

Health and Environmental Implications of Shale Fracturing for Natural Gas

HEAL AGM EVENT

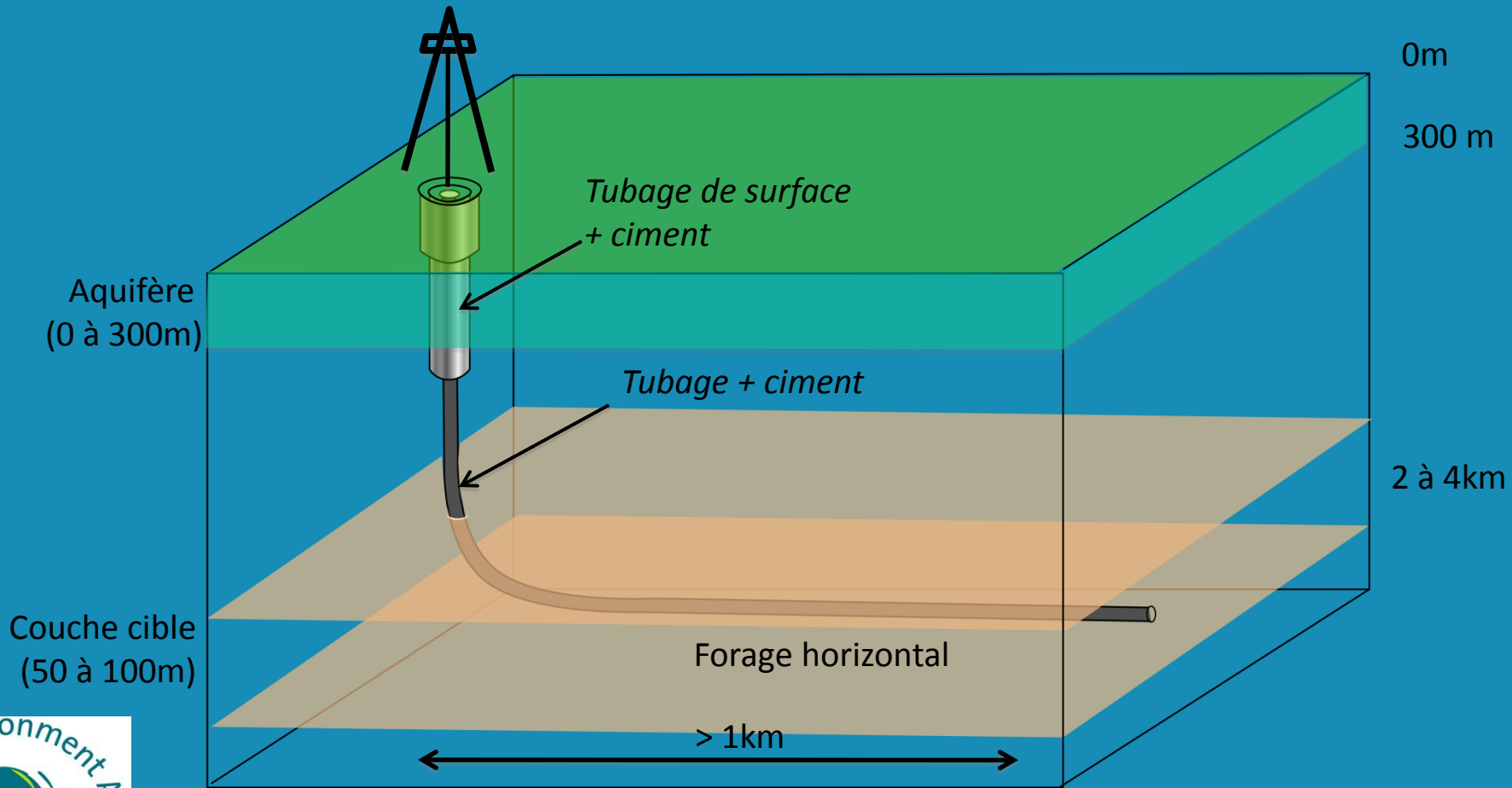
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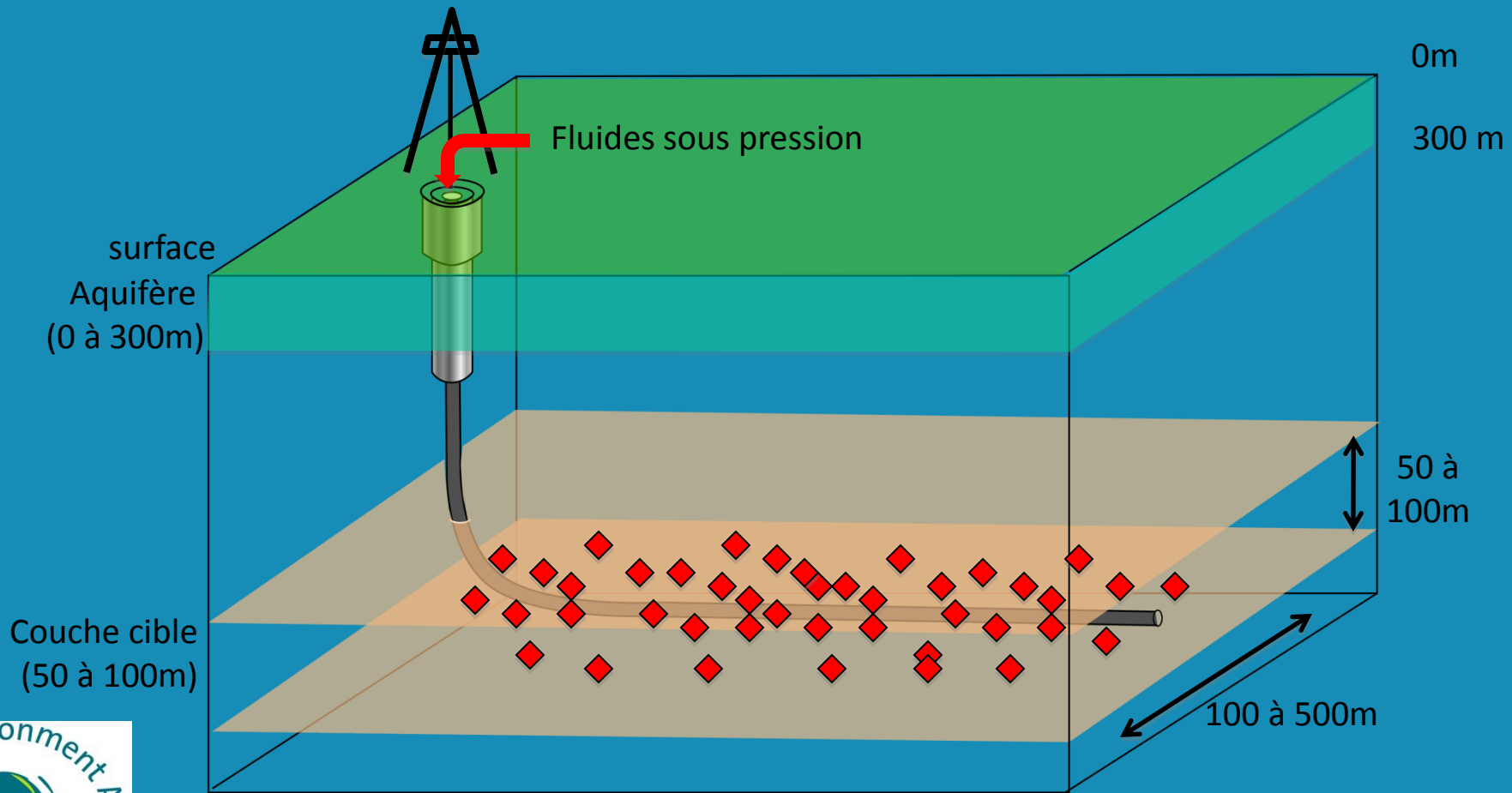
Méthode d'extraction

1- Forage parallèle à la couche pour optimiser la surface de contact avec les argiles



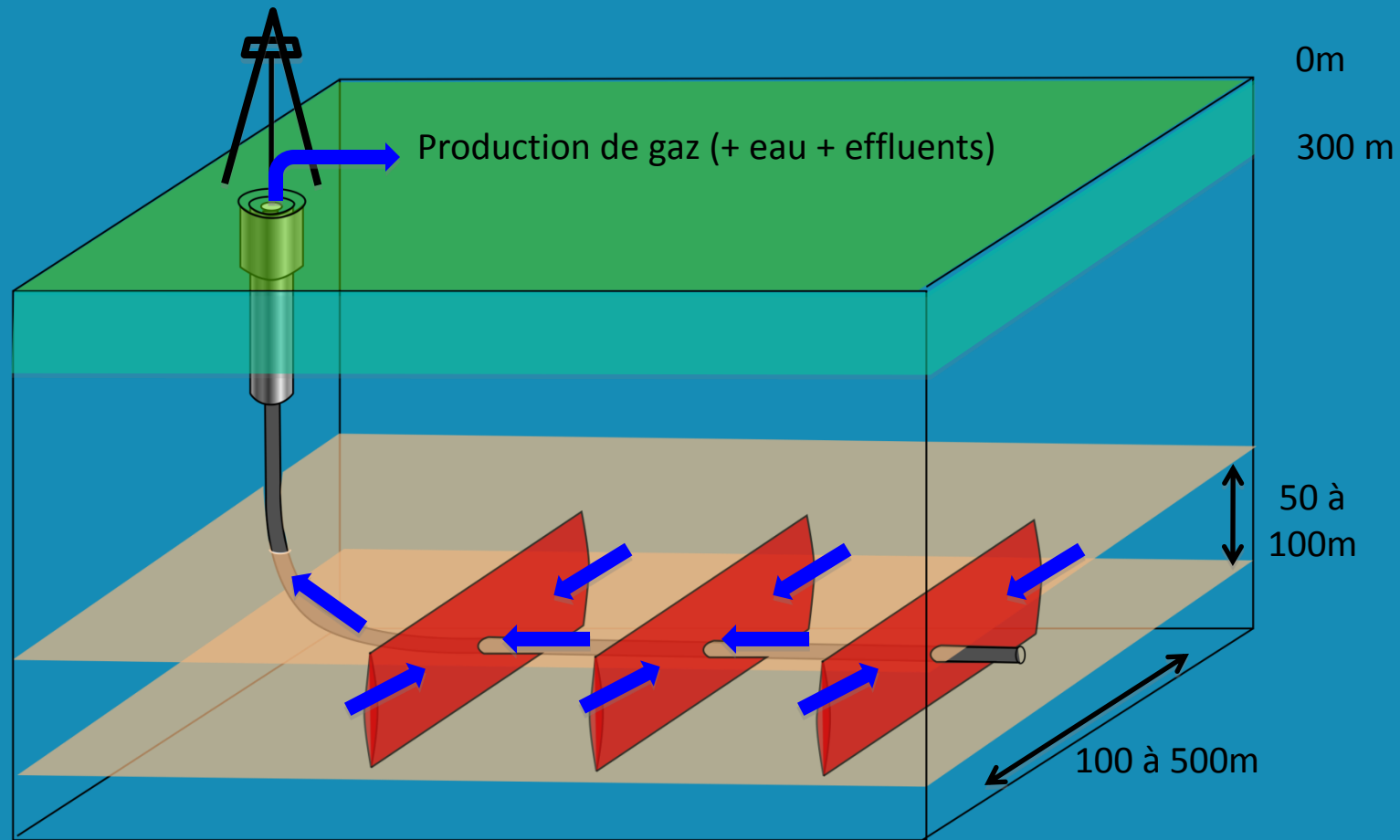
Fracturation hydraulique

2- fracturation de la couche pour favoriser la perméabilité et l'écoulement du gaz



Augmentation de la pression fluide => rupture de la roche => microsismes autour du forage

Fracturation hydraulique



Formation de fractures contenues dans la couche = fractures hydrauliques

Current overview of known companies with European unconventional gas positions

IOC's:	XOM, Shell, COP, Total
Large E&P Co's:	MRO, Devon, Nexen, BG
State Oil Co's:	OMV, MOL
European Utilities	Centrica, GDF Suez
Niche players	Eurenergy; Falcon, Lane



Environmental Health Implications



Climate Change

Water Contamination (Toxic Chemicals)

Air Pollution (UFP, VOCs, other Chemicals)

Soil / Underground Pollution (Chemicals)

Earthquakes / Vibrations

Accidents (fires, explosions, gas & chem ems)

Noise Pollution

Workers Health

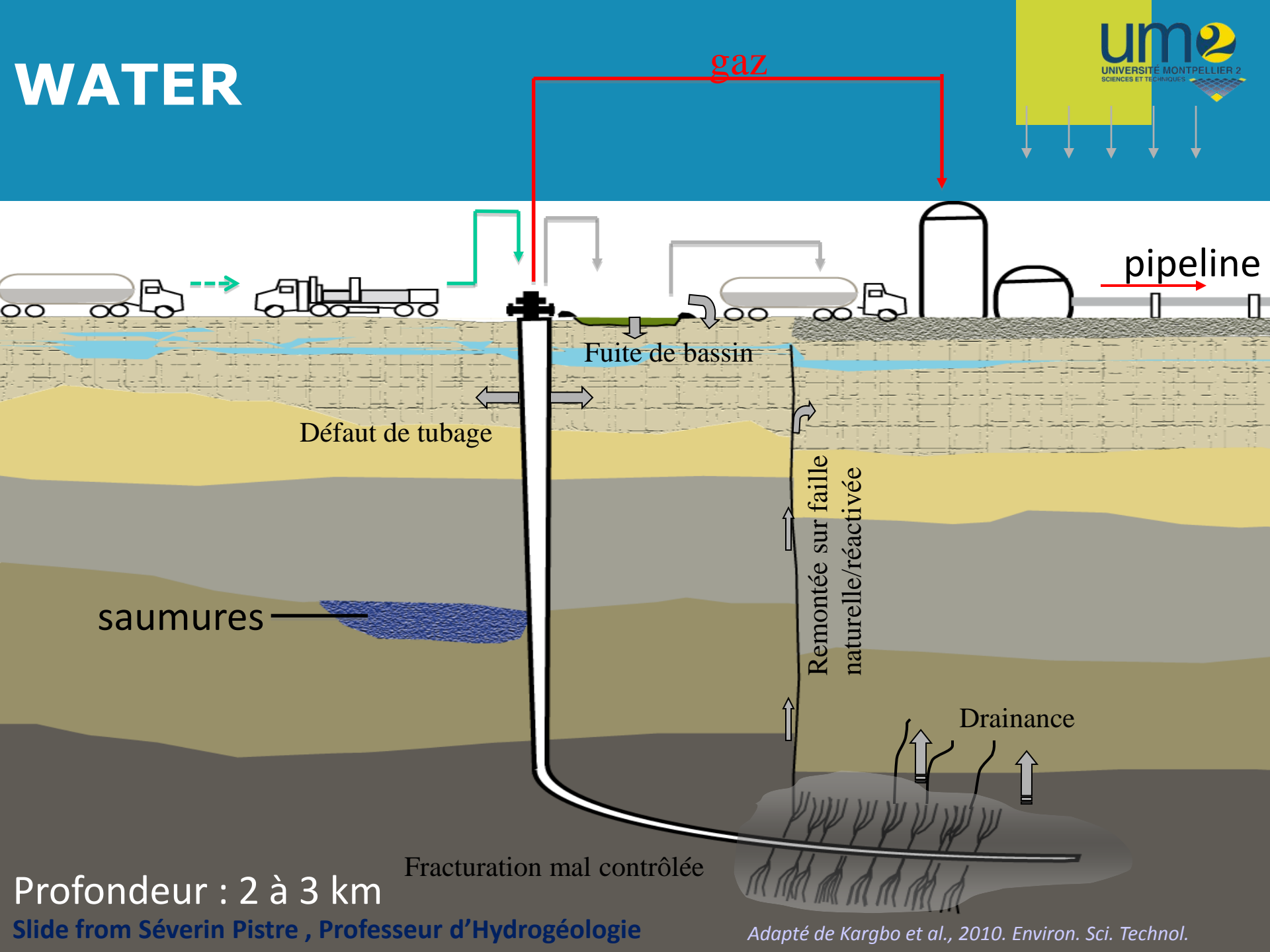
CLIMATE

Fugitive Methane Emissions

CO₂ content & 'expenditure'

SHORT TERM impact (in next 20 years)
- see Howarth study

WATER



Profondeur : 2 à 3 km

Slide from Séverin Pistre , Professeur d'Hydrogéologie

Adapté de Kargbo et al., 2010. Environ. Sci. Technol.



USE Huge use of water

CONTAMINATION

Fracking chemicals (toxics)

Naturally occurring radioactive materials

Naturally occurring heavy metals

New toxics from inter-actions of above

BY Accidents, Spills, Leaks, Earthquakes

TO Surface Water, Underground Aquifers

FROM Equipment, Wells, Fractures

ALSO Interaction with Water Disinfectants

AIR

Combustion/exhaust fumes; Chems Ems

Trucks

Drilling equipment (venting well heads)

Evaporating fracking chemicals

Evaporating chems from underground

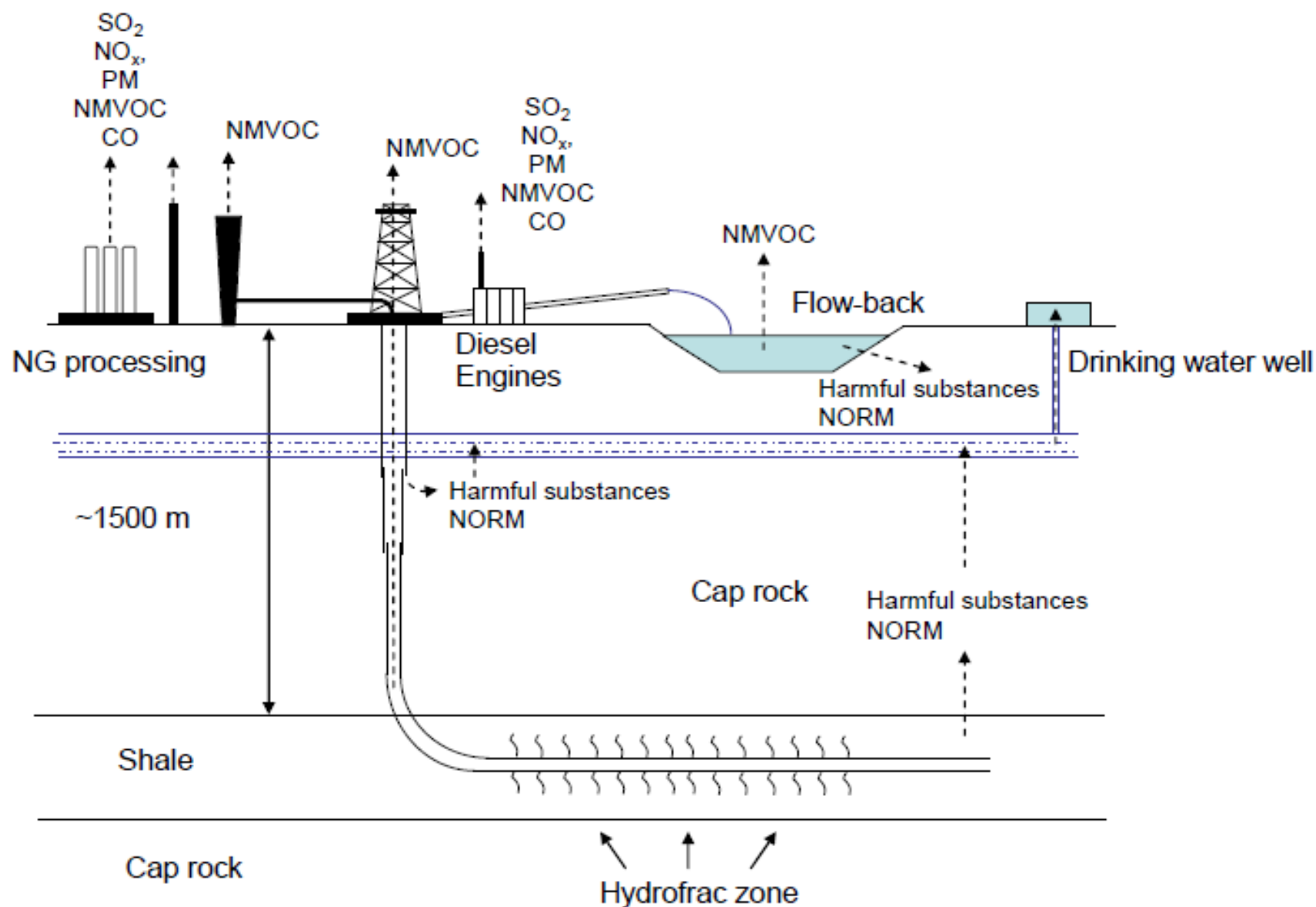
Evaporating Waste Water (flowback)

Ultrafine particles, SO₂, Nox, VOCs, Methane





Figure 1: Potential flows of air pollutant emissions, harmful substances into water and soil, and naturally occurring radioactive materials (NORM)



LAND / UNDERGROUND

Soil contamination by

Fracking chemicals

Heavy Metals from underground

Radioactive Materials from underground

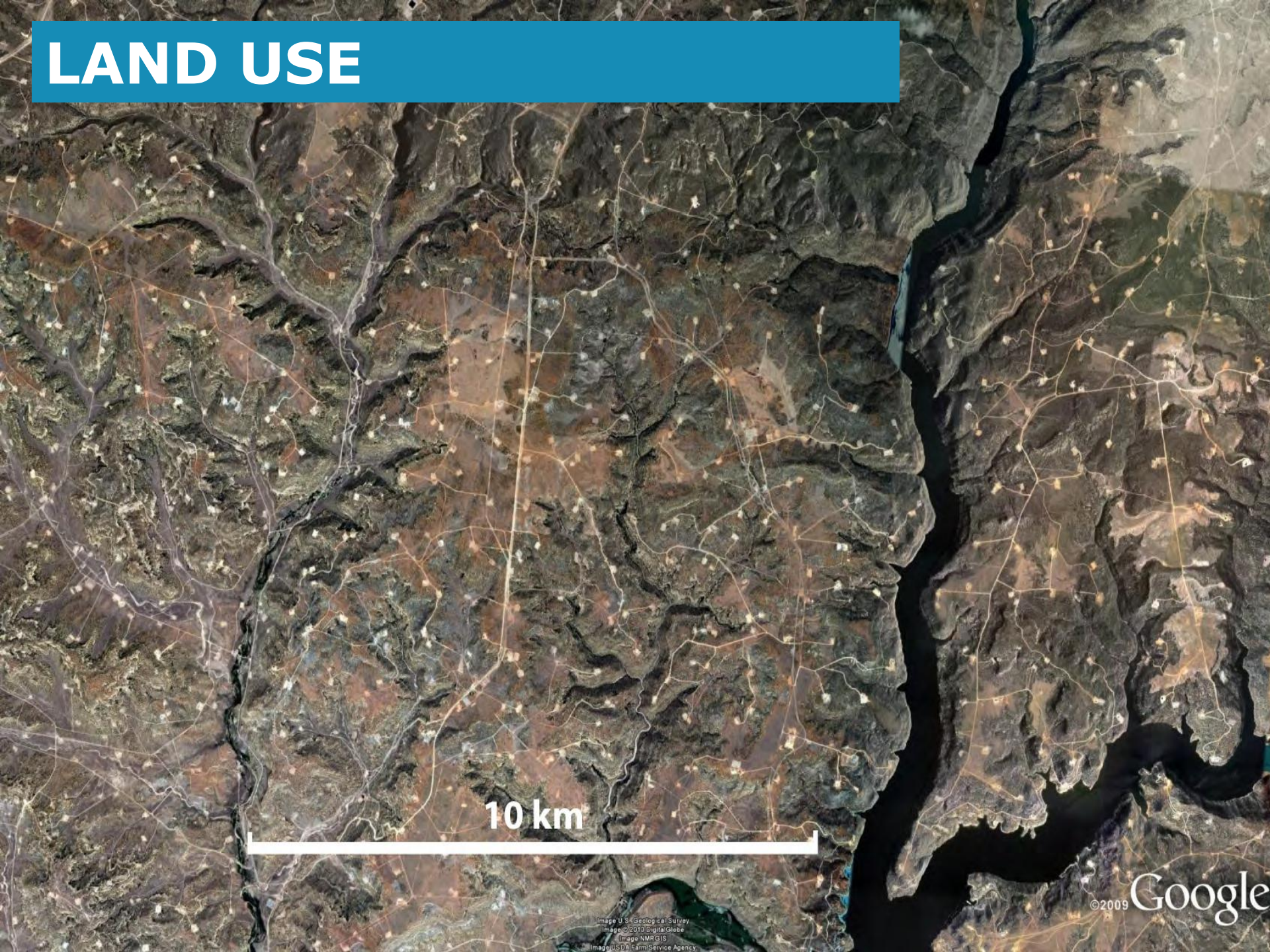
New toxics

Change of Land cover / Biodiversity impacts

Underground – chemicals in ‘undetected pathways’



LAND USE



10 km

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Image NMR GIS
Image © USDA Farm Service Agency



OTHER



Earthquakes

New pathways for water contamination

Home / Infrastructure damage

Land damage

Accidents

Explosions, tank & pit fires,

Well blowouts

On transport roads outside side

Landfills of Wastes

Noise Pollution

Engines, Trucks

Occupational Health

Environmental Health Impacts



Adult:

CANCER

bladder, lung, breast, colon

STROKE

MISCARRIAGE

DIABETES

PREMATURE DEATH

Children:

PREMATURE BIRTH

ASTHMA

COGNITIVE DEFECTS

STUNTED LUNG DEVELOPMENT


EU Parliament STUDY



DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT
ECONOMIC AND SCIENTIFIC POLICY **A**

Economic and Monetary Affairs	
Employment and Social Affairs	
Environment, Public Health and Food Safety	
Industry, Research and Energy	
Internal Market and Consumer Protection	



**Impacts of shale gas and
shale oil extraction on the
environment and on human
health**

Environmental impacts
Greenhouse Gas Balance
EU Regulatory Framework
Role in Low Carbon Future
Recommendations

- Get analysis of EU laws
- Consider *comprehensive* EU directive on Fracking
- Use CBA with LCA
- Numerous specific reccs

HEAL Recommendations

PRECAUTION

POLLUTER PAYS

RIGHT TO KNOW / RIGHT TO PARTICIPATE

SUBSTITUTION / ALTERNATIVES

HAZARD ELIMINATION



Thank you for your attention!

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