onitoring, **m**itigating, and **m**anaging these impacts.



4 sub-programs:

- SP1-subsurface
- SP2-surface
- SP3-air emissions
- SP4-public perceptions

Funding:
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Horizon 2020 Topic LCE-16-2014:
Understanding, preventing and mitigating the potential environmental impacts and risks of shale gas exploration and exploitation.

Project duration:
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Coordination:
TNO

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