

An Assessment of the Economics of Undeveloped Discoveries in the Southern North Sea of the UK Continental Shelf through Employment of Cluster Developments and the Introduction of Floating CNG Technology (FCNG)

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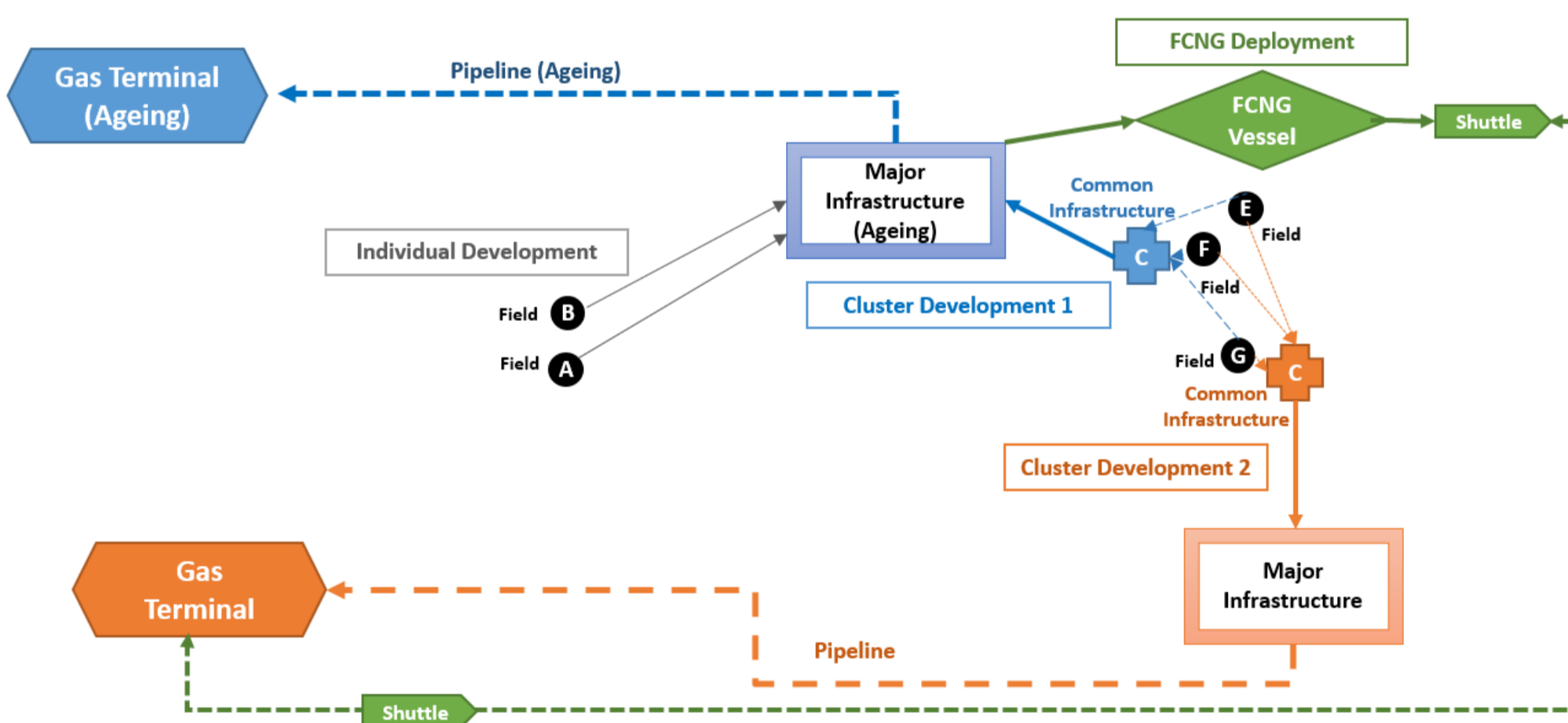
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Background

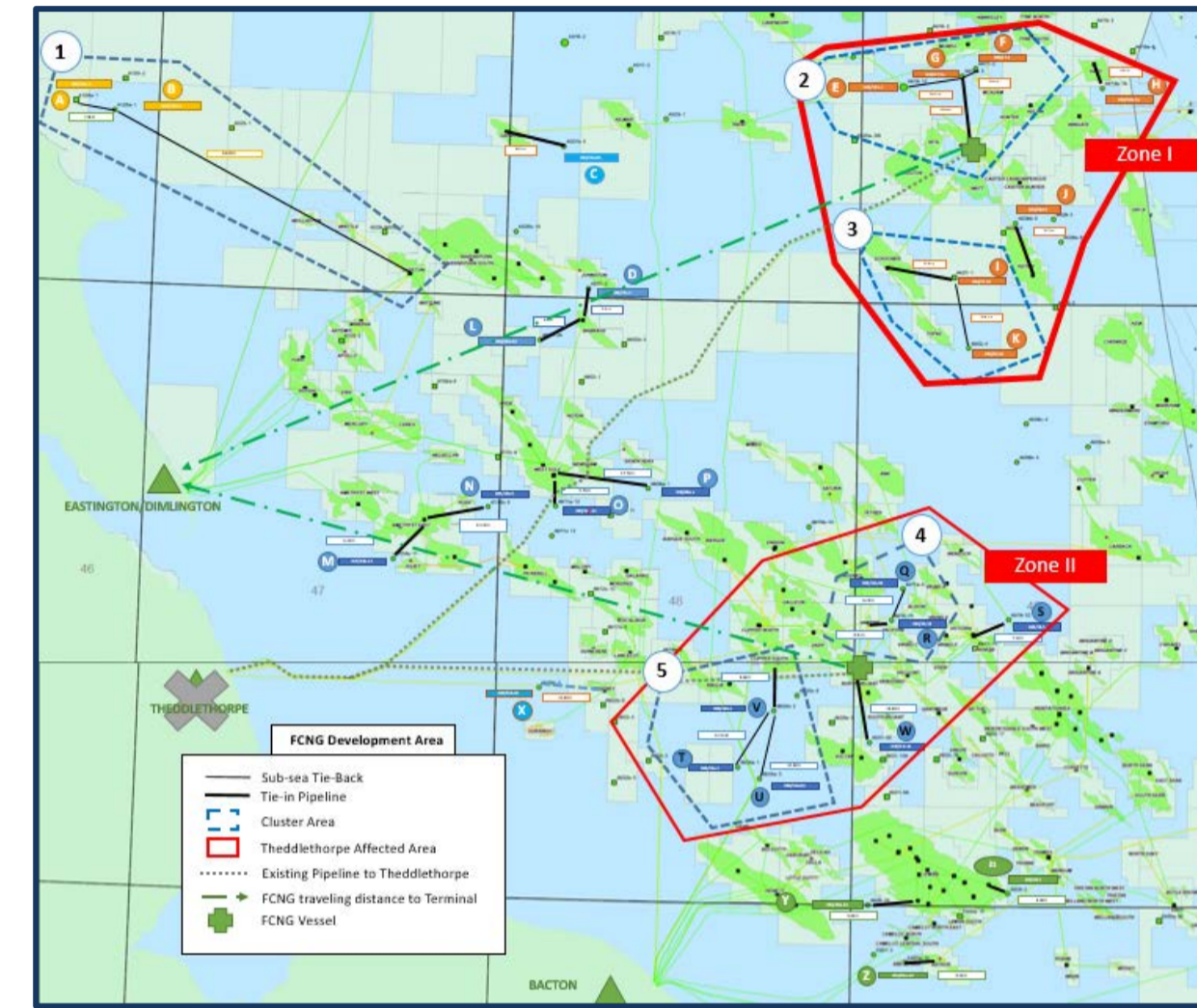
- Small size of discoveries in the SNS provides challenges in encouraging new investments. Many of them may not be economically viable to be developed individually.
- This study assesses the economics of 27 small unsanctioned discoveries in the SNS, with raw data provided by the OGTC, whether they can be economically viable via the employment of 4 development scenarios:
 1. Standalone Development
 2. Cluster Development 1
 3. Cluster Development 2
 4. FCNG Deployment
- Scenarios 3 & 4 consider the absence of some existing infrastructure which are ageing and due to be decommissioned.



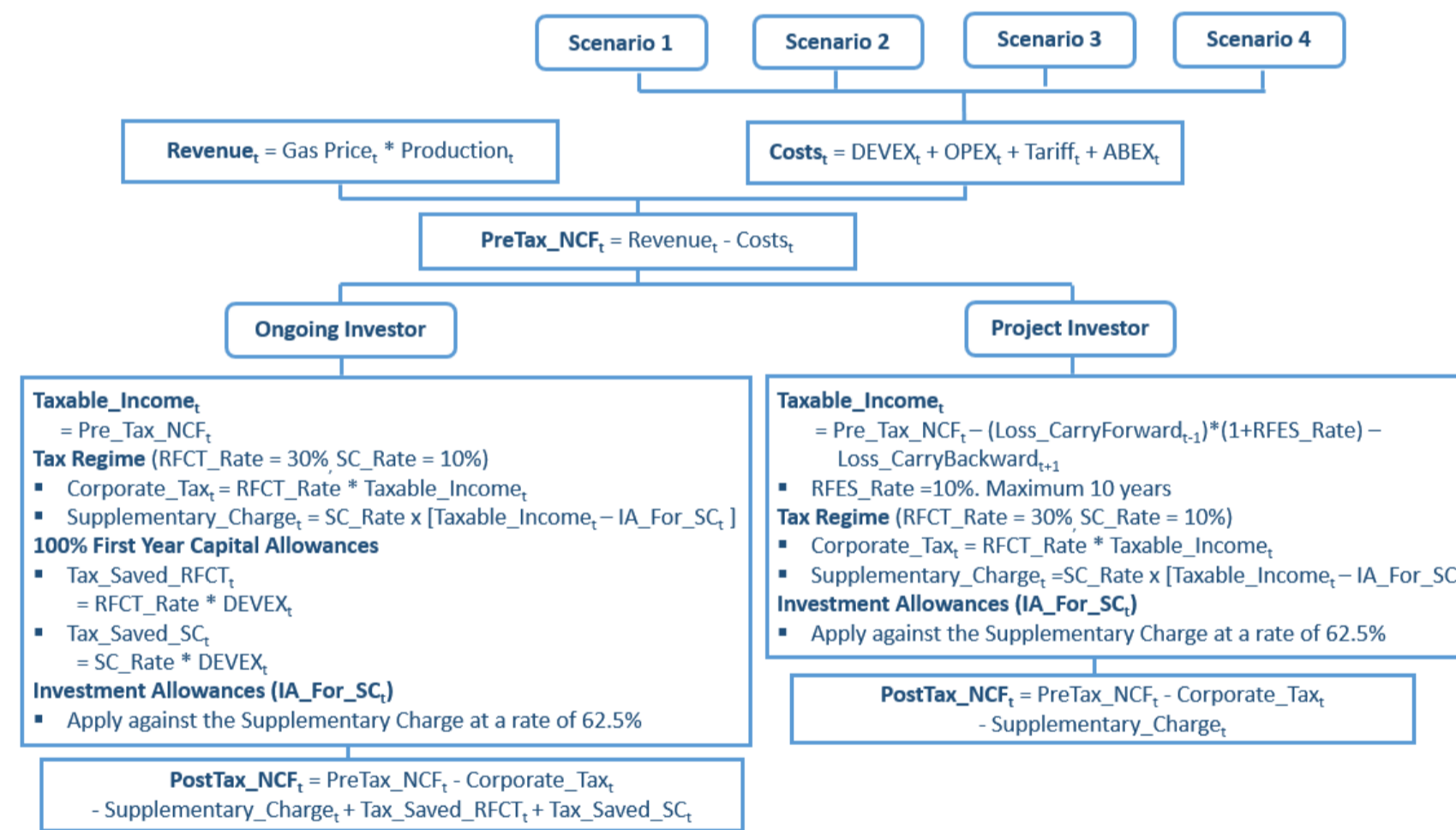
- Each scenario is examined through the investor in 2 taxation situations: Ongoing Investor (in a full tax-paying position) & Project Investor (not in a full tax-paying position), to analyse the impact of the current taxation system.

Methodology

Mapping Exercise
In each scenario, the fields were tied-in to the existing facilities and/or potential common infrastructure, based on GIS data from the UKCS Interactive Map.



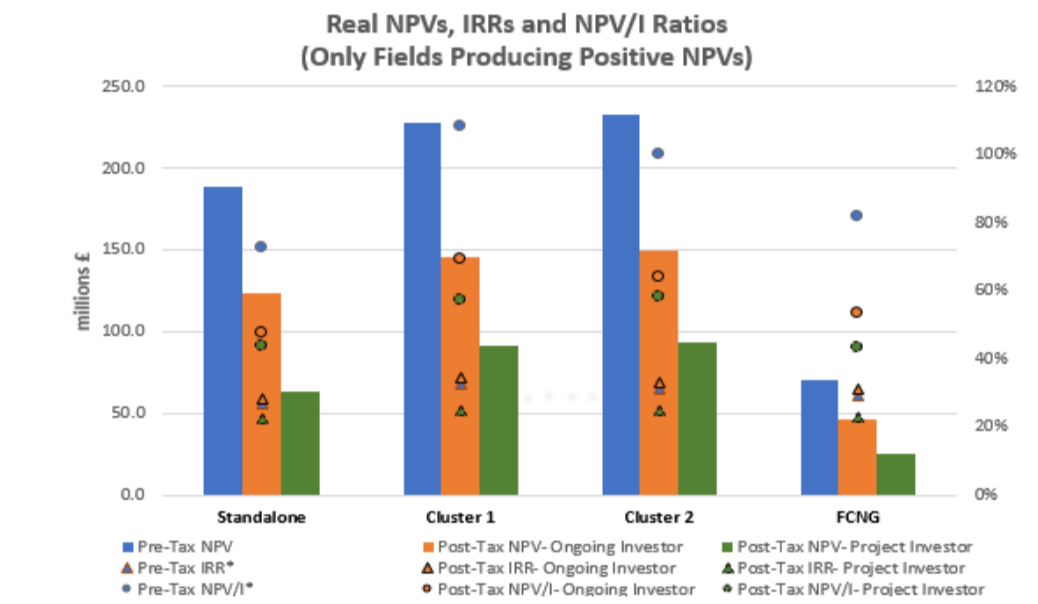
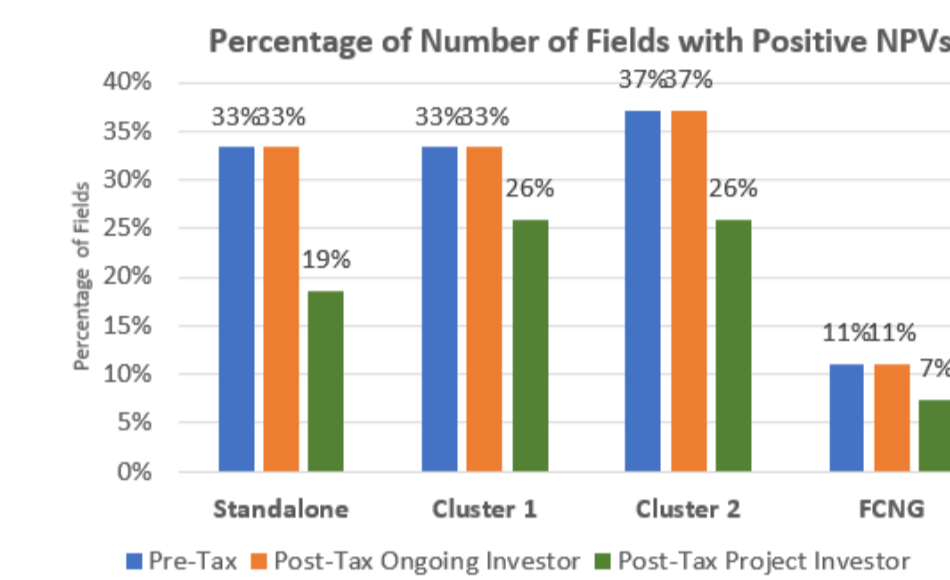
Financial Simulation Models



- **Deterministic Model:** Determination of Cash Flows. Calculation of NPVs, IRRs and NPV/I Ratios (Pre-Tax & Post-Tax).
- **Sensitivity Analysis:** Analysing all input variables - Tornado Chart. Spider plot to locate breakeven points of 4 main parameters on Scenario 3 & 4.
- **Probabilistic Model:** MC Simulation on Gas Price (Log-Normal Distribution), Reserves, DEVE_x and OPEX (Normal Distribution).

Main Findings

Indicators	Standalone	Cluster 1	Cluster 2	FCNG
Pre-Tax NPV (m£)	-107.2	-13.7	6.5	-1107.9
Post-Tax NPV- Ongoing Investor (m£)	-40.4	13.9	25.8	-629.3
Post-Tax NPV- Project Investor (m£)	-257.5	-171.5	-154.6	-1163.6
Pre-Tax IRR	8%	12%	12%	N/A
Post-Tax IRR- Ongoing Investor	10%	13%	14%	N/A
Post-Tax IRR- Project Investor	1%	4%	5%	N/A
Pre-Tax NPV/I	-14%	-2%	1%	-67%
Post-Tax NPV/I- Ongoing Investor	-5%	2%	4%	-38%
Post-Tax NPV/I- Project Investor	-33%	-25%	-23%	-70%



Conclusions

- Less than half of the small pools show positive returns since most of them have relatively low P50 reserves (less than 3.4 mmboe).
- Only Scenario 3 shows positive aggregate pre-tax and post-tax returns (for ongoing investor); very marginal profits. But project investor's post-tax returns are substantially negative because many small fields cannot recover their costs.
- Project investor requires higher reserves & gas price, and lower costs to justify his investment.
- Economies of scale of cluster developments would be very worthwhile, but still have high risks to encounter negative aggregate returns & very low likelihood that more than half of fields will be economic.
- FCNG is currently uneconomic and not yet a suitable alternative for SNS marginal gas fields. Require much lower FCNG costs & higher aggregate reserves to enable this technology.