



ORFEUS OBSTACLE DETECTION TECHNOLOGY FOR HORIZONTAL DIRECTIONAL DRILLING

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GRTgaz/RICE

HOST ASSOCIATION



PROUDLY SUPPORTED BY



HOST PARTNERS

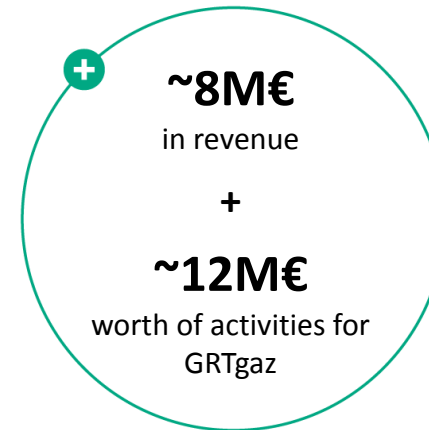
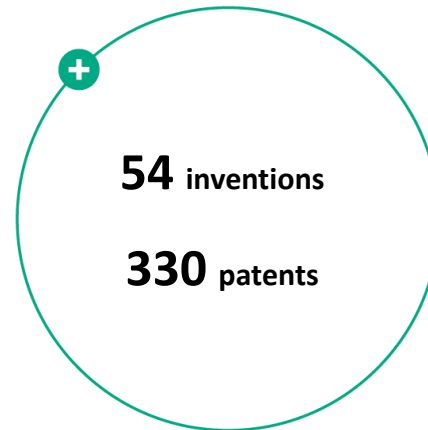


PRINCIPAL SPONSORS



RICE : Research & Innovation Center for Energy

Key figures



Pipelines Lab



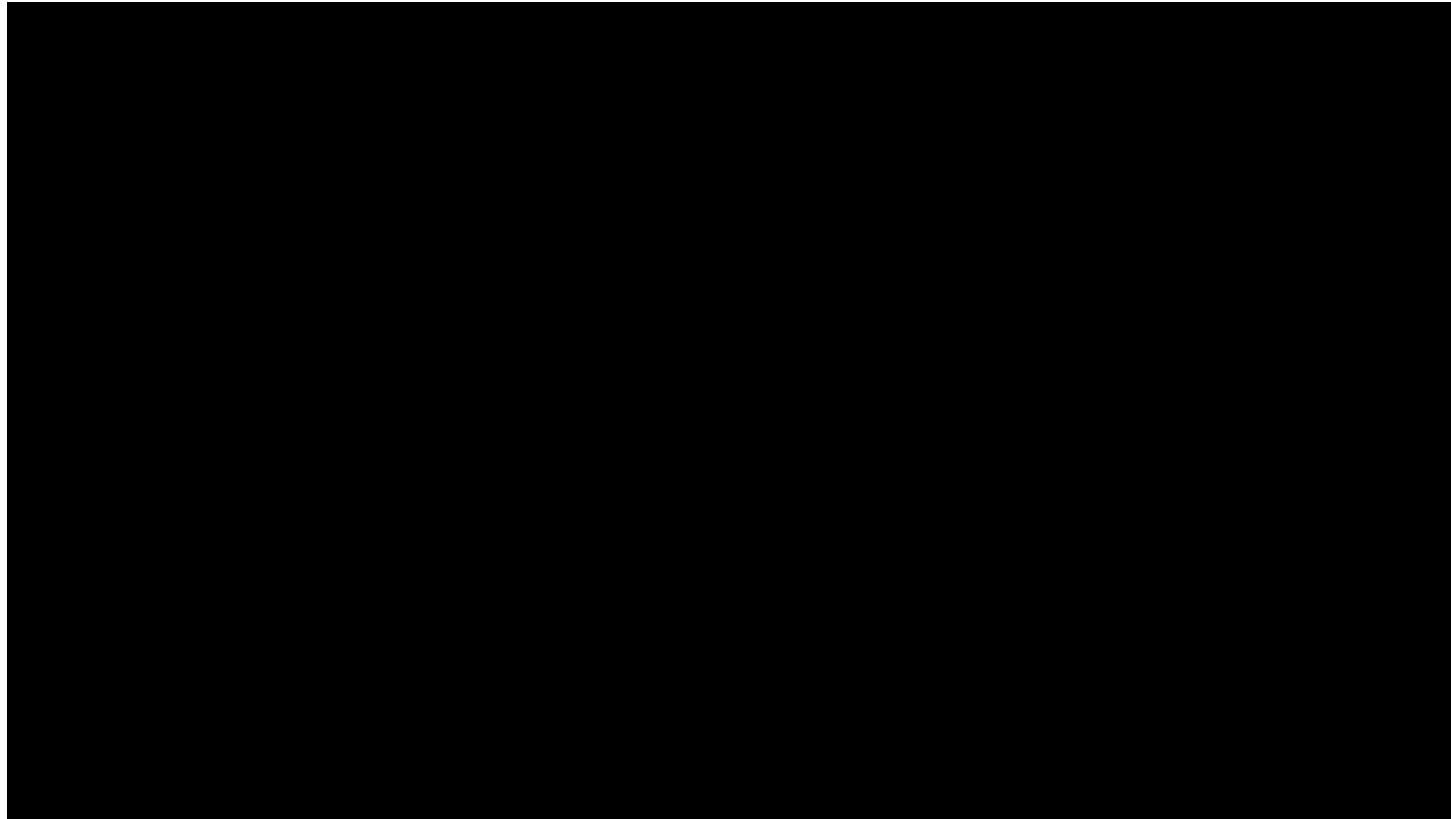
Gas Analysis Lab



Metrology & Test Center



Orfeus in action



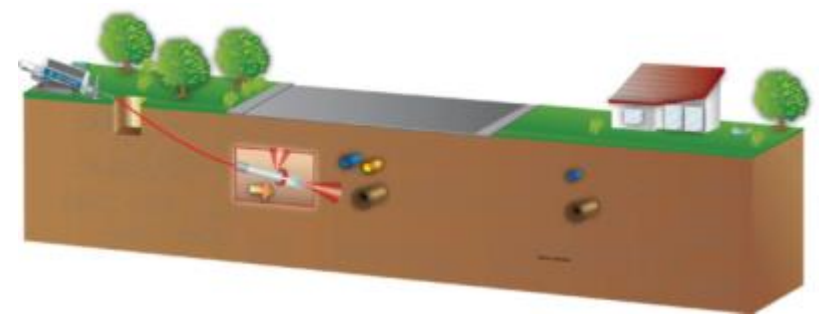


What is Orfeus ?

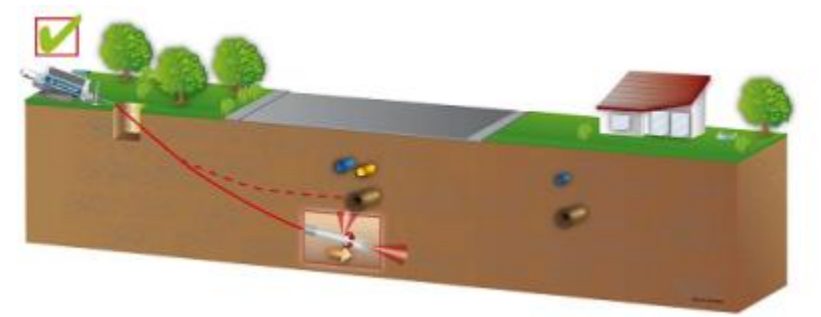
ORFEUS : Operational Radar For Every drill string Under the Street

















Detection of object by the GPR bore head



Visualization and drilling deviation



Orfeus partner

	Partner	Country	Role
	Osys Technology limited	UK	Coordinator / Electronics
	Wellington Associates	UK	Innovation advisory
	IDS	Italy	GPR design and manufacturing
	Tracto Technik (TT)	Germany	Manufacturer of horizontal drilling machine
	RICE	France	Referrer / End User
	Exergia	Greece	Communication
	Vilkograd	Slovenia	Civil engineering company
	Euram Ltd	UK	Budget Management
	Dublin city	Ireland	Referrer / End User
	J&P Geo	France	Consultant
	Florence Engineering	Italy	Tilt sensor design
	Gas Technology Institute	US	Coordinator / Demonstration US
	OTD	US	Funder for US site demo
	PG&E Company	US	Referrer / End User

Orfeus system

- **Orfeus system is made with:**

- Bore head
- Radar antenna
- Electronics housing
- Angular position sensors and signal transmission



And:

- Software for signal and GPR treatment



Orfeus radar software



Focus on La Courneuve test site

Overview of test sites:

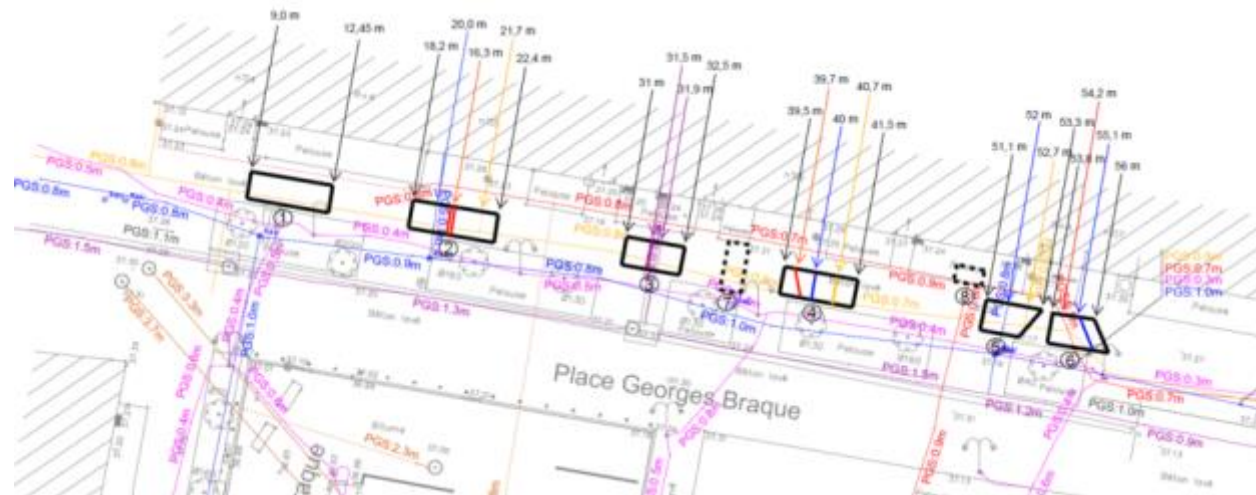
Location : Place Georges Braque, La Courneuve, 93120

Pipe laid : Water pipe PE 125 mm OD

Drilling length : Average of 75 m

Depth: Between 1.20 and 1.60 m

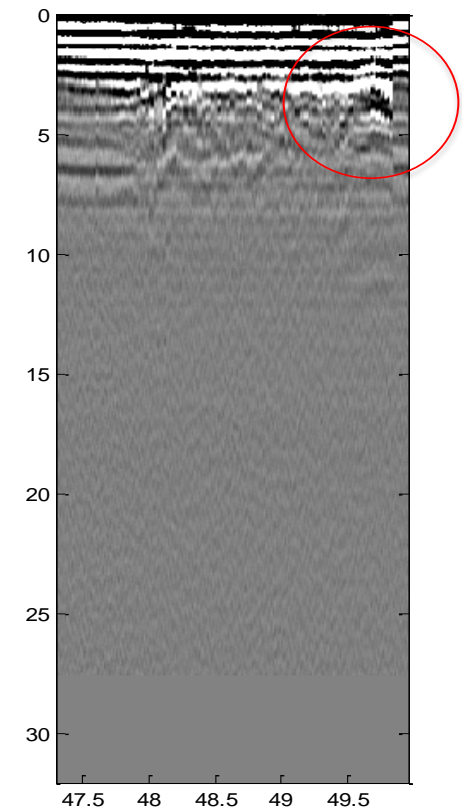
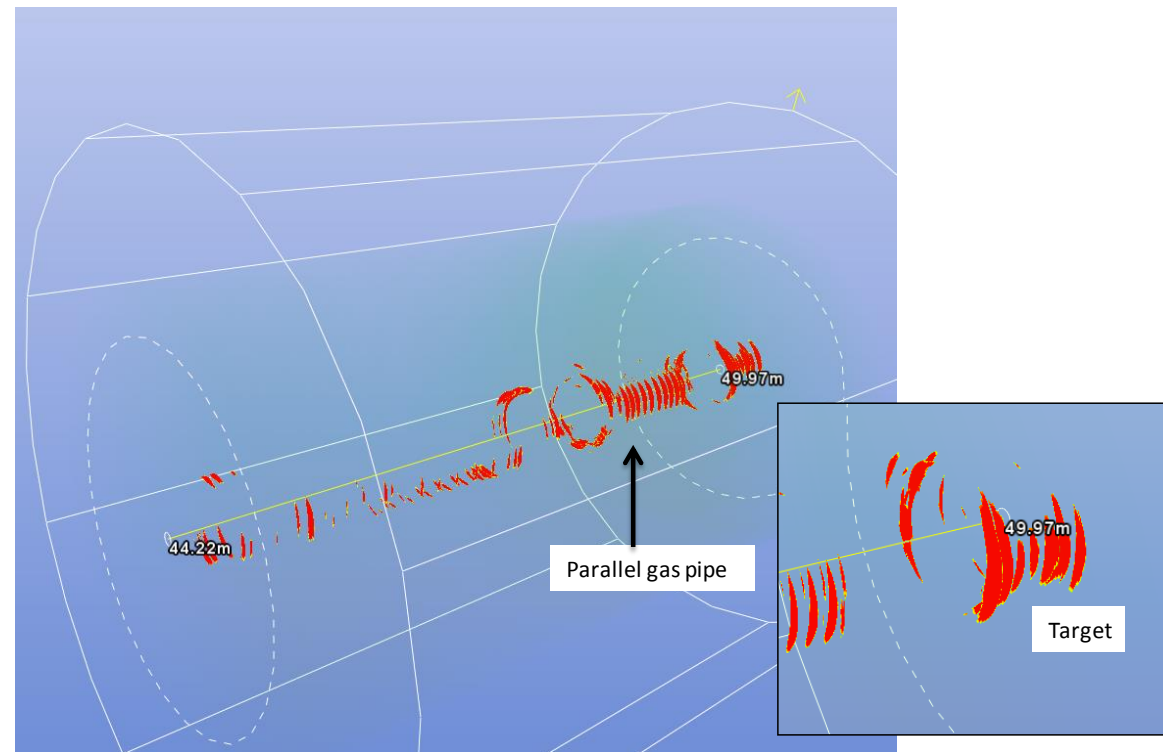
Difficulties: Lot of buried networks



Some results

Detection by ORFEUS of object on cartography ...or not

Radar data from la Courneuve, test site, section d 44m to 50m of the drilling :



Orfeus system in real site

Test of ORFEUS system :

- ❑ 3 test sites:
 - Lennestadt/Germany, Aire Y' RICE/France, PG&E facilities/US
- ❑ 3 real sites:
 - Stuttgart/Germany, La Courneuve/France, Sentjur/Slovenia

Validation of :

- ❑ Detection capacity and reliability of GPR in different kind of soil
- ❑ Communication part
- ❑ Performances of modified drill rod in bentonite
- ❑ Robustness (chocks and vibrations)
- ❑ Feedback of operators

Conclusions and perspectives

After the 6 test sites:

- Reliability of results
- Positive feedback of operators and subcontractors

For industrialization of ORFEUS system :

- Improvement of antenna position, to better detect obstacles in front of the antenna
- Detection of obstacles when not rotating
- Raise up detection length ($\approx 50\text{cm}$)
- Optimization of warning system

Funding from US, European & Brazilian DSO and PHMSA in order to reach industrialization within 2 years