Russian ESPO: Impact on EOS Crude Markets

Argus ESPO Conference 2012
Marina Mandarin, 10 – 11 December 2012
Singapore

Dr. Tilak K. Doshi
Principal Fellow & Head, Economics, Energy Studies Institute

Nahim Bin Zahur and Oliver Yuen
Energy Analysts, Economics, Energy Studies Institute
# Content

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nature of EOS Crude Oil Markets</td>
</tr>
<tr>
<td>2</td>
<td>Dubai: Benchmark by Default</td>
</tr>
<tr>
<td>3</td>
<td>ESPO as a potential benchmark</td>
</tr>
<tr>
<td>4</td>
<td>Potential impacts of ESPO on EOS markets</td>
</tr>
</tbody>
</table>
Major Oil Flows 2011 (MMBD)
Total Imports: 54.6 MMBD; Total Consumption: 88.0 MMBD

Reshaping of the oil map, with N. America displacing imports, flat OECD demand and rapid Asian demand growth

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ME =&gt; AP</td>
<td>14.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>WAF =&gt; AP</td>
<td>1.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>LA =&gt; NA</td>
<td>2.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>CAN =&gt; US</td>
<td>2.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>WAF =&gt; NA</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>NAF =&gt; EUR</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>ME =&gt; NA</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>ME =&gt; EUR</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>FSU =&gt; EUR</td>
<td>6.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>FSU =&gt; AP</td>
<td>1.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>WAF =&gt; EUR</td>
<td>1.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: BP 2012
Russia increasingly important relative to WAF as the marginal barrel into Asia

Saudi Arabia oil exports by region (mbd)
Increasing dominance of Asian markets

Atlantic v. Far East markets: key differences

<table>
<thead>
<tr>
<th>Atlantic Markets</th>
<th>Far East Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Spot crude competes actively with terms crudes from AG</td>
<td>• Far less spot traded crude competing with term contracts.</td>
</tr>
<tr>
<td>• Buyers highly conscious of short term trading and business risks</td>
<td>• Buyers highly conscious of long term supply security risk</td>
</tr>
<tr>
<td>• Key refining regions (USGC, Rotterdam) can access multiplicity of short and long haul crudes</td>
<td>• Region massively net crude short, with heavy dependence on Middle East crude.</td>
</tr>
<tr>
<td>• Supply and demand flexible and competitive among many alternative grades (“price elastic”)</td>
<td>• Less flexible supply and demand responses, less alternative grades, fewer short haul sources (“price inelastic”)</td>
</tr>
</tbody>
</table>
Content

1. Nature of EOS Crude Oil Markets
2. Dubai: Benchmark by Default
3. ESPO as a potential benchmark
4. Potential impacts of ESPO on EOS markets
Dubai – a default market crude

- From peaks of over 400 mbd in early 90s, down to current estimates of 60 – 70 mbd or about 4 – 5 cargoes per month; hardly any spot traded
- Several attempts to handle Dubai illiquidity:
  - Oman deliverable into Dubai contract (2001),
  - introduction of “partials” trade (2004),
  - Upper Zakum deliverable into Dubai contract (2006),
  - reports of Qatar Marine and Basrah Light as potential deliverable streams into Dubai contract (2012)
- Platts partials contracts are illiquid and have few players since 2008
- Price discovery based on spot physical transactions no longer feasible
- Yet Oman-Dubai MOPS assessment still the pricing basis for bulk of ME crudes
Dubai illiquidity does not matter!

- Dubai is a relative price market, set by liquidity in Dubai inter-month swap spreads and Brent-Dubai EFS spreads
  - Inter-month swaps allow hedges from month to month
  - EFS allows transfer of risk from a sparsely traded crude to the Brent complex with deep pools of liquidity
- Derivative swap market sets physical transaction prices
- But this is not unique to Dubai: Platts Dated Brent quote uses CFDs to fix price relative to Brent Forward cash contract
Dubai Debates: the “Asia Premium”

Key assertions on why there is a premium

| Dubai – a deficient Far East Marker | Asian “dependency” on AG crude imports | End user and destination restrictions |

Counters

| Dubai a function of swaps-based price discovery but no reason why this would cause a premium. | Works both ways: export dependency of Middle East | Such restrictions necessary for market price discovery via marker crudes |

Dubai – a deficient Far East Marker

Asian “dependency” on AG crude imports

End user and destination restrictions

Works both ways: export dependency of Middle East

Such restrictions necessary for market price discovery via marker crudes
Marker Crudes & Network Economics

• Network Economics: when the value of a good or service increases when others buy the same good or service

• “Oman-Dubai” MOPS is the network product, until “others” stop using it

• Inertia or “chicken-and-egg” problem
  – not until a major stakeholder has reason to forego benefits of networked product
  – tipping points when existing product gets too dysfunctional (ANS to WTI; WTI to ASCI)
## Content

1. Nature of EOS Crude Oil Markets
2. Dubai: Benchmark by Default
3. ESPO as a potential benchmark
4. Potential impacts of ESPO on EOS markets
Flow of ESPO

Current delivery by rail. Pipeline to be completed in 2014.

Source: Platts (2011), ERINA
ESPO Oil Flow

- Competes with Middle East Oil
- ESPO oil will play an increasing role in Asia

![Diagram showing ESPO Oil Flow](image)

**Capacity of ESPO Pipeline**

<table>
<thead>
<tr>
<th>Year</th>
<th>MMBPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>0.6</td>
</tr>
<tr>
<td>2012</td>
<td>1.1</td>
</tr>
<tr>
<td>Later date</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Source: Platts (2011)
ESPO export volumes

Source: Platts (2011), Argus
First ESPO exports from Kozmino in December 2009

Average monthly loading volumes increased in early 2010, stabilizing at 1.4 million mt (340,000 b/d) from April 2010 onwards

Pipeline exports directly to China officially began in January 2011, increasing monthly total export volumes to 2.5 million mt (600,000 b/d)

ESPO: ~300,000 b/d at Kozmino, projected to increase to 600,000 b/d by 2013 and 1,000,000 b/d by 2016

ESPO buyers include 14 countries, including Japan (21%), China (21%), US (13%) and other Asia-Pacific countries
ESPO Oil Flow

- Demand: East of Suez
- Supply: East Siberia
  - Thru ESPO pipeline and Russian port of Kozmino on the Pacific coast
  - 84% of ESPO crude exported to Asia

Source: Platts, February 2011
ESPO as a regional benchmark?

- Platts: “Due to its location, ample production levels and wide equity ownership, ESPO crude stream has attributes that could, over time, lead it to become a major flat price indicator of spot oil volumes in Asia”

- IEA: ESPO may become a regional oil benchmark

- For instance, Platts ESPO FOB Kozmino used for Rosneft term deliveries to China

- Barriers to emergence of ESPO as a benchmark
  - ESPO continues to be priced off Dubai or Oman, though premium has been increasing
  - Most volumes sold on long-term basis rather than in spot market
  - “Strong concern amongst many companies that an ESPO benchmark could fall victim to political persuasions”
ESPO as a global benchmark?

• Question marks over reliability of Brent and WTI, which may not be fully reflective of global supply and demand fundamentals

• ESPO blend and DME Oman have emerged as potential future benchmarks

• Pre-requisites for benchmark
  – Physical volumes of at least 500,000 b/d (ESPO exports still at 300,000 b/d in 2012 and projected to rise to 400,000 b/d in 2013)
  – Financial liquidity, which depends on trading volumes (e.g. large volumes of trading in Brent futures and contracts) and access to financing
    • Financial liquidity determines level of investment, but liquidity itself is driven by increased investment: chicken-and-egg problem
Basic features of a benchmark crude

<table>
<thead>
<tr>
<th></th>
<th>ASCI</th>
<th>WTI</th>
<th>BFOE</th>
<th>Dubai</th>
<th>Oman</th>
<th>ESPO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production (MBPD)</td>
<td>735</td>
<td>300-400</td>
<td>1,220</td>
<td>70-80</td>
<td>710</td>
<td>610</td>
</tr>
<tr>
<td>Volume Spot Traded (MBPD)</td>
<td>580</td>
<td>940</td>
<td>635</td>
<td>85</td>
<td>245</td>
<td>230</td>
</tr>
<tr>
<td>Number of Spot Trades per Cal Month</td>
<td>260</td>
<td>330</td>
<td>100</td>
<td>&lt;5</td>
<td>10</td>
<td>?</td>
</tr>
<tr>
<td>Number of Spot Trades Per Day</td>
<td>13</td>
<td>16</td>
<td>5</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>?</td>
</tr>
<tr>
<td>Number of Different Spot Buyers per Cal Month</td>
<td>26</td>
<td>27</td>
<td>10</td>
<td>3</td>
<td>5</td>
<td>?</td>
</tr>
<tr>
<td>Number of Different Spot Sellers per Cal Month</td>
<td>24</td>
<td>36</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>?</td>
</tr>
<tr>
<td>Largest 3 Buyers % of Total Spot Volume</td>
<td>43%</td>
<td>38%</td>
<td>72%</td>
<td>100%</td>
<td>50%</td>
<td>?</td>
</tr>
<tr>
<td>Largest 3 Sellers % of Total Spot Volume</td>
<td>38%</td>
<td>51%</td>
<td>56%</td>
<td>100%</td>
<td>80%</td>
<td>?</td>
</tr>
</tbody>
</table>

Source: Fattouh (2011); Argus (2012)
## Characteristics of a benchmark crude

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>ASCI</th>
<th>WTI</th>
<th>BFOE</th>
<th>Dubai</th>
<th>Oman</th>
<th>ESPO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freely tradable (no restrictions on re-sale)</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>?</td>
</tr>
<tr>
<td>Adequate tradable physical base</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>No dominant buyer/seller</td>
<td>✓</td>
<td>✓</td>
<td>?</td>
<td>x</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Adequate loading facilities, known loading schedules</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Capable of being loaded onto VLCCs</td>
<td>✓</td>
<td>N/A</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tax certainty, absence of official constraint on trading prices</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Stable regulatory regime and lack of regulatory risk</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Source: Horsnell (1997); Fattouh (2011); Argus (2012)
Characteristics of a benchmark crude (2)

<table>
<thead>
<tr>
<th></th>
<th>ASCI</th>
<th>WTI</th>
<th>BFOE</th>
<th>Dubai</th>
<th>Oman</th>
<th>ESPO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political stability, including low embargo risk</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>?</td>
</tr>
<tr>
<td>Crude should be deliverable in water-borne cargoes</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>?</td>
</tr>
<tr>
<td>No special characteristics that limit refineries able to process the crude</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>No significant non-refining uses</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ (?)</td>
</tr>
<tr>
<td>No perception that market could be influenced by political control</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Price behavior should be proxy for marginal conditions</td>
<td>?</td>
<td>x</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Source: Horsnell (1997); Fattouh (2011); Argus (2012)
Characteristics of a benchmark crude

- Freely tradable (no restrictions on re-sale)
- Adequate tradeable physical base
- No dominant buyer or seller
- Adequate and known loading schedules
- Capable of being loaded onto VLCCs (very large crude carriers)
- Tax certainty and absence of official constraint on trading prices
- Stable regulatory regime and lack of regulatory risk
Characteristics of a benchmark crude (2)

- Political stability, including low risk of being embargoed
  - No perception that the market could be influenced by political control
- Crude should be deliverable in water-borne cargoes
  - Pipeline crudes may be less fungible
- No special characteristics that reduce the number of refineries able to run it
- Should not have significant non-refining uses (e.g. direct burn for power)
- Price behavior should be proxy for marginal conditions
Content

1. Nature of EOS Crude Oil Markets
2. Dubai: Benchmark by Default
3. ESPO as a potential benchmark
4. Potential impacts of ESPO on EOS markets
Quality specifications of major crudes

Gravity, API

Sulphur, %

Cossack
Gippsland
Tapis
Attaka
Widuri
Miris
Daqing
Miri
Tapis
Bach Ho
Sokol
WTI
Forties
Murban
Lower Zakum
ESPO
Brent
Minas
Arduna
Handil
Vityaz
Bonny Light
Duri
Forcados
Shengli
Urals
Oman
Arab Light
Dubai

Middle East
Asia-Pacific
Russia
West Africa
North Sea
United States

Energy Studies Institute
National University of Singapore

26
Quality specifications of major crudes (2)

• Asia-Pacific crudes
  – Sweeter (sulphur < 0.15) compared to other crudes
  – Generally in light to medium range

• Traditional benchmarks were Tapis (light), Minas (medium) and Duri (heavy)

• Current major benchmark is Dated Brent (light, less sweet than most Asia-Pacific crudes)
  – Other grades of similar quality include ESPO and Murban: potential competitors as benchmarks for sweet crude?
  – WTI also in the sweet, light range: possible impact in the future if shale oil flows begin?
Comparison of product yields

Sources: Argus (2012), Platts (2011); BP (2012); Energy Intelligence Research (2006)
Pricing

• Argus: ESPO Blend assessed as a differential to Dubai swaps, with trading beginning 30-75 days before cargo loading

• Platts: ESPO Crude assessed as a differential to Platts Dubai
Evolution of ESPO prices

Platts ESPO-Dubai differential

- Traded at a discount to Dubai crude in 1st half of 2010
  - Quality uncertain
  - Perceived as inferior to Dubai

- From August 2010-January 2011, a steadily increasing premium relative to Dubai, reaching a peak of $3.62/barrel
  - Sweeter and lighter crude than Dubai
  - ESPO crude widely accepted by regional refiners due to proximity of Kozmino to key demand centers
  - Widening Brent/Dubai spread has encouraged purchase of crudes priced against Dubai

- ESPO beginning to compete with Middle Eastern premium grades (e.g. Murban)

Source: Platts (2011)
ESPO-Dubai and ESPO-Brent

Source: Argus (2012)
ESPO and Arab Light relative to Dubai

Source: Argus (2012)
ESPO and Arab Light relative to North Sea Dated

Source: Argus (2012)
ESPO-Arab Light differentials

Source: Argus (2012)
ESPO and Arab Light compared

- ESPO (0.54% sulphur) significantly sweeter than Arab Light (1.78% sulphur), but of similar API gravity
- Since the initial few months, ESPO has generally traded at a $1-3 premium to Arab Light until the recent drop in prices
- Both ESPO-Dubai and Arab Light-Dubai differentials rose in 1st half of 2011 when Brent-Dubai gap widened
- During same period, ESPO and Arab Light began trading at discount to North Sea Dated
- Since start of 2012, differentials to Dubai and to Brent have been more closely aligned for both ESPO and Arab Light
ESPO-Murban and ESPO-Bonny Light differentials

Source: Argus (2012)
ESPO-Murban and ESPO-Bonny Light differentials (2)

<table>
<thead>
<tr>
<th></th>
<th>ESPO</th>
<th>Murban</th>
<th>Bonny Light</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sulphur content</strong></td>
<td>0.54%</td>
<td>0.8%</td>
<td>0.16%</td>
</tr>
<tr>
<td><strong>API gravity</strong></td>
<td>34.7</td>
<td>40</td>
<td>32.9</td>
</tr>
</tbody>
</table>

- ESPO close in quality to Murban and Bonny Light
  - Heavier and sweeter than Murban
  - Slightly lighter and sourer than Bonny Light
- ESPO traded at a $2-3 discount to both crudes until mid-2010
- ESPO-Murban differential has remained between -$2 and $2 since mid-2010, largely tracking the ESPO-Dubai differential
- ESPO traded at a significant discount of $2-6 against Bonny Light until Oct 2011, but since then differential has been between -$3 and $2
- Depending on comparative refinery gate values, ESPO could compete with Murban and Bonny Light, especially given ESPO’s freight cost advantage in NE Asia
Effect on competition in EOS crude market

- Saudi Arabia and Russia have been competing with each other for increased market share in Asia Pacific since ESPO exports began.

- One aspect of Saudi response: export crude to the US via East Asia given that the US has also become the top importer of Russia's ESPO Blend crude.

- Traders in 2010 expected Saudi Arabia to lower the prices of all its crude grades heading to Asia for August
  - Partly due to slow demand from regional refiners
  - Intensifying competition from Russia's ESPO crude

- Collusion possibly less likely than competition, with little prospect of Russia joining OPEC
Other issues

• Diversification benefits of ESPO imports?
  – "Too much dependence on the Strait of Malacca exposes Japan to significant risk of supply disruption," Kaieda (Japan’s Minister of Economy, Trade, and Industry) said. "The route from Russia is important for delivery of natural gas and oil." (January 2011)

• Russian tax policy and its implications
  – Initial exemption from export duty for ESPO exports
  – Since July 2010, an export duty of $9.50/b ($69.90/mt), revised on a monthly basis ($18.72/b in February 2011, which is 40% of Urals duty)
  – In addition, a “through transportation fee” for crude deliveries via the pipeline