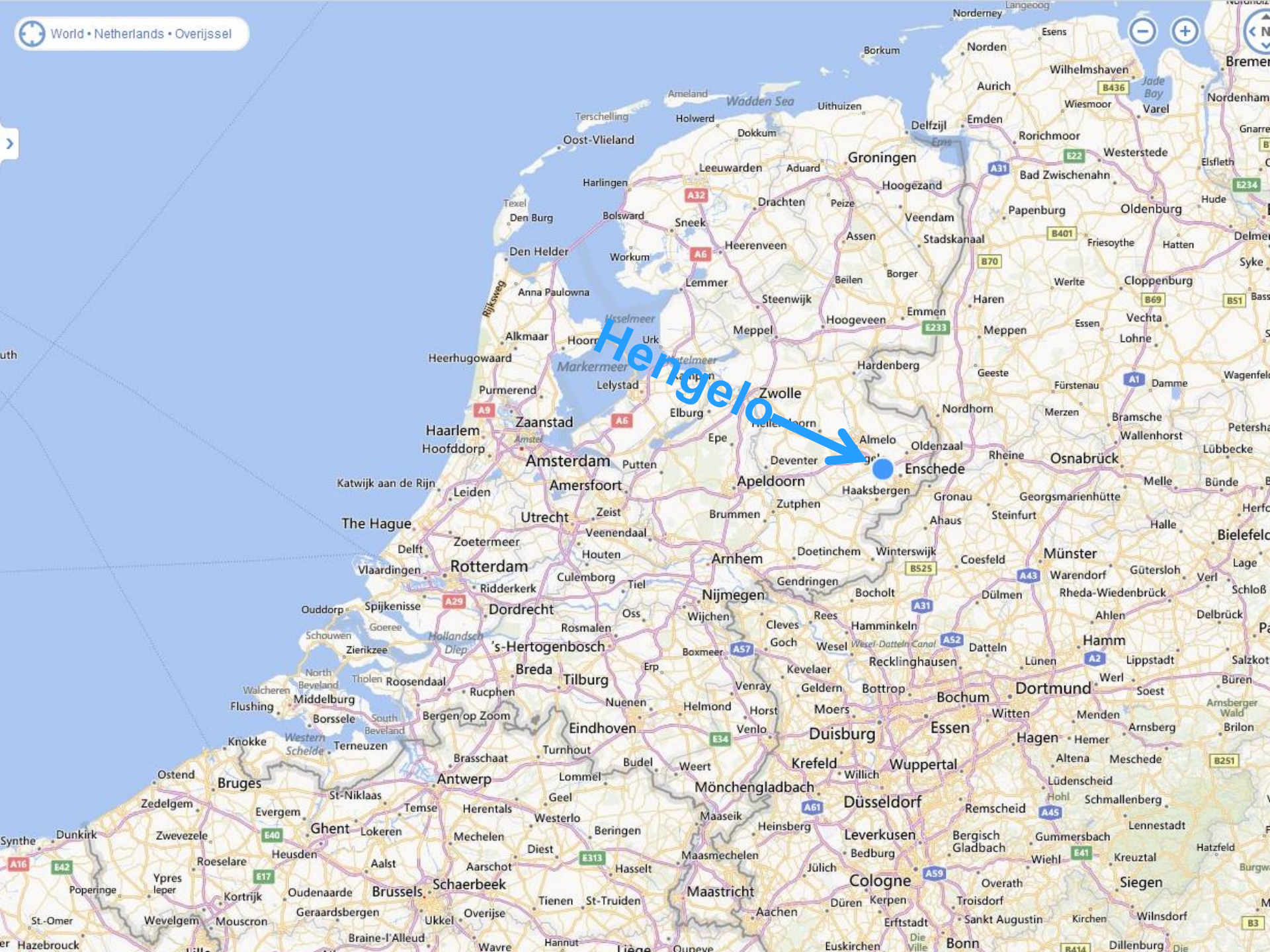


STAN Stoomleiding Twence AkzoNobel

Martijn Gielen AkzoNobel Industrial Chemicals
Project Development Manager
March 2014



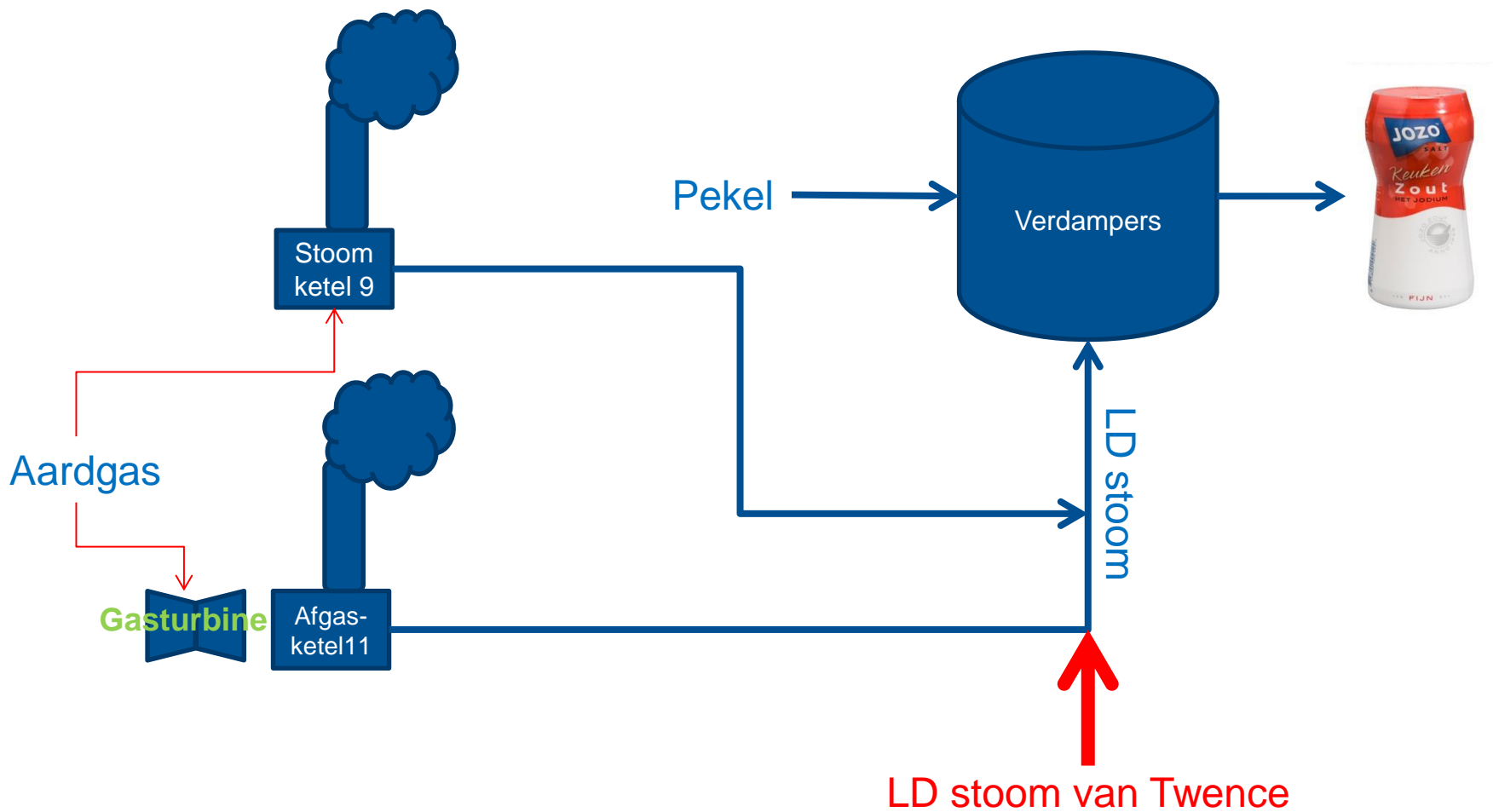
1. Introduction
 2. Cooperation with Twence
 3. Permitting
 4. Economical overview
 - Investment, revenues
 5. Planning
-



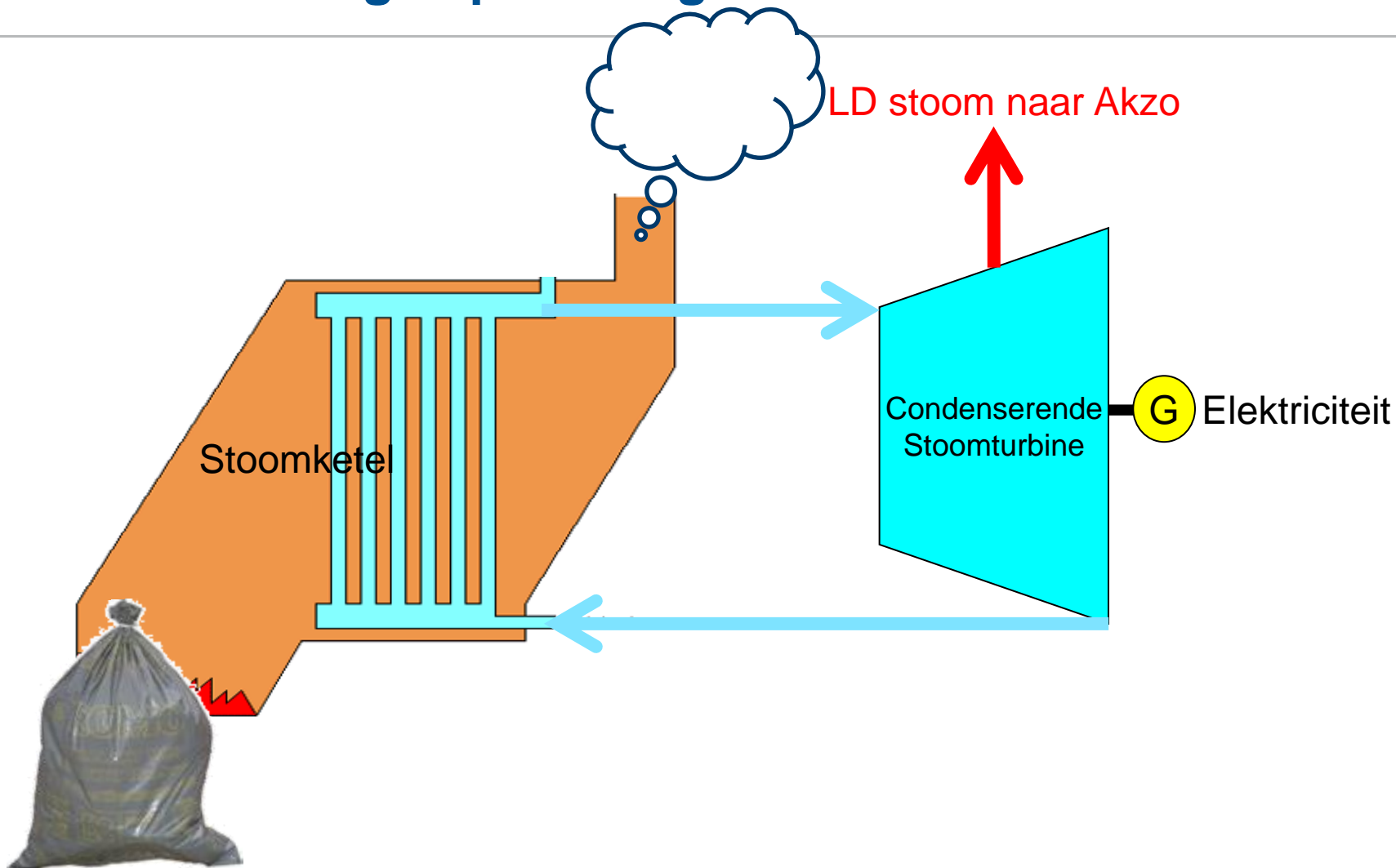
Hengelo



AkzoNobel Hengelo



Twence energieopwekking



Preparation for steam supply

2006	AkzoNobel starts looking for alternative fuels
2006	Preproject with Twence for construction of RDF incineration plant
Aug 2008	Contract with Twence on steam supply and investment
2009	Engineering & permitting (Bestemmingsplan wijziging!)
2010	Construction of steampipe, connections
Jan 2011	Start steam supply

Co-operation Twence/AkzoNobel took some time....

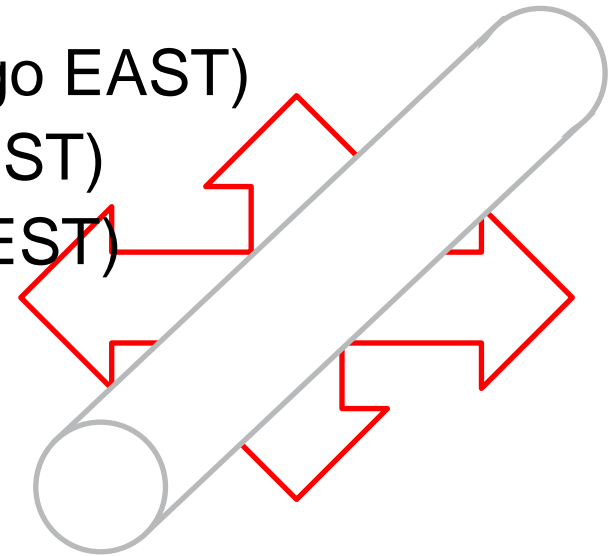
1. First attempts for steam supply project failed due to **high steam availability demand** of salt process
 2. Joint preproject: a designated **RDF-fired steam boiler** (Refuse Derived Fuel project) not feasible (high CAPEX, pressure on gate fees)
 3. Joint project: supply via **steampipe** (STAN) succeeded because of transparency and trust between partners
 4. Model for **equal profit/losses sharing** between AkzoNobel and Twence
 5. Steam supply during offpeak attractive due to decrease in power-to-grid for both Twence and AkzoNobel
-

First design



Permitting; main issues

- Different forces acting literally in different directions on steampipe
 - new industrial zone for Hengelo (go EAST)
 - Water emergency storage (go WEST)
 - Keep Twekkelo untouched (go WEST)
 - Subsurface (go DOWN)
 - at 6m height (go UP)
- Landschappelijke inpassing
- Height of expansion loops
- Esthetics of pipe bridges

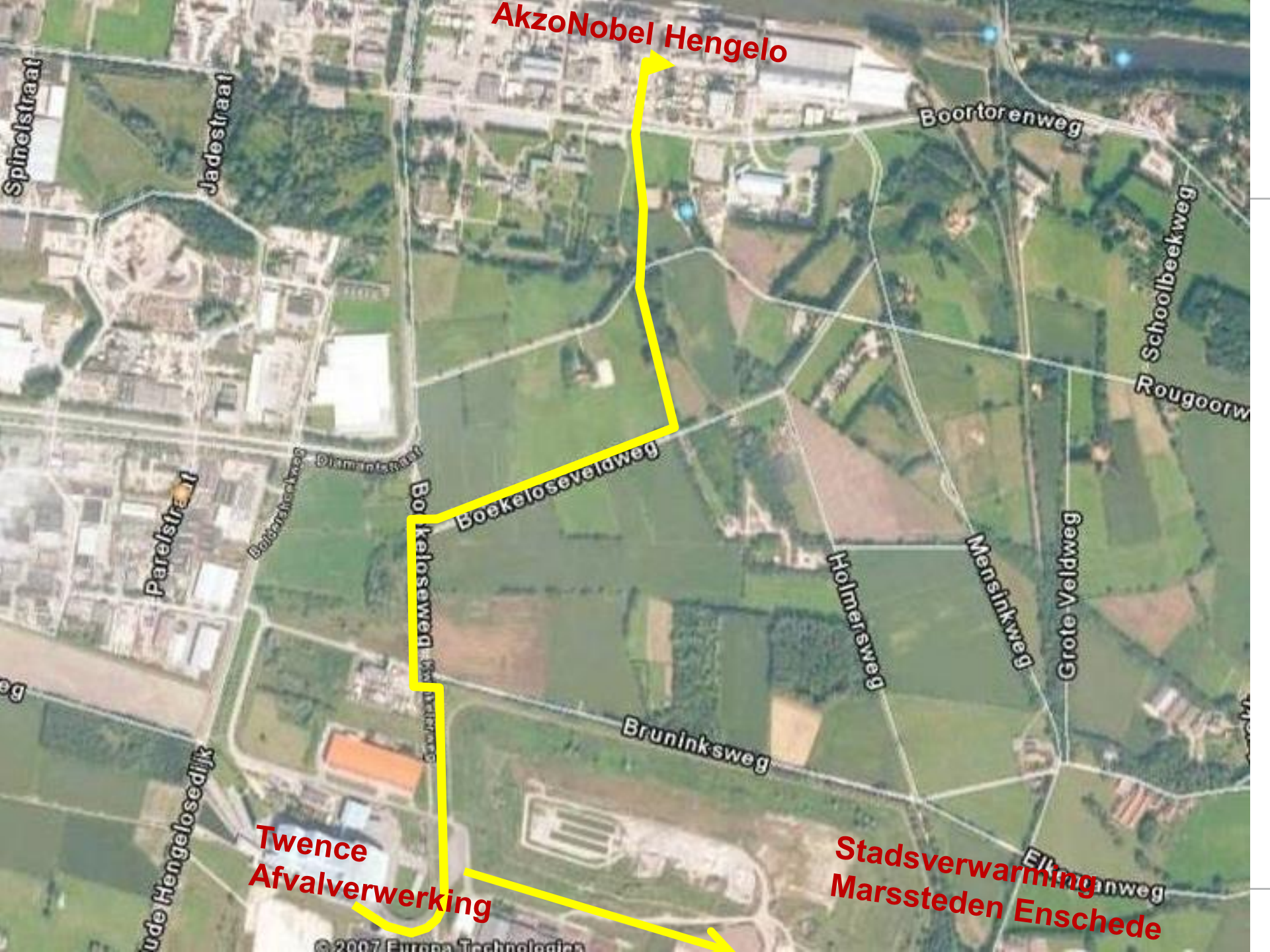




Alternatives for trace steam pipe

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Google



AkzoNobel Hengelo

**Twence
Afvalverwerking**

**Stadsverwarming
Marssteden Enschede**

Spinelstraat

Jadestraat

Boortorenweg

Schoolbeekweg

Rougoorweg

Parelstraat

Boortorenweg

Plantinstraat

Boekeloseweg

Boekeloseveldweg

Holmersweg

Mensinkweg

Grote Veldweg

Bruninksweg

Grote Hengelosedijk

Eikbosweg

Aanleg 2010



Project – financiering en risico

“Alle kosten en baten worden 50/50 gedeeld tussen partners Twence en AkzoNobel”

⇒ Investering circa 15M€

⇒ Marktafhankelijke besparingen in aardgas, CO2 emissies, elektriciteitsderving

Risico: marktprijzen zodanig dat stoomlevering verliesgevend is.

Onderhoud

Personeelskosten

Investering

Derving elektriciteit

Minder CO₂ emissie

Aardgasbesparing

15 M€



Timeline Steam supply

2006	AkzoNobel starts looking for alternative fuels
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2010	Construction of steampipe, connections
Jan 2011	Start steam supply
2012 H2	Prepare Akzo installations for extra steam supply
Dec 2012	1 million ton steam supplied to Akzo
Feb 2013	Start extra steam supply
Mar 2014	2 million ton steam supplied to Akzo

