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CCJ – Impact of Risk on Project Finance

Den Gammer



What is the ETI?

- The Energy Technologies Institute (ETI) is a public-private partnership between global industries and UK Government

Delivering...

- Targeted development, demonstration and de-risking of new technologies for affordable and secure energy
- Shared risk

ETI members

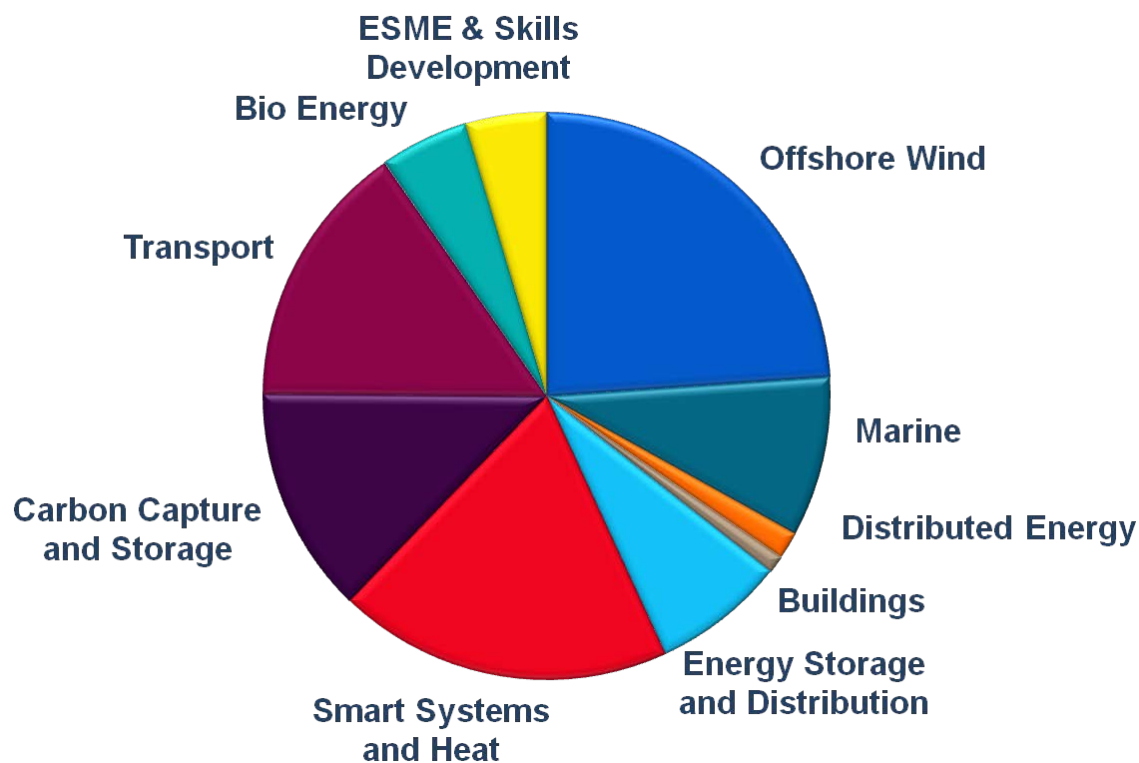


ETI programme associate





ETI Portfolio



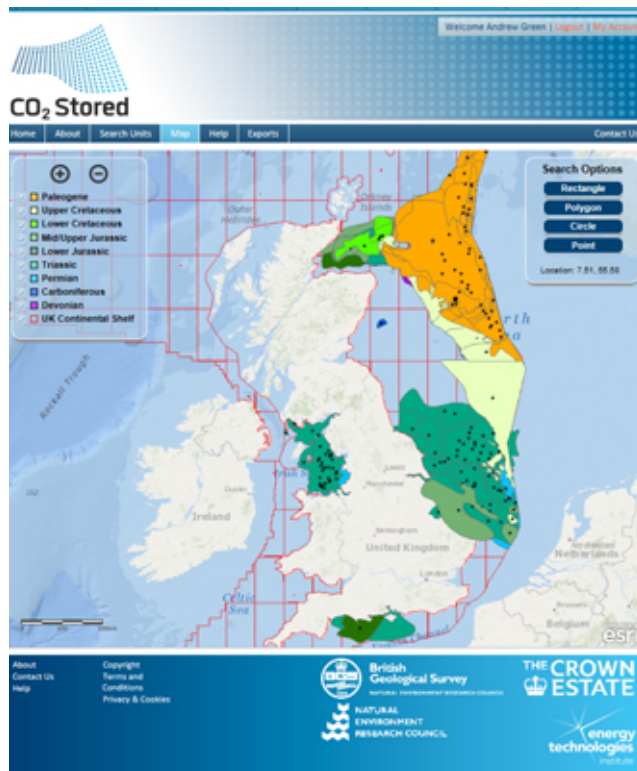
9 Technology Programme areas

Delivering...

- New knowledge
- Technology development
- Technology demonstration
- Reduced risk



UK Storage Appraisal Project UKSAP (CO₂ Stored)



- UK's first CO₂ storage database
- Licenced to the Crown Estate and the British Geological Survey
- Publically launched under the brand of CO₂ Stored in 2013

Project Partners





The Saline Aquifer Appraisal Project



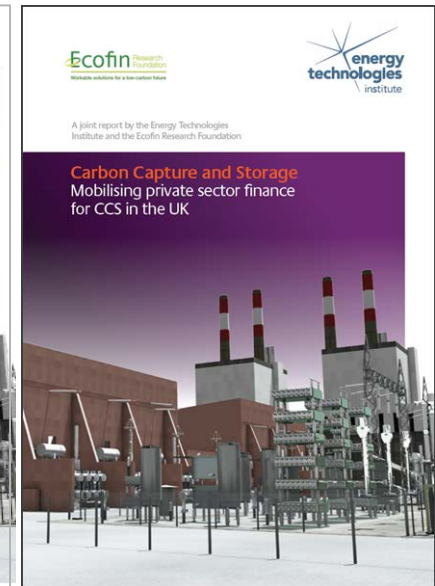
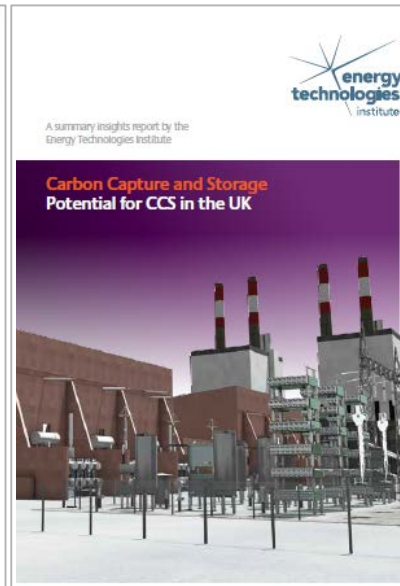
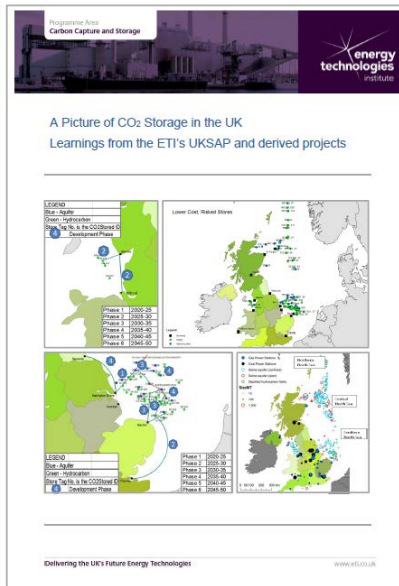
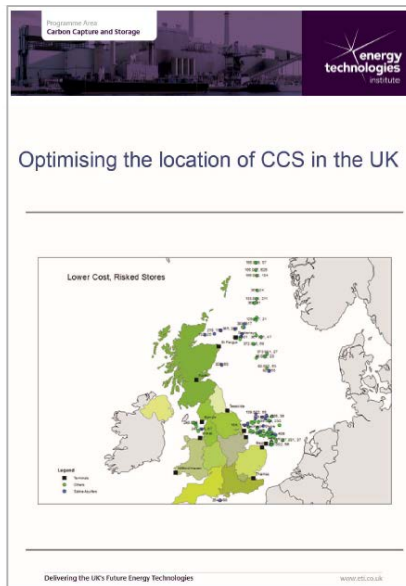
- Co-investment in the UK's first drilling assessment of a saline aquifer storage site
- Appraisal confirms the suitability of proposed site for storage of CO₂ with 200Mt+ capacity
- Confidential ETI learnings reports for members produced

Project Partners

[nationalgrid](#)



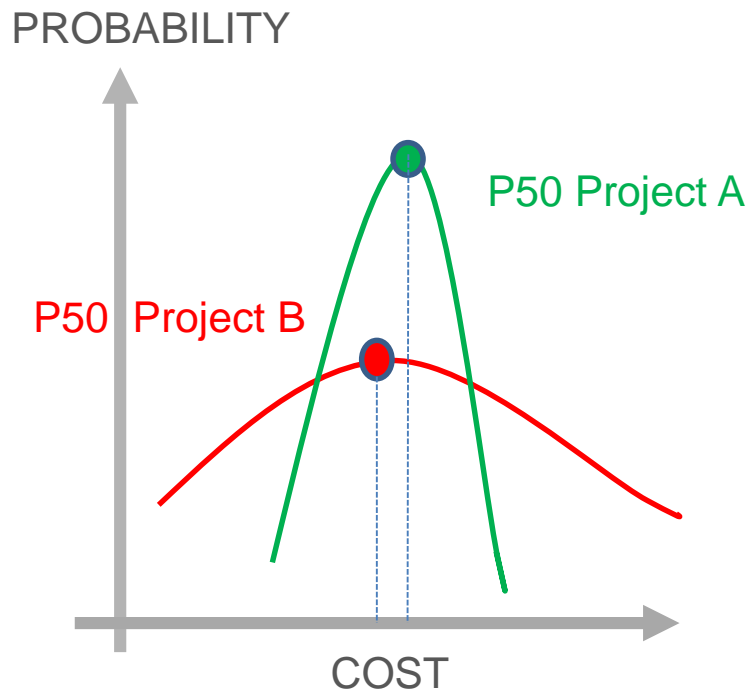
Building Confidence -Sharing Knowledge





Phase 2 and Phase3 project options - risks

- To see how risk and scope elements in different types of Phase 2 and Phase 3 projects could effect their cost, finance and LCOE (levelised costs of electricity)



	Project A	Project B
Capex, £M	1200	1400
Opex, £M /Y	60	30
Levelised Cost. £/MWh	94	90



Choices within the project bring different levels of risk

FINANCIERS RISK CATEGORIES

CONSTRUCTION RISK
TECHNOLOGY RISK
OPERATIONAL RISK
OWNERSHIP & CONTRACTUAL RISK
POLICY & REGULATORY RISK
PERMITTING & CONSENT RISKS



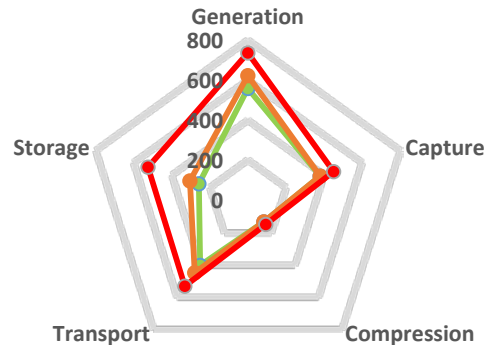
BUILDING BLOCK COST ELEMENT

BASE GENERATOR
CO2 CAPTURE
COMPRESSOR
GAS CONDITIONING
ELECTRICITY CONNECTION
TRANSPORT
STORAGE
OVERALL CCS EFFICIENCY
DELIVERED FUEL PRICE
ETC

ASSIGNED RISK

Low
High
Medium
Low
Low
Low
Low
Medium
High

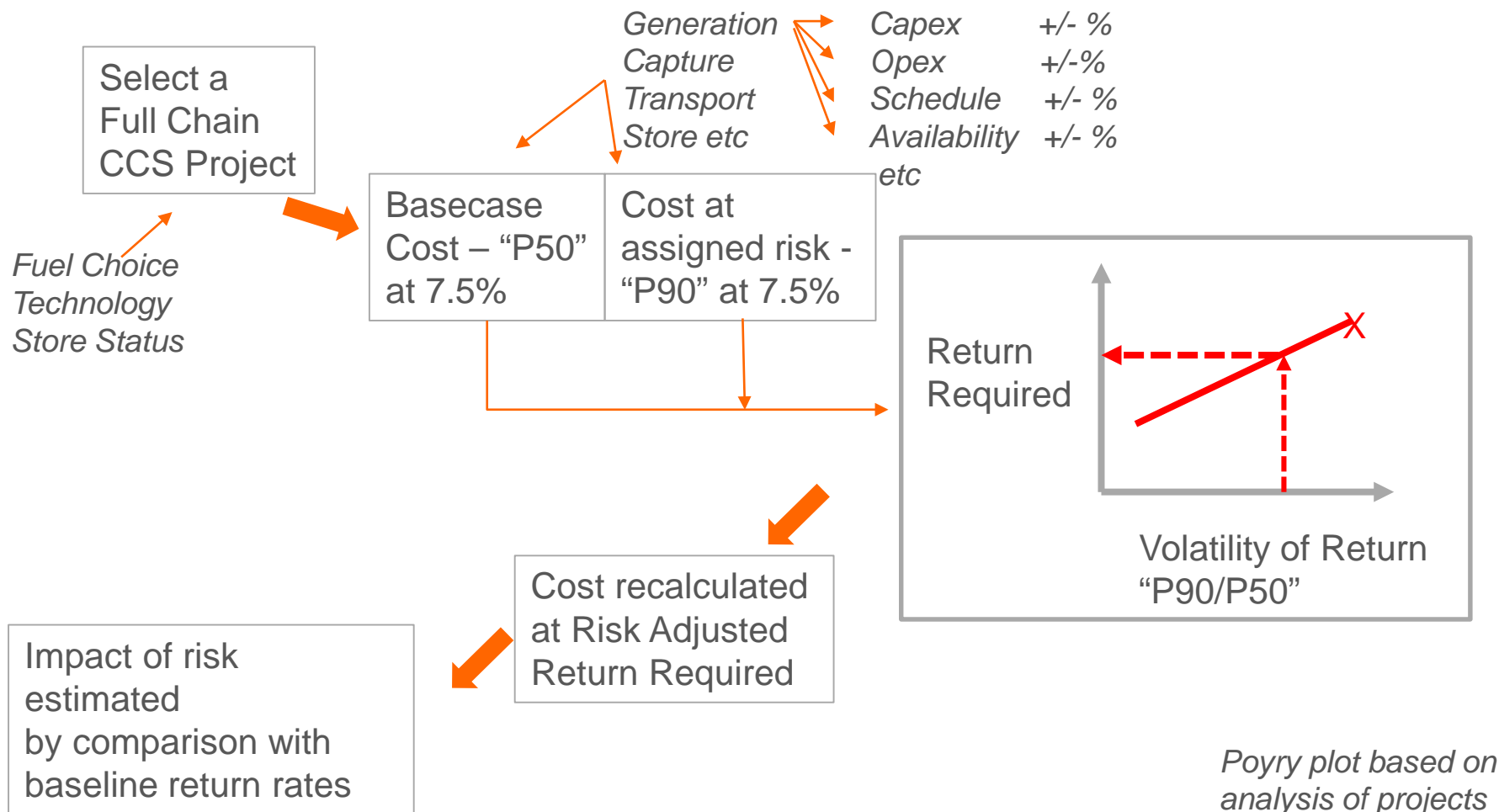
Low Risk Med Risk High Risk



Example : Spread of capital costs



Method





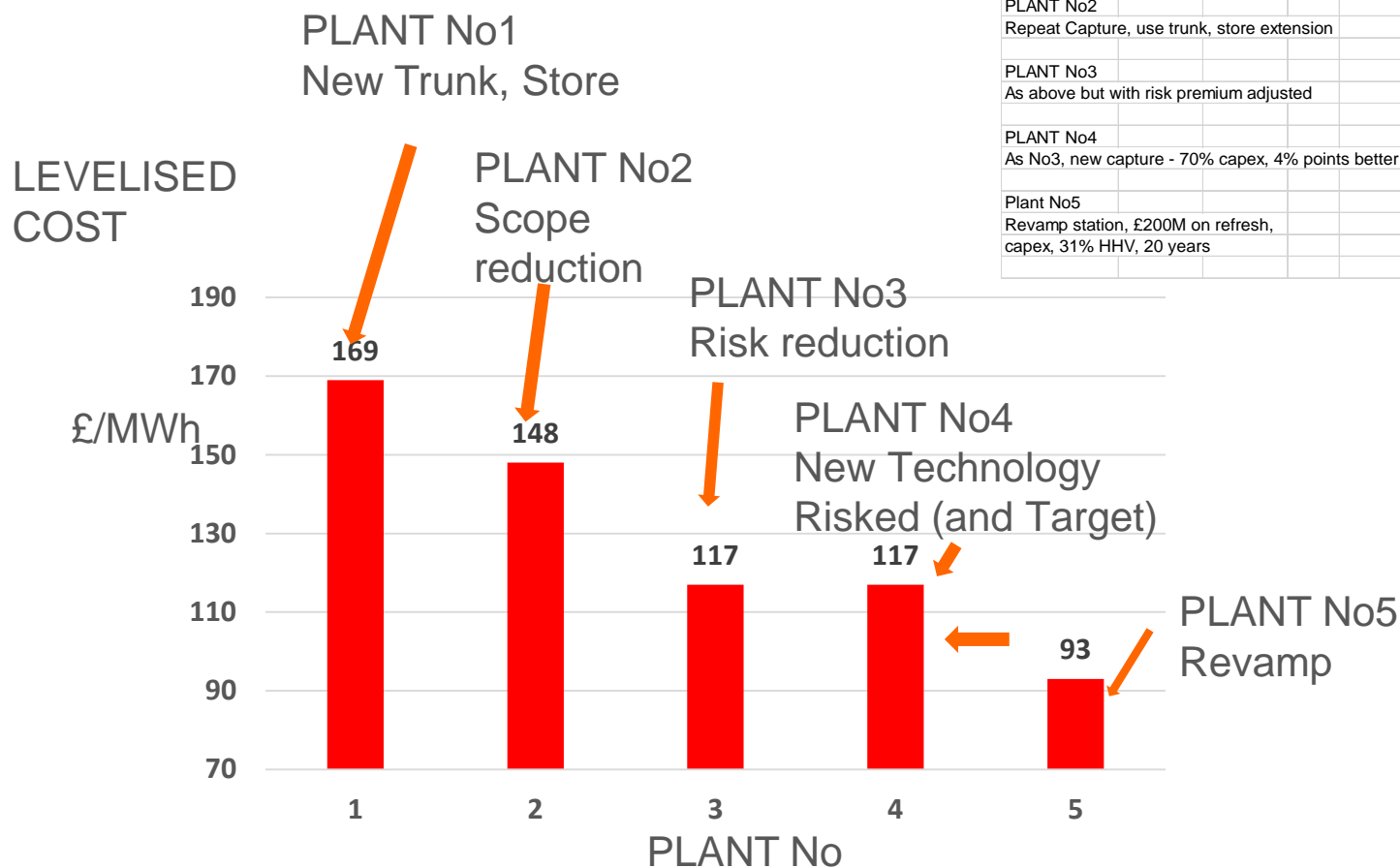
Gas Fired Station



		RISK	LEVELISED	LCOE at
GAS PLANT	860MWe	ADJUSTED	COST	Adjusted rate
		DISCOUNT		vs 10% rate
		RATE, %	£/MWh	0
PLANT No1		15.6	116	1.2
Amine Capture, new trunk and store				
PLANT No2		14.4	101	1.13
Scope Reduction, use trunk, extend store				
PLANT No3		9.1	87.3	0.98
As above but with risk premium adjusted				
PLANT No4		11.1	87.1	1.03
As No3, new step out capture				
- 80% capex, 3% points better				



Pulverised coal plants



COAL	626MWe	RISK ADJUSTED DISCOUNT %	LEVELISED COST £/MWh	LCOE at Adjusted rate vs 10% rate
PLANT No1		17.2	169	1.42
Amine Capture, new trunk and store				
PLANT No2		16.4	148	1.35
Repeat Capture, use trunk, store extension				
PLANT No3		11.4	117	1.07
As above but with risk premium adjusted				
PLANT No4		12.7	117	1.14
As No3, new capture - 70% capex, 4% points better				
Plant No5		12	93	1.06
Revamp station, £200M on refresh, capex, 31% HHV, 20 years				



Summary Findings

Phase 2 and Phase 3 projects building on phase 1 infrastructure

- Can significantly reduce the risk premium (and capital required) by reducing scope.
- Can further reduce the risk premium by using low risk assets and technology.
- Project rankings using a flat rate LCOE are not the same as rankings using risked LCOEs.
- The risked LCOE is a rough proxy for strike price needed to get finance.
- When derisked over several projects as above :
 - Risk comes down to “financeable “levels.
 - New step out technologies which re- introduce risk to the chain have to offer “game changing “ performance to look attractive.
- The store offers the biggest risk in the ETI analysis (even after de-risking at the Final Investment Decision point). It is not important to be adjacent to the trunk line, a gas supply or power connections, provided these are within 20 miles or so.



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