Prospects for activity levels in the UKCS

We present here edited notes and revealing, if somewhat pessimistic, illustrations on future projections of UK oil and gas E&P activity in the years to come from the presentation by Prof Alex Kemp, Professor of Petroleum Economy, Aberdeen University. The conclusion from the data presented was that the UK will in less than five years be facing a sharp decline in offshore activity caused to a large extent by factors beyond the control of a single country.

Data and Methodology

Prof Kemp provided the following brief notes on how his charts were derived.

Field Data

For sanctioned fields, 78 incremental projects, 54 'probable' fields, and 19 'possible' fields from UKOOA database.

For technical reserves, 259 other fields with block numbers, type (gas, oil, gas/condensate), and estimated reserves. These are named as further 'possible' fields in the presentation'.

Modelling

For five areas, significant overall exploration success rates for 2000; for three regions, based on published data for 1994–1999 inclusive. For West of Scotland and Irish Sea, 10% used (higher than 1994–1999).

A number of different scenarios are examined dependent on oil price. For the Medium Case scenario, modest decline rates in success to 2020 are postulated. The High and Low Cases are ±5%, compared with MC.

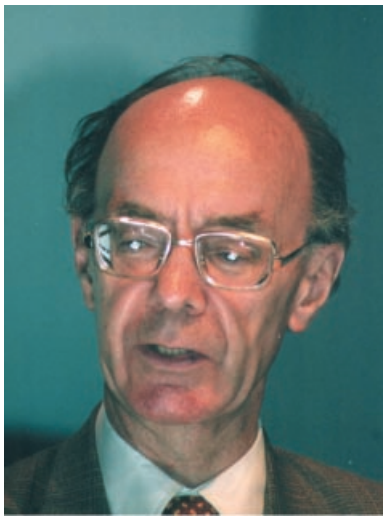
The chances of finding oil or gas are based on historic evidence, and the future exploration effort is related to oil and gas prices, e.g., High Case: $24 (oil), 20p (gas); Medium Case: $18 (oil), 13p (gas); and Low Case: $12 (oil), 10p (gas).

For all three cases, the number of exploration wells falls substantially over the period 2000–2020.

The distribution of exploration effort among the five regions is based on historic experience 1994–1999 inclusive.

The average size of discovery in all five regions is assumed to continue to fall broadly in line with historic experience.

Distribution of field sizes taken to be lognormal in line with the evidence. SD assumed to be 50% of mean for dry gas fields and 40% for gas/condensate fields.



Monte Carlo modelling was employed to project numbers and sizes of new discoveries in each region under the three levels of exploration effort and success rates.

Mean values of development costs per boe (for each region separately) is based on averages for existing and 'probable' fields.

Distribution of development costs is taken to be normal with SD equalling 30% of mean value. Annual operating costs equal 5%–15% of accumulated devex depending on field size.

Monte Carlo modelling was employed to determine devex and opex for any identified discovery.

For the 259 'possible' fields, Monte Carlo technique was used to sample from stock to produce a series of potential field developments through time. The ceiling set on the total number of potentially developable fields ('possible' plus new discoveries) is based on historic trends in the 1990s in numbers of developments. High Medium and Low Cases on such numbers were developed.

Table 1 Average costs

	Real development costs ($/boe)	Real lifetime costs (Devex + Opex) ($/boe)	Total costs (Devex + Opex + Decommissioning) ($/boe)	Average Mboe
All incremental projects	3.67	6.19	6.21	27.6
of which:				
Predominantly oil	3.37	5.47	5.5	25.68
Predominantly gas	4.20	7.47	7.47	31.03
All probable fields	2.88	6.23	6.59	43.32
of which:				
Predominantly oil	3.64	7.92	8.35	32.31
Predominantly gas	2.68	5.79	6.14	46.14
All possible fields	3.89	7.76	8.13	50.17
of which:				
Predominantly oil	4.24	8.20	8.59	53.77
Predominantly gas	3.29	7.01	7.34	43.99

Mean devex for 'possible' fields was set at $2 per boe higher than those for new discoveries. SD was set at 30% of the mean. Monte Carlo technique was employed to determine devex and opex for identified potential 'possible' developments.

Financial modelling was employed to calculate pre-tax and post-tax returns for all potentially developable new fields. The hurdle rate of 15% post-tax in real terms was employed as a binding constraint. The High Case equals High Price + High Exploration Effort + High Number of Potential Developments. Corresponding combinations are calculated for the Medium and Low Cases.

The results for gas and gas/condensate fields has been separated from oil.

Role of smaller oil companies

In his conclusions Professor Kemp made reference to the opportunity that the coming scenario might present for smaller oil and gas companies.

Compared with the Gulf of Mexico, production in the UKCS is concentrated in fewer companies. In Norway, the concentration is even greater. Smaller oil companies offer the prospect of lower unit costs.

There are many potentially developable small fields/incremental projects in mature fields. Depending on oil price, costs, tax, etc, these can offer attractive rates of return (IRRs) but only modest net present values (NPVs) even at high prices. Small companies, but not large ones, may well consider such projects acceptable.

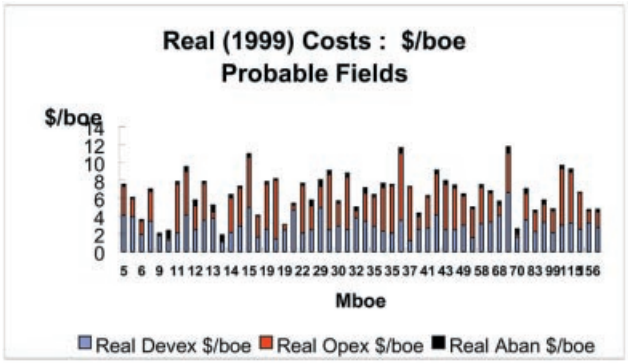
Enhancing the role of smaller companies depends on several factors including: Access to acreage and assets for (i) exploration, (ii) mature field EOR, and (iii) new field developments. The LIFT initiative should provide enhanced access to information with substantial reduction in transaction costs. Initial results are favourable. Mega majors should lead to more assets becoming available. More proactive cajoling by DTI could encourage relinquishment of undrilled acreage. Rollover relief for CGT will permit asset transactions at less net cost.

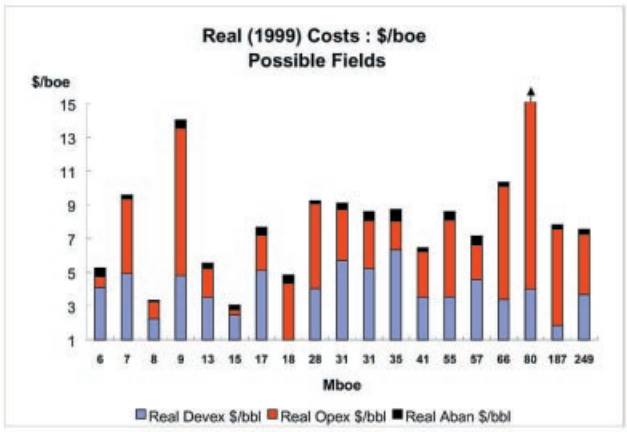
Particularly in mature fields, an efficient solution to the decommissioning liability/security/problem is required. UK government security is procured through joint and several liability on co-licensees. For licensees many possible schemes include (i) third party (bank) guarantee, (ii) parent company guarantee, (iii) Trust Fund, (iv) guarantee insurance. Problems and potential exist with all these schemes. The Trust Fund is probably efficient with tax relief on contributions, but the government is not enthusiastic. Other schemes may be expensive or the cover is not full. There is scope here for financial innovation.

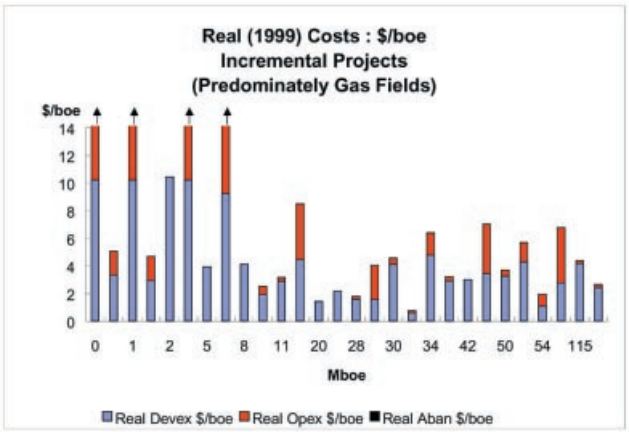
Access to further venture capital for small companies in the oil and gas market is much more developed in the US than in the UK. There is potential here for the financial community.

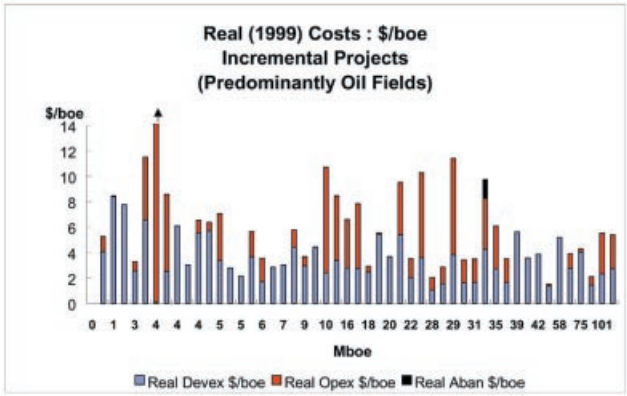
Table 2 Significant exploration success rates (%). (DTI Brown Book Basis). Discoveries/wells started.

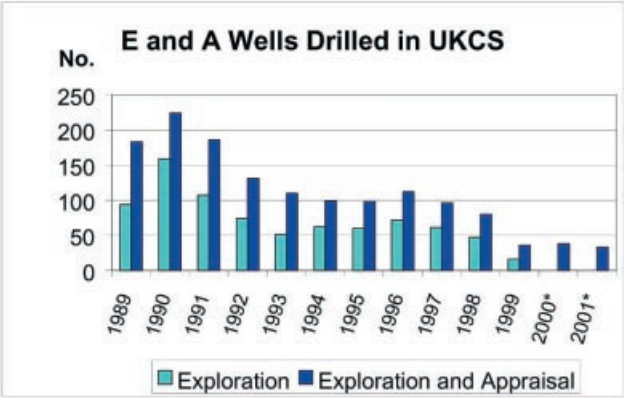
	SNS	CNS	NNS	IS	WOS	Total UKCS (incl. 7 wells in West. Appr.)	UKCS excl. SNS
1988	15.4 (4/26)	13.6 (6/44)	33.3 (5/15)	20 (1/5)	0 (0/1)	17.8 (16/93)	17.9 (12/67)
1989	40 (14/35)	23 (9/39)	26.7 (4/15)	0 (0/3)	0 (0/2)	28.7 (27/94)	22 (13/59)
1990	17.6 (6/34)	12.2 (10/82)	10.3 (3/29)	37.5 (3/8)	16.7 (1/6)	14.5 (23/159)	13.6 (17/125)
1991	18.2 (4/22)	13 (7/54)	18.75 (3/16)	25 (2/8)	0 (0/5)	14.95 (16/107)	14.1 (12/85)
1992	46.7 (7/15)	14.3 (6/42)	30 (3/10)	42.9 (3/7)	∞ (2/0)	28.4 (21/74)	23.7 (14/59)
1993	28.6 (4/14)	33.3 (8/24)	0 (0/5)	20 (1/5)	50 (1/2)	27.45 (14/51)	27 (10/37)
1994	33.3 (7/21)	15 (3/20)	40 (2/5)	12.5 (1/8)	0 (0/8)	20.9 (13/62)	14.6 (6/41)
1995	16.7 (2/12)	4.2 (1/24)	50 (2/4)	0 (0/5)	0 (0/14)	8.3 (5/60)	6.25 (3/48)
1996	16.7 (2/12)	22.5 (7/31)	15.4 (2/13)	0 (0/8)	14.3 (1/7)	16.9 (12/72)	16.7 (10/60)
1997	18.75 (3/16)	16.7 (4/24)	23.0 (3/13)	0 (0/2)	0 (0/6)	16.4 (10/61)	15.5 (7/45)
1998	25 (3/12)	17.6 (3/17)	10 (1/10)	0 (0/2)	0 (0/6)	14.9 (7/47)	11.4 (4/35)
Av. 1988–96	26.2	15.8	21.4	19.3	11.3	19.0	16.7
Av. 1988–98	25.5	16.0	21.5	18.0	8.8	18.6	16.4
Av. 1995–98	19.2	15.6	26.0	0	3.0	14.2	12.8
Discoveries 1988–98 (Ex. Wells)	56 (219)	64 (401)	28 (135)	11 (61)	5 (57)	164 (880)	108 (661)
Relative exploration effort (%)	24.9	45.6	15.3	6.9	6.4	Rest in west. appr.	

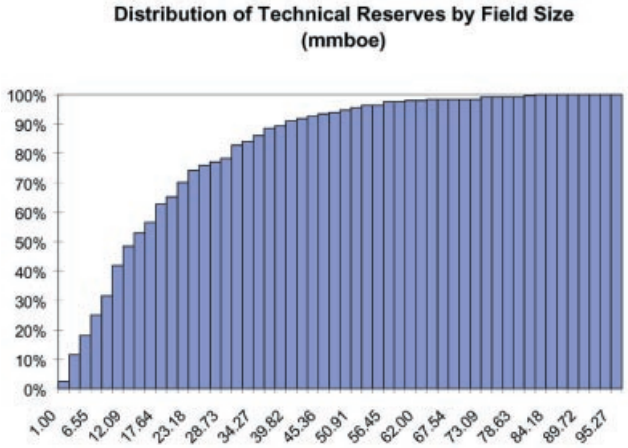


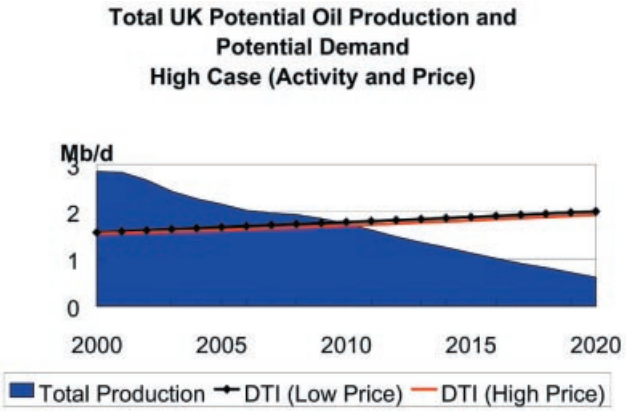


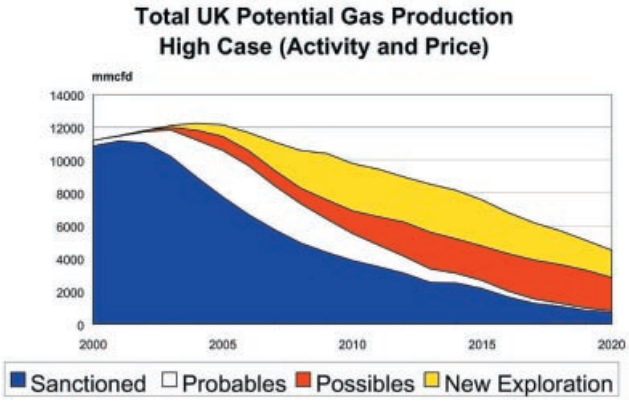


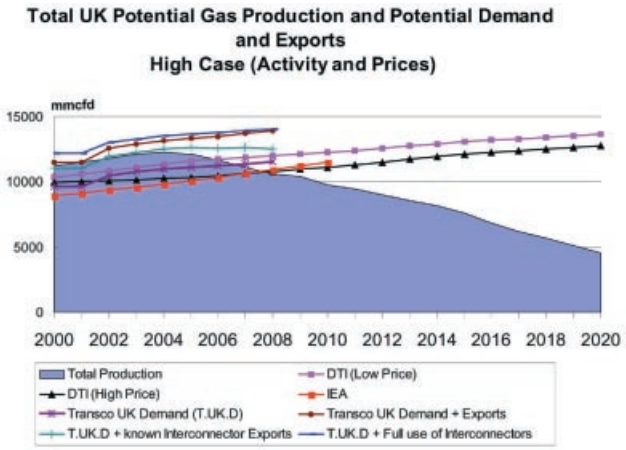


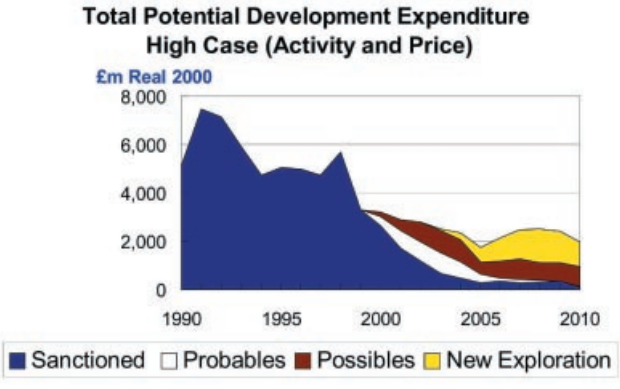

E and A Wells Drilled in UKCS
No.
250
200
150
100
50
0
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000*
2001*
Exploration
Exploration and Appraisal

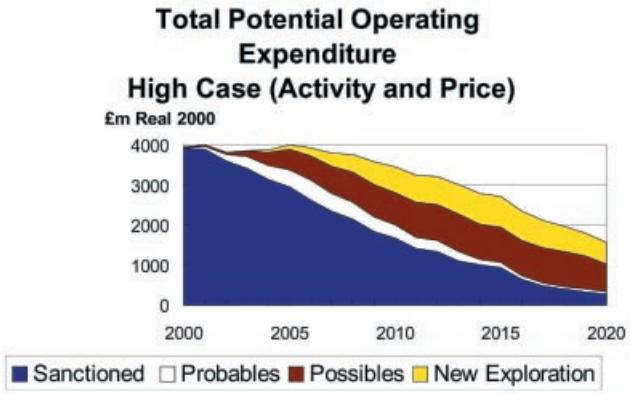

Distribution of Technical Reserves by Field Size
(mmboe)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1.00
6.55
12.09
17.64
23.18
28.73
34.27
39.82
45.36
50.91
56.45
62.00
67.54
73.09
78.63
84.18
89.72
95.27

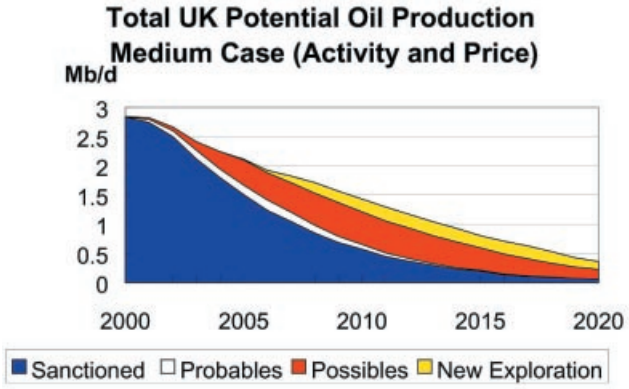

Total UK Potential Oil Production and
Potential Demand
High Case (Activity and Price)
Mb/d
3
2
1
0
2000
2005
2010
2015
2020
Total Production
DTI (Low Price)
DTI (High Price)

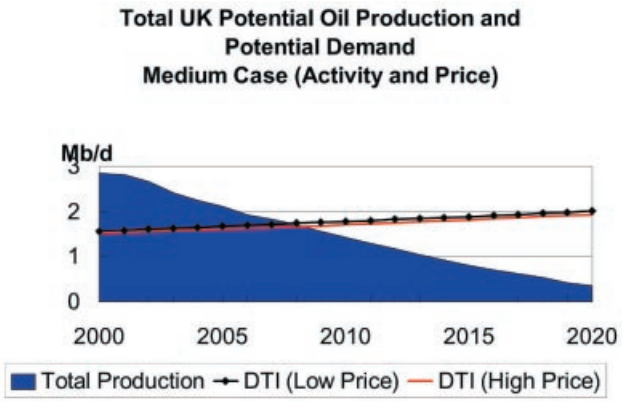

Total UK Potential Gas Production
High Case (Activity and Price)
mmcfd
14000
12000
10000
8000
6000
4000
2000
0
2000
2005
2010
2015
2020
Sanctioned
Probables
Possibles
New Exploration

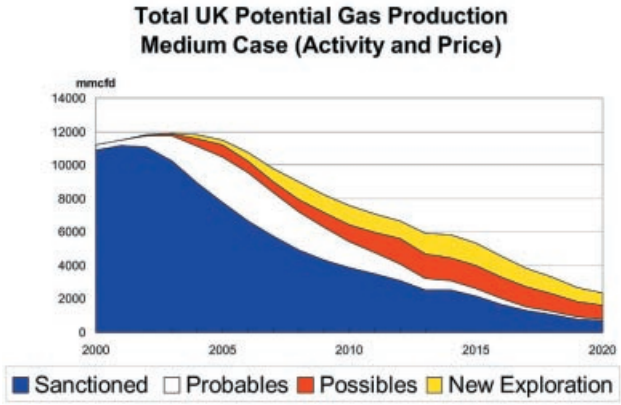

Total UK Potential Gas Production and Potential Demand
and Exports
High Case (Activity and Prices)
mmcfd
15000
10000
5000
0
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Total Production
DTI (Low Price)
DTI (High Price)
IEA
Transco UK Demand (T.UK.D)
Transco UK Demand + Exports
T.UK.D + known Interconnector Exports
T.UK.D + Full use of Interconnectors


Total Potential Development Expenditure
High Case (Activity and Price)
£m Real 2000
8,000
6,000
4,000
2,000
0
1990
1995
2000
2005
2010
Sanctioned
Probables
Possibles
New Exploration


Total Potential Operating Expenditure
High Case (Activity and Price)
£m Real 2000
4000
3000
2000
1000
0
2000
2005
2010
2015
2020
Sanctioned
Probables
Possibles
New Exploration


Total UK Potential Oil Production
Medium Case (Activity and Price)
Mb/d
3
2.5
2
1.5
1
0.5
0
2000
2005
2010
2015
2020
Sanctioned
Probables
Possibles
New Exploration


Total UK Potential Oil Production and Potential Demand
Medium Case (Activity and Price)
Mb/d
3
2
1
0
2000
2005
2010
2015
2020
Total Production
DTI (Low Price)
DTI (High Price)


Total UK Potential Gas Production
Medium Case (Activity and Price)
mmcfd
14000
12000
10000
8000
6000
4000
2000
0
2000
2005
2010
2015
2020
Sanctioned
Probables
Possibles
New Exploration

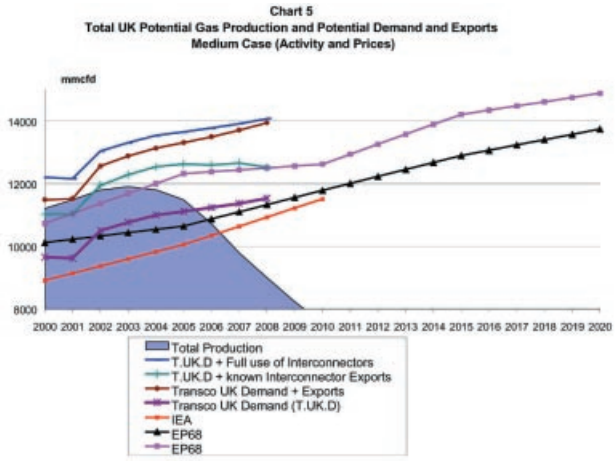
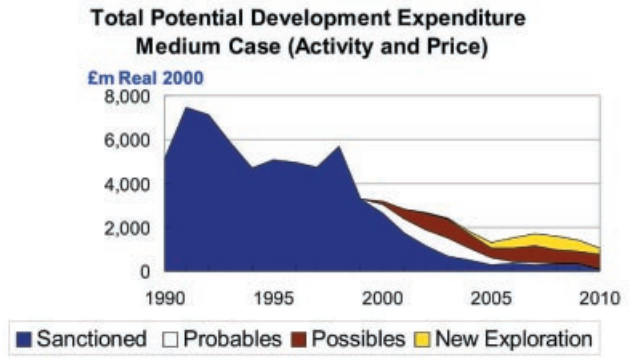
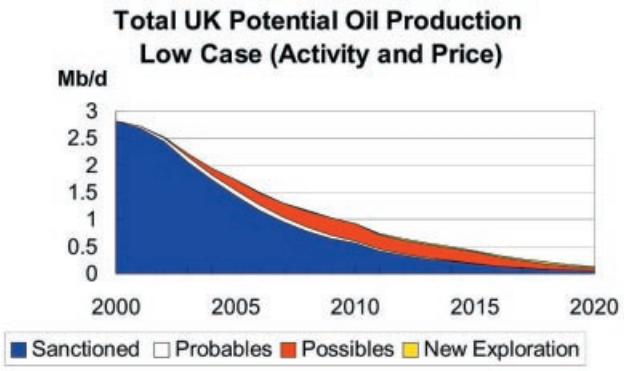
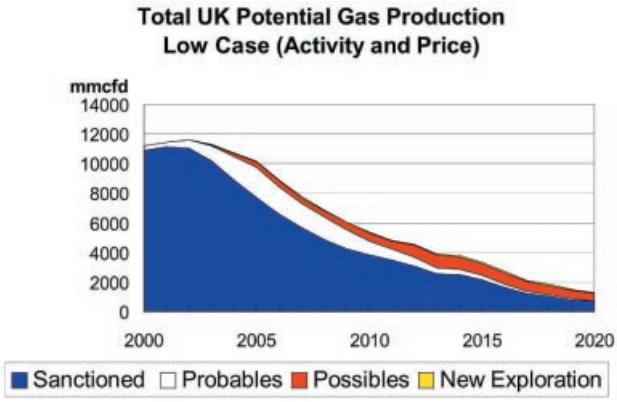


Chart 5
Total UK Potential Gas Production and Potential Demand and Exports
Medium Case (Activity and Prices)
mmcfd
14000
12000
10000
8000
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Total Production
T.UK.D + Full use of Interconnectors
T.UK.D + known Interconnector Exports
Transco UK Demand + Exports
Transco UK Demand (T.UK.D)
IEA
EP68
EP68


Total Potential Development Expenditure
Medium Case (Activity and Price)
£m Real 2000
8,000
6,000
4,000
2,000
0
1990
1995
2000
2005
2010
Sanctioned
Probables
Possibles
New Exploration


Total UK Potential Oil Production
Low Case (Activity and Price)
Mb/d
3
2.5
2
1.5
1
0.5
0
2000
2005
2010
2015
2020
Sanctioned
Probables
Possibles
New Exploration


Total UK Potential Gas Production
Low Case (Activity and Price)
mmcfd
14000
12000
10000
8000
6000
4000
2000
0
2000
2005
2010
2015
2020
Sanctioned
Probables
Possibles
New Exploration

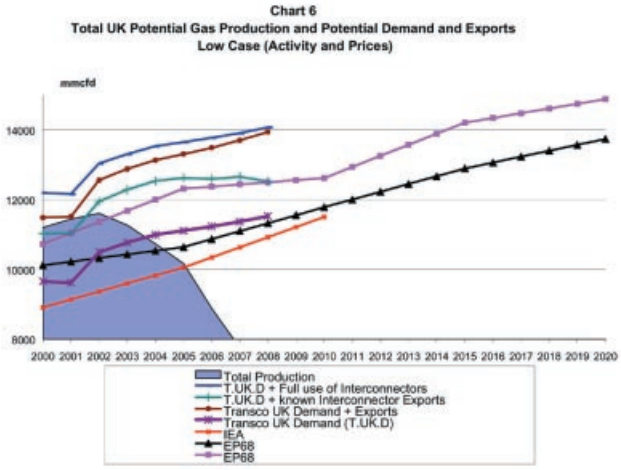
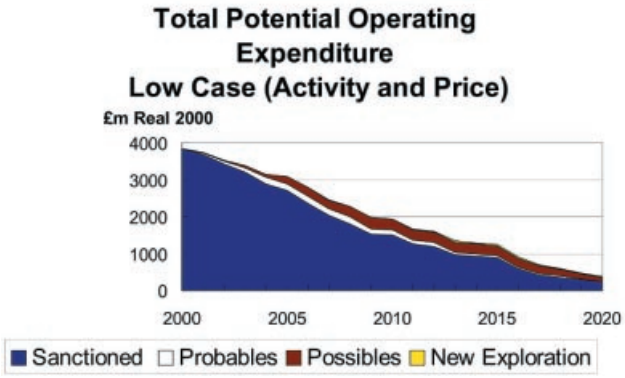


Chart 6
Total UK Potential Gas Production and Potential Demand and Exports
Low Case (Activity and Prices)
mmcfd
14000
12000
10000
8000
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Total Production
T.UK.D + Full use of Interconnectors
T.UK.D + known Interconnector Exports
Transco UK Demand + Exports
Transco UK Demand (T.UK.D)
IEA
EP68
EP68


Total Potential Operating
Expenditure
Low Case (Activity and Price)
£m Real 2000
4000
3000
2000
1000
0
2000
2005
2010
2015
2020
Sanctioned
Probables
Possibles
New Exploration