

# Strong Drilling Performance in a Remote, Harsh Operating Environment Offshore Ireland



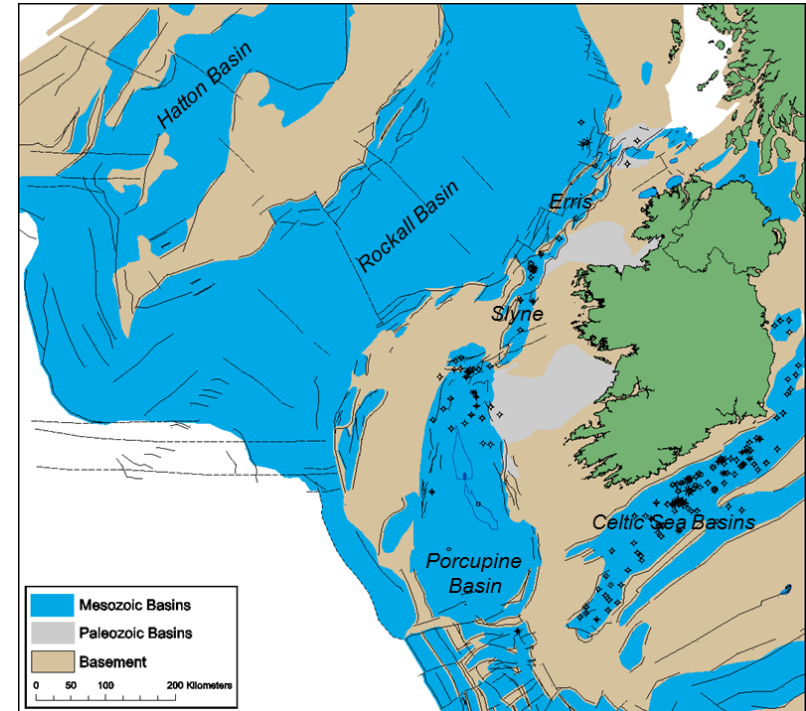
Presented by Stephen Jewell

2017 Update to the ISPSG 'Engineering Downtime Analysis and Cost Effective Drilling' Study  
Prepared by George Ross, Kinetic Engineering Ltd



# Engineering Downtime Analysis and Cost Effective Drilling Study

- Sponsored by PIP ISPSG
- First published in 2004 covering 154 wells across all basins offshore Ireland
- **Part 1:** A detailed breakdown of historical operational downtime and drilling performance
- **Part 2:** A review of new drilling and development technologies relevant to the Irish sector
- An invaluable resource for Operators planning wells or preparing scoping economics for proposed activity
- Updated in 2017, to include 19 additional wells



# 2017 Update: Downtime Analysis and Cost Effective Drilling Study

- Additional 19 wells, including 3 wells at Corrib, 173 in total
- ENI's 'Dunquin', Petronas' 'Midleton' and Providence's 'Druid / Drombeg' wells are referenced but excluded from the analysis (data not yet released)
- Basis for downtime analysis is unchanged
- Detailed breakdown of historical operational downtime and drilling performance updated
- New drilling and development technologies relevant to the Irish sector revised and updated

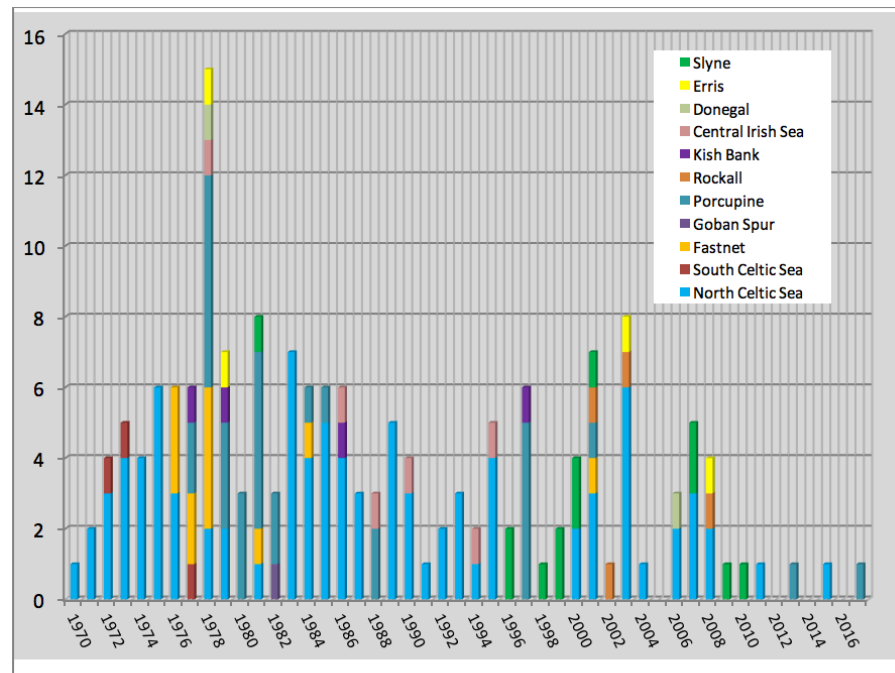


Figure 2 Irish Wells Drilled by Sedimentary Basin



# 2017 Update: Results Summary

- Little change to overall downtime breakdown
- About one quarter of all downtime can be attributed to weather
- Next biggest contributor to downtime is BOP running / testing which is more significant in deeper waters
- Overall average downtime of 20% compares favourably to other harsh environment areas

	Central Irish Sea and Kish Bank	North/South Celtic Sea and Fastnet	Donegal, Erris and Slyne	Porcupine and Goban Spur	Rockall	All Wells
Weather Downtime	5.0%	6.1%	5.7%	3.7%	2.4%	5.3%
Top Hole (open water)	6.0%	1.8%	1.2%	3.3%	1.0%	2.2%
BOP running/testing problems	2.6%	3.5%	3.0%	6.4%	6.6%	4.2%
Other rig equipment downtime	0.3%	1.3%	1.5%	1.9%	4.1%	1.6%
Stuck pipe, twist off, fishing	3.6%	2.8%	2.9%	3.1%	1.3%	2.8%
Hole condition	0.1%	1.2%	1.1%	1.1%	2.8%	1.2%
Casing and cementing problems	0.4%	1.3%	2.3%	1.1%	1.1%	1.3%
Coring/Logging/Testing/Completion Problems	0.3%	1.0%	2.9%	1.8%	2.0%	1.5%
Well Control	0.0%	0.1%	0.2%	0.3%	0.4%	0.2%
Total Downtime	18.4%	19.1%	20.7%	22.6%	21.6%	20.3%



## 2017 Update: 2004 vs 2017 Results

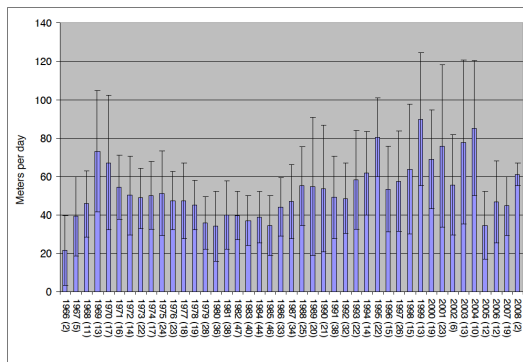
- Only small changes to overall downtime breakdown
- Increases in casing and cementing could be attributed to better QC
- Increases in Coring etc. might be attributed to increased appetite for data
- Overall average downtime shows little change, and suggests no significant performance improvements over the last 10 years
- The devil is in the detail

	1970 - 2004	1970 - 2013	Change
Weather	5.2	5.3	+0.1
Top Hole	2.3	2.2	-0.1
BOP	4.3	4.2	-0.1
Other Rig	1.4	1.6	+0.2
Stuck Pipe / Fishing	2.8	2.8	-
Hole Conditions	1.2	1.2	-
Casing / Cementing	1.1	1.3	+0.2
Coring/Logging/Testing	1.4	1.5	+0.1
Well Control	0.2	0.2	-
<b>TOTAL</b>	<b>19.9</b>	<b>20.3</b>	<b>+0.4</b>

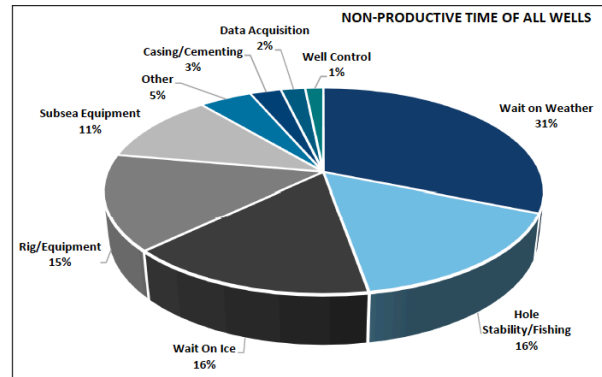


# How does Performance in Ireland compare with other Harsh Environment Areas ?

- Drilling downtime breakdown compared with Canada\*
- Overall ROP performance compared to Canada\* and Norway\*\*



**Figure 3:** Average meters drilled per day. Exploration wells on the NCS, from 1966 to 2008. Annual number of wells in brackets. Black vertical lines indicate standard deviation. Data source: Norwegian Petroleum Directorate.



**Figure 2-9:** Average Non-Productive Time Breakdown of all Wells

\* Drilling Performance Review, Offshore Newfoundland and Labrador, NSB Energy Consulting for Nalcor Energy – Oil and Gas, August 2016

\*\* Norwegian Petroleum Directorate (NPD)



# Rate of Penetration (ROP) Performance

- **Canada**  
112 wells reviewed, 1966 – 2013  
ROP, 14 – 86 m/day, average 36 m/day
- **Norway**  
926 wells reviewed, 1966 – 2008  
ROP, 12 – 120 m/day, average 60 m/day
- **Ireland**  
173 wells reviewed, 1970 – 2013  
ROP, 12 – 192 m/day, average 67 m/day

\* Estimates assume depths drilled from spud to TD including 'flat spots' – casing running etc.



# Non Productive Time Comparison – Ireland vs Canada

- Overall NPT in Canada stands at 25% of all operational time, compared to 20% in Ireland
- Around 16% of all NPT in Canada is ice related
- Remove the effect of ice and overall NPT is similar to Ireland's 20%

NPT Breakdown	Ireland %	Canada % - no ice	Difference
Weather	26	37	-9
Top Hole / Other	11	6	+5
BOP	21	13	+8
Other Rig Equipment	8	18	-10
Hole Conditions / Stuck Pipe / Fishing	20	19	+1
Casing / Cementing	6	4	+2
Coring/Logging/Testing	7	2	+5
Well Control	1	1	-
<b>TOTAL</b>	<b>100</b>	<b>100</b>	





## Summary

- An Update to the '*Engineering Downtime Analysis and Cost Effective Drilling*' study has been recently completed and will be published before end 2017
- This study provides an invaluable planning aid for Engineers designing wells or performing scoping economics in Ireland
- Historical ROP performance and Weather related NPT in Ireland compares very favourably with other harsh environment operating areas

