Value Creation from UK–Norway Co-operation

Evaluation of the potential gain from improved co-operation

1. Context

The UK–Norway North Sea Co-operation Workgroup has requested advice from members of PILOT's Economic Advisory Group and equivalent experts from the Norwegian Industry and Government on the scale of the potential prize from closer co-operation in the vicinity of the UK/Norway median line.

There is a perception that historically the median line has acted as a commercial and operating barrier in addition to the ones that exist for development and operation of fields within each country. The respective developments of the UK and Norwegian provinces have been largely ring-fenced from one another with little enthusiasm for cross-border development solutions. Of necessity, however, some co-operation has existed, for example in development of trans-median fields and for transport infrastructure (oil and gas).

This situation has probably engendered a sub-optimal development evolution with over-investment in, and under-utilisation of, infrastructure. Certain discoveries might have become stranded due to development frameworks being confined within the borders of each province. It is also reasonable to believe that it has contributed to unnecessarily high operating costs.

The UK–Norway North Sea Co-operation Workgroup provides evidence that there is the potential for significant value creation from closer cross-border co-operation. This is of increasing importance. As the North Sea continues to mature, smaller and technically challenging developments need access to the lowest cost solutions if they are to achieve economic viability.

It is clear that some cross border co-operation would have happened anyway but this initiative aims to create value from accelerating and expanding this. However, it should be recognized that quantifying the size of the prize is not a precise process.

2. Co-operation Vision

The co-operation model should be founded on the premise of what would be possible if the remaining potential and infrastructure endowment were located within one jurisdiction. Cross-border development solutions should ideally involve no additional commercial or political barriers than intra-country solutions. It is likely that the perception of the border as a barrier has a more damaging impact on development than the reality. One of the key benefits of the cross-border dialogue is to expose the myths and to propose solutions to address the real barriers.

3. Manifestation of Improved Co-operation

In order to estimate the potential scale of benefits from better UK/Norway co-operation it is necessary to consider the practical ways in which value could be created. Without this initiative some ongoing co-operation would clearly have happened anyway, though most investment in new projects would have continued to be based on intra-country solutions. The benefits of co-operation are therefore of an incremental nature. Co-operation would have probably yielded greater savings if it had occurred much earlier in the life of the basin, but it is never too late to start.

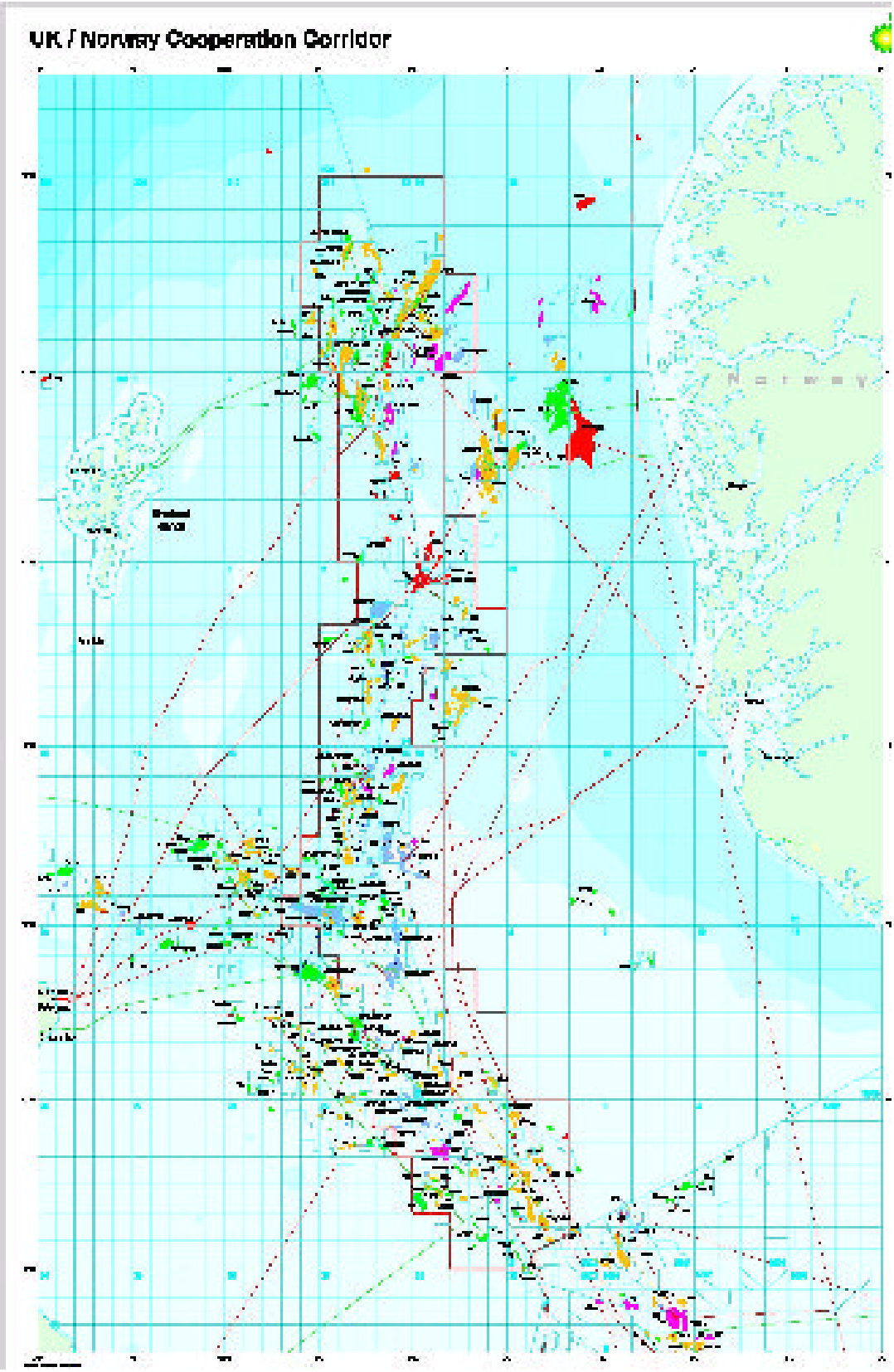
Specific areas where co-operation may produce benefits include the following:

- **Developments and re-developments**
    - Access to new cross-border transport and/or processing solutions will increase available development options. Closer co-operation should make cross-border utilization of existing infrastructure more efficient. This will assist in minimising total costs of development and/or redevelopment.
    - Reduced extraction costs (capex, opex, tariffs) of new developments should increase the expected value of exploration and thus give incentives to increase exploration activity near the median line.
    - Closer co-operation offers the potential to accelerate development plans based on tie-backs across the median line. This will increase the value of currently ‘stranded’ discoveries and exploration prospects.
- **Operational synergies**
    - Savings focused on reducing operating costs via logistics savings etc.
    - Sharing of best practices.
- **Decommissioning**
    - Greater economies of scale and synergies from decommissioning options covering a wider area

4. The Cooperation Corridor

To help estimate the scale of the potential prize from co-operation a “corridor” has been defined. The corridor approximates to a 60 km wide zone either side of the median line (see overleaf). This distance was chosen to represent the current technology limit of multiphase tie-backs. Beyond this distance it was considered that development solutions or inter-field co-operation were unlikely to involve cross-border relationships.

However, when the question is use of transport infrastructure, the distance from a discovery to the median line will not be so limiting. Thus, cross border arrangements might in this respect be an option for discoveries outside the corridor as well.



The corridor represented in the map above captures a considerable proportion of both UKCS (United Kingdom Continental Shelf) and NCS (Norwegian Continental Shelf) production and reserves of oil and gas. The significance of the corridor can be deduced from the analysis in Section 5 below.

5. Corridor data

5.1 UK Corridor data

- The corridor includes over 100 existing fields and 32 potential developments (in addition to 75 further discoveries not currently thought to be economically or technically producible)
- It represents over half of each of current UKCS oil and gas production in the period to 2010
- Corridor investment of $12 billion, approximately 46% of remaining UKCS investment in the period to 2010
- Over half of UKCS operating costs, circa $3 billion p.a.

Data from the UKOOA/DTI Industry activity survey from Autumn 2001 indicated that operators had plans for some 36 developments containing circa 1,700 million boe of reserves. A number of these developments have been sanctioned in recent months and the total number of undeveloped fields has fallen to 32, based on the latest DTI data; the probable reserves in these remaining developments lie in the range 700–1,350 million boe (with a further 1,150–2,150 million boe of possible reserves). The DTI have also estimated the yet-to-find (YTF) potential in the UK side of the corridor as being in the range 300 to 3,250 million boe; this is equivalent to between 9% and 13% of remaining UKCS YTF potential. The potential is more oil prone, accounting for some 17% of the oil YTF in the UKCS. Exploration and Appraisal (E&A) activity in the corridor has been disproportionately high, some 129 E&A wells having been drilled since 1997, representing over 36% of total UKCS activity.

5.2 Norway Corridor data

The Norwegian corridor is equally significant, though this derives from a smaller number of much larger fields:

- The corridor includes 30 existing field and 31 discoveries
- It represents 45% of NCS oil and gas production in 2002, and 32% of total production up to 2020, but less than 15% of remaining reserves

- Approx 24% of expected NCS investments during 2002–2020
- Approx 41% of NCS operating costs during 2002–2020, or circa $1.6 billion p.a.

Data from the annual reporting to Norwegian Government from Autumn 2001 indicated that operators had plans for some 33 developments containing circa 1,400 million boe of reserves. Two of these have been sanctioned in recent months and the total number of undeveloped fields has fallen to 31, based on the latest Norwegian data; the expected recoverable reserves in these remaining developments is 1,350 million boe.

The expected oil and gas production from the Norwegian side of the corridor is almost 9 billion boe up to 2020. Development of existing as-yet-undeveloped discoveries represents some 10% of this. A similar amount is expected to be produced from fields not yet discovered.

E&A activity in the Norwegian part of the corridor has historically been high, and by year-end 2001 some 550 E&A wells had been drilled since 1967 which is 50% of total E&A wells drilled. Of this total, some 60 E&A wells have been drilled since 1997, representing 38% of total E&A wells drilled during the last 5 years on the NCS.

5.3 Total Corridor data~~:~~

Aggregating the UK and Norwegian corridors creates an impressive province:

- Nearly 13 billion barrels oil equivalent remaining; some 2/3rds of this is oil
- Reserves split approximately 50:50 between UK and Norway
- Current production of 4.5 million boepd
- Some $71 billion of remaining expenditure in the period to 2010, comprising capex of $27 billion, opex of $41 billion and removal costs $3 billion (all in constant 2002 prices). A further $35 billion in spend is predicted for the following ten years to 2020.

Given the scale of the remaining resource potential, and an expected expenditure of circa $71 billion by 2010, even modest success from improved co-operation should yield considerable improvements in value.

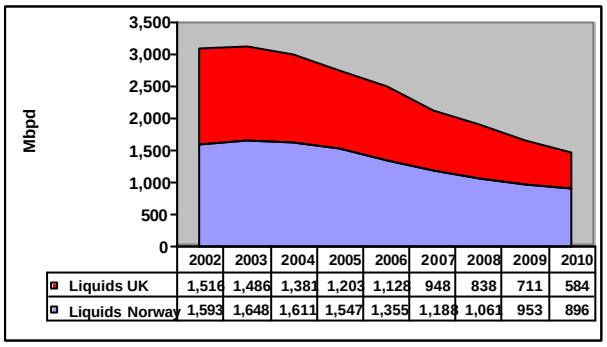
The large proportion of North Sea production that is represented by the corridor is indicative of the intensive development activity of recent decades. Despite this, much potential remains in terms of undeveloped discoveries and YTF exploration potential.

The charts below provide a visual representation of the production and cost data from within the corridor.

Cooperation Corridor- Production

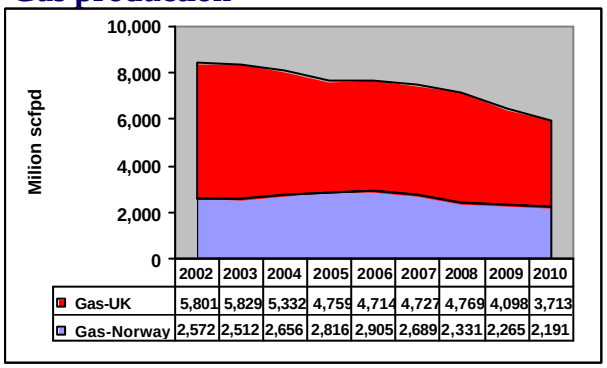
EAG analysis UK/Norway

Liquids Production



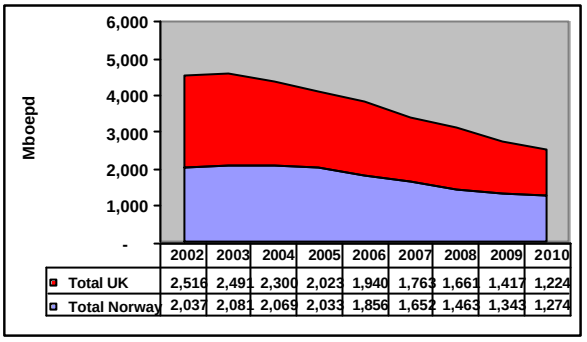
	2002	2003	2004	2005	2006	2007	2008	2009	2010
Liquids UK	1,516	1,486	1,381	1,203	1,128	948	838	711	584
Liquids Norway	1,593	1,648	1,611	1,547	1,355	1,188	1,061	953	896

Gas production



	2002	2003	2004	2005	2006	2007	2008	2009	2010
Gas-UK	5,801	5,829	5,332	4,759	4,714	4,727	4,769	4,098	3,713
Gas-Norway	2,572	2,512	2,656	2,816	2,905	2,689	2,331	2,265	2,191

Total Production

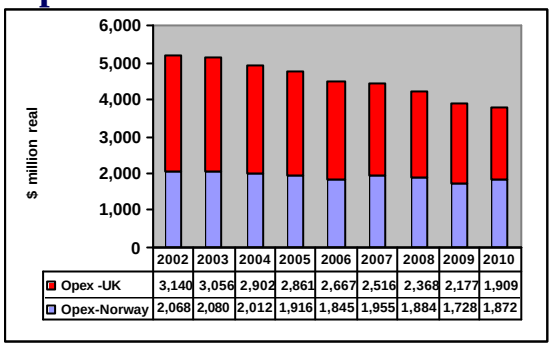


	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total UK	2,516	2,491	2,300	2,023	1,940	1,763	1,661	1,417	1,224
Total Norway	2,037	2,081	2,069	2,033	1,856	1,652	1,463	1,343	1,274

Cooperation Corridor – Cost data

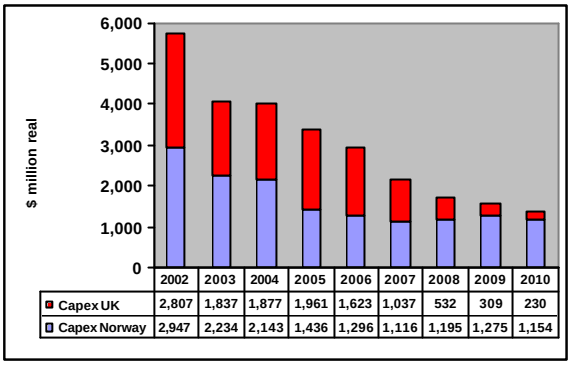
EAG analysis UK/Norway

Opex



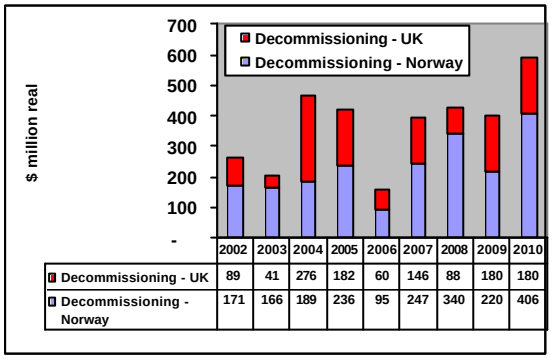
	2002	2003	2004	2005	2006	2007	2008	2009	2010
Opex -UK	3,140	3,056	2,902	2,861	2,667	2,516	2,368	2,177	1,909
Opex-Norway	2,068	2,080	2,012	1,916	1,845	1,955	1,884	1,728	1,872

Capex



	2002	2003	2004	2005	2006	2007	2008	2009	2010
Capex UK	2,807	1,837	1,877	1,961	1,623	1,037	532	309	230
Capex Norway	2,947	2,234	2,143	1,436	1,296	1,116	1,195	1,275	1,154

Removal costs



	2002	2003	2004	2005	2006	2007	2008	2009	2010
Decommissioning - UK	89	41	276	182	60	146	88	180	180
Decommissioning - Norway	171	166	189	236	95	247	340	220	406

More visual information can be found at the PILOT and Konkraft websites *www.pilottaskforce.co.uk and www.dep.no/oed*

6. Pipeline Infrastructure

The importance of infrastructure is underlined by the efforts of the dedicated Transportation and Infrastructure (T&I) Task Group. The total length of pipelines in the UKCS & NCS is as follows:

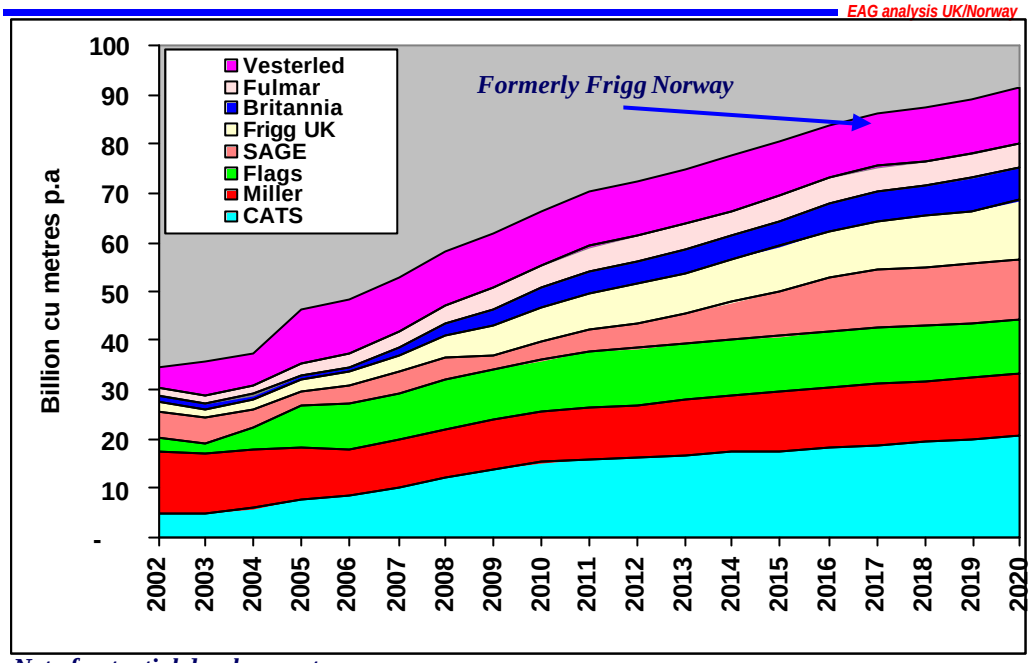
- UKCS: Gas – 8,100 km, liquids – 1,500 km
- NCS: Gas – 7,000 km, liquids – 1,200 km

There are different challenges regarding efficient use of infrastructure on the UKCS and NCS. These are addressed separately in the sections that follow.

6.1 UKCS Perspective

The chart below illustrates potential excess capacity in existing Central and Northern North Sea gas pipelines. Naturally, as UKCS gas production declines, capacity opens up and by 2010 the excess capacity exceeds 170 million m^3/d (6,000 million scfpd).

UKCS Spare Capacity projection: Central & Northern North sea



Net of potential developments.
Source :Wood Mackenzie

Clearly, from an economic perspective, it will normally be preferable to use spare capacity in existing pipelines in preference to new builds. However, many other factors can come into play, such as:

- Pipeline location and proximity to undeveloped reserves
- Landing point and grid access
- Specification - wet or dry, sweet or sour
- Age and integrity
- Fiscal environment
- Ownership alignment
- Tariffs levels and construction costs for pipeline and terminal

Improved co-operation should make cross-border utilisation of existing pipelines more efficient. However, this is far from certain. A rapidly emptying pipeline concentrates the minds of the owners, leading to aggressive marketing of the capacity and reduction in tariff expectations. This tendency has to battle against the aspiration of many gas resource owners to construct new pipelines on the basis that the UKCS infrastructure is ageing, in many cases falls short of the border and lands gas in the wrong part of the country (remote from consumers and at bottlenecks such as St Fergus where grid access is constrained).

A barrier to efficient use of existing pipelines is also widely perceived to exist in the shape of the UKCS fiscal regime. New pipelines unconnected with UK upstream production facilities are subject to a 30% corporation tax regime whilst upstream pipelines will (once Royalty is abolished) face tax rates of 40% or 70%. The impact of these tax differences may limit the positive efforts of greater co-operation in the short term. Even if in the longer term the potential distortions from the UKCS fiscal regime are removed, changes are unlikely to be before one or two new pipelines are commissioned. Indeed, proposals for new gas pipelines such as 'Symphony' have already been announced.

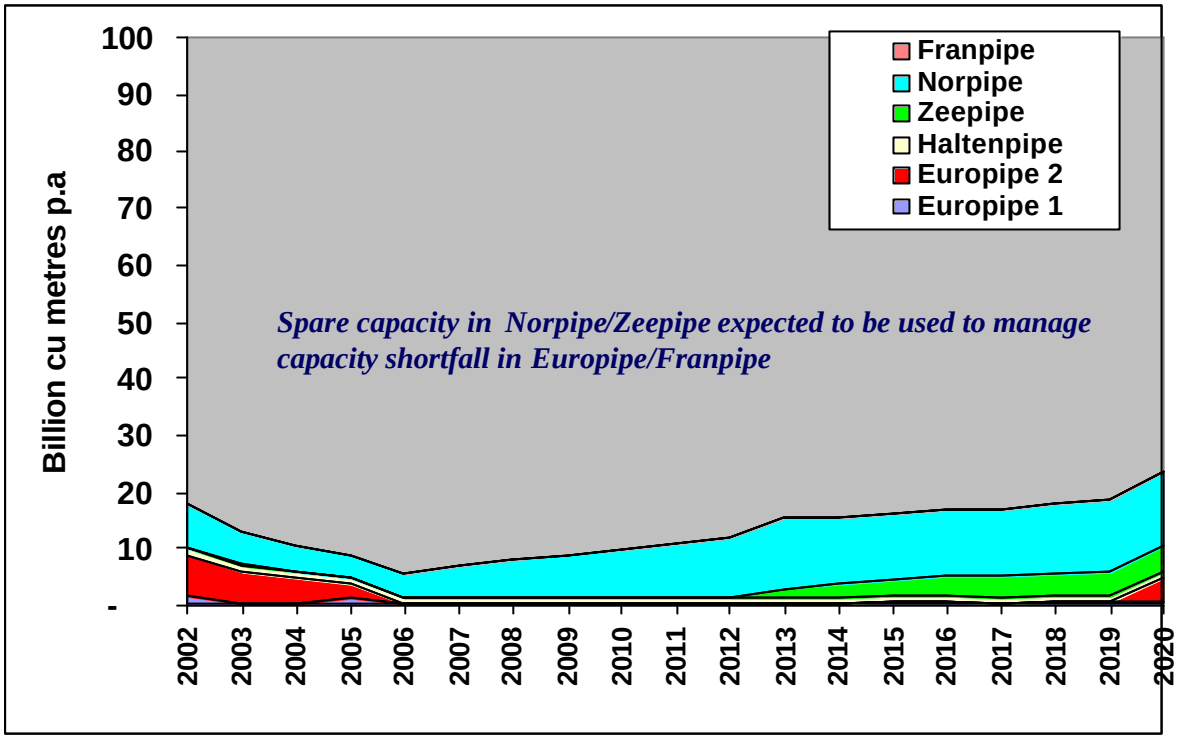
6.2 NCS Perspective

The Norwegian gas pipeline infrastructure has evolved from supply contracts rather than field specific depletion contracts. This has led to a more integrated pipeline system with pipeline equity driven more by ownership of total NCS gas resources than by individual field interests. New capacity in gas pipelines has been driven by new export contracts rather than field developments. This has further developed into work to create a common ownership structure (GASSLED) and GASSCO as a neutral system operator. There is a level playing field for gas pipelines in the NCS as all established participants face the same fiscal regime, and there is a regulated tariff regime.

The chart below highlights the lack of spare pipeline gas export capacity from Norway before 2020.

NCS Spare capacity projection :Norwegian gas export

EAG analysis UK/Norway



Source: Wood Mackenzie, net of potential developments

7. Evaluation of Prize

The template for determining the potential size of the prize from improved co-operation is based on incremental savings under the broad headings summarised in Section 3 above. Large value creation from closer co-operation could be demonstrated if cost savings are accessed that encourage the discovery and production of extra reserves or development of otherwise stranded developments. The extent of this gain is difficult to judge. The continued advance of technology is such that it is unwise to assert unequivocally that a given development will never be developed in the absence of co-operation. What can be said more confidently is that such developments can happen earlier and/or at lower cost with closer co-operation.

Considering each of the value themes, the following assumptions have been made. All numbers are pre-tax for the corridor as a whole.

1) **Developments and redevelopments**

   Identifying more cross border options for new field development and redevelopment of existing fields encourages more competition as well as creating smart solutions.

Overall corridor capex could be reduced materially. Each 1% saving on total corridor capex ($27 billion to 2010) would translate to an average saving of circa $35 million p.a.

These smart solutions will be manifested by a combination of some or all of the following:

I. **Accelerated developments**: The visibility of the UK/Norway co-operation process will change Industry perceptions as to the reality of the median-line as a barrier. The changed mindset will encourage resource deployment onto formerly stranded resources, including exploration prospects. The result might be accelerated development plans based on tie-backs across the median line. The potential for such an impact is indicated by the success of the PILOT initiative in the UK, which over the last 3 years has contributed to raised investment levels and accelerated development of undeveloped discoveries. If typical development times for small, medium, and large satellite developments (25, 50 and 100 mln bbls) could be reduced by 4, 3 and 2 years, respectively, the pre-tax value would be increased by $50–100 million per development (depending on cycle time reduction and development size).

II. **Efficient Transportation**: Improved co-operation should make cross-border utilization of pipeline infrastructure more efficient. If improved co-operation makes use of spare capacity in existing pipelines economically efficient for new developments, large costs savings can be gained. The benefit will be up to the cost of building a new pipeline, less tariffs (when tariffs cover the actual additional shipping costs). The cost of one new pipeline, plus terminal tie-in/upgrade costs, will, depending on capacity and length, not unrealistically be in the range $300 to $400 million.

2) **Operational synergies**

Reductions in operating costs, via logistics savings and sharing of best practice, could be achieved through closer cross-border co-operation. The operating costs in the corridor are some $5 billion p.a. currently. Each 1% saving on total corridor opex ($41 billion to 2010) translates to a saving of circa $50 million p.a.

3) **Decommissioning**

This represents an activity where a very material prize ought to be accessible. This is particularly so since the decommissioning business has yet to begin in earnest. Many installations are geographically proximate and economies of scale suggest that area removal programmes involving a cluster of fields may

be one way forward. With OSPAR providing a template of harmonised removal obligations, there is a clear common interest in co-operation. For the corridor, aggregate removal costs to 2010 are $3.3 billion. Each 5% saving would create a prize of circa $150 million.

4) **Lower Tariffs**

More competition should translate into lower tariffs. However, unless they result in additional activity, lower tariffs do not create overall economic value, they simply shift profit from the tariff recipient to the tariff payer. There is little if any evidence that tariffs have prevented economic developments from taking place. But an expectation of lower tariffs might encourage additional exploration activity. The extent of this effect is extremely difficult to quantify. Accordingly, no value has been assumed for this outcome.

5) **Exploration**

Closer co-operation that reduces the perception of cross-border barriers should result in the remaining exploration potential in the co-operation corridor being viewed as equally attractive to other exploration targets in the North Sea. The improved value of existing discoveries will change the perception of the value of the exploration acreage as well. It is asserted that the exploration potential in parts of the co-operation corridor has not been as fully tested as other regions of the North Sea due to the perception that discoveries close to the median line run the risk of extension into another country. In combination, the prospect of lengthy unitisation discussions, subsequent redetermination risk and sub-optimal development act as a major deterrent. Perceptions need to be changed such that this exploration potential is viewed as equally attractive to other exploration targets. The prize from this level of co-operation has not been enumerated. Strictly speaking, it is difficult to see the co-operation being manifested prior to the well being drilled. This is largely about confidence from licensees that co-operation will ensure that perceived barriers can be overcome.

8. Summary

The relative contributions from the various building blocks are difficult to predict. It will depend on how successful the co-operation is on the different areas discussed and what would have happened in the absence of this improved co-operation. Despite these caveats, it has been estimated that combining these illustrative building blocks yields a prize from closer co-operation of up to $2 billion (pre tax) across the co-operation corridor in the period to 2010. All the areas identified have potential to contribute significantly towards the $2 billion prize. For example, the contribution from accelerated developments could generate up to $1 billion of the total.