



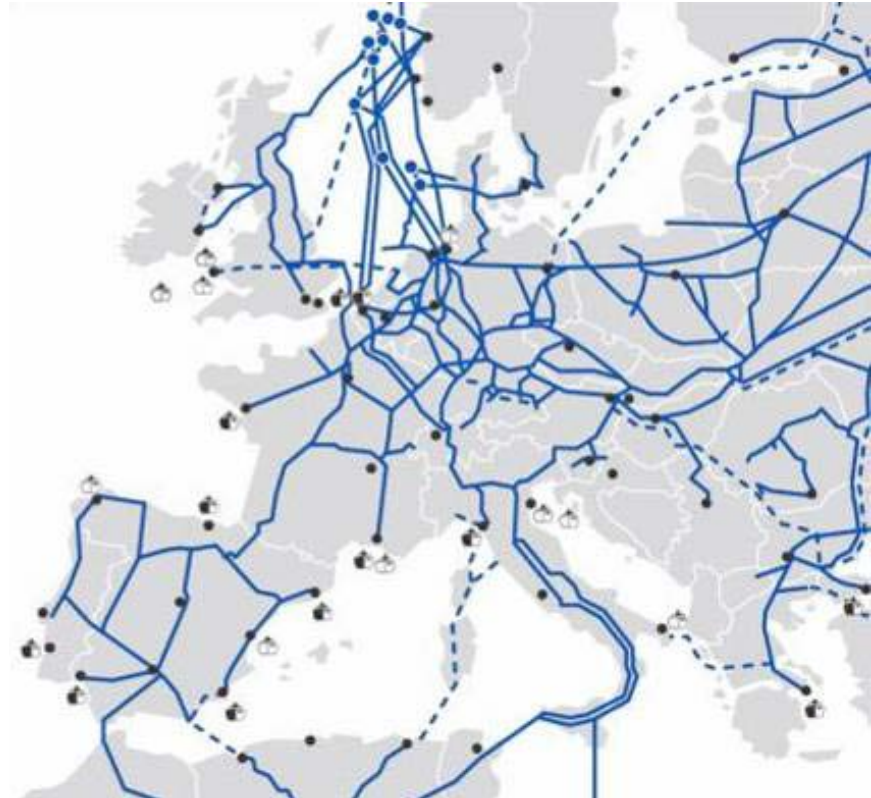
## Avoiding climate-damaging methane emissions during pipeline repairs

Krakow, October 14<sup>th</sup>, 2011

Christian Hadick (Pipeline Intervention) and Axel Scherello

## Reduction of natural gas emissions

Reduction of natural gas emissions during maintenance work on pipelines / at field stations



## Climate protection

### Methane

- 21 to 25 times higher impact on global warming, measured in terms of CO<sub>2</sub> (t/100a)
- 2<sup>nd</sup> most important anthropogenic greenhouse gas, Global Warming Potential (GWP)  
Value: 21 - 25

### Voluntary commitment by E.ON AG on climate protection

- (Corporate responsibility in environmental management)
- ➔ No requirements imposed anywhere in Europe (but voluntary commitments by gas suppliers)
- ➔ Evaluation of methane emissions (no CH<sub>4</sub> emission allowance trading)

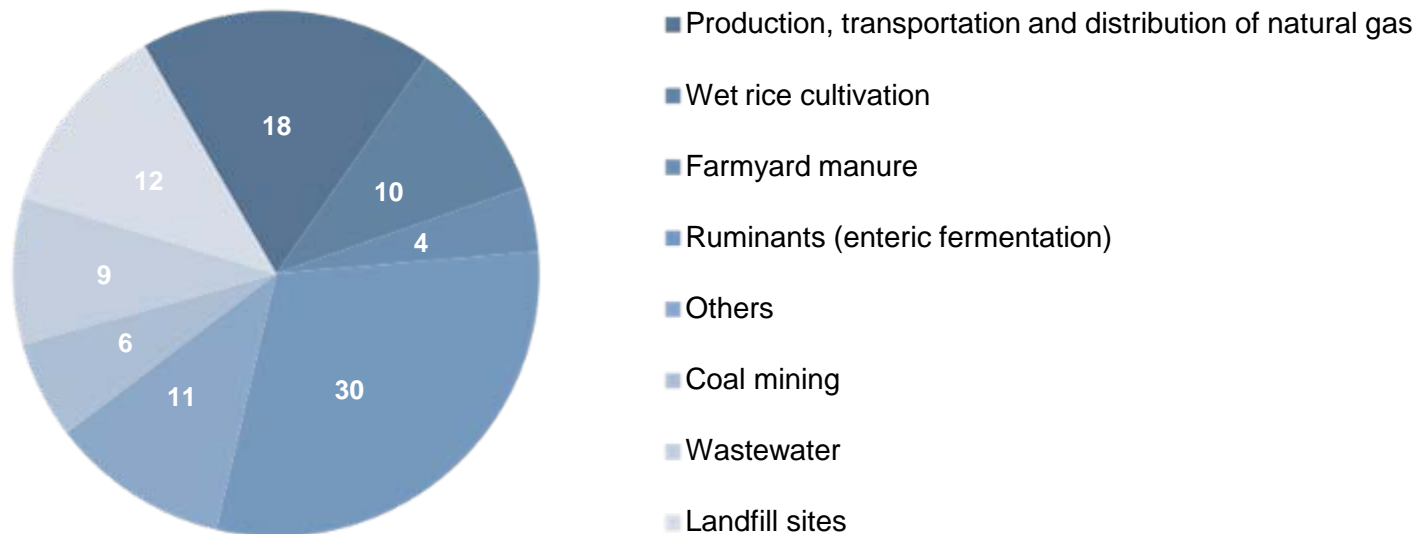
## Natural gas emissions

### Open Grid Europe experience

- 5 scheduled venting operations on the transmission pipeline system p.a. correspond to approx. 3 million m<sup>3</sup> of natural gas (2.2 kt of CH<sub>4</sub>) which equates to the annual gas consumption of some 1,500 households

### Comparison

- Global anthropogenic methane emissions by source (in %)

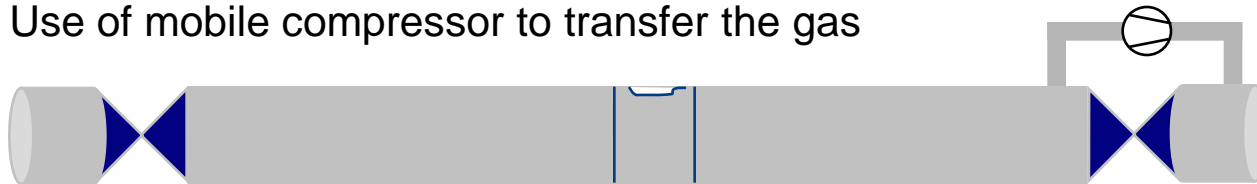


## Approaches to technical solutions

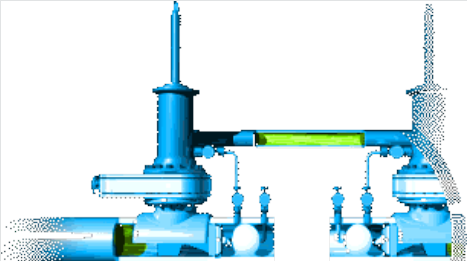

Use of stoppling method to reduce length of isolated pipeline section



Use of mobile compressor to transfer the gas

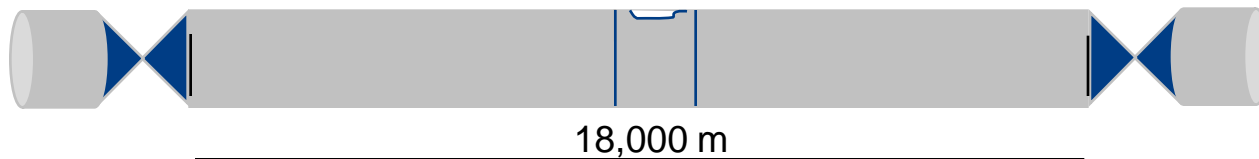


## Technologies available at Open Grid Europe

Stoppiling	Mobile compressor / Status today
	
<ul style="list-style-type: none"><li>↑ Equipment rated up to 100 bar (MOP) available at Open Grid Europe</li><li>↑ Vented gas volumes are reduced to a minimum</li><li>↑ Natural gas transmission is not interrupted</li><li>↓ costly</li></ul>	<ul style="list-style-type: none"><li>↑ Equipment available at Open Grid Europe</li><li>↑ Low venting losses</li><li>↑ Use of natural gas not vented allows cost savings</li><li>↑ Technology available for use at short notice</li></ul>

## mobile compressor - reduction of natural gas emissions and losses

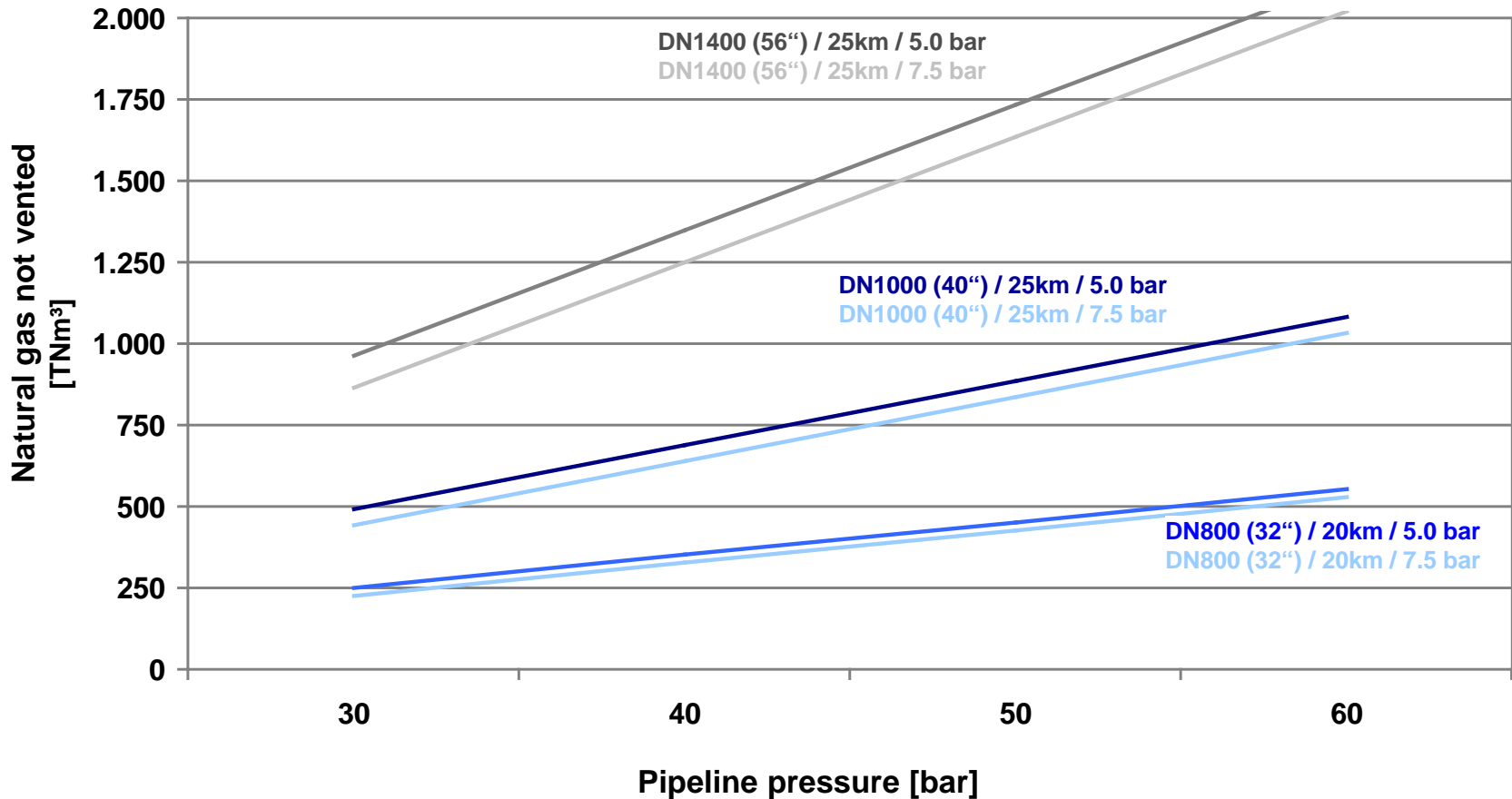
- Repair work on natural gas pipelines requires the lines to be depressurised down to atmospheric pressure, particularly when they have to be isolated. Using a mobile compressor allows the gas to be transferred from the isolated section into other pipelines or pipeline sections.
- ➔ Pipeline evacuated down to minimum residual pressures (6 bar)
- ➔ Methane emissions reduced by up to 90%
- ➔ Use of natural gas not vented to atmosphere
- ➔ High environmental protection effect



Example:

- An 18 km DN 1000 (40") pipeline section operated at 70 bar contains some 1 million Nm<sup>3</sup> of natural gas.

## Mobile compressor - Natural gas savings per project





## OGE requirements for mobile compressor

### Compressor

- Max. capacity, shortest possible transfer time

### Energy source

- Natural gas (autonomous unit)

### Safety

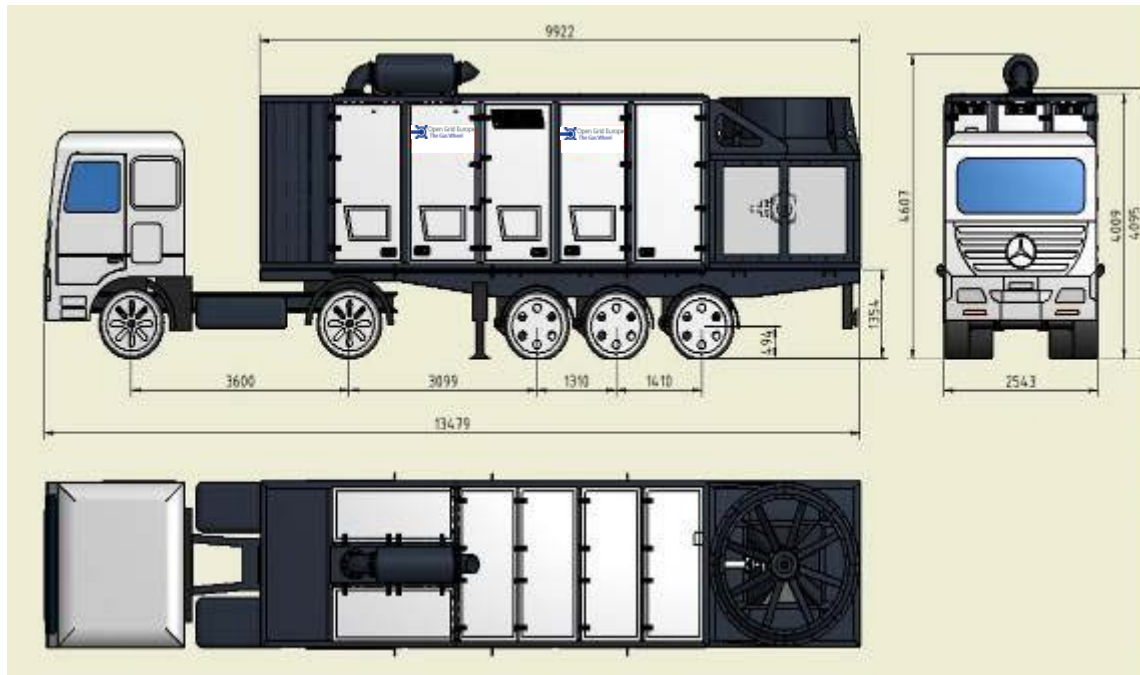
- Built according to applicable European and German codes and standards
- Discharge pressure protection (can be adjusted as required in line with MOP of pipeline)
- Discharge temperature protection
- Gas warning sensor
- Fire extinguishing system (Inergen)



## Mobile compressors – Technical data

Mobile (road-approved) natural gas transfer system

- Vehicle: Mercedes MB-1848 LS, 350 kW
- Dimensions: Length: 13.5 m; Width 2.55 m; Height: 4.0 m
- Weight: less than 40 t



## Mobile compressor built in cooperation with LMF

- LMF, the vendor retained by OGE, was willing to face up to the project's ambitious targets (maximum capacity, minimum weight and minimum evacuation time).
- The unit had the usual teething problems typical of prototypes. Thanks to decades of experience in gas engineering, these problems were resolved and the compressor made available for field use.
- The project has provided the most efficient mobile compressor unit currently available in Europe.



## Mobile compressor – Technical details

### Compressor

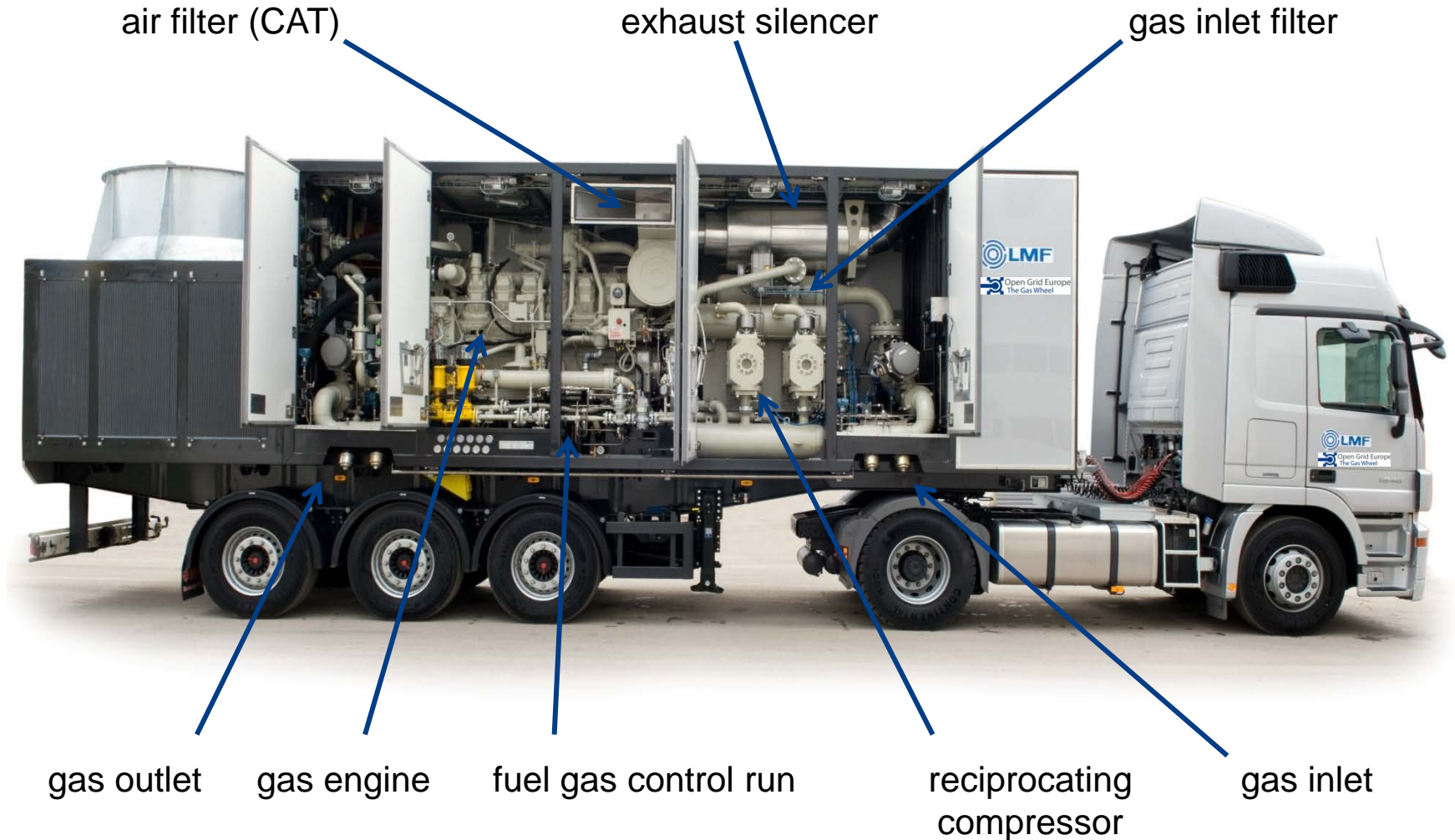
- Reciprocating compressor (LMF BS 604), two-stage, double-acting, 4x130mm
  - 640 kW (max.)
  - 2,200 – 61,000 Nm<sup>3</sup>/h (dependent on pressure ratio)
  - Suction pressure: 69 to 5 barg,
  - Max. discharge pressure. 70 barg

### Drive

- Gas engine (CAT G3512LE)
  - 750 kW (max.) at 1,400 rpm
  - Average fuel consumption:  
150 Nm<sup>3</sup>/h (250 Nm<sup>3</sup>/h max.)

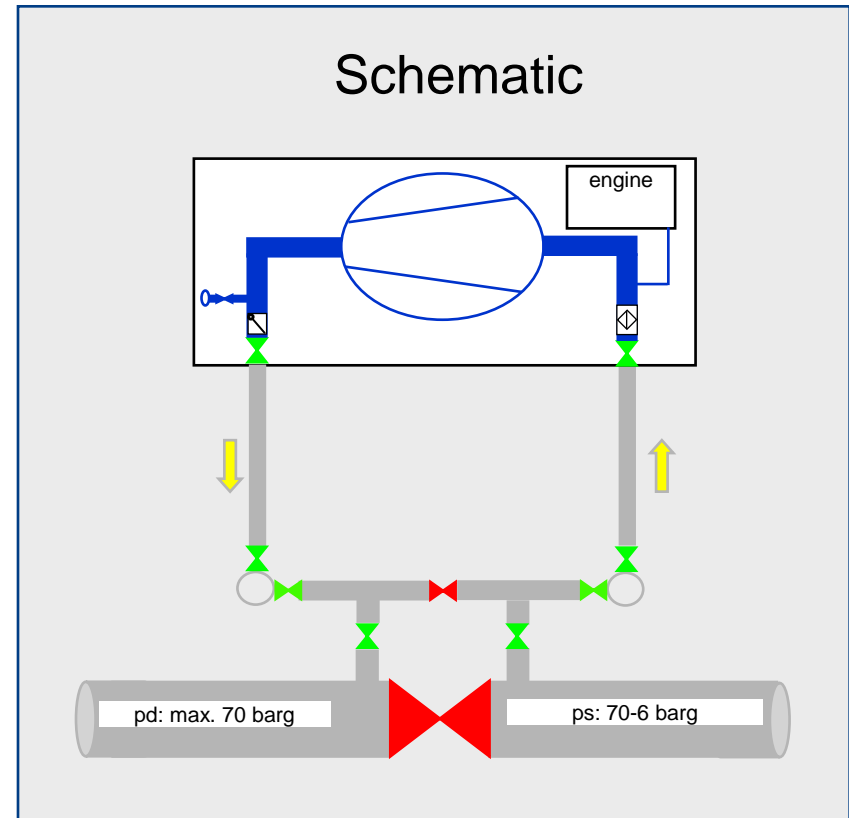


## Mobile compressor

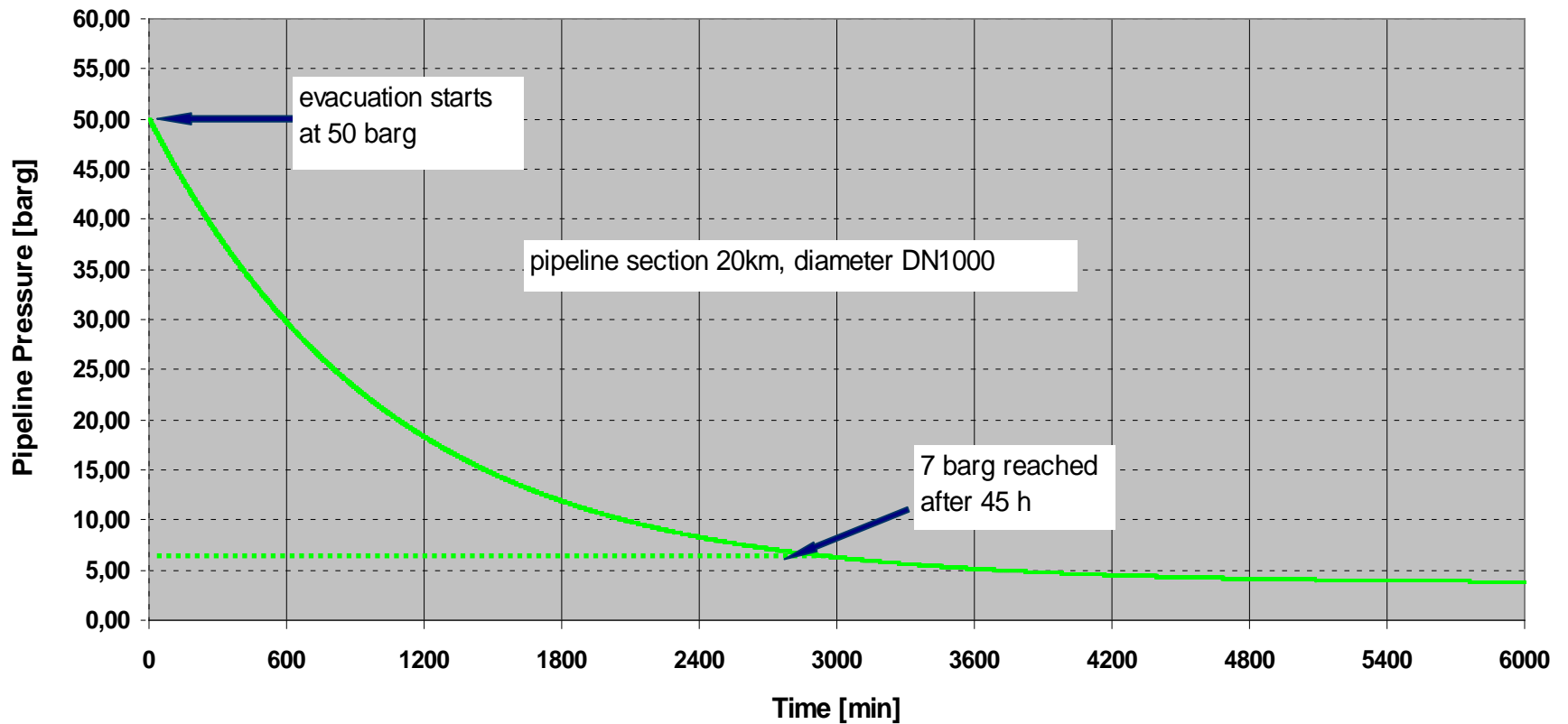


## Installation

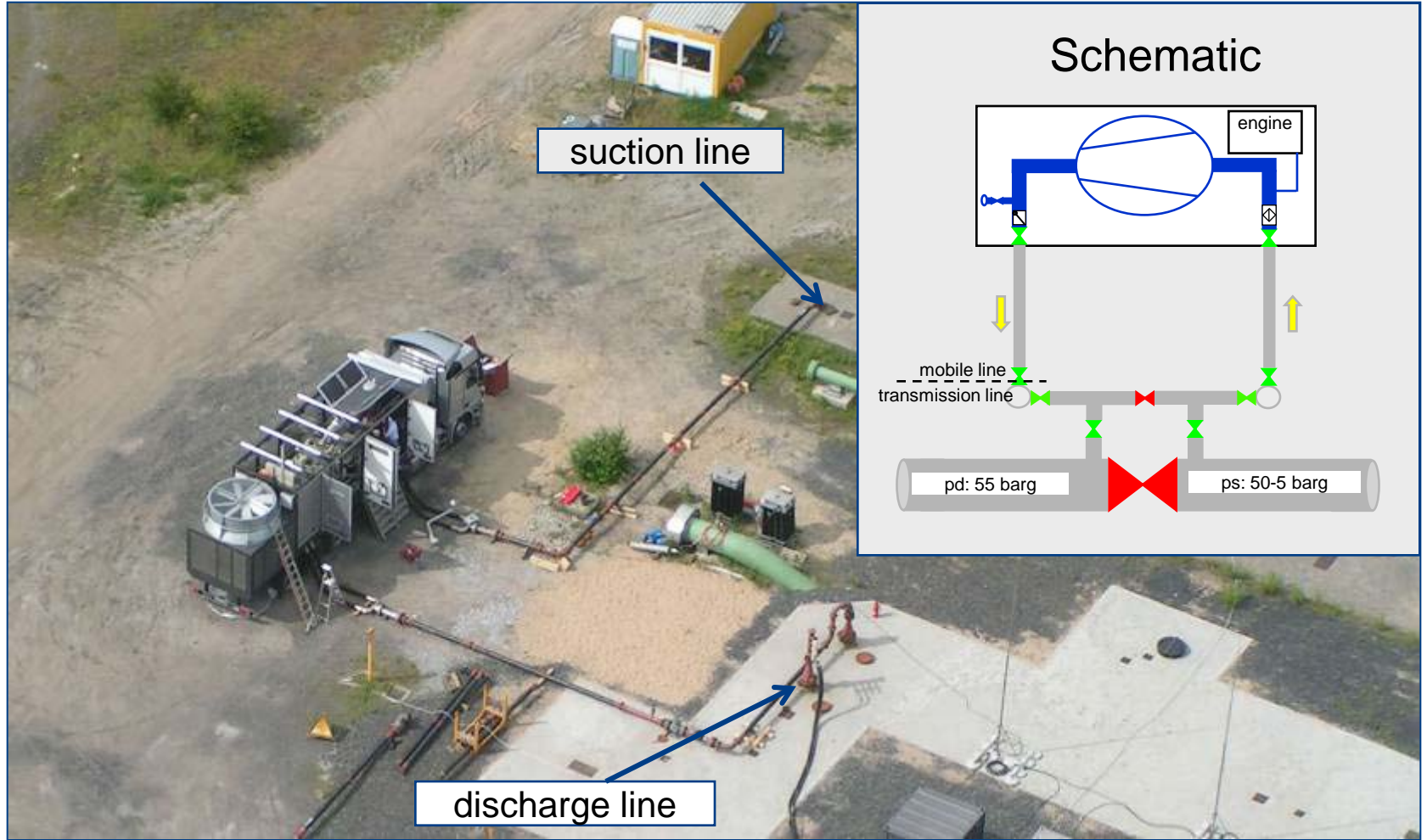
- Can be used to connect two different pipelines
- Can be installed on one pipeline as shown in the schematic
- Connecting fittings are retrofitted e.g. by hot tapping
- Min. diameter of connecting piece is 100 mm
- Adapters are available for different connecting pieces



# Mobile compressor Typical evacuation process



# Installation





## Reference projects in 2010

- Three projects on OGE pipeline system
- Natural gas volume transferred: approx. 1.5 million m<sup>3</sup>
- Avoided CO<sub>2</sub> equivalent: approx. 25,000 t
- Value of natural gas not vented to atmosphere: € 330,000



## Reference projects in 2011

- Four projects on OGE pipeline system
- One project each on Bayernets and GRTgaz systems
- Natural gas volume transferred: approx. 8.5 million m<sup>3</sup>
- Avoided CO2 equivalent: approx. 145,000 t
- Value of natural gas not vented to atmosphere: € 1,870,000





Open Grid Europe  
The Gas Wheel

I am pleased to answer your questions  
or contact  
[christian.hadick@open-grid-europe.com](mailto:christian.hadick@open-grid-europe.com)