

Gas Storage in Salt Caverns in the Netherlands



Natural gas storage in salt caverns

IGU - World Gas Conference
Amsterdam – June 6th, 2006

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Zuidwending

Presentation

on behalf of

Gasunie & NUON

Quirijn Hoelen - project manager

Gasunie

Project execution

- **General partnership between**
 - **Gasunie**
 - **NUON**

- **Salt concession holder**
 - **Akzo Nobel**

Essential requirements Dutch Gas Law

- **Combined construction and combined operation permitted**
- **Separate marketing of storage capacity required**

Objectives

■ Gasunie

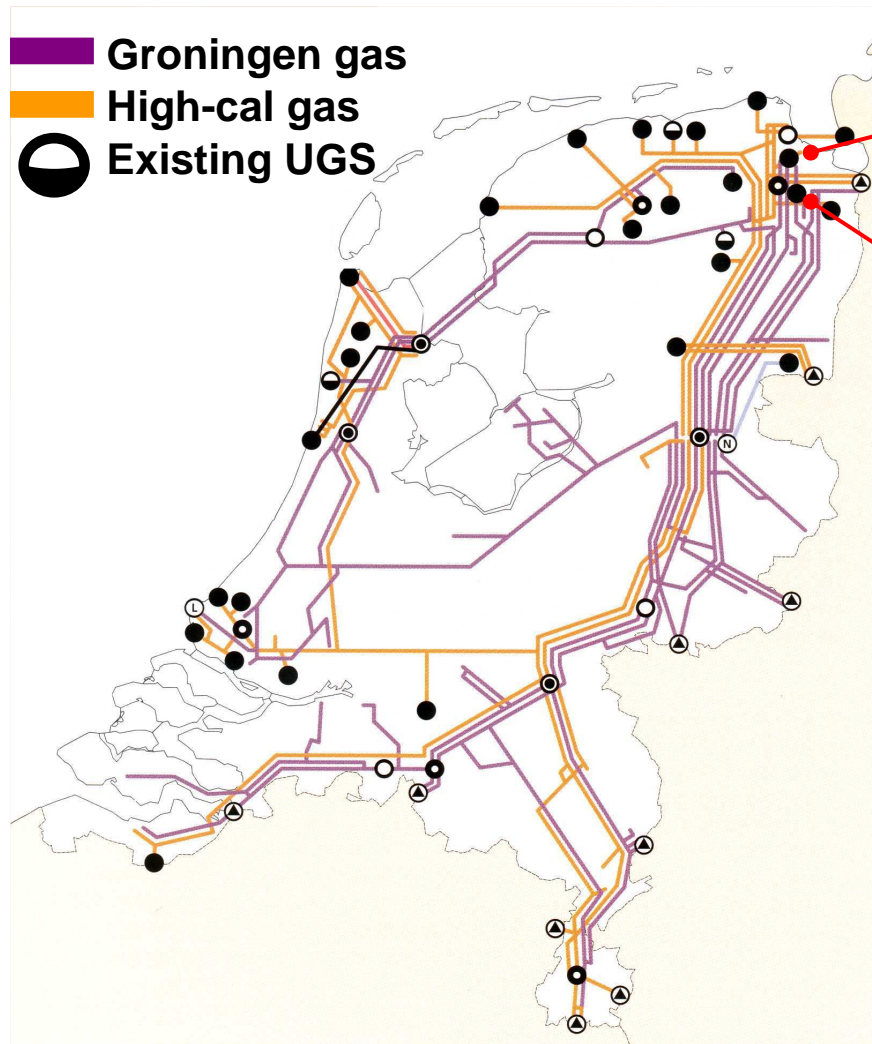
- **Flexibility for TSO for grid balancing**
- **Flexibility for third parties**

■ NUON Energy Sourcing

- **Cost reduction of own portfolio**
- **Trading possibilities**
- **Flexibility for third parties**

Why in Zuidwending ? and where can we find it ?



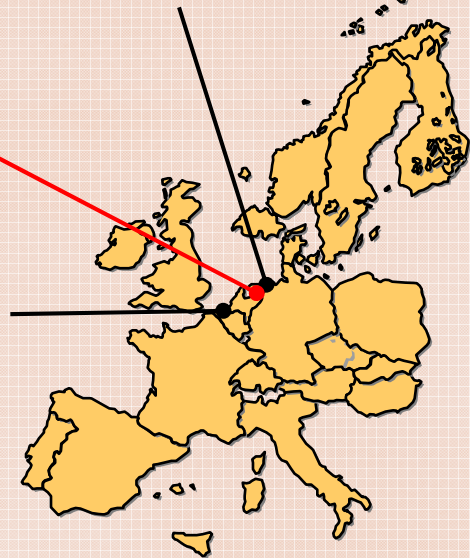


**Delfzijl – Akzo Nobel
Brine processing plant**

**Zuidwending
Gas Storage site**

Emden/Bunde hub

Zeebrugge hub



Gasunie - gas grid

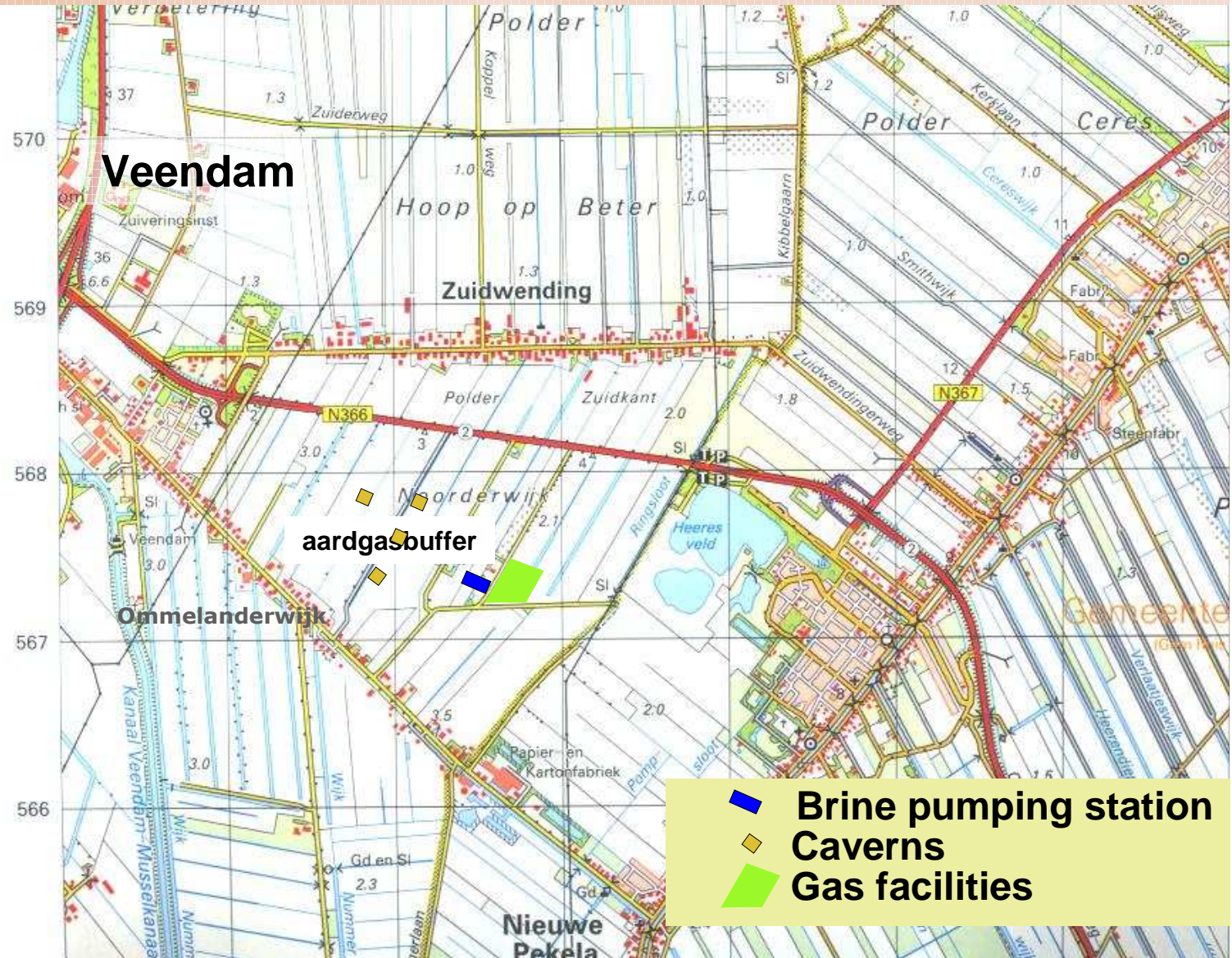
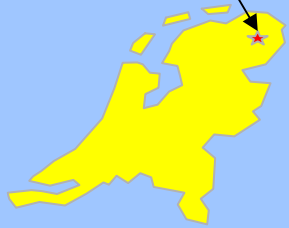


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- Salt dome with perfect salt quality
- Close to salt plant Akzo Nobel
- Close to Low- & High cal gas grid
- Close to HV - electricity grid

Location "Aardgasbuffer Zuidwending"

Zuidwending

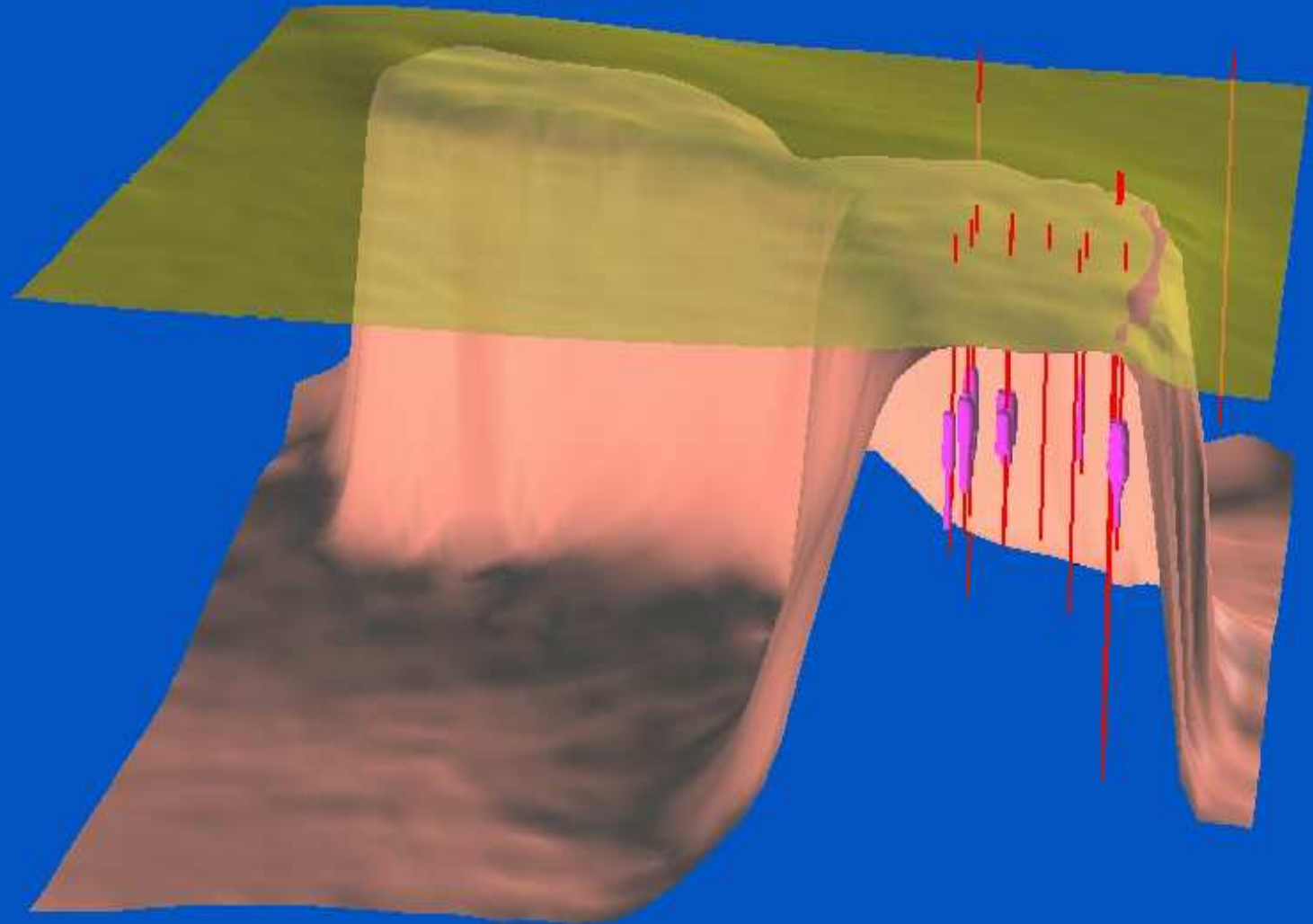


-  Brine pumping station
-  Caverns
-  Gas facilities

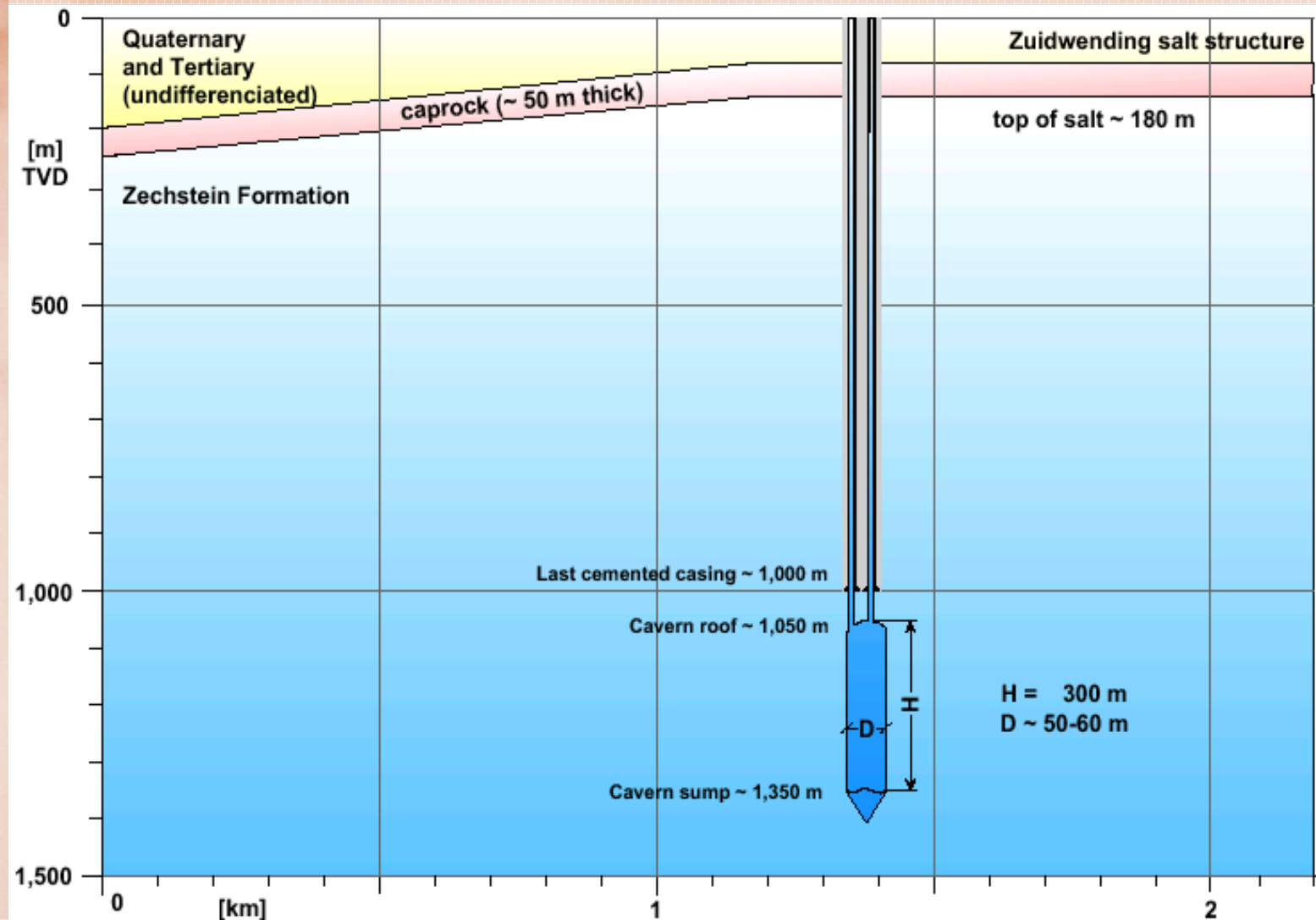
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Salt Dome Zuidwending



Main cavern parameters



Main Design Data

- **Number of caverns** : **4 (max 10)**
- **Wells per cavern** : **2**
- **Working gas volume** : **200 (max 900) mln m³**
- **Total send-out capacity** : **1.6 (max 2.6) mln m³/h**
- **Total injection capacity** : **1.0 (max 2.6) mln m³/h**
- **Compressor power** : **100 (max 150) MW**
- **Gas storage operational** : **end 2009 / mid 2010**

Progress up-to-now (1)

■ Engineering

- **Basic engineering package for leaching station**
- **Drilling & leaching programs**
- **First gas fill program**
- **Basic engineering gas facilities**

■ Procurement

- **Two drilling rigs contracted**
- **Casings, tubings, wellheads and bottom flanges ordered**
- **Specification for drilling services are being prepared**

Progress up-to-now (2)

■ Construction

- **Site preparation & four cavern platforms in progress**
- **Hp-pump & 33 kV- stations under construction**
- **Activities for laying two 110 kV power cables (6 km) 2nd half 2006**

■ Permits

- **All relevant permits granted**

Construction impressions









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Akzo Nobel pumping station











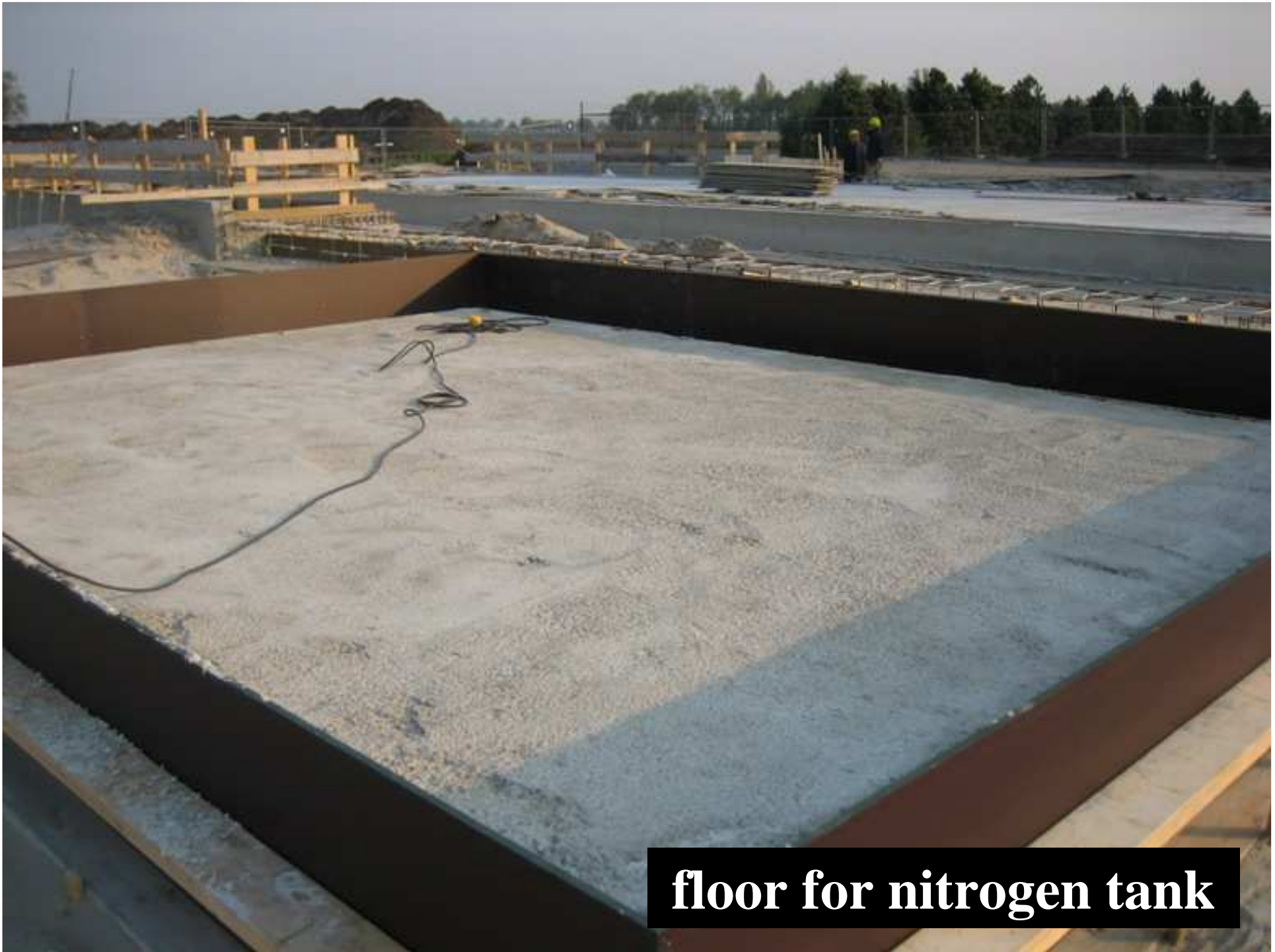
brine storage pit



32 " conductor pipes



conductor pipe 80 meter depth



floor for nitrogen tank



33 kV - High Voltage substation



floor of HV-substation

ITAG-drilling rig

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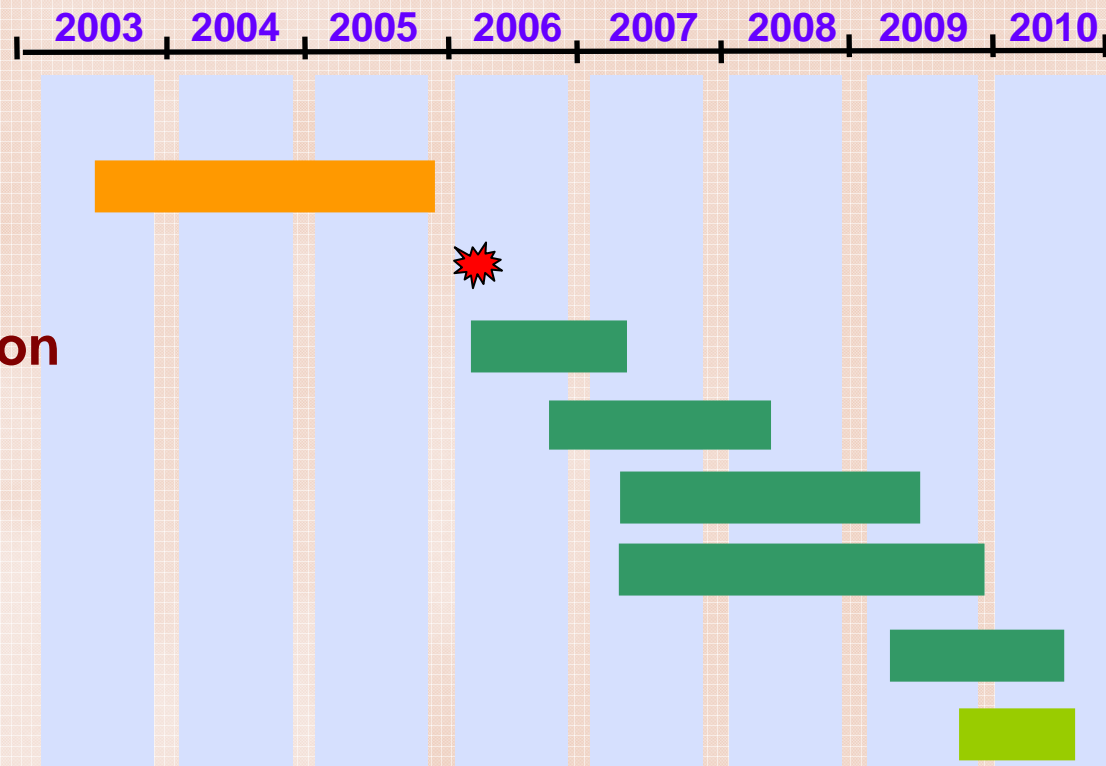
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Project Time Schedule

Pre- Project
Board Decision
Construction Leaching Station
Drilling
Leaching Process
Construction Gas Facilities
1st Gasfill
Operational



Thank you for your attention !

General partnership

- **Contract between partners**
- **Partners are jointly and severally liable for all debts**
- **No corporate capacity (unlike UK-Ltd, German - GmbH)**
- **Major decisions to be taken by partners acting together**
- **Certain tax benefits**
- **In the Zuidwending project, the general partners are special project companies (Dutch BV's, compared to UK-Ltd) limiting their activities to this project and hence their liabilities towards third parties**