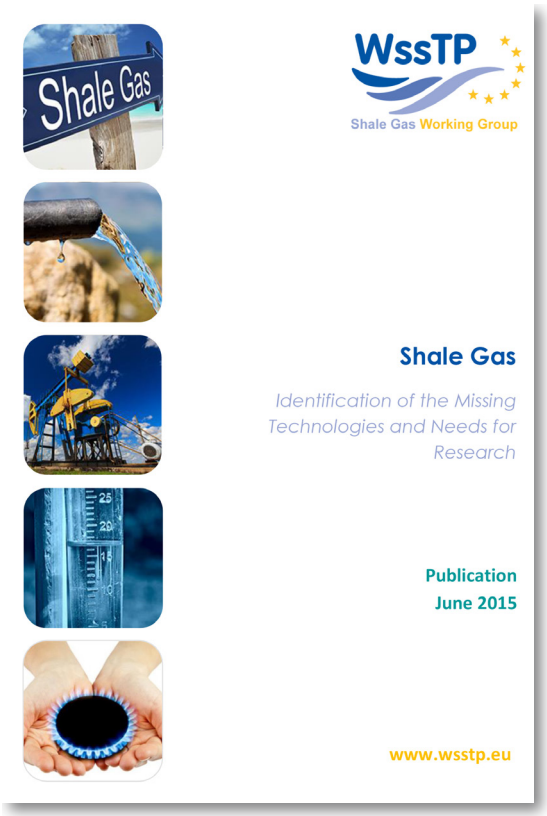
Executive Summary

SHALE GAS - Identification of the missing technologies and needs for research

WssTP
The European Water Platform

THE BACKGROUND OF THE SHALE GAS - IDENTIFICATION OF THE MISSING TECHNOLOGIES AND NEEDS FOR RESEARCH REPORT

This report was published in June 2015 and was elaborated the WssTP Shale Gas Working Group



The main WssTP WG goals were:

1. To review best practices related to water cycle management during unconventional gas production as shale gas.
2. To evaluate the potential of replication of such water management approach in an EU context (population density).
3. To identify further research and demonstration needs.

KNOWLEDGE GAPS AND RESEARCH NEEDS

The main goal of this working group was to assess existing best practices & technologies allowing for safe and sustainable wastewater disposal as well as to identify ways to minimize the need of water e.g. by reuse of the flow back water).
The group provided a review on water treatment technologies from shale gas market & addressed countries (large Cie scope, mainly US). This review aimed to identify:

- 24 water treatment companies/actors providing solutions for shale gas water management.
- Referencing more than > 50 available technos.
- The study of US Shale gas operation sites (not diffused) to understand water cycle management and consideration.

Review on water cycle management from ongoing operation sites aims to define 2 separate operation phases of the shale gas well: the well drilling & fracking phase followed by the well production.

- The well Drilling & Fracking period is about two/three months (Short term). The water requirements for frac fluid production and wastewater management of Flowbacks represent about 10 000 to 20 000 m3 of water/well. Looking on contaminant and pollutant control, the technology review highlights that a large variety of technological solutions already exists and presents reliability to reach requirements and to secure water treatment and pollutant control for water disposal &/or reuse.
  However the large amount of water to manage in this very short term period conducts operators to choose highly flexible & mobile water treatment and network solutions (truck, storage ponds, storage tanks…). These ones are also economically preferred than centralized ones.
- The well production could represent several years, 10 year and more (long term). The wastewater management of the produced water may represent more than 1 Mm3/well. Looking on contaminant and

pollutant control, the technology review highlights that a large variety of technological solutions already exists and presents reliability to reach requirements and to secure water treatment and pollutant control for water disposal &/or reuse. 100% water treatment/reuse is achievable (Zero liquid waste solutions, manly based on thermal processes) but commercially unattractive due to their high CAPEX and OPEX, which may force to consider reasonable solutions, as high recovery solutions, 70 – 85% recovery, technology based on membrane desalination but considering liquid waste disposal (deep well, evaporation pond) or offsite treatment. The continuous wastewater streams production involves a higher water treatment plant capacity/lifetime focusing the approach on centralized system (network & water treatment facilities…). This approach is very similar than one use in conventional Oil&Gas extraction based mainly on a replicable & reliable approach. (flow rate can be however much higher than conventional).

It is difficult to consider that the best practices developed in these countries are directly applicable to the European context.

From well's drilling & fracking period: How can we better manage short term water network considering sustainability? Can we find alternative to storage truck, ponds?

One way may be to switch from local solutions based on mobile technologies to sustainable and reliable centralized systems. This will require specific development of strategies of well's pads deployment & management.

From well's operation period: how can we increase performance & sustainability of produced water treatment plant, how can we get more attractive the sustainable water treatment technology (zero liquid discharge/ waste technologies) or take into account the true cost of water based on high recovery water technologies.

RESEARCH AND TECHNOLOGY NEEDS

The main challenge of water management in shale gas exploitation is to review existing approaches and best practices into an European environmental context and to demonstrate their efficiency and economic viability. Some development will require development to allow an integrated approach for water management & potentially enlarged to the unconventional oil and gas exploitation framework.

Therefore, a pilot site demonstration may be useful in order to apply the strategy and methodology in terms of sustainable water network management and demonstration of treatment technologies, including innovative treatment technologies and new water cycle management models which could be promising in this "game changing".

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