Saga Energy

Cross-Border Valuation Workshop — International Finance

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Background

Saga Energy AS is a Stavanger-based developer of offshore wind farms. The company designs, finances, builds, and operates wind installations across the North Sea. Saga is listed on the Oslo Stock Exchange and has a market capitalization of approximately NOK 8 B.

The board is evaluating a new project: **North Sea Wind** — a 200 MW offshore wind farm to be built and operated in UK territorial waters. The project would be structured as a UK subsidiary, partially financed with local GBP-denominated debt. Expected operational life is 10 years, after which the turbines and seabed lease revert to the Crown Estate.

The decision. The project finance team must determine the appropriate cost of capital, value the project using the APV framework, and verify that the valuation is consistent whether performed in GBP or NOK.

Market Data

Risk-free rates and exchange rate

	Value
NOK/GBP spot rate	13.30
r_f^{NOK}	3.00%
r_f^{GBP}	4.50%

Asset pricing parameters

	Value
Global equity premium $E[\tilde{r}_W] - r_f$	5.50%
World market beta β_W	0.90
GBP exchange rate beta β_s	0.35
FX risk premium λ_s	2.00%

PPP regression (NOK/GBP, annual data, 20 years)

$$\Delta s = 0.003 + 0.25 \times (\pi_{\text{NOK}} - \pi_{\text{GBP}})$$

Standard error of slope: 0.18. $R^2 = 0.04$.

Project data

	Value
Investment (at $t = 0$)	GBP 75 M
Base-case annual FCF	GBP 14 M
Project life	10 years
Subsidiary debt	GBP 30 M (constant)
GBP cost of debt r_D	5.50%
UK corporate tax rate τ	25%

The debt is maintained at GBP 30 M throughout the project life and repaid in full at year 10.

Country risk scenarios

The UK energy market faces regulatory uncertainty. The project team has identified three scenarios:

Scenario	Probability	Annual FCF
Base case	70%	GBP 14 M
Regulatory tightening	20%	GBP 11 M
Windfall tax	10%	GBP 8 M

All rates are annualized with simple compounding.

Tasks

Part A: International cost of capital framework

Before computing a discount rate, the team must determine which asset pricing model applies.

1. A Norwegian pension fund buys a UK government bond (gilt) yielding 4.50% per annum. Over the holding period, GBP depreciates 6% against NOK (i.e., the NOK/GBP rate falls by 6%). What is the pension fund's return in NOK? Is the UK gilt "risk-free" for the Norwegian investor?

2. The PPP regression above tests whether relative purchasing power parity holds between Norway and the UK. Can we reject the hypothesis that the slope equals 1? What does this imply about **product market** integration?

3. Norway and the UK both have open capital accounts, deep equity and bond markets, substantial cross-border investment flows, and many cross-listed firms. What does this tell us about **financial market** integration?

4. Based on your answers to (2) and (3), which case in the 2\$×\$2 ICAPM framework applies? Write down the appropriate formula for the expected excess return on the project.

Part B: Computing the cost of equity

Using the asset pricing parameters provided, compute the cost of equity for the North Sea Wind project.

1. As a first approximation, ignore exchange rate risk. Compute the cost of equity using only the world market factor (global CAPM).
2. Now include the exchange rate factor. Compute the cost of equity using the two-factor ICAPM. How much does the FX risk premium add?
3. Suppose Saga perfectly hedges all GBP cash flows using forward contracts. What happens to β_s? What is the hedged cost of equity? How large is the reduction?
4. For the APV valuation in Part C, you will discount GBP cash flows at a GBP discount rate. Convert the unhedged NOK cost of equity to its GBP equivalent. *Hint: the equity risk premium is the same in both currencies — only the risk-free rate shifts.*

Part C: APV valuation

Value the North Sea Wind project using the Adjusted Present Value framework.

1. **Step 1 — Unlevered value.** Using the GBP cost of equity from B.4 and the base-case FCFs (GBP 14 M per year for 10 years), compute the unlevered project value V^{UL}.
2. **Step 3 — Tax shields.** The UK subsidiary borrows GBP 30 M at 5.50%. Compute the annual tax shield and its present value over the 10-year project life. *Discount at the cost of debt.*
3. **Step 4 — Country risk.** Compute the probability-weighted expected annual FCF across the three scenarios. Then compute the country risk adjustment as the present value of the difference between base-case and expected FCFs (using the GBP cost of equity as the discount rate).
4. **Total APV.** Combine your results: $V^{APV} = V^{UL} + PV(\text{tax shields}) - \text{country risk haircut}$. Is the project value-creating (NPV > 0)? Convert the NPV to NOK.

Part D: Home currency vs. foreign currency consistency

A robust valuation should give the same answer whether performed in GBP or NOK.

1. Using covered interest rate parity, compute the forward NOK/GBP rate for years 1 through 5:
$$F_{0,t} = S_0 \times \left(\frac{1 + r_f^{\text{NOK}}}{1 + r_f^{\text{GBP}}} \right)^t$$
2. Convert the base-case GBP 14 M cash flows to NOK using the forward rates from (1) for years 1–5. Discount each NOK cash flow at the NOK cost of equity (8.65%). Verify that the present value of these five years matches the GBP approach (i.e., discounting GBP 14 M at 10.15% and converting to NOK at the spot rate).
3. A junior analyst discounts the GBP 14 M cash flows directly at the NOK cost of equity (8.65%) instead of the GBP rate. She obtains V^{UL} = GBP 91.4 M. Explain the error and calculate how much this overstates the correct unlevered value.

4. What general principle ensures that the HC and FC approaches give the same answer? Under what conditions might they diverge?

All data in this exercise is fictional but calibrated to realistic market conditions.