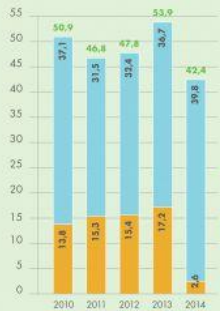


### JAARPRODUCTIE GRONINGEN-GASVELD

De vijf productielocaties rond Loppersum waarvan de productie is beperkt in 2014 zijn oranje. De grafiek geeft de productie uit het Groningen-gasveld van de afgelopen jaren weer.

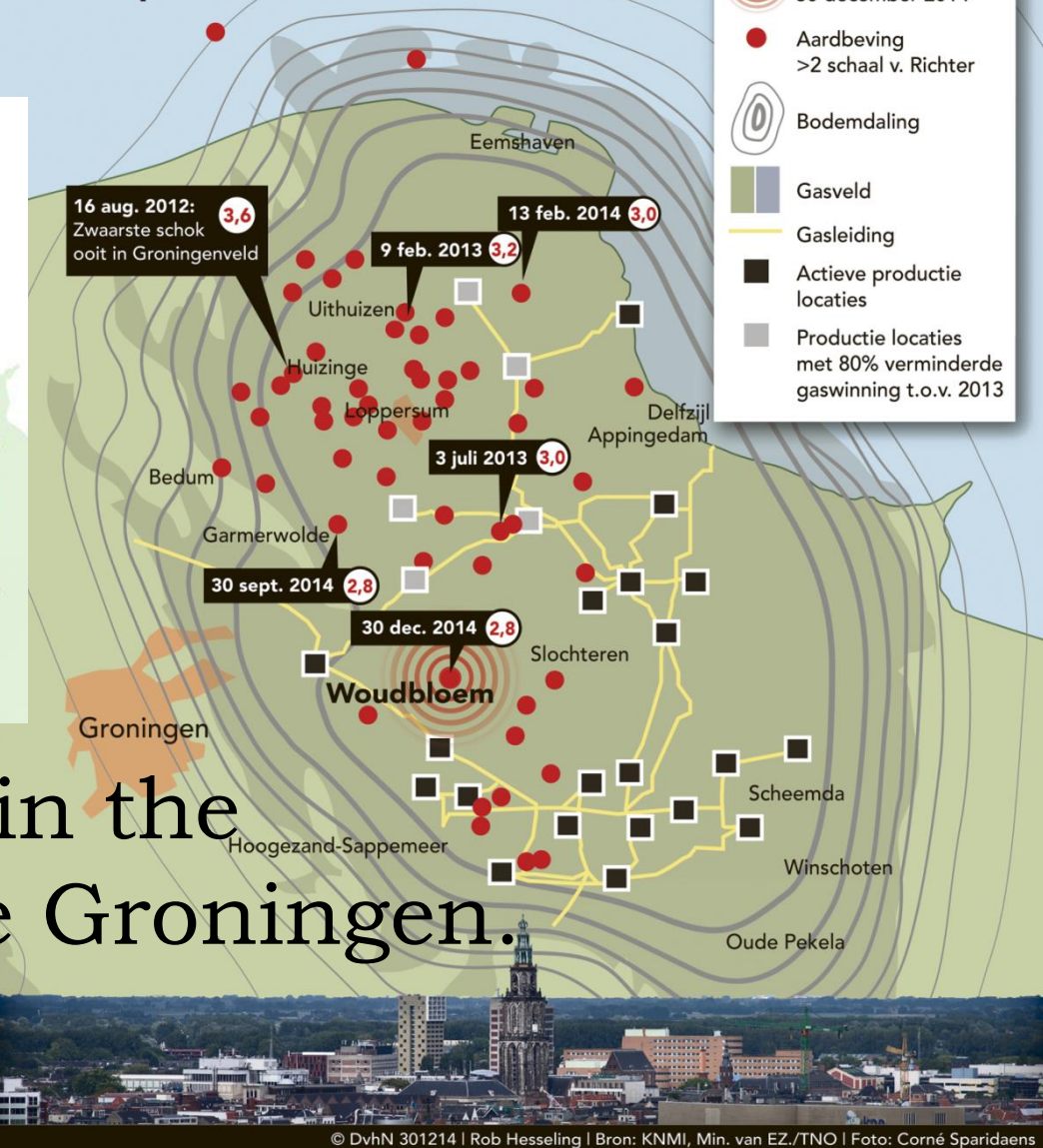
#### PRODUCTIE UIT GRONINGEN-GASVELD (PER JAAR IN MIJARD M<sup>3</sup>)



- Totale productie Groningen-gasveld. Maximale productie voor 2014 = 42,5
- Productie Groningen-gasveld 5 clusters rondom Loppersum. Maximale productie voor 2014 = 3,0
- Productie overige clusters Groningen-gasveld

De vijf oranje cijfers en daar afzonderlijk staan komen lokale afslachten. De productielocatie voor gas zijn weergegeven in 'normaal' lokale meter (2ha). Een normaal lokale meter 2 ha normaal gebied gas die 14 een temperatuur van 0 °C en een drukke die van 1 01225 bar, een volume toename van 1 lokale meter.

### Recente aardbevingen zwaarder dan 2 op schaal van Richter



# Energy Transition in the Netherlands - Case Groningen.

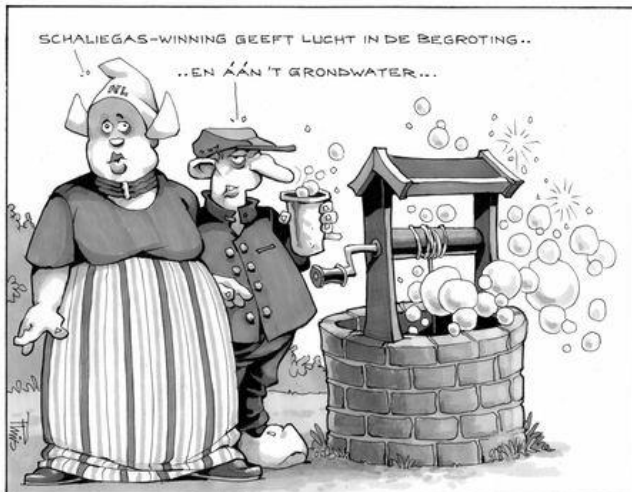
Aad Correljé

# Dutch natural gas...?

- Why away from gas?
- Why is everybody using so much gas?
- Where does it come from?
- What do we do with that gas?
- How did we organize that?
- Could we do it differently.....?
- And when?
- And how....?

# Energy Transition in The Netherlands – Away from gas!

- 2011 Cancellation CCS Pilot Project Barendrecht
- 2011/2018 Moratorium on Shale gas development
- 2012 Protest against UGS Bergen
- 2013 – 2018 Production caps on Groningen gas field, from 40+, to 33, 24, 12 Bcm)
- 2017 70 Municipalities “Away from gas” by 2025/30



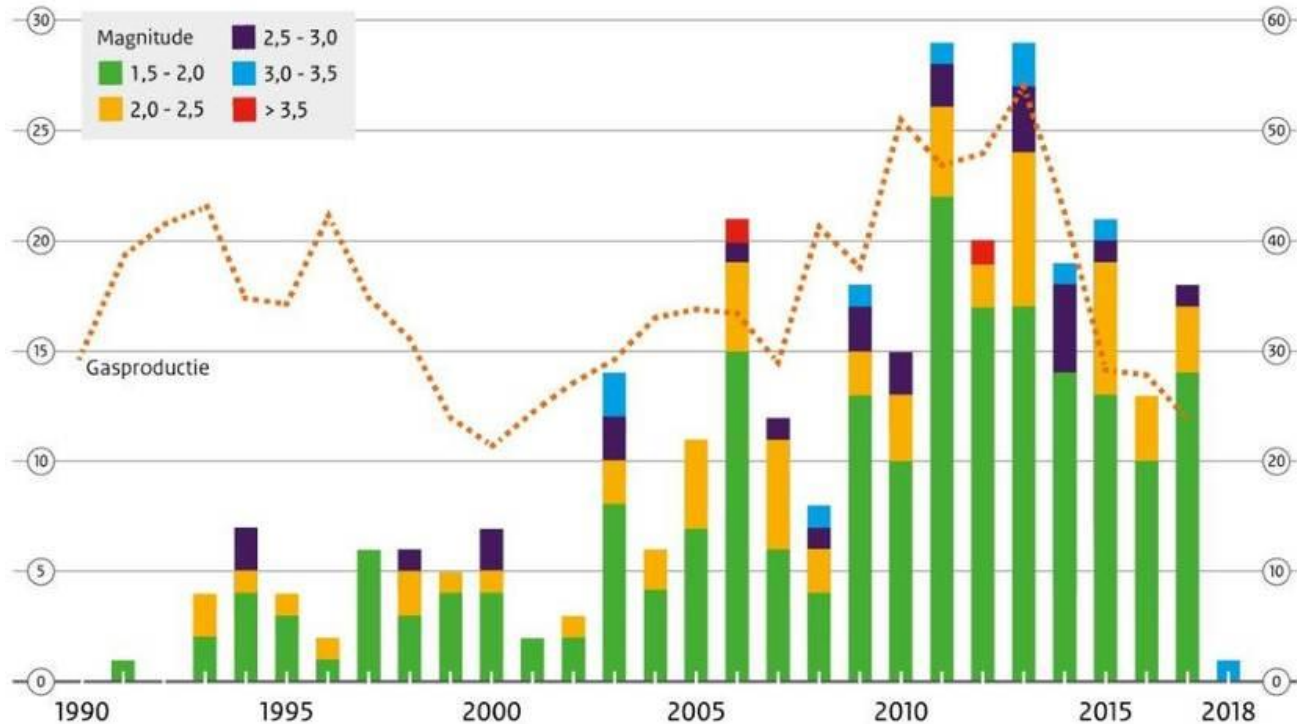


# Earthquakes and gas production

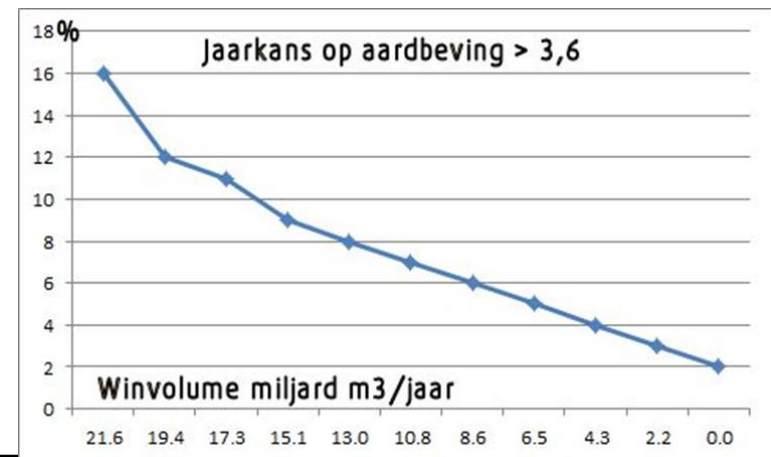
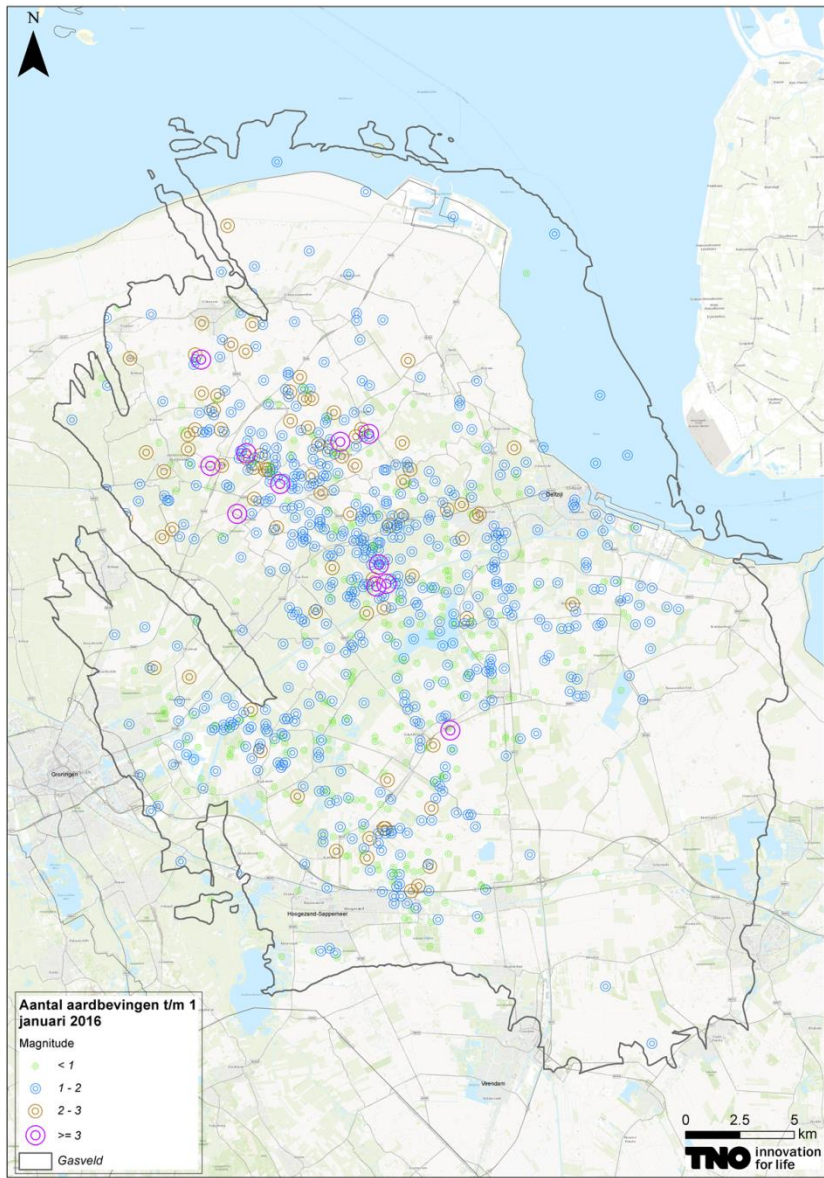
## Aantal aardbevingen in het Groningen-gasveld vs. gasproductie

Van 1990 tot en met 2017

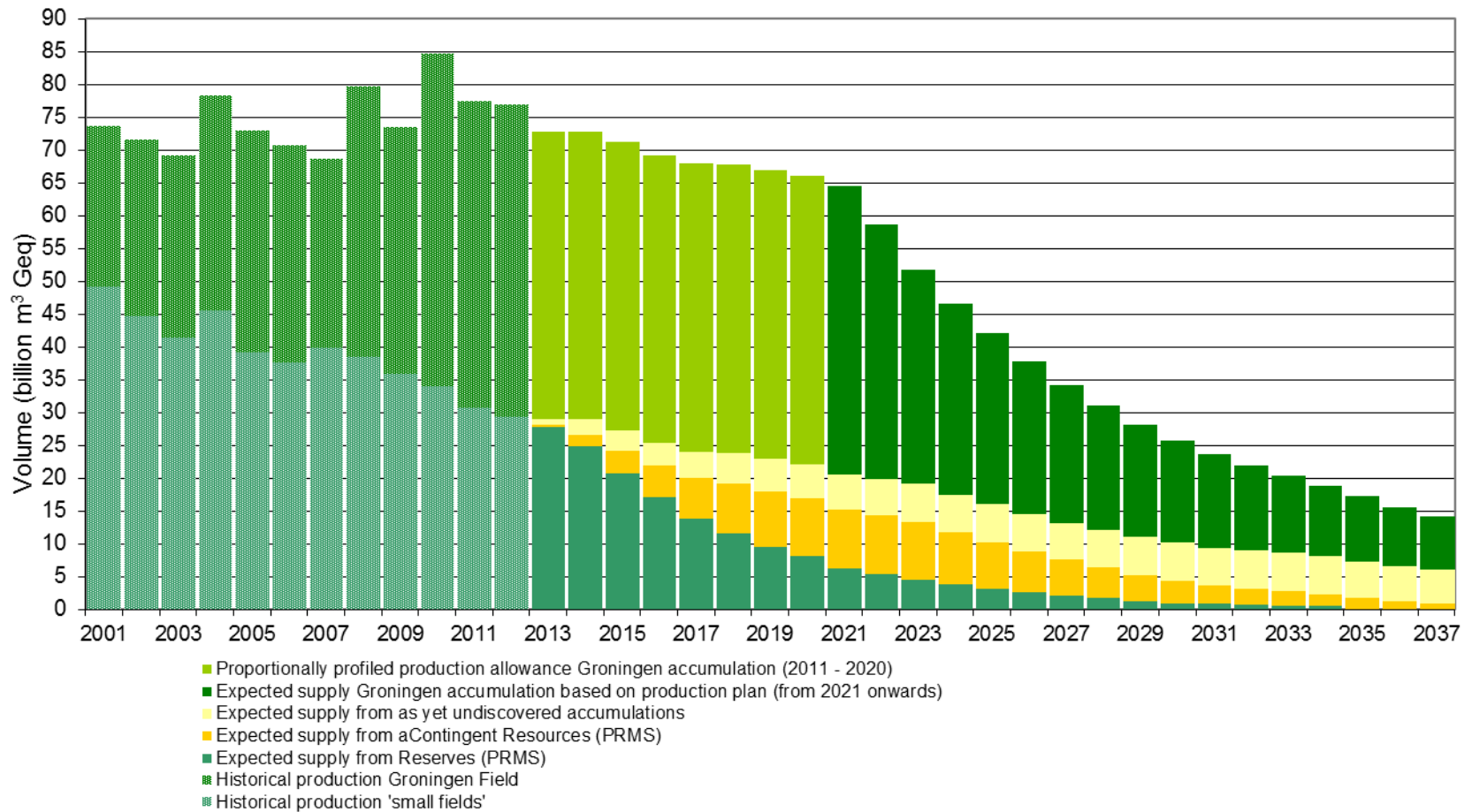
Bronnen: KNMI en NAM



# Earthquakes and Resistance

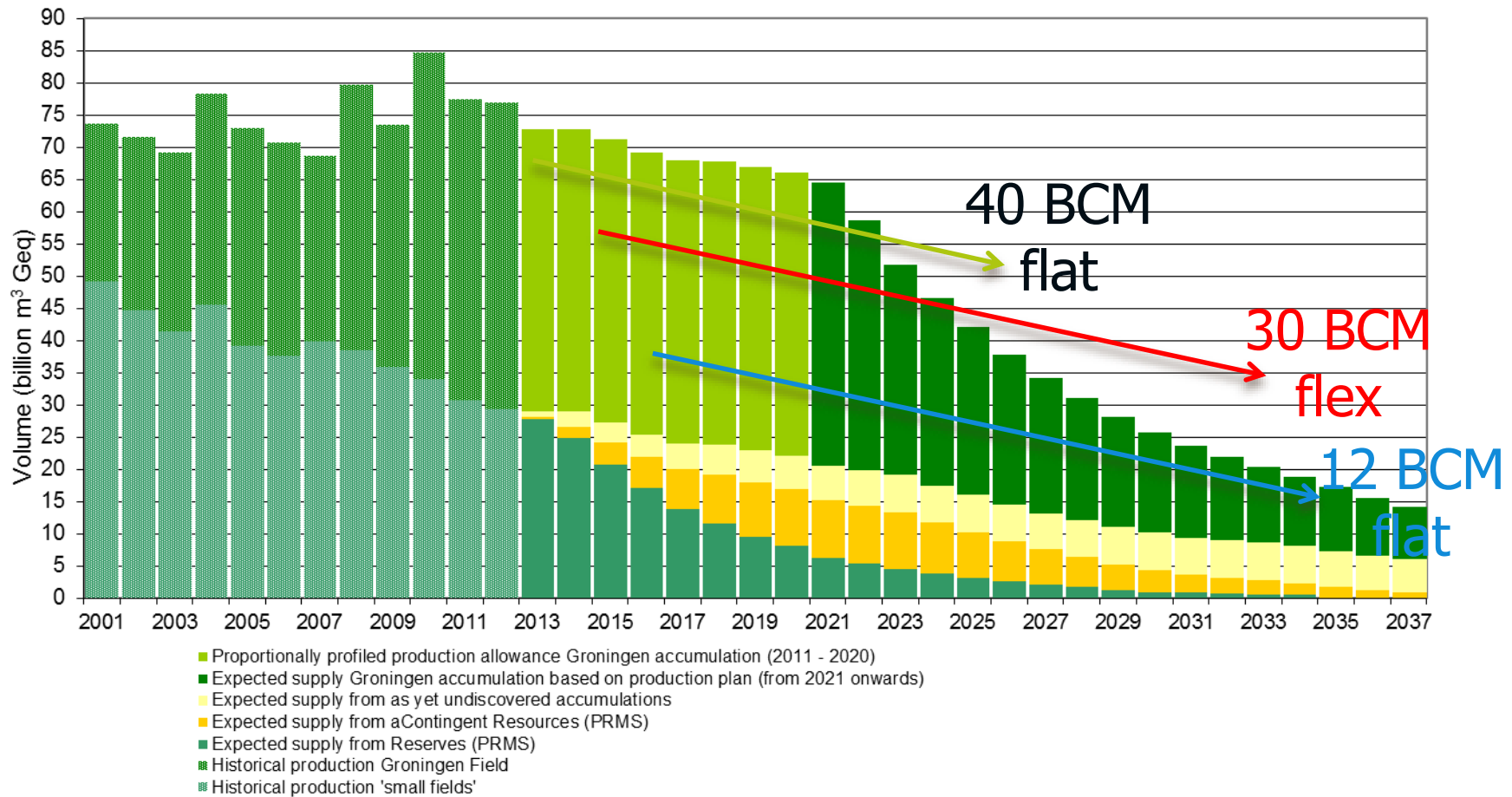


# The future of Dutch gas in 2012!

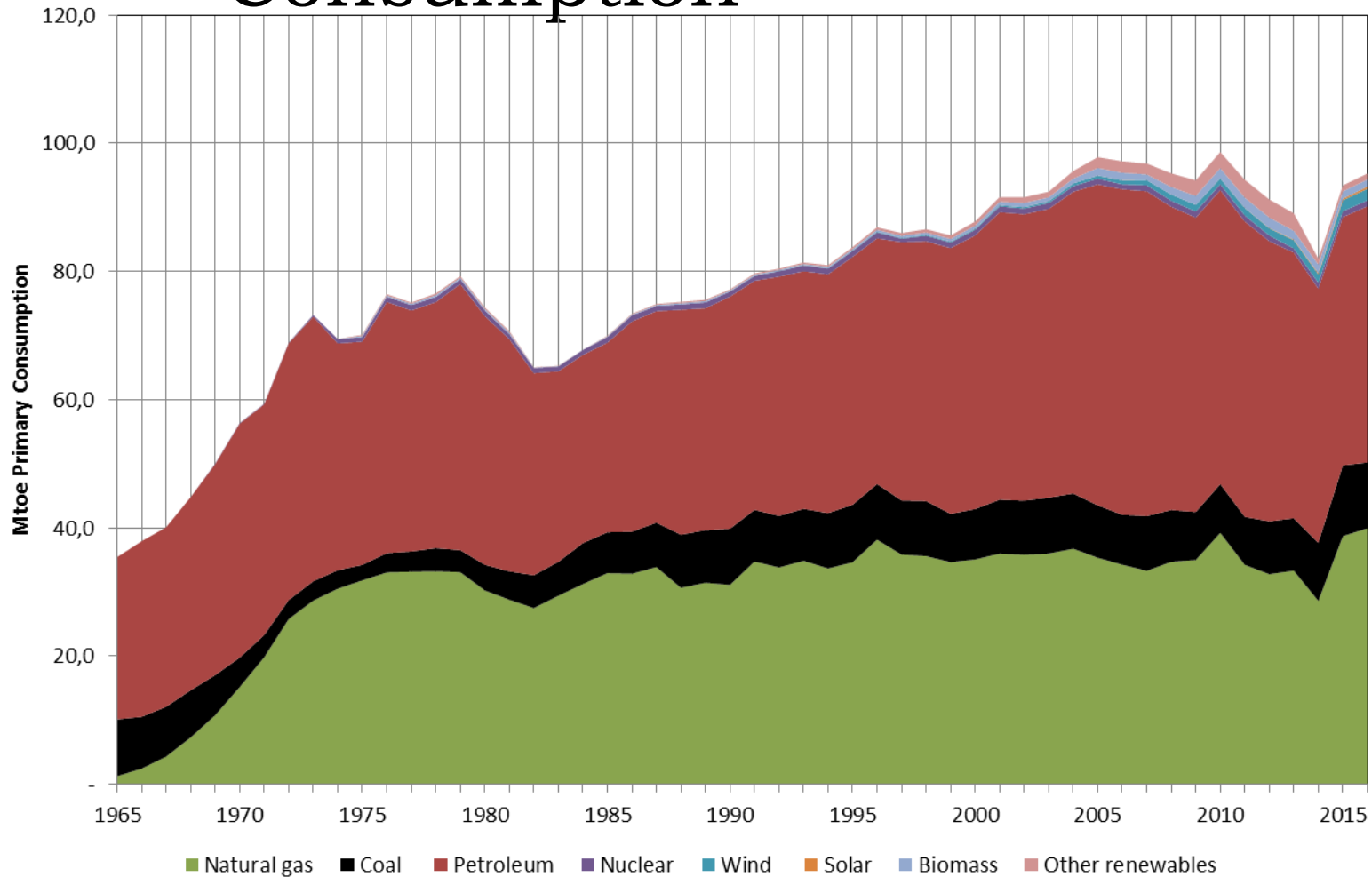




# Groningen's current future...

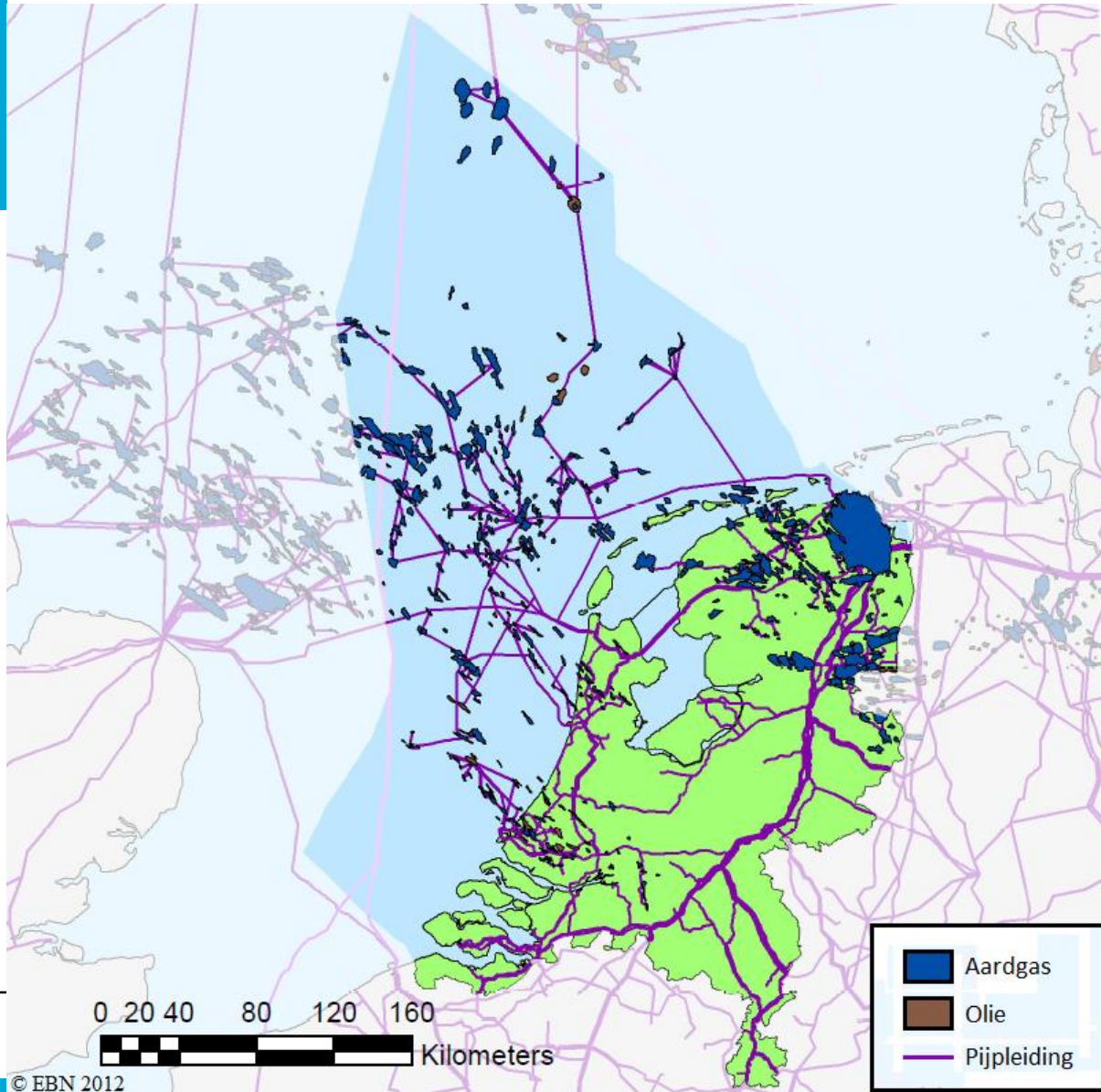


# Gas in The Netherlands' Energy Consumption

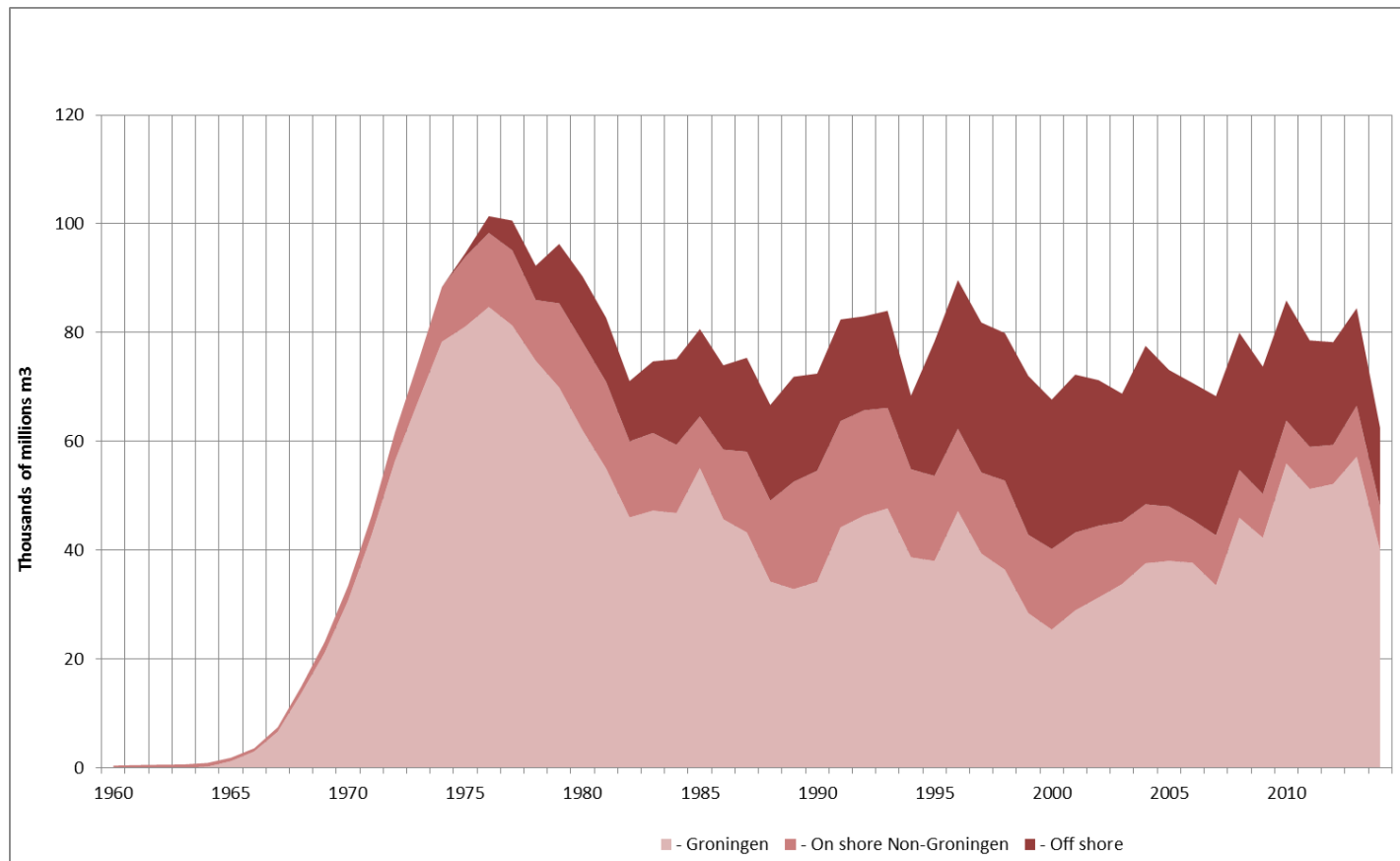




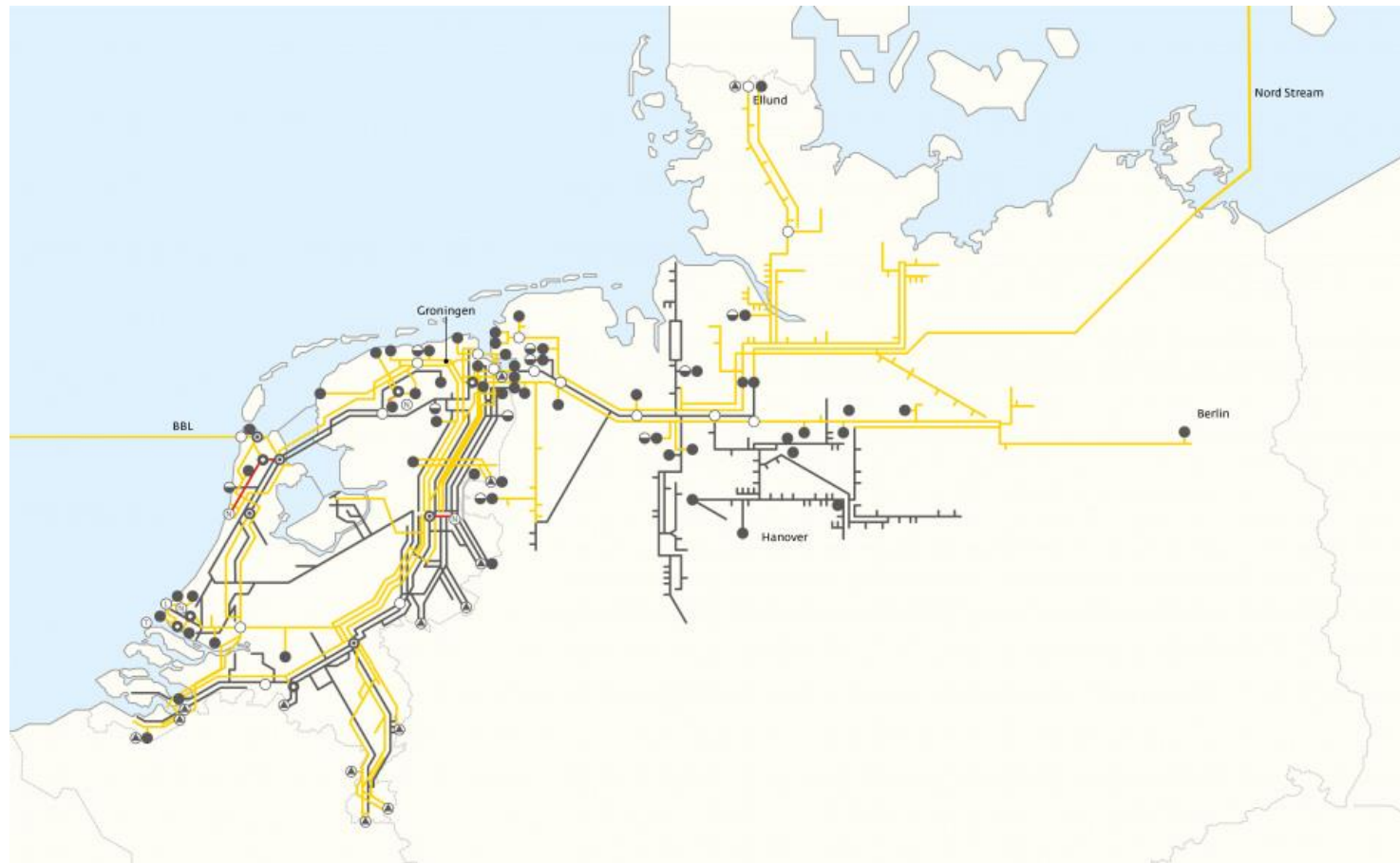
# Where does it come from...



# Supplies from Groningen... and smaller fields!

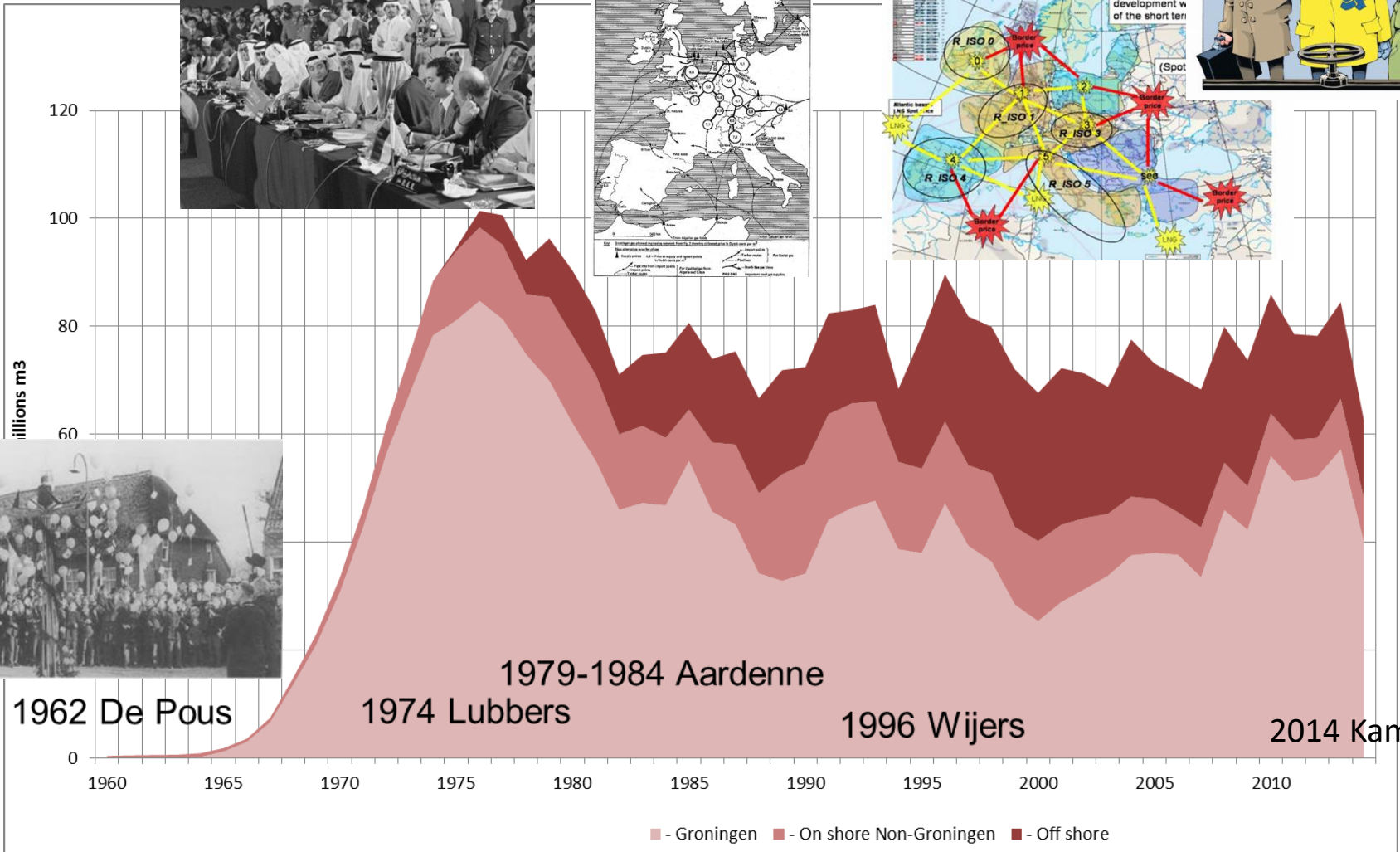
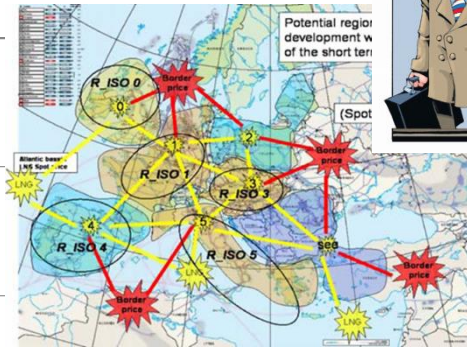
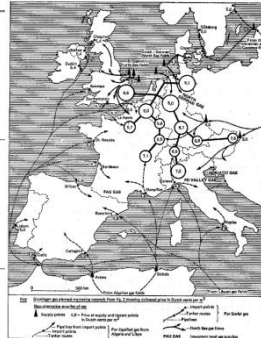
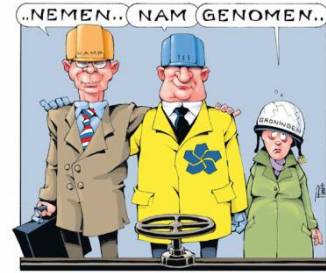


Two types: G and H gas in two systems, for dedicated users!

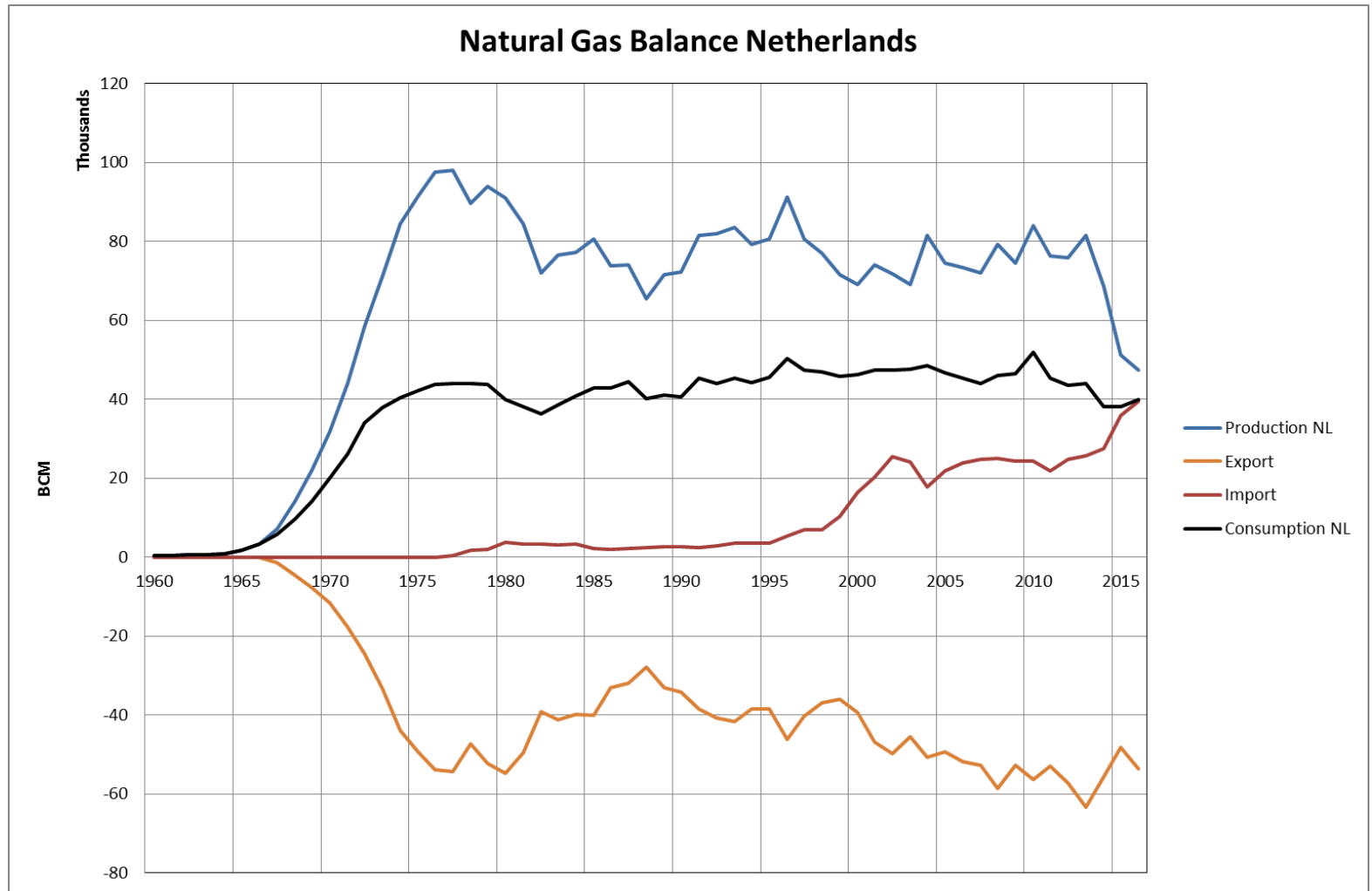




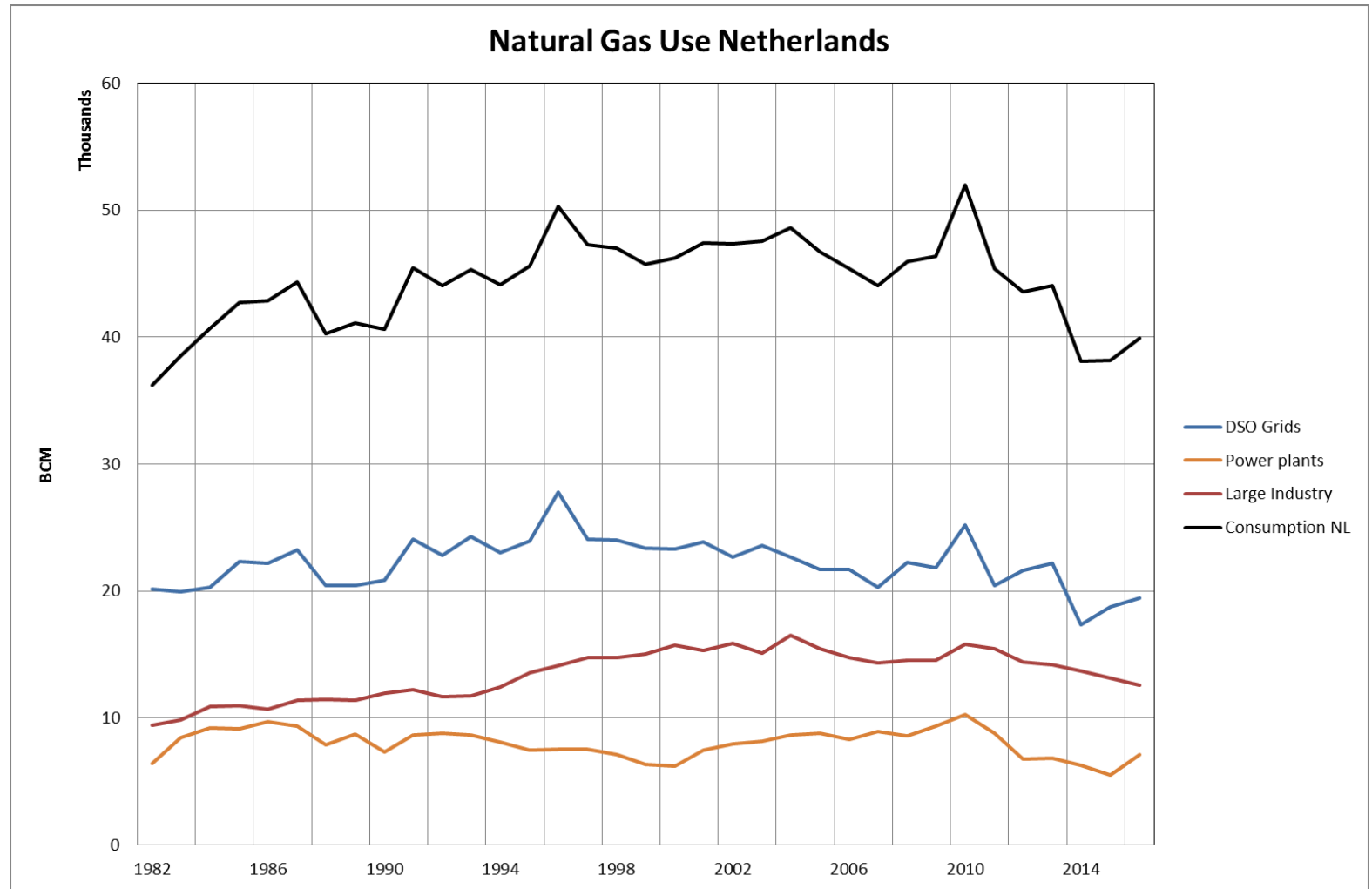
# Episodes in Dutch gas...



# What did we do with it?

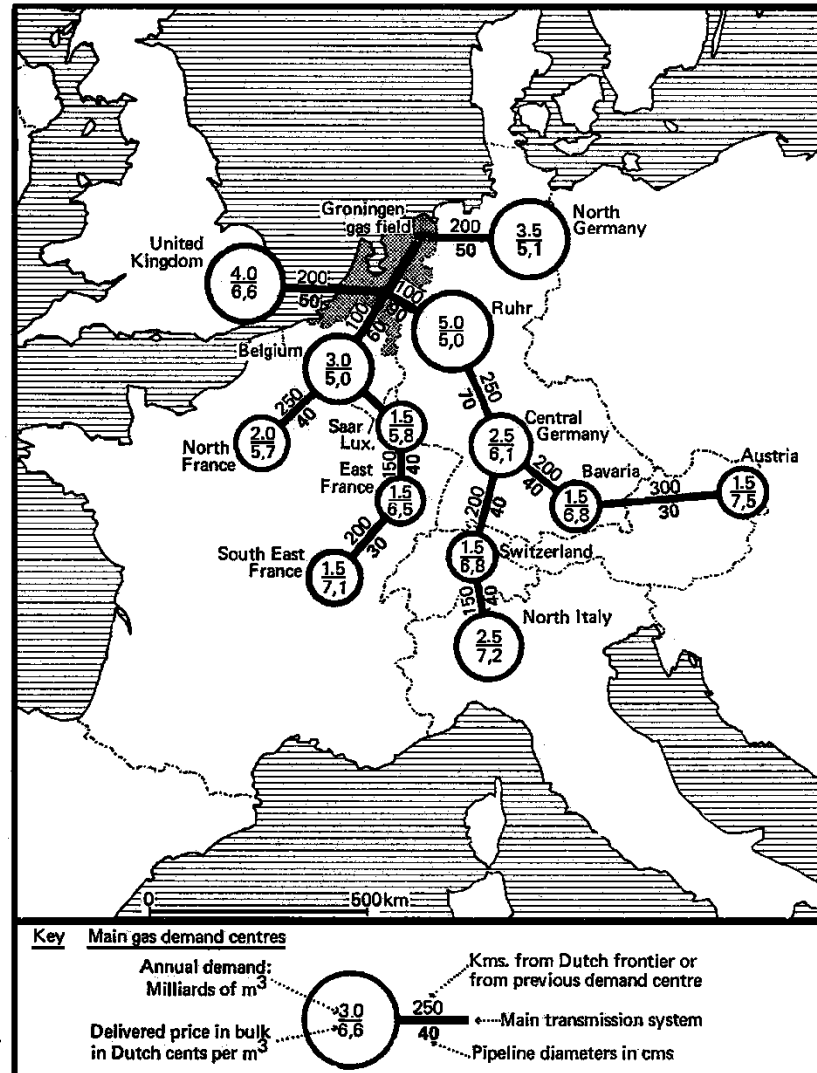


# What did we do with it?





# Export

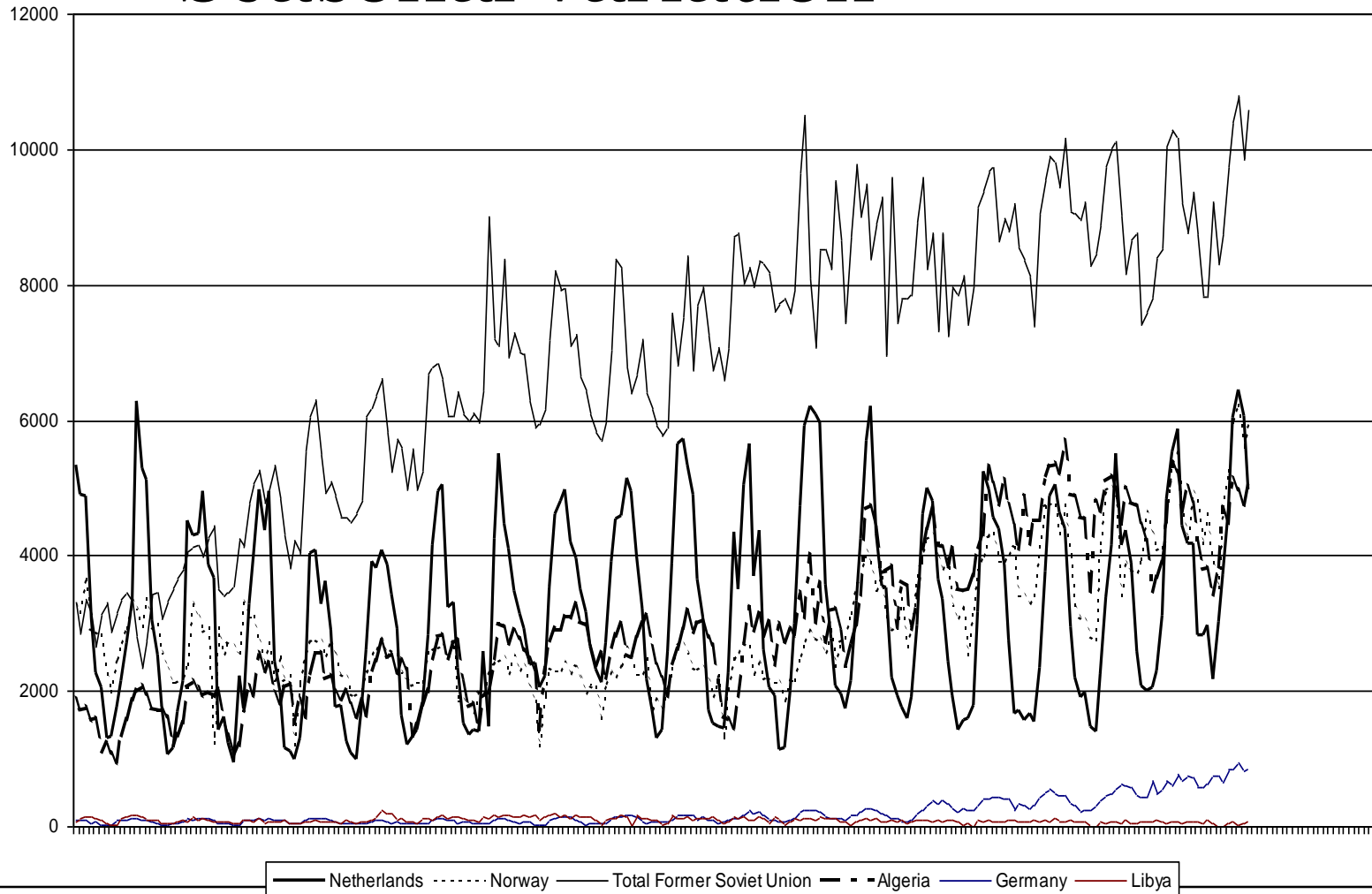


April 9, 2018

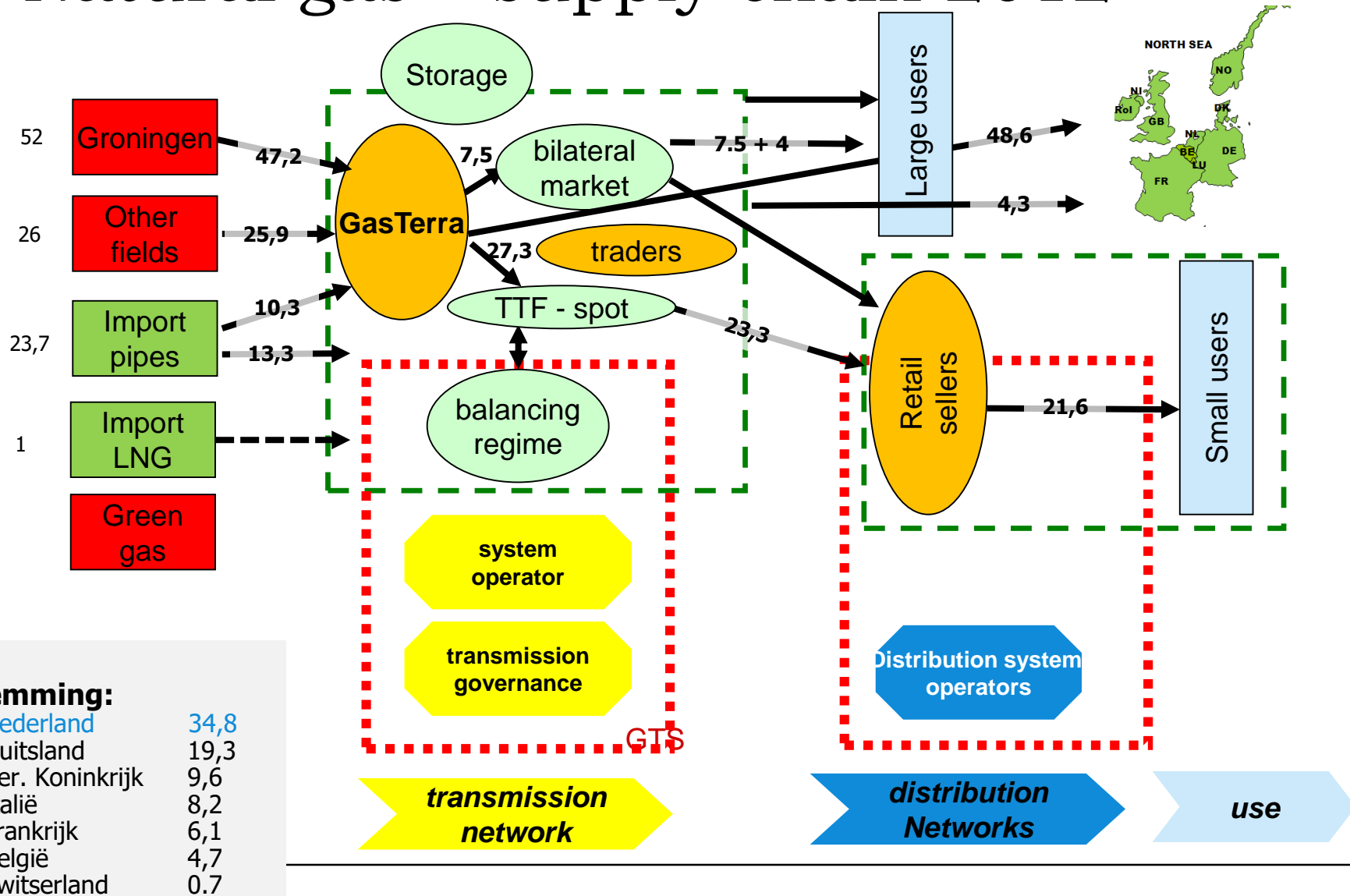
15

# And some flex...

## Seasonal variation



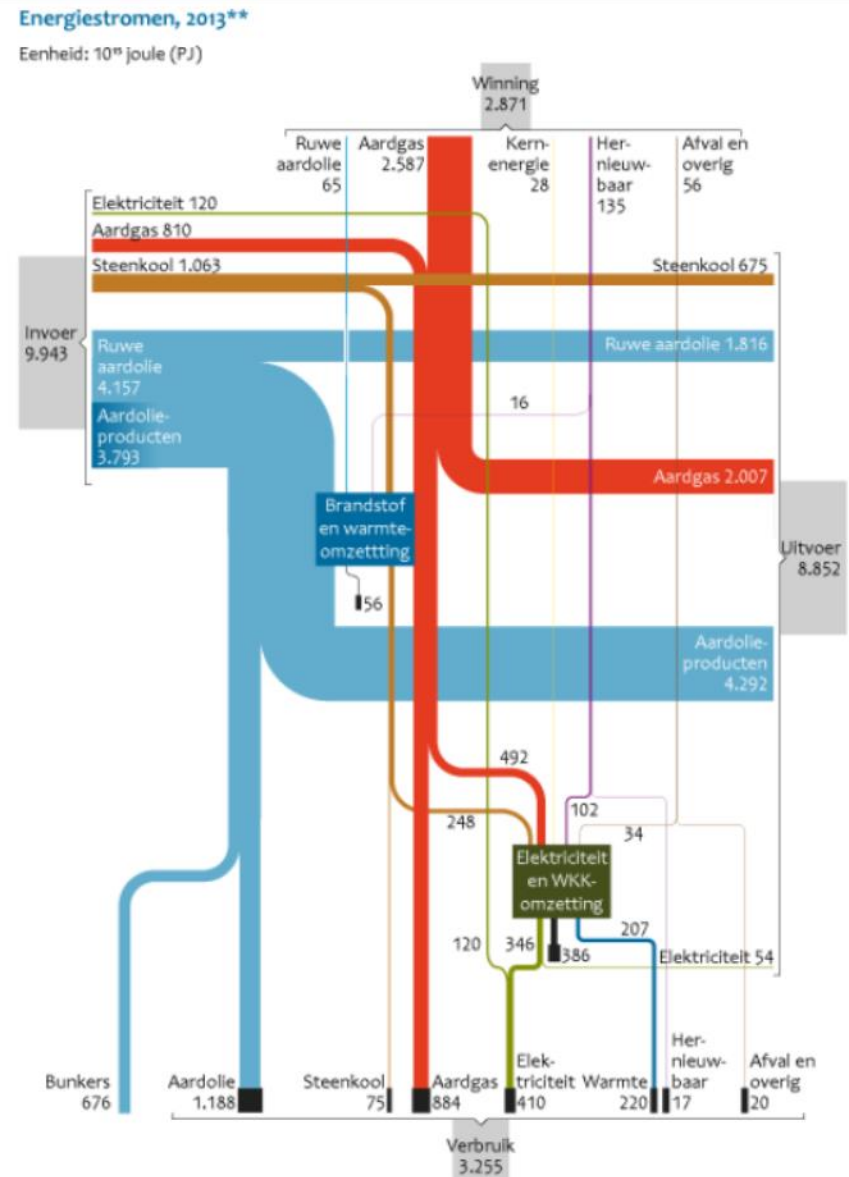
# Natural gas – supply chain 2012





# Could we do it differently?

## Current role of gas?



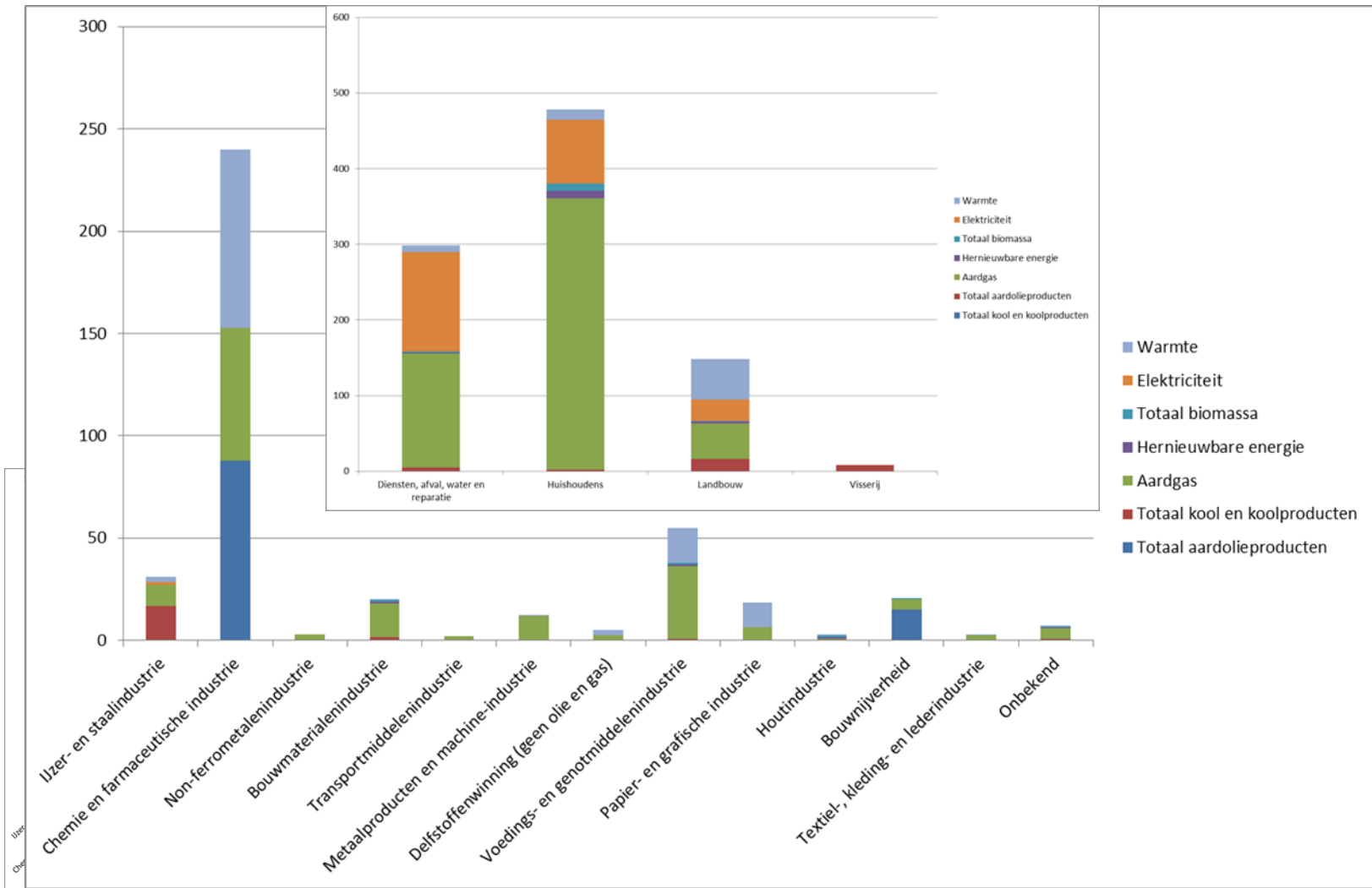
N.B. De som van de zwarte blokjes is het totale energieverbruik (finaal verbruik en saldi omzetting). In deze figuur zijn verschillende details verwaarloosd.

Bron: CBS.

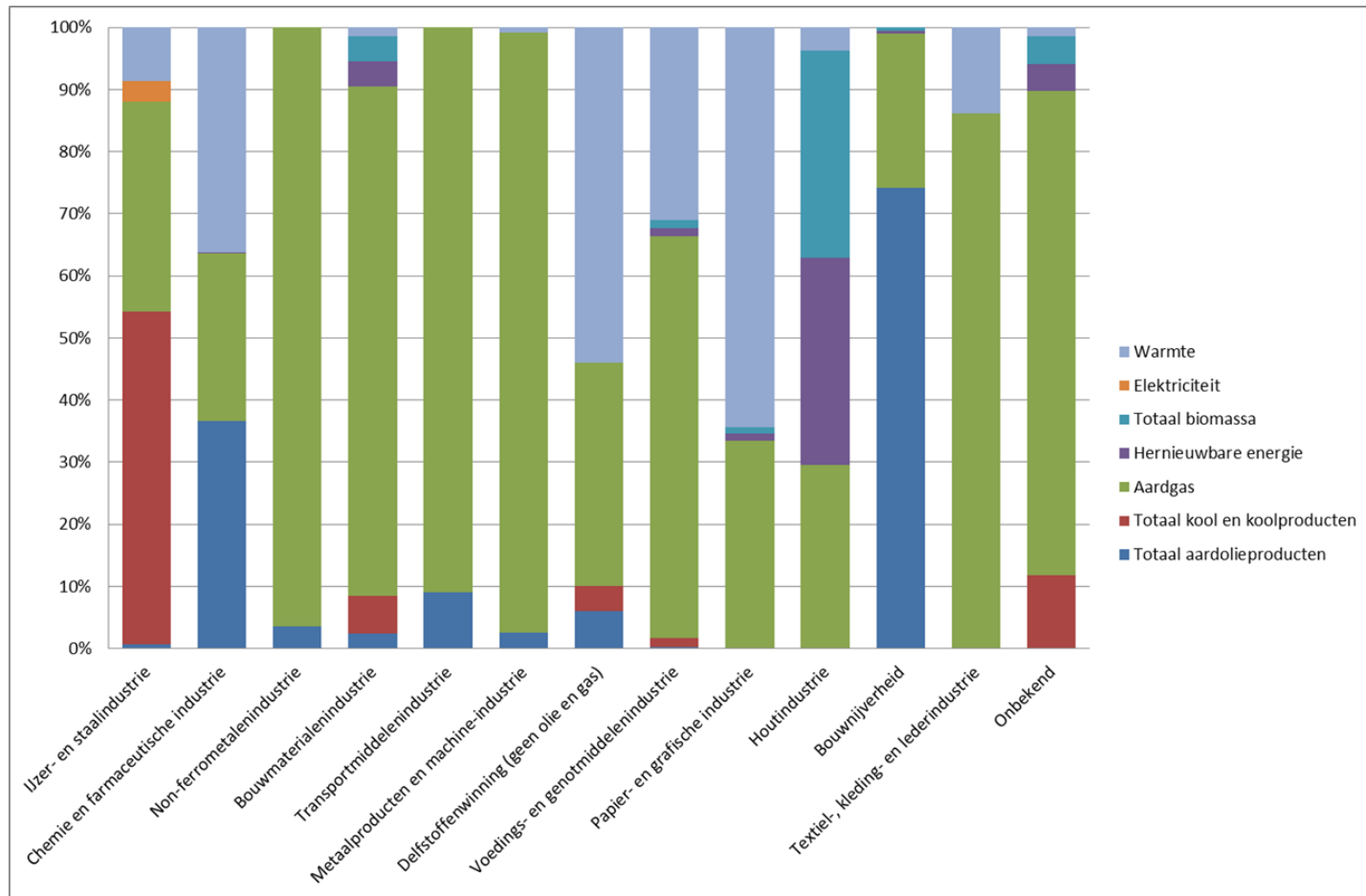
CBS/okt14  
www.clo.nl/nl02019

Figuur 1. Energiebalans voor Nederland winning invoer verbruik uitvoer en bunkers energiedragers

# Dutch gas consumption 2013

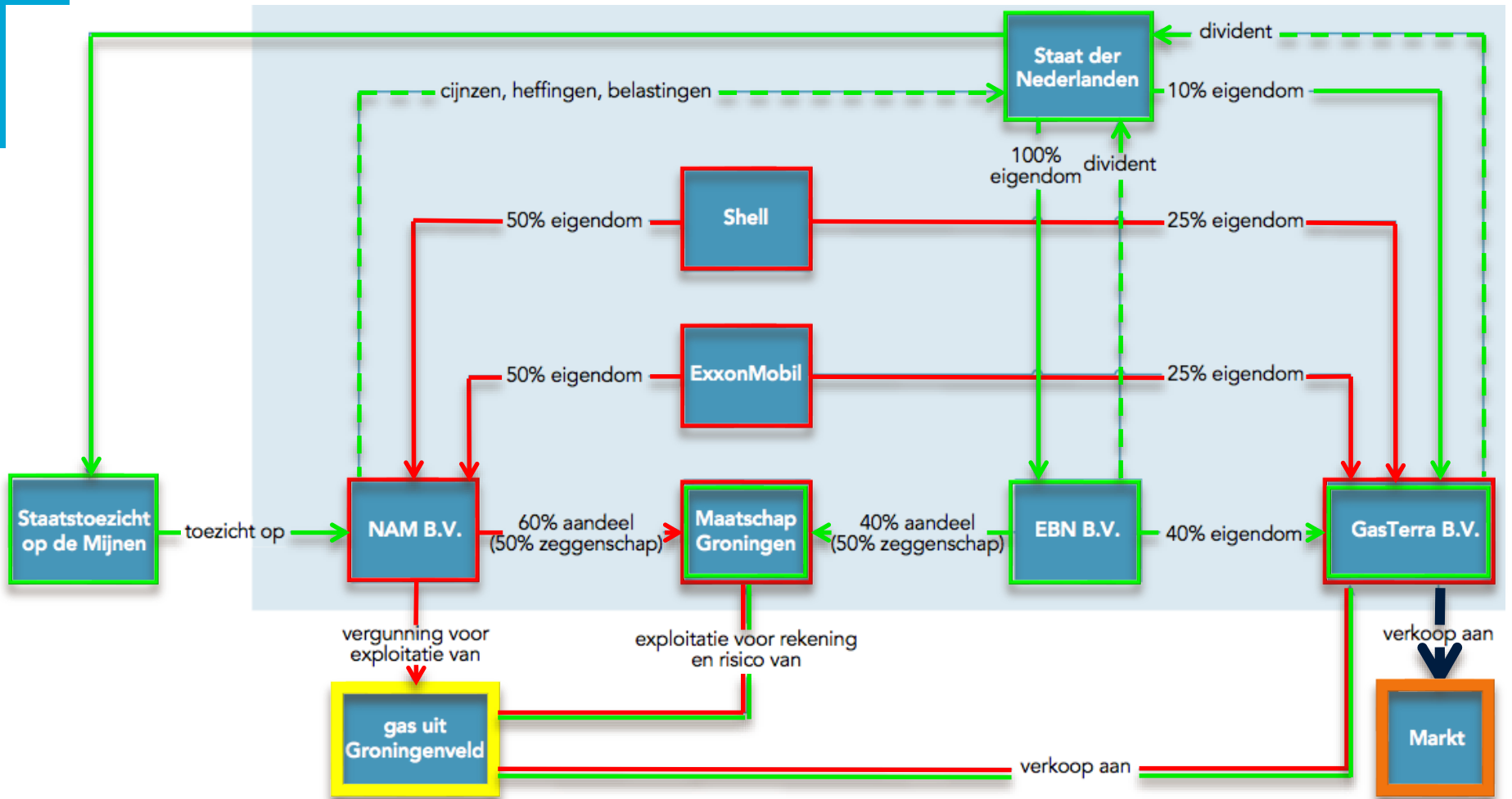


# Much gas in industry ...





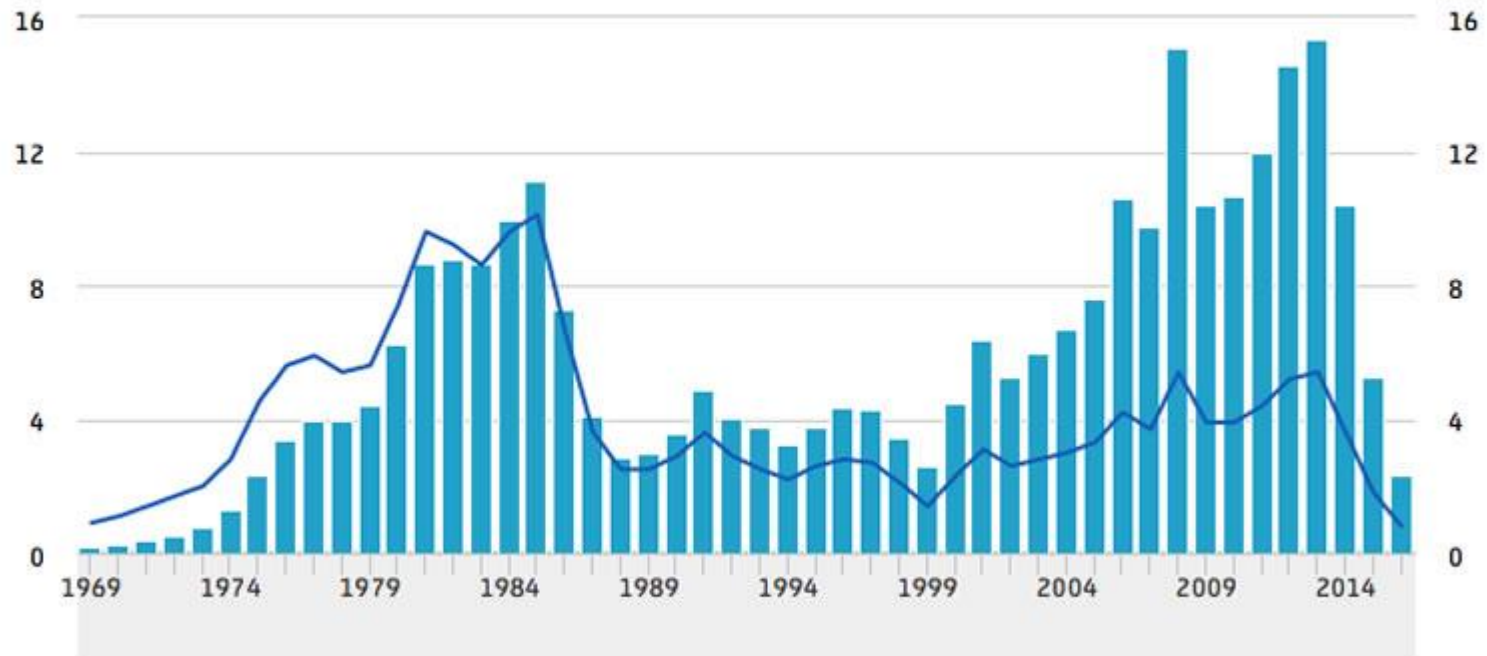
# How did we organize that?



# And state revenues (absolute and as a %-share)

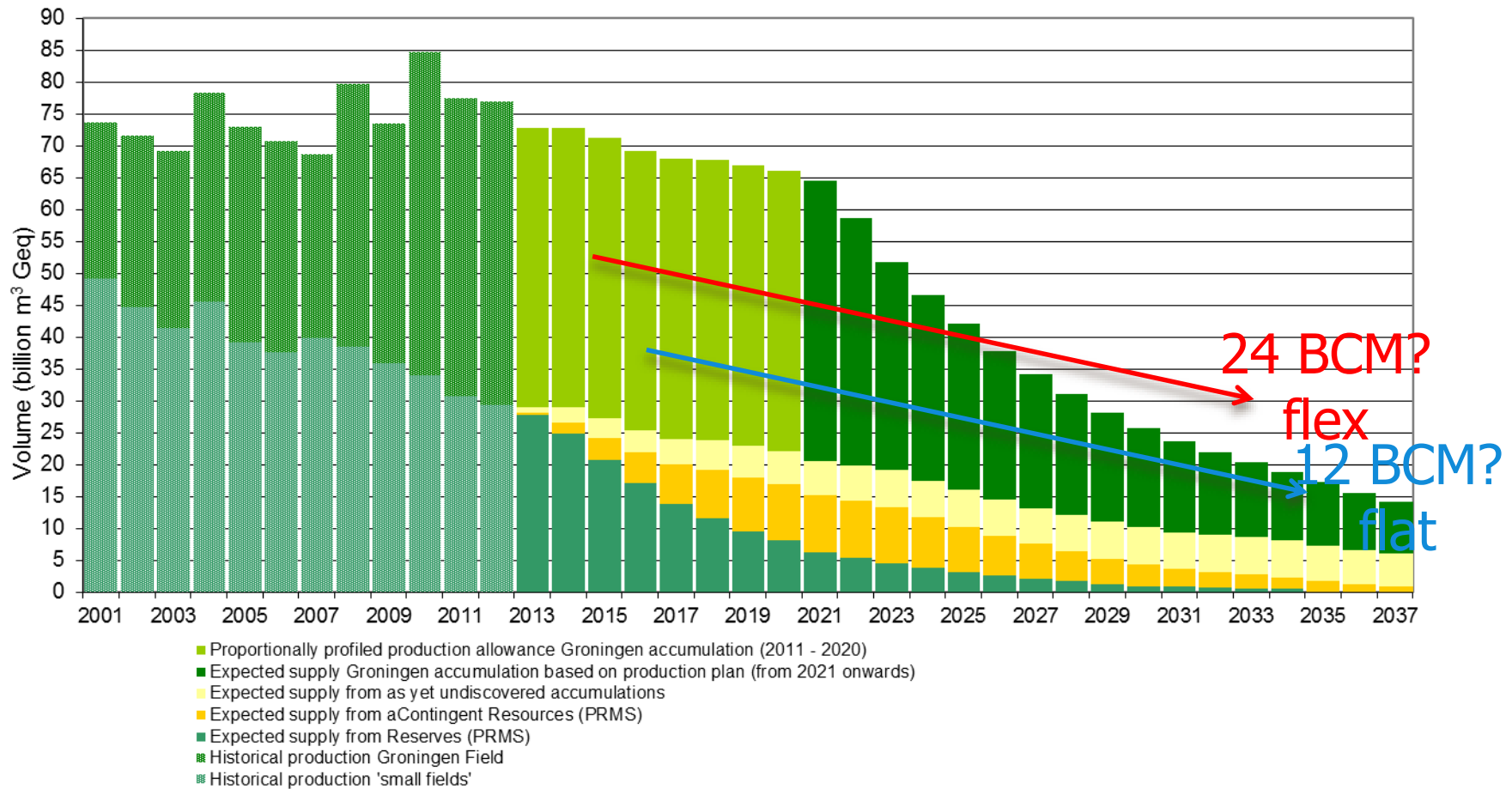
## Aardgasbaten

x mld euro



■ Aardgasbaten — Aandeel in overheidsinkomsten

# Groningen's current future...?



# What about the NWE gas market?

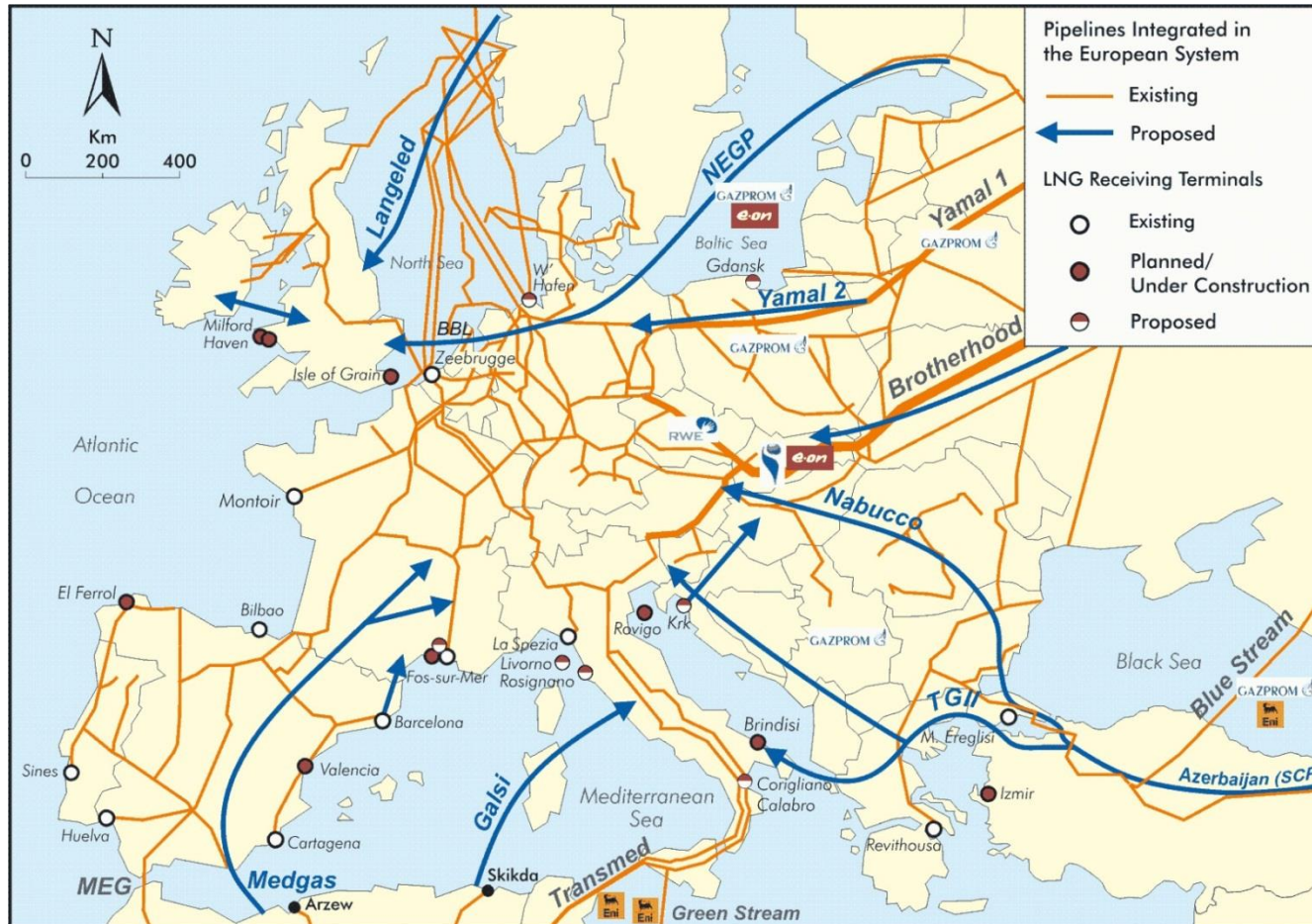
- Reduction in supply of G gas (from 40, to 33, 24, 12, ... Bcm)
- Increase in demand for H gas?
- Transit capacity is available (Nord Stream, LNG)
- Conversion H gas to G gas quality
- Expansion of the need for seasonal storage: Flat Gas supply
  
- Convert G gas in 200 industrial firms to H gas
- Quick(er) transfer to H gas in foreign markets (Germany, Belgium and France)...
- Away from gas in 70 Dutch cities, but where to get the alternative(s)
- And how....



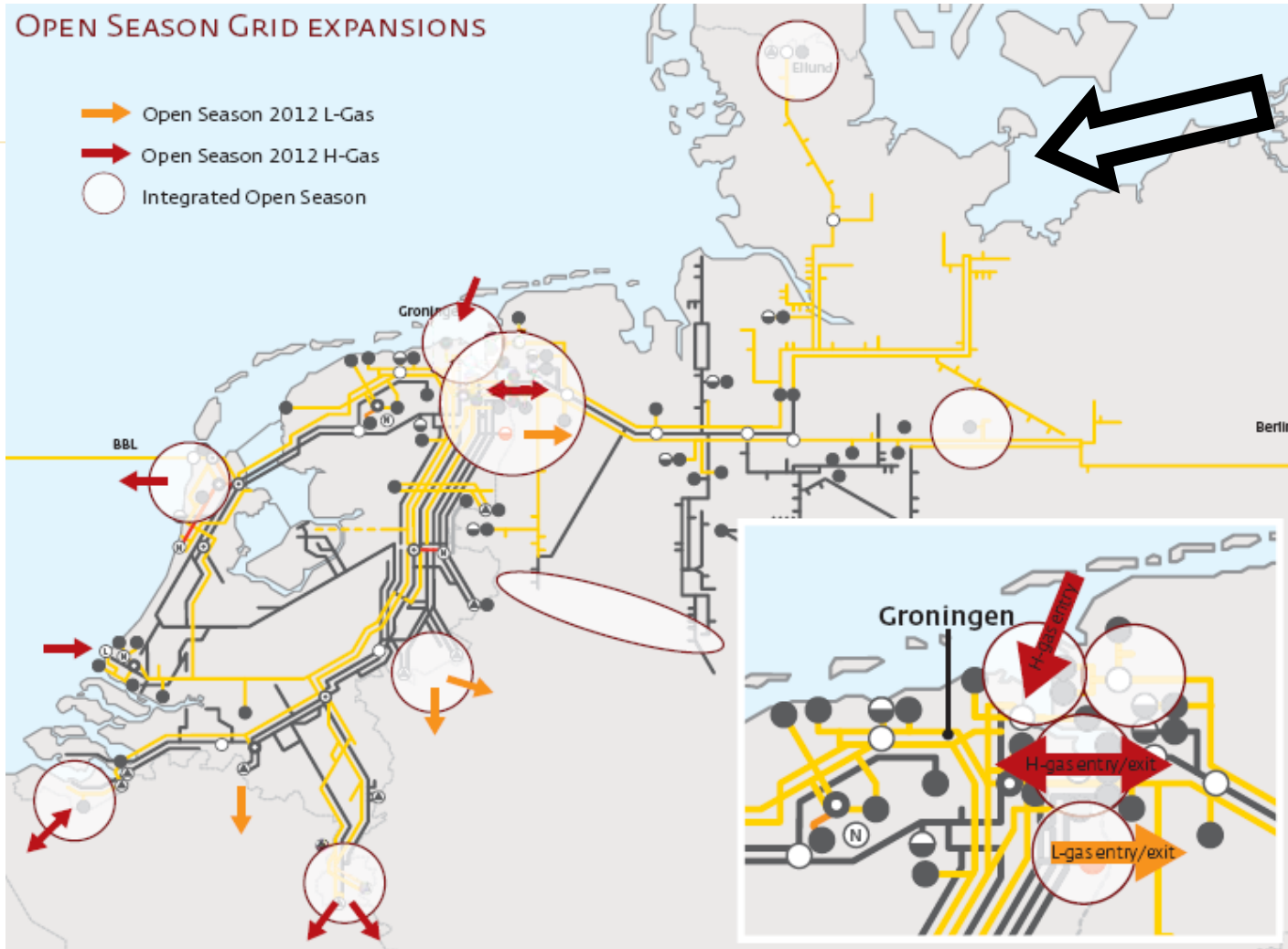
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# Supply of H gas to Europe



# Transit and the Gas Roundabout



# What about the NWE gas market?

- Reduction in supply of G gas (from 40, to 33, 24, 12, ... Bcm)
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- Transit capacity is available (Nord Stream, LNG)
- **Conversion H gas to G gas quality**
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# H gas conversion by Nitrogen blending....





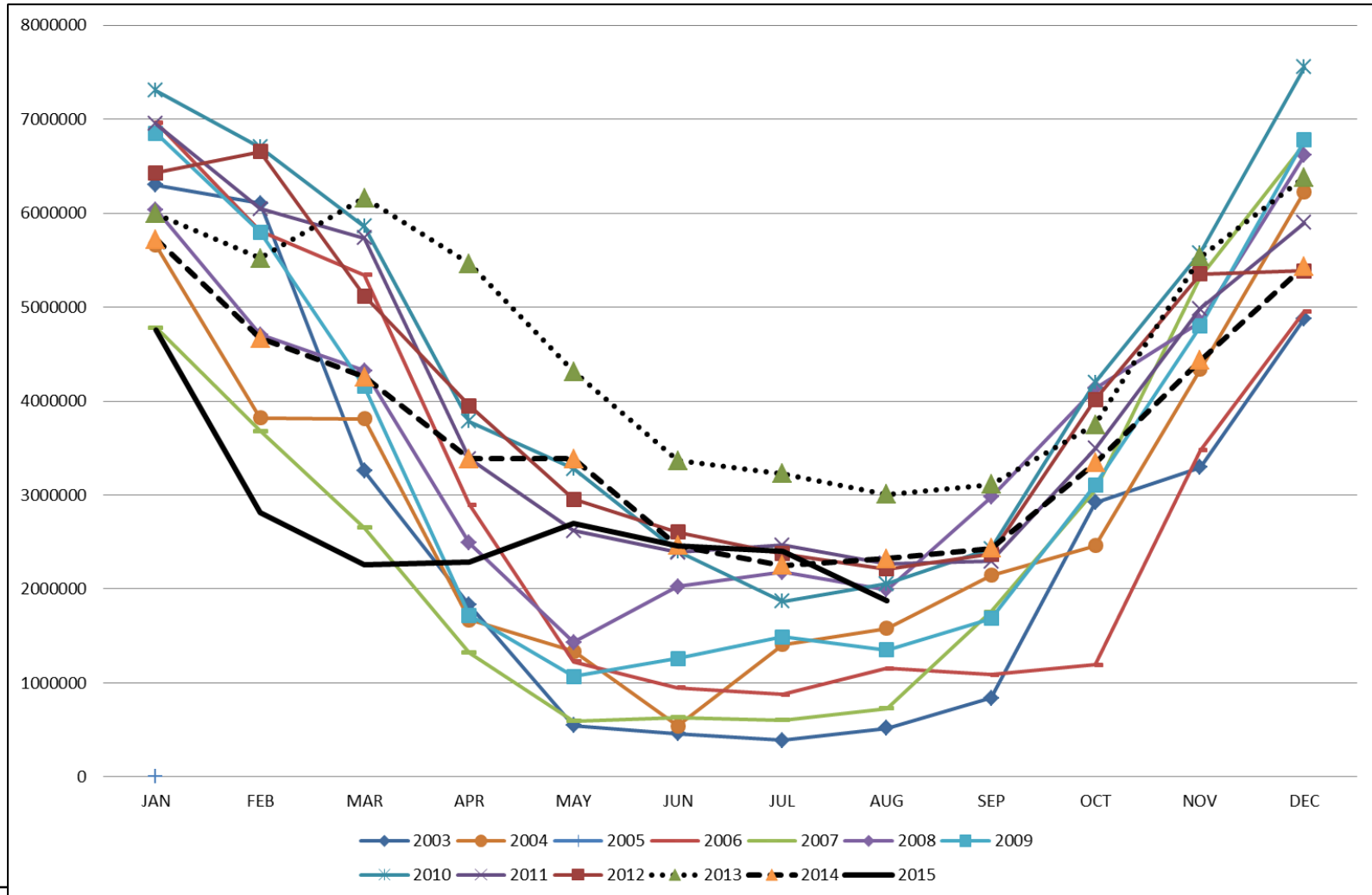
Available but limited: to be expanded?....? For how long??



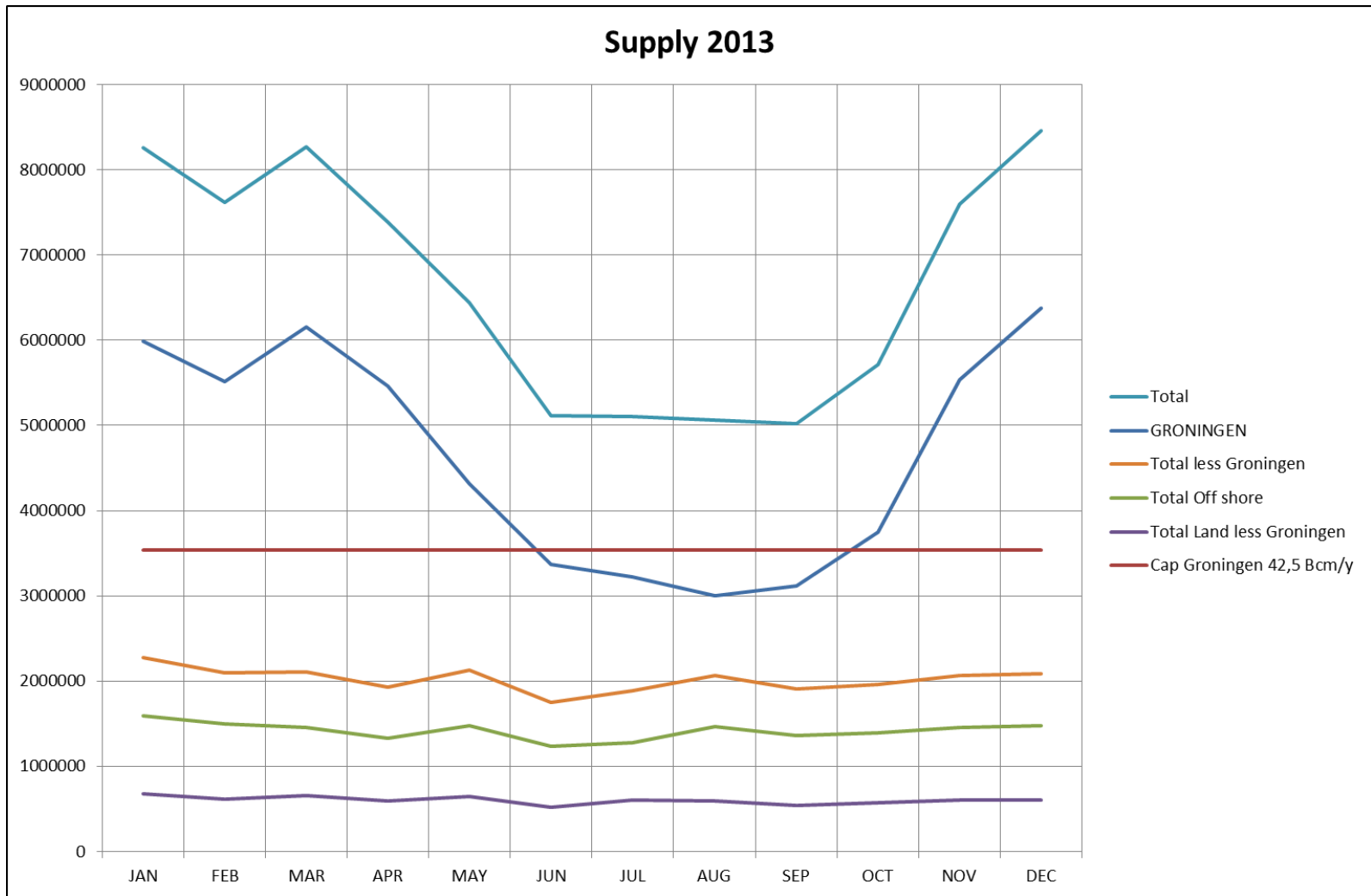
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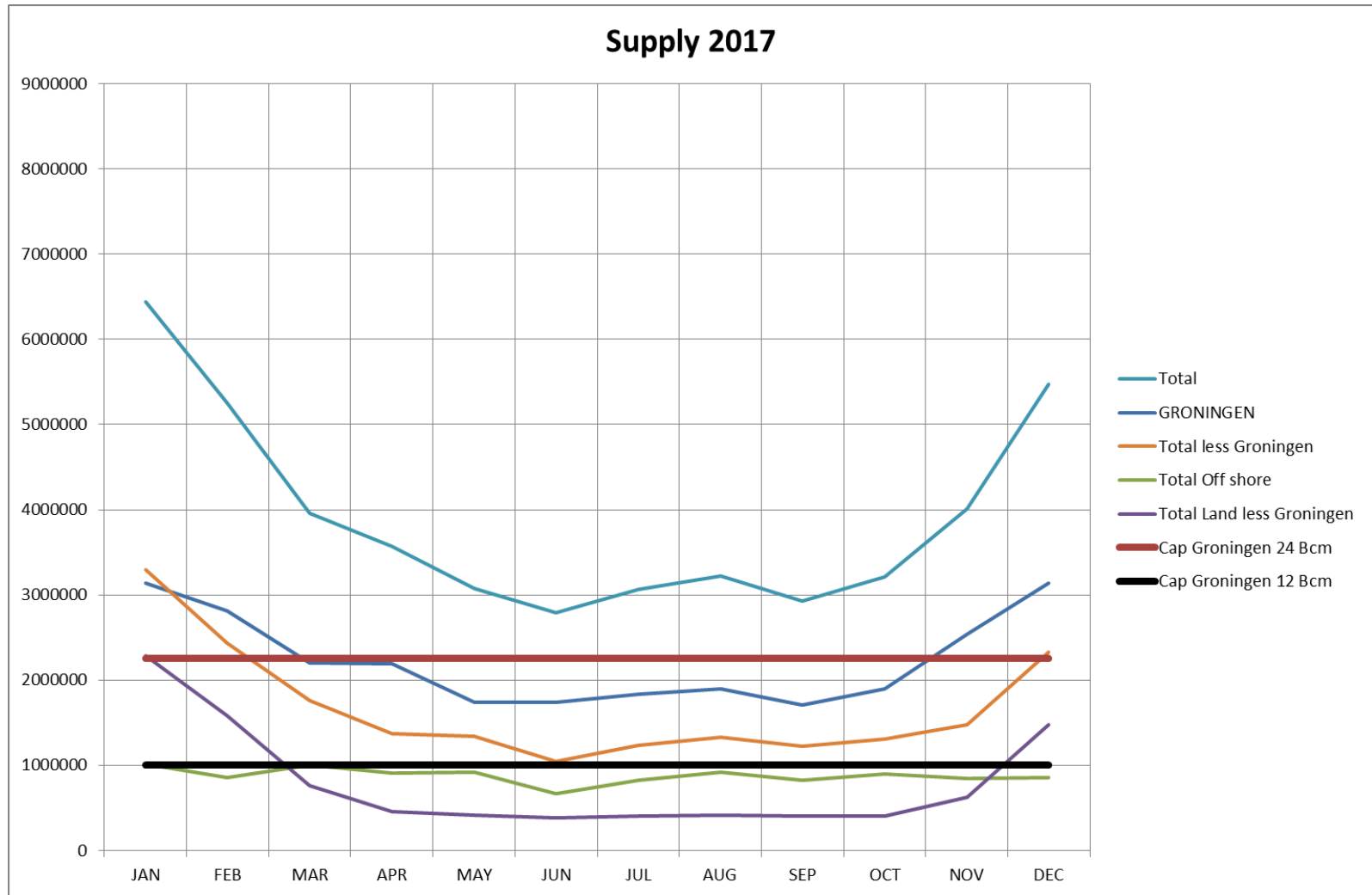
# But what about Groningen flex...?



# Groningen flex in 2013...



# Groningen flex in 2017/8





# More underground gas storages?

## BERGINGEN



:s.nl/

# What about the NWE gas market?

- Reduction in supply of G gas (from 40, to 33, 24, 12, ... Bcm)
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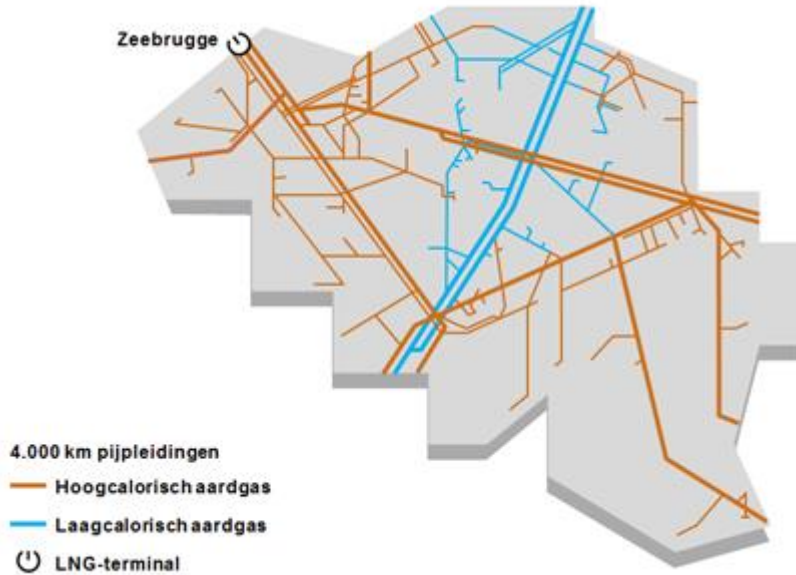
# H gas in 200 industrial firms...?



# What about the NWE gas market?

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# Groningen gas abroad...





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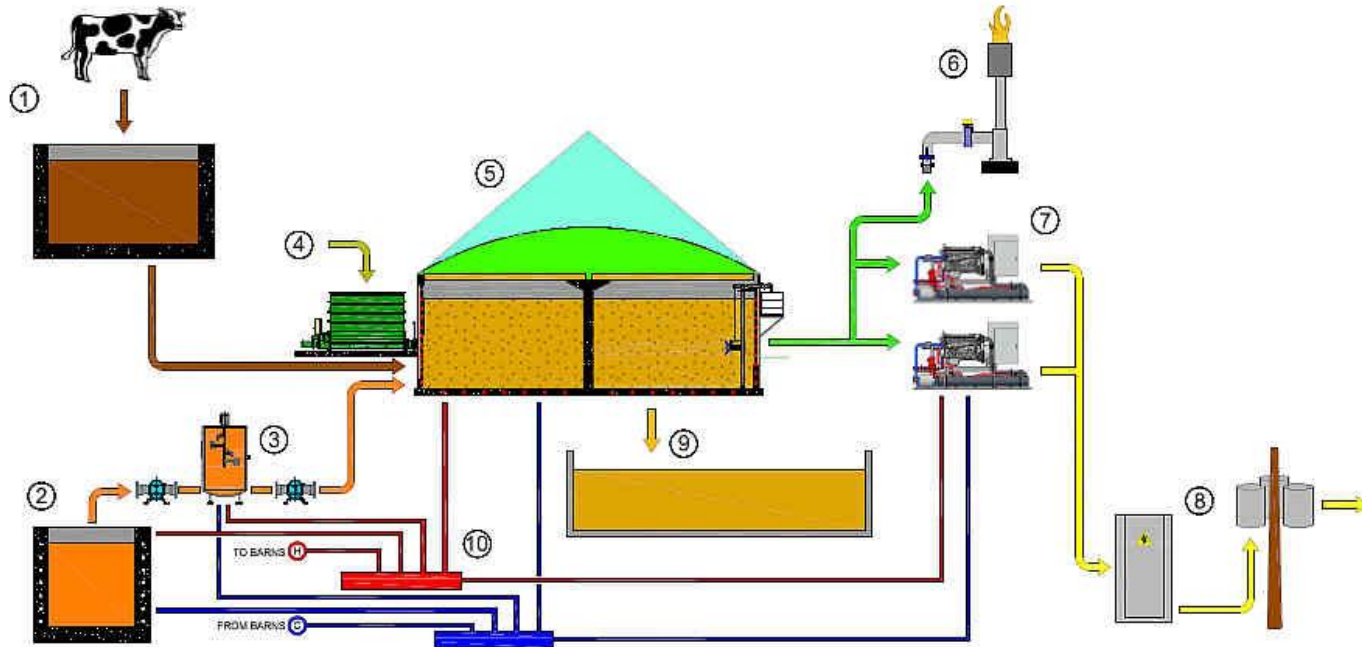
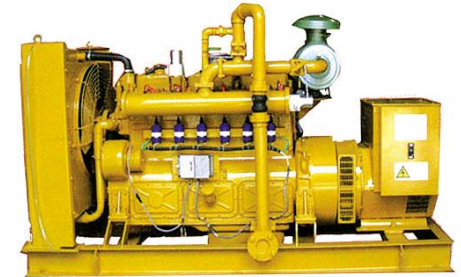
# Shalegas???



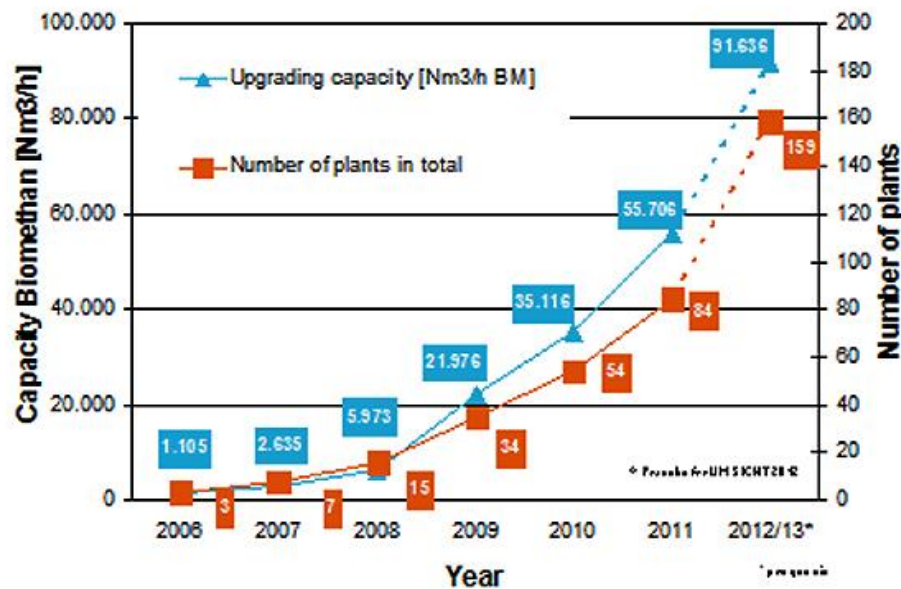
# What else is possible?



## DELFT BLUE VEAL BIOGAS PROCESS

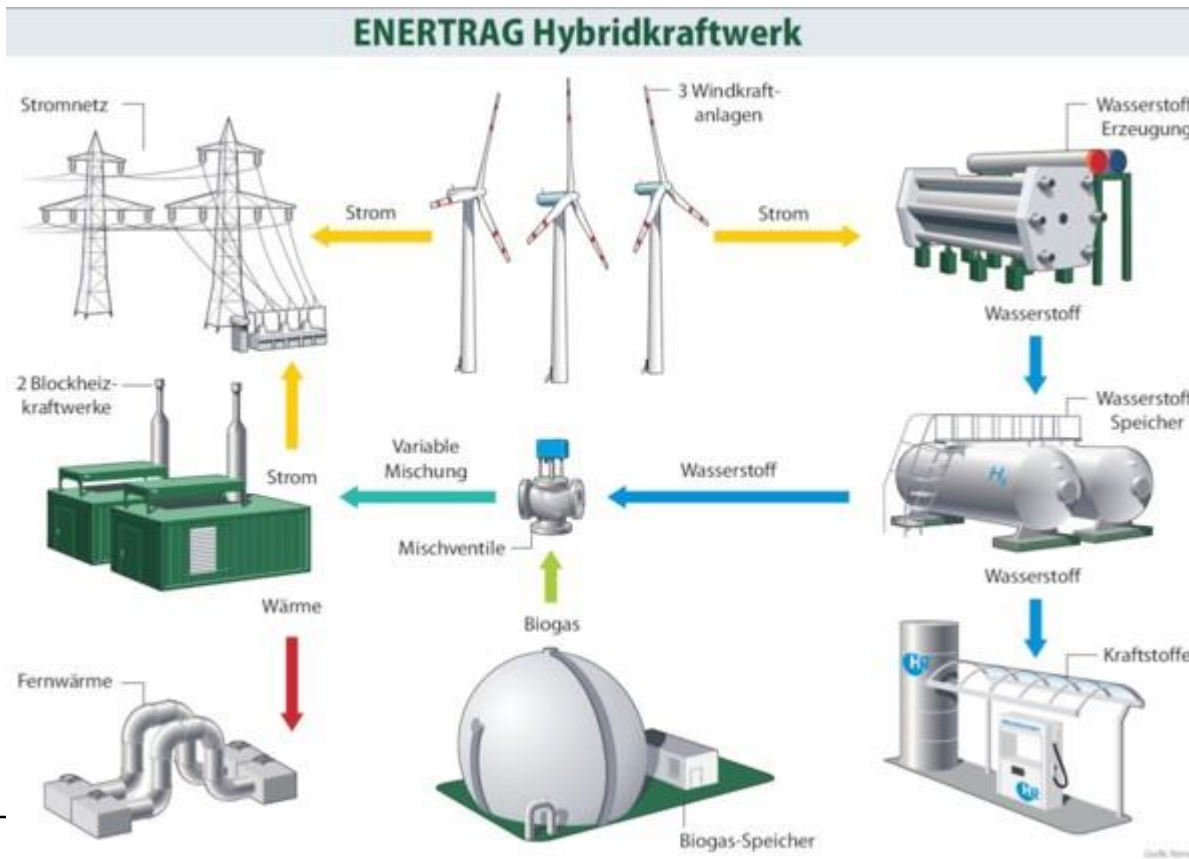


# Larger scale biogas!!

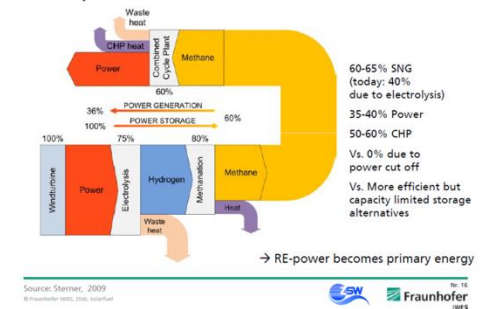




# Also Hydrogen! Power2Gas...

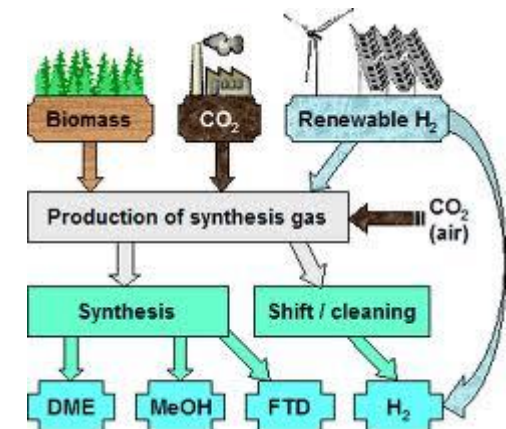
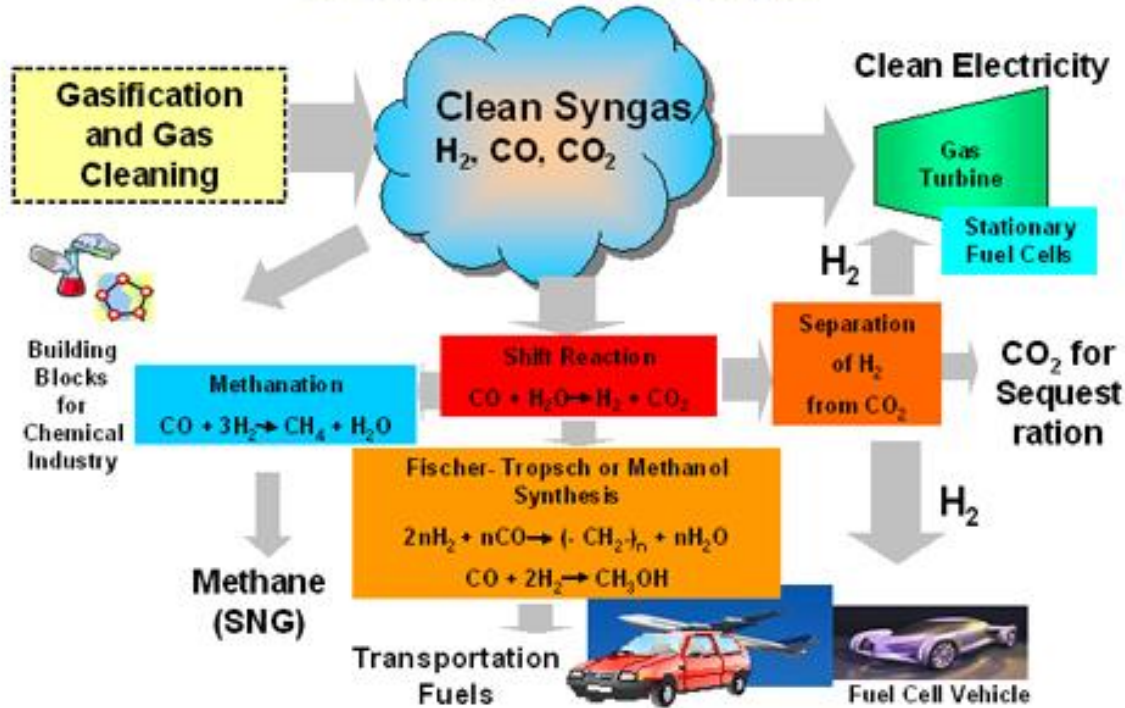


Wind gas Efficiency



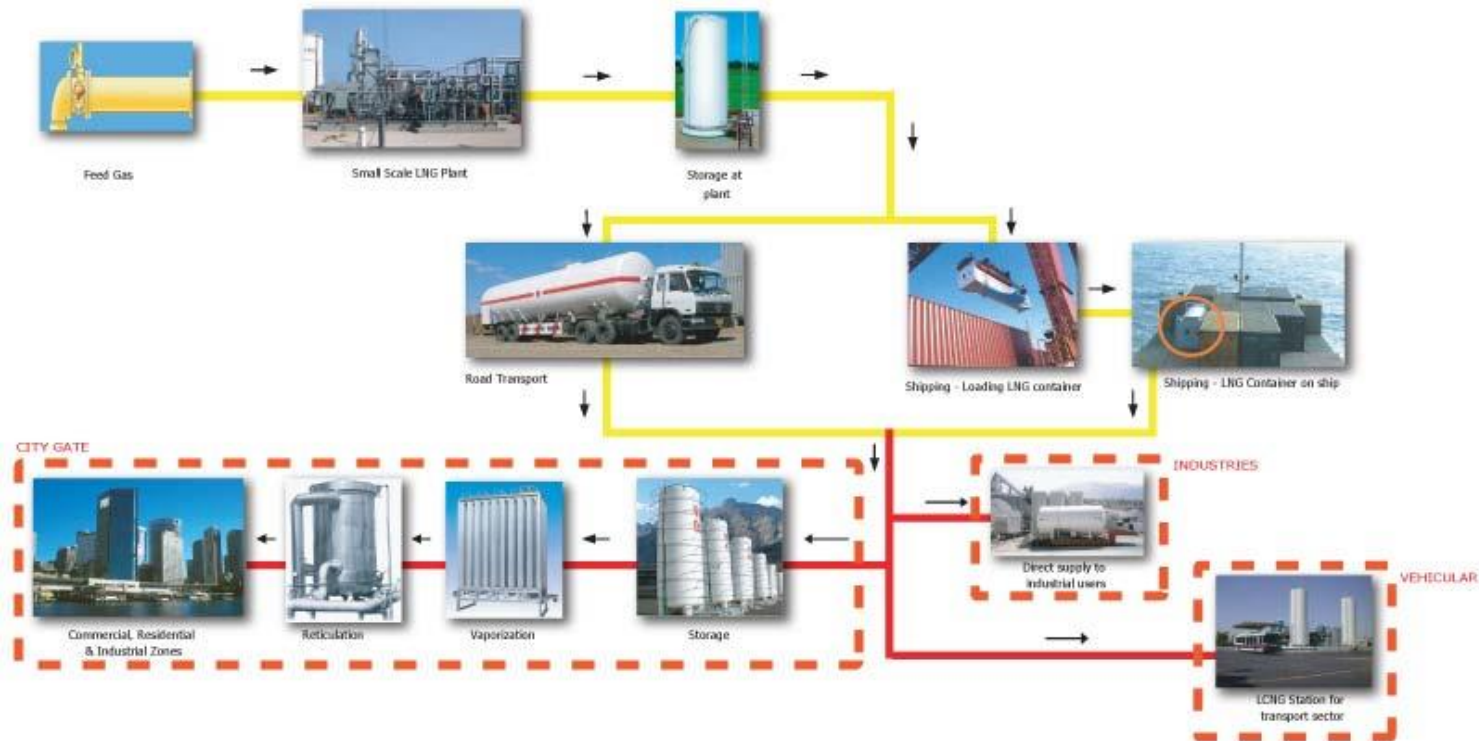
# And...

## Products from Syngas





# And also micro LNG!

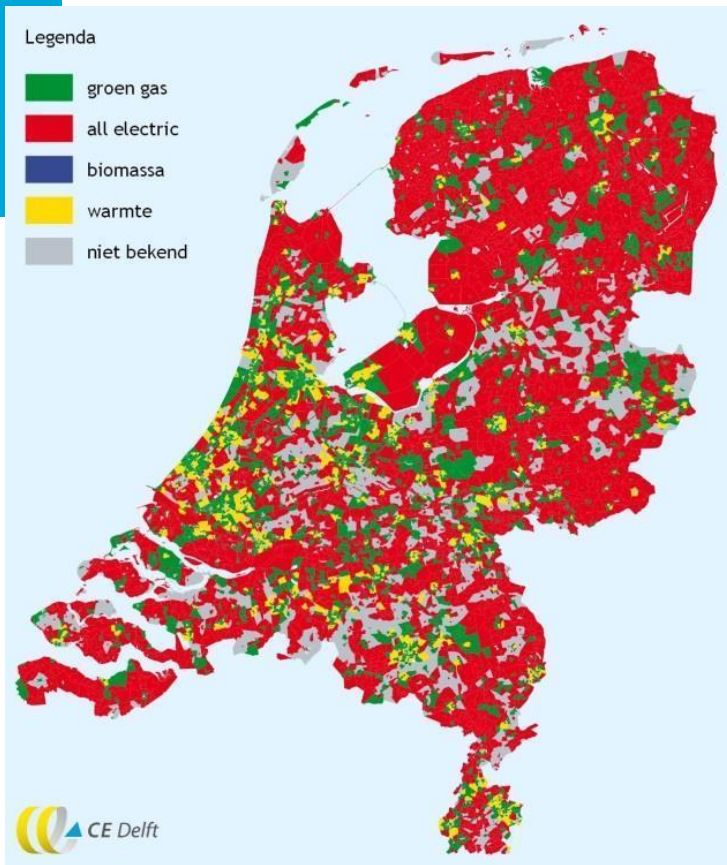


LNG - Process, Transport and Delivery

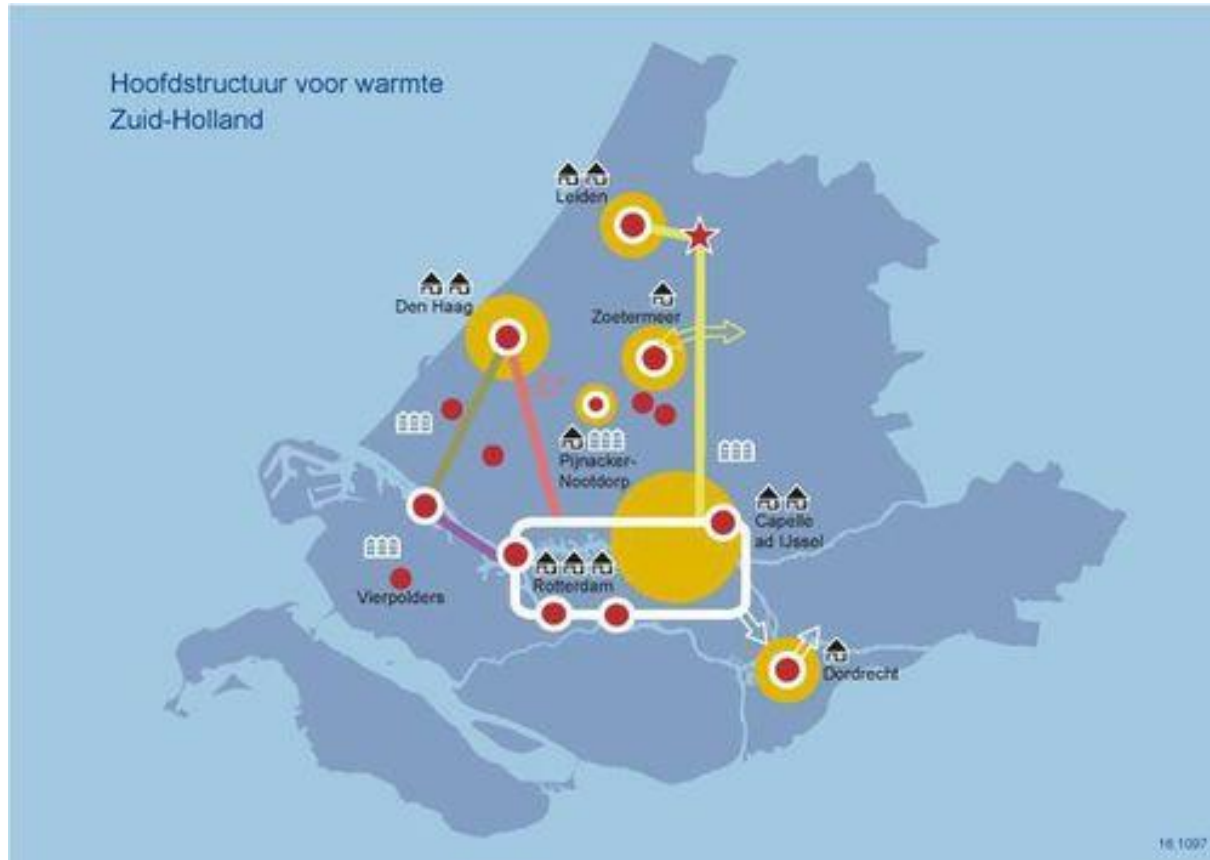
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# Away from gas in 70 cities?



# Heat distribution?



April 9, 2018

49

# All Electric?

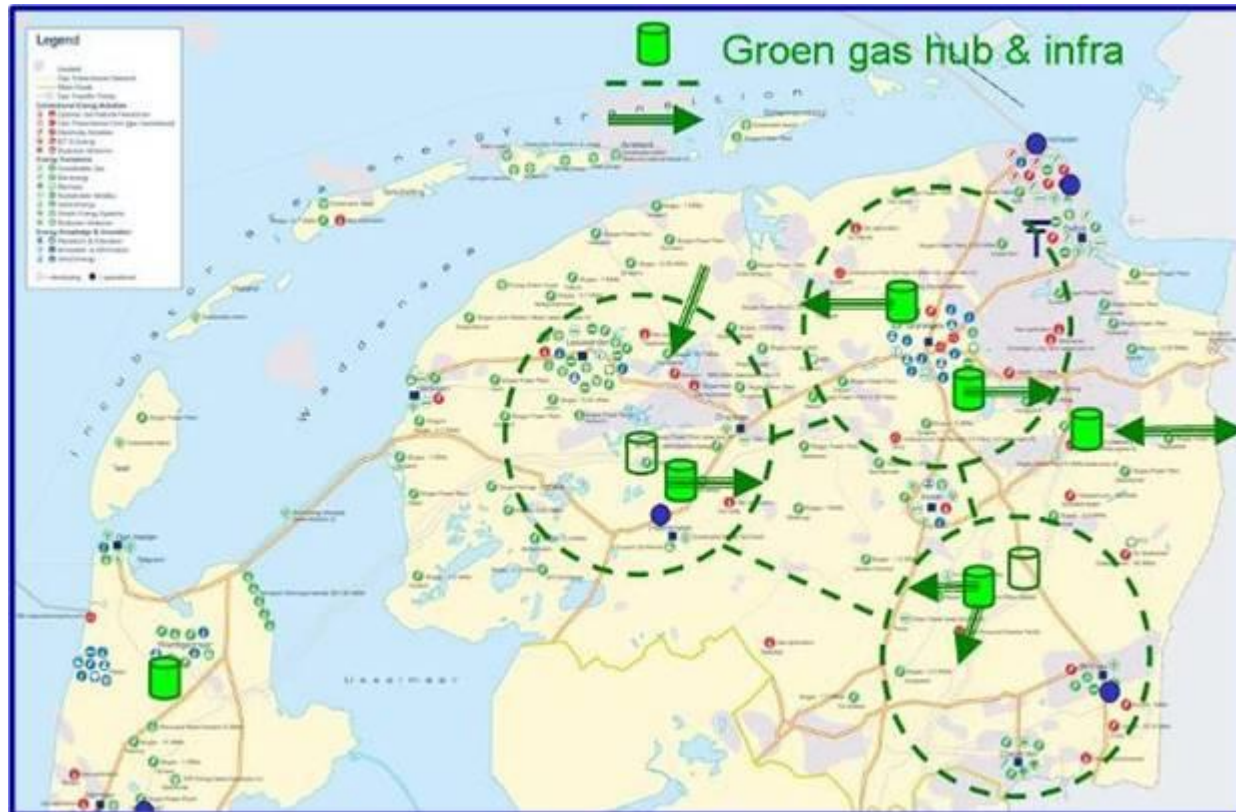


April 9, 2018

50

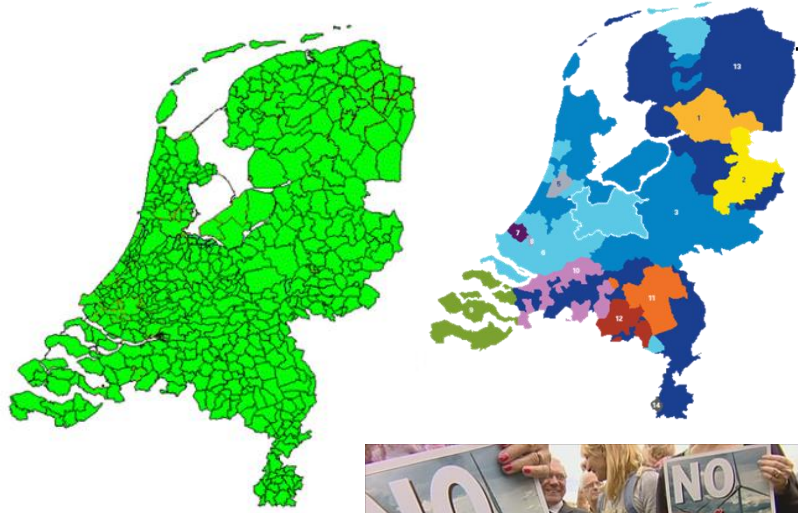


# Who is blending, storing and transporting and delivering ??





# How are we going to organize that? And when?



# Thanx!

