Shale Gas and Water

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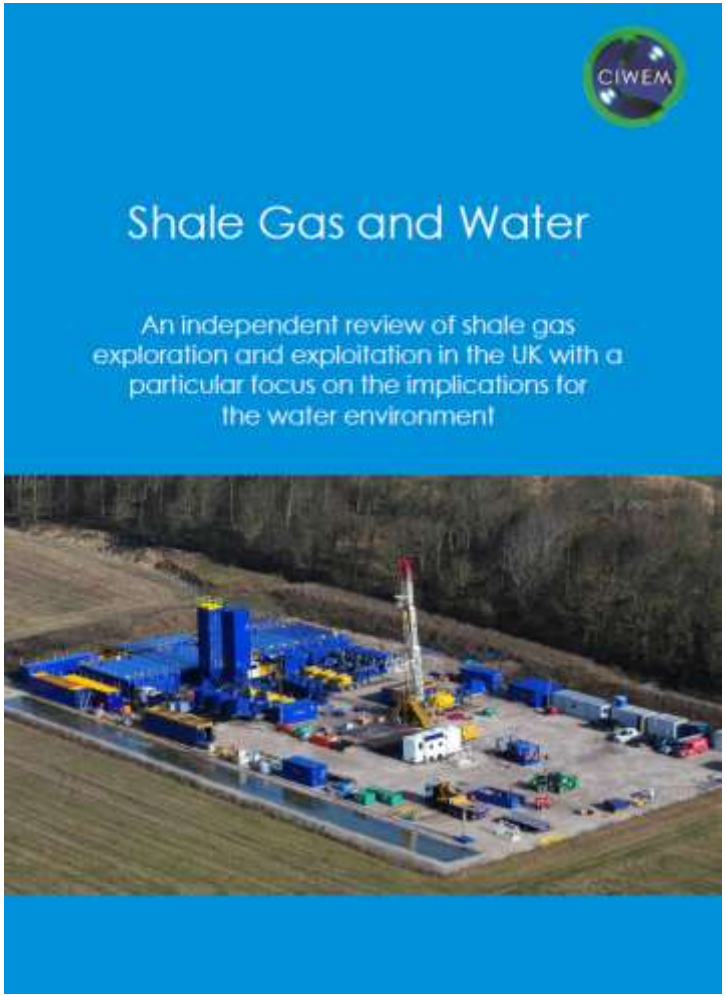
Water resources / supply

Potential for contamination of groundwaters and the local environment

Treatment of flowback and produced water

Conclusions of review



Water resources & supply

How much water is needed?

Where will the water come from?

Future water availability

Water resources

Process	Water use per well	Duration
Drilling	0.25 – 4Ml	2 – 8 weeks
Hydraulic fracturing	7 – 23 Ml	5 – 7 weeks
Production	0 Ml – potential for reuse of returned water	5 – 20 years

Water resources

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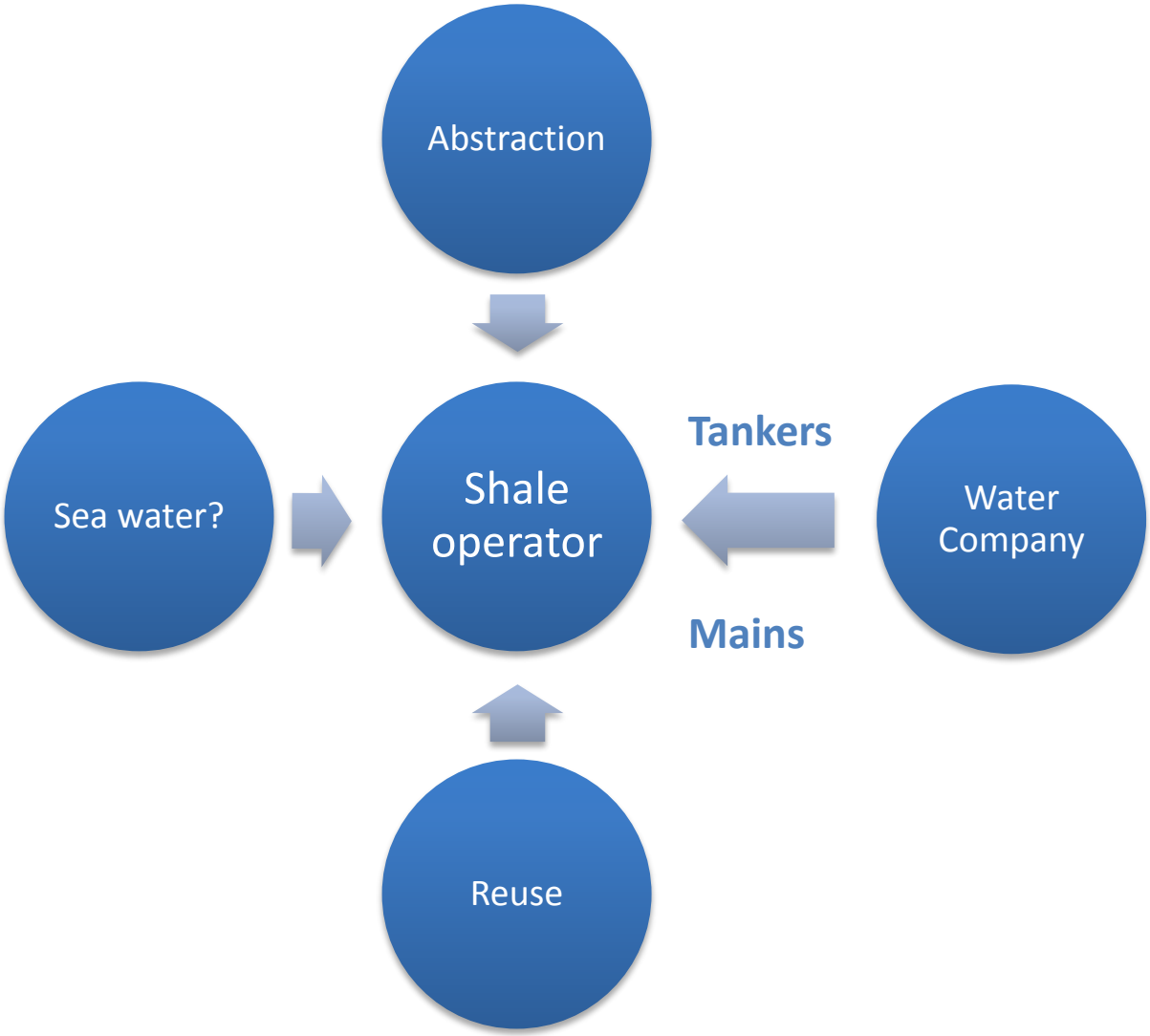
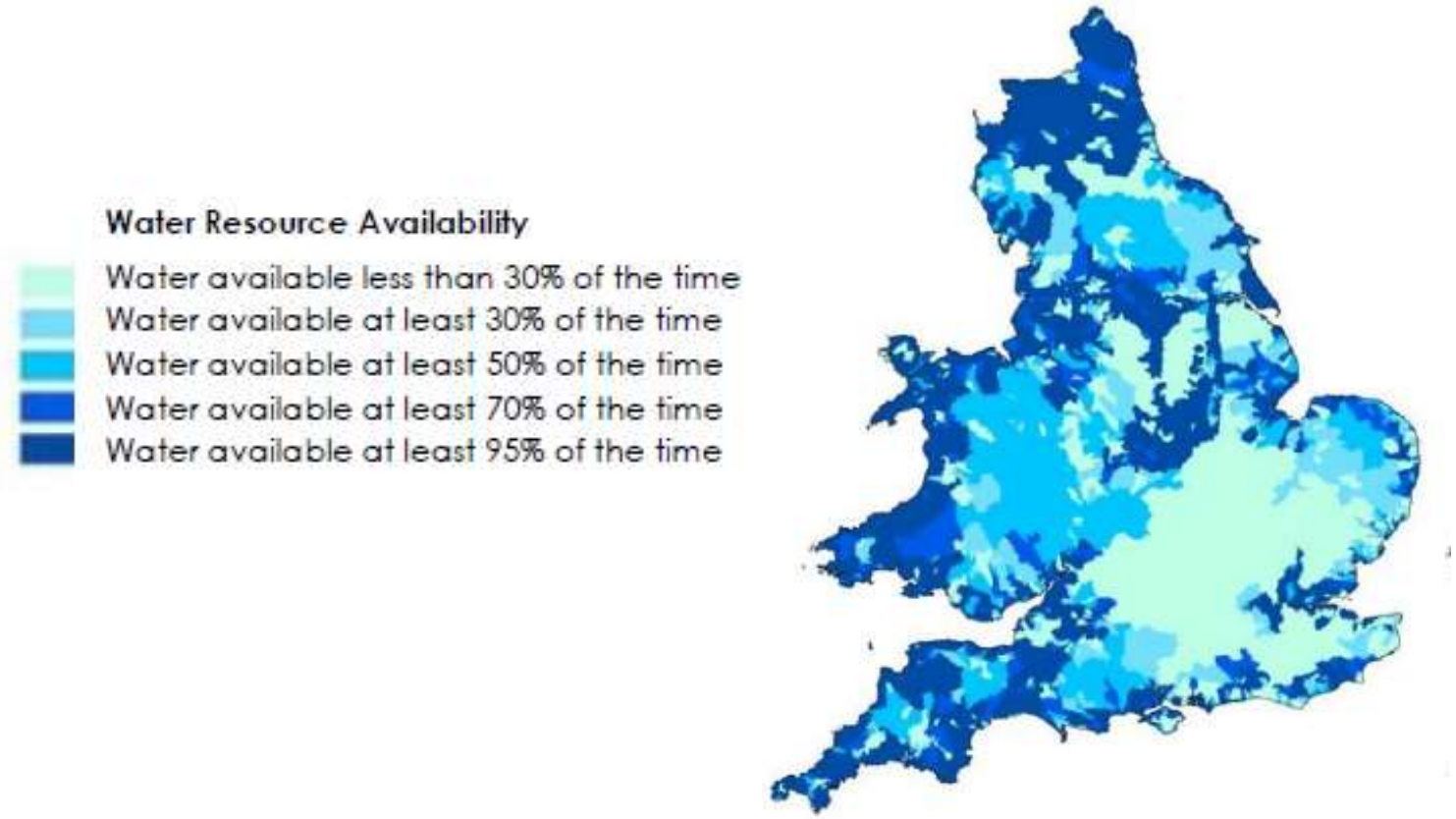
	Comparison	
United Utilities water demand (Regional)	12,180 Ml	1 week
National Groundwater abstraction	42,000 Ml	1 week
National surface water abstraction	119,000 Ml	1 week

Water resources



Water resources



Potential for contamination of groundwaters

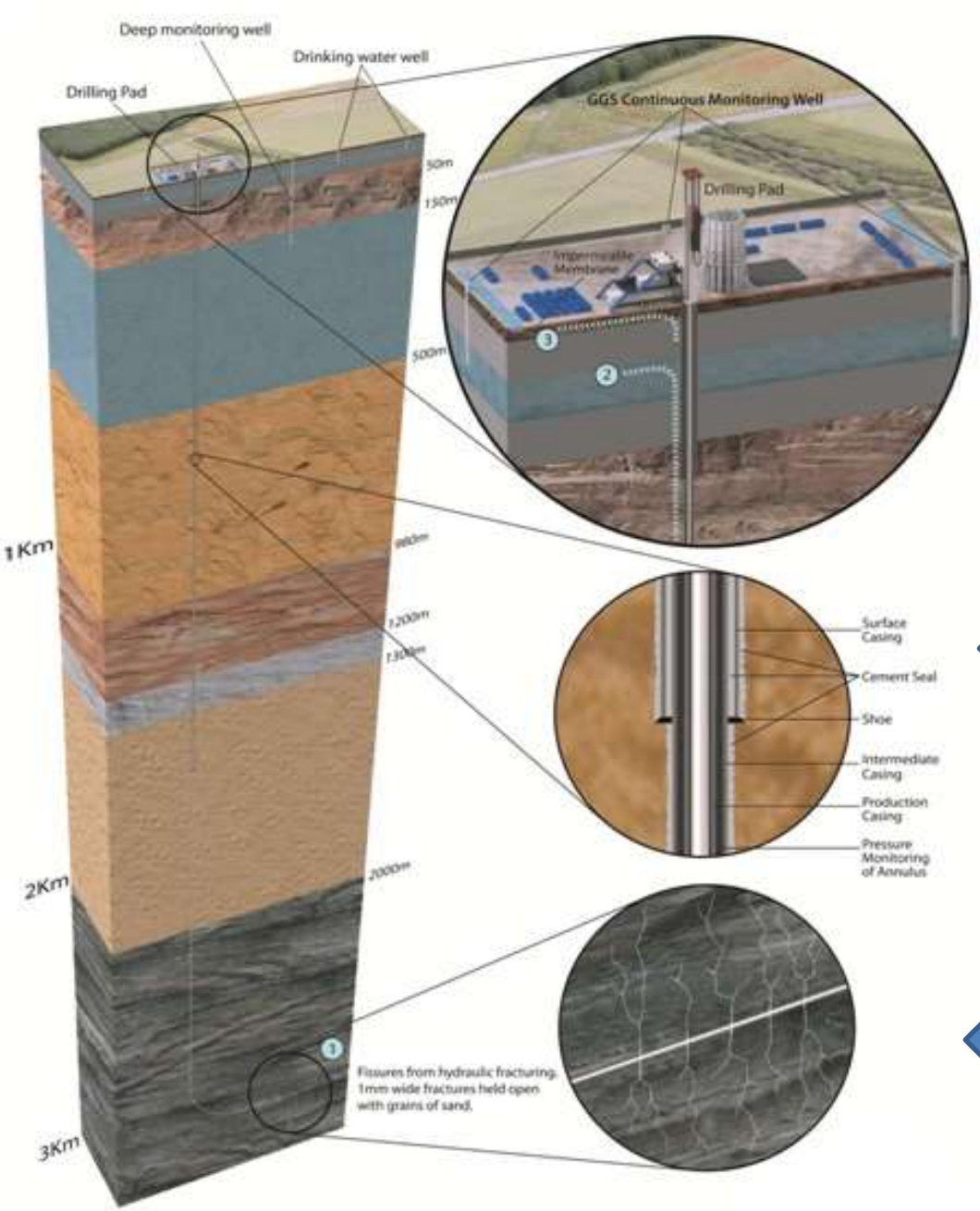
What is in the returned waters?

- heavy hydrocarbons
- naturally occurring radioactive materials (NORMs),
- a range of minerals and salts representative of the underlying natural geology,
- a small proportion of the proppants and lubricant substances, added prior to fracturing

Potential for contamination of groundwaters

Questions to be answered/posed:

- What is in the fracture fluid?
- What is in the returned waters?
- What are the risks to groundwaters?



Spills, inadequate storage, transport of returned waters etc

Contamination due to poor well design or failure

Contamination due to mobilisation of solutes or methane

Treatment of flowback and produced water

How can the water be treated?

- Can it go to Wastewater treatment works?
- Transport (tankers or sewer capacity) and Volume

What's the potential for reuse?

- Salinity, scale formation, pH, NORMs, Gases entrained
- European Mining Waste Directive (on-site use)

Potential for Off-site inundation or Flood risk?

- appropriate design and siting (constructional detail)

Conclusions of Jan14 Review

- Water and sewerage companies should become statutory consultees in the shale gas planning process. Proposed (Infrastructure Bill)

- The importance of baseline monitoring cannot be overstated. Has been acknowledged widely.

- The protection of groundwater must be made a priority. Precautionary Principle applied by EA.

Further Technical Evaluation

- The industry and regulator to work closely to identify solutions to reuse of hydraulic fracturing fluid on site.

- Further research (BGS, OUGO, EA/SEPA/NRW) is needed into:
  - hydraulic fracturing with lower quality waters;
  - waterless techniques to minimise water use and thus requiring less subsequent treatment;
  - water treatment and decontamination technologies that exhibit reduced energy consumption;
  - onsite and mobile treatment solutions that reduce the risks of transporting waste.

Further activity/advice from CIWEM

Report: www.ciwem.org/shalegas

Policy Position Statement: www.ciwem.org/fracking

- Intention to Update or Review the PPS later in 2015
- UKOOG call for Wastewater specialists from CIWEM

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