## OFFSHORE GAS R&D EFFORTS IN THE NETHERLAN

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## OUTLINE

- > E&P in the Netherlands
- Offshore challenges
- > Stimulating oil and gas activities in the Netherlands
  - 1. Small fields policy
  - 2. Easy access to data
  - 3. Innovation Program
  - Summary
  - Way forward

## NETHERLANDS OIL&GAS ACTIVITIES

- > Started in 1950's
- largest natural gas producer and exporter in the EU.
- > Produced 3600 BCM up till now
- > Groningen field 2800 BCM
- Small fields





## **HISTORIC PRODUCTION & FORECAST**



source: EBN

| GOT IA, Perth 2015



## **PRODUCTION FROM SMALL FIELDS**





## LARGER CAP ON GRONINGEN GAS

- Production caused 196 earthquakes in the region in the past two years
- Major public resistance to gas production
- I july decision whether the output should be limited to 35 or 39.4 BCM/y (current target = 42.5 BCM/y)





## NETHERLANDS FROM 2025 FROM IMPORT TO EXPORTING COUNTRY





## **OFFSHORE DEVELOPMENTS**

- 1962 First exploration drilling
- > 1974 First offshore gas development L10/L11a
- > 1986 First lower cost tripod facility
- 1988 First subsea wellhead facilities L10-S1
- 2009 power generation from windmills and solar panels on monotowers (K17/L9/M7)
- 2011 Re-use of platforms (restricted to same affiliate)



L10A GDF Suez Netherlands.BV





## **OFFSHORE CHALLENGES**

- Declining volumes and margins
- > Tail-end production,
  - Declining pressures leading to flow instabilities and precipitation
    - Water production and disposal
    - Liquid loading
    - > Salt (halite) precipitation
- > Ageing and outdated infrastructure and facilities
  - Abandonment operations

#### Stranded fields



## STIMULATING OIL AND GAS ACTIVITIES SMALL FIELDS POLICY

- > Expensive to exploit
- Higher exploration risks
- High production costs
- > 1974 : small fields are produced as priortiy to the Groningen field
- > 2010: 'Marginal Fields Tax Allowance'
  - For economically marginal field due to small volumes and high production costs
  - Tax deduction of additional 25% of the investment





### **STIMULATING OIL AND GAS ACTIVITIES EASY ACCESS TO DATA**

- Over 5000 wells
- Over 500.000 km<sup>2</sup> 2D seismics
- Over 70.000 km<sup>2</sup> 3D seismics
- Many reports
  - **Reservoir parameters**
  - Gas composition
  - Pressures
  - Etc.





#### 2-5y confidentiality

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- National consortium to achieve ambitions of the Netherlands on hydrocarbon exploration and production
- > ~2 M€/y (50% government)
- Coordination: TNO
- > 2012-ongoing
- > Partners from Industry, SME, University and RTO's



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# OFFSHORE INNOVATION PROJECTS 2012-2014

Theme	Projects	Budget (k€)	Funding (%)
Enhanced Gas Recovery	EGR Technical & Economical feasibility	390	50%
Compression	Integrated compression solutions	250	50%
	High Frequency Dynamics Guideline	150	50%
Real Time Optimization	Real time Monitoring & Optimization Mature Gas Fields	780	50%
Salt Deposition	Prediction and mitigation of salt precipitation	1100	50%
Water management	Produced water treatment	575	50%
Gas well deliquification	Prediction of the effect of foamers	990	50%
	Hydrofobic coatings for mitigation	150	50%
	Predicting unstable flow	200	75%
Well abandonment	Well abandonment: Ductile formation sealing	150	75%
	Total	4735	



## LIQUID LOADING FOAMERS

- How to select the best foamer to mitigate liquid loading?
- How to predict the effect of a foamer in the field?



- Experiments and modeling
  - What are the most important parameters
  - How can we quantatively predict the effect of foamers on gas production?

NAM

ΤΟΤΑΙ



ORANIE-NASSAI

ENERGIE







## SALT DEPOSITION NEAR WELL BORE

- How to select predict salt deposition and its effect on gas inflow?
- > How to mitigate salt deposition?



- Where and when does the salt precipitate?
- How can we minimize deposition and optimize fresh water washes?





## **REAL TIME OPTIMIZATION**

How can we optimize production from a mature platform with unstable and discontinuous producing wells?



- Monitor flow based on model based data interpretation methods
- Dynamic Optimization of production meeting based on objectives and constraints





## **IN SUMMARY**

- Decreasing volumes of gas in the North Sea
- Maturing fields
- Maturing infrastucture
- > Expensive development
- To stimulate offshore E&P
  - > Small fields policy
  - Data accessibility
  - R&D efforts within TKI upstream gas
    - Production optimization and cost reduction.

