

# Plug & Abandonment Forum (PAF)



Norsk olje & gass

Need for new and cost effective P&A technology

P&A Seminar 30 Oct 2014

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# Topics

- 1. Well statistics in Norway**
- 2. P&A costs and resource requirements**
- 3. Can new P&A technology change this picture**
- 4. Conclusion**

# P&A future in Norway ?

- Choose English
- Fact Pages
- Wellbore Statistics

Source: [www.npd.no](http://www.npd.no)



# Wells drilled in Norway from 1966 – Oct 2014

- Total (23/10-14) 5496 wells
- Development (production, injection & monitoring) 3978
- Exploration (exploration + appraisal) 1518
  
- 1966 – 2 wells, yearly average next 48 yrs 114
  
- Yearly average of development wells the last 10 yrs: 144

# # of wells for permanent P&A

- No available statistics at NPD's fact pages as of today.
- Development wells 3978
- Temporarily abandoned wells 279
- Abandoned platforms (Frigg, Ekofisk,.....) ??? 699
- Estimated # of wells to be permanently plugged 3000
- In this example – 15 rigs are assumed used full time for P&A

# Time spent on P&A

## 20 – 60 days

(Note: This is using traditional P&A technology)

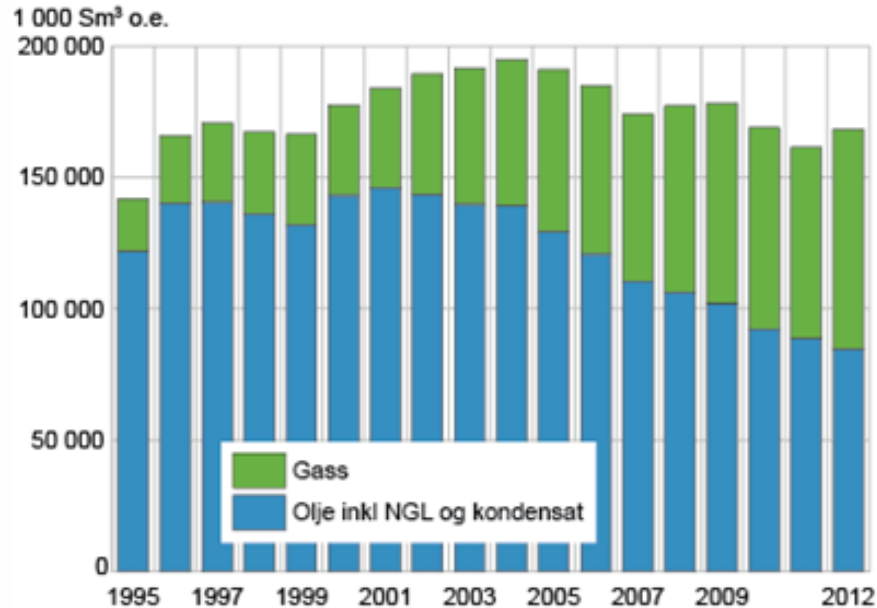
- This example - time per well: 35 days
- 1 rig will P&A 10 wells per yr: 350 days
- 15 rigs will P&A yr: 150 wells
- Time to permanently plug 3000 wells: 20 yrs
- New development wells in this period (144 per yr): 2880 wells
- Time to P&A 2880 wells at this speed: 19,2 yrs
- **Conclusion:** 15 rigs will do full time P&A for 20+19,2 yrs **40 yrs**



- 15 rigs doing P&A for 40 yrs
- Resources (people and equipment)
- Costs (expensive)
- Are we seeing a new industry emerging ?

# Will we get a conflict of interest between P&A and development drilling ?

Samlet produksjon av olje (inkludert NGL og kondensat) og gass.  
Januar-september 1995-2012. 1 000 Sm<sup>3</sup> o.e.



- Source: Statistisk Sentralbyrå (Statistics Norway)
- Conflict, YES - Do nothing – 15 rigs for 40 yrs



## Example of costs

- Rig rate/day  $\$ 300,000 \times 6 \text{ NOK} = 1,8 \text{ mill NOK}$
- Overhead  $= 2,2 \text{ mill NOK}$
- Total rate (spread):  $= 4,0 \text{ mill NOK}$
  
- Yearly costs per rigg:  $4,0 \text{ mill NOK} \times 365 \text{ dy} = 1\,460 \text{ mill NOK}$
  
- 15 rigs:  $1\,460 \text{ mill NOK} \times 15 \text{ rig} = 21\,900 \text{ mill NOK}$
  
- 40 yrs:  $21\,900 \text{ mill NOK} \times 40 \text{ yr} = 876\,000 \text{ mill NOK}$
  
- **Conclusion:** **876 billion NOK**
  
- Oil fund (23 Oct 2014):  $5590 \text{ billion NOK}$

## Who is paying for all this ?

- 876 billions in P&A costs
- 22 % license
- 78 % eller 683 billions – you and me





## Any possibilities for cost reductions ?

- Improve existing technology
- New and inovative technology
- Move P&A from rig time to smaller rigs to rigless P&A
- 30% technology gain is realistic

• Gain:  $876 \text{ billion Nok} \times 30\% = 263 \text{ billion NOK}$

## Can the gain be even more?

- With 30 % technology improvement
- Save 30 % of the time
- Will only need 10 rig instead of 15 rig for P&A over 40 yrs
  
- I.e: will release 5 rigs
- These 5 rigs can now be used to drill production wells
  
- **Exactly what they were intended to do**



## New production wells ?

- One production well 90 days
- One rig 4 wells/yr
- 5 rigs 20 wells/yr
- **40 yrs 800 wells**



# Production history

- Norway's production history is 40 yrs
- 1974 – 18 development wells (from npd fact pages)
- 2014 - 3978 development wells
- 3978 development wells have created 5590 billion NOK
  
- Use the history to predict about the future (avoid guessing)
  
- 800 new wells is 20,1% of 3978 wells
- 20,1 % of 5590 billion NOK is 1123 billion NOK
  
- Assume new wells produce only 1/3 of previous wells
- 1123 billion : 3 = 374 billion NOK

## Cost savings / gain

- Original cost estimate - 876 billion NOK
- Savings using new P&A technology + 263 billion NOK
- Incomes from new wells + 374 billion NOK
- **New cost estimate - 239 billion NOK**

## Possible cost savings

- Possible savings due to new P&A technology and new wells over 40 yrs

- Savings  $876 - 239 =$  **637 billion NOK**

- 57 % of the Norwegian national budget  
(1,114 billions i 2014 – total expenses)





# • YES !!!!!

## Invest in P&A Technology

### Licenses

- JIP
- Individual Company technology development

### Norwegian Research Council

- Petromaks 2
- Demo 2000
- OG21

### Innovasjon Norge

**Winn-Winn for licences and Norway (us)**



## Summary

- P&A in Norway may take 40 yrs w/15 rigs – large industry
- Costs using conventional P&A technology 876 billion NOK
- We, the taxpayers are paying 78 % of these P&A costs
- New technology could result in large savings 637 billion NOK

## Goal

New P&A technology may easily save many «eldre milliarder» (billions).



Kilde: Google

**But remember:** Technology does not happen by itself !!!