



### ATLAS TO EXPLORE HYDROCARBON OPPORTUNITIES IN THE DUTCH OFFSHORE

### LOWER CRETACEOUS PLAY



### Lower Cretaceous Play

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**Energising** the transition

## Lower Cretaceous play elements & risk mapping



ebn

### Lower Cretaceous reservoirs



Modified after Van Adrichem Boogaert & Kouwe (1993-1997)

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### **CRS** maps reservoir presence

#### Vlieland sandstone members

|   | No KN  |  | reservoir present > 5m |  | 0-5m | KN, n | io reservoir |
|---|--------|--|------------------------|--|------|-------|--------------|
| Ρ | OS: 0% |  | 100%                   |  | 70%  | 15%   |              |

#### if only one reservoir > 5m $\rightarrow$ reservoir is present









# **THO** ebn

| Play<br>type | Seal Effectiveness            |            |  |  |  |
|--------------|-------------------------------|------------|--|--|--|
|              | Composite seal<br>thickness   | POS<br>(%) |  |  |  |
|              | Absent [0 m]                  | 0          |  |  |  |
| olay         | 'Not Present'<br>[ 0 – 20 m ] | 30         |  |  |  |
| Gas          | Ambiguous<br>[ 20 – 50 m ]    | 80         |  |  |  |
|              | Present<br>[ > 50 m]          | 100        |  |  |  |

## **CRS Gas Charge (Vlieland & Holland)**







CRS maps from GEODE source rock project Assumption: no gas charge from Posidonia

#### Middle Graben Coals



### Input for migration

# CRS gas charge & migration (Vlieland + Holland)





Based on presence of 1) sealing salt (ZE) and 2) marine clay seals (RN, AT, SG) encountered during upward migration from Carboniferous. Adjusted for fault density

## **CCRS** Calculation

#### Play 3b Vlieland, gas

#### <u>3b Vlieland:</u>

Gas play: CRS reservoir presence (play risk) x CRS reservoir effectiveness gas (play risk) x CRS top seal gas (play risk) x CRS charge gas (play risk) x repeatability risk = **CCRS Vlieland Gas** 





## Sweetspots Gas ?

#### CCRS and Critical risk element





Outside grabens/inversion highs: Reservoir/Seal weakest element

## **CCRS** Calculation

#### Play 3a Vlieland, oil

#### **3b Vlieland:**

Oil play: CRS reservoir presence (play risk) x CRS reservoir effectiveness oil (play risk) x CRS top seal oil (play risk) x CRS charge oil (play risk) x repeatability risk = CCRS Vlieland Oil







## Sweetspots Oil ?

#### CCRS and Critical risk element





### **Conclusions Lower Cretaceous play**

 $\Box$  Weakest (critical) element maps  $\rightarrow$  key for further exploration

- □ Main chance for oil is in the grabens (charge↓)
- □ Chance for gas more widespread (charge↓)
- Northern DCG is underexplored. Friesland Mb is patchy, but may provide sweet spots (if charged)
- More consistency of well stratigraphy required
- Some producing fields have thin Vlieland + Holland seal additional Cenozoic seals ?
- PDWA shows tight oil play occurs at inversion axis (burial anomaly)
- □ Outlook → outside "certain" domains, reservoirs can be considered for other applications (CCS, geothermal, hydrogen, ....)



### Thank you for your attention

