Zero Fuel Oil Production

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Senior Vice President – Ruwais Refinery (East)

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TAKREER’S REFINING CAPACITY

**Ruwais Refinery (East):**
Capacity: 420,000 bpd
Configuration: CDU, VDU, Hydrocracker, Mild Hydrocracker, Reformer, Isomerization, Base Oil.
Despatches: Jetty & pipelines

**Ruwais Refinery (West):**
Capacity: 417,000 bpd
Configuration: CDU, RFCC, Olefin Conversion Unit, Alkylation, mild Hydrocracker, Isomerization, Coker, Carbon Black.
Despatches: Jetty & pipelines

**Abu Dhabi Refinery:**
Capacity: 90,000 bpd
Configuration: CDU, Reformer.
Despatches: Pipelines
JOURNEY TOWARDS EXCELLENCE
TAKEER JOURNEY TOWARDS EXCELLENCE

Value maximization by bottom of the barrel up gradation by commissioning Base Oil Unit & RFCC and entry into specialized products like Group II and III Base Oil, Polymer Grade Propylene, Alkylate, etc.

Zero Fuel Oil generation from the Refinery & Diversification into High valuable products like Anode Coke, Carbon Black while producing high valuable Propylene from Propane streams.

Increase Refining Margin through petrochemicals integration - Integrated Gasoline Aromatics Project and shifting feed to more tougher, heavier, High Sulfur Offshore crude.

To increase ADNOC’s international refined products market share.

World Class diversified Refining complex

Takreer operates world’s 4th LARGEST Refining Capacity in a given location at Ruwais
TAKREER’S REFINING CAPACITY

### Refineries current capacity

<table>
<thead>
<tr>
<th>Refinery</th>
<th>Capacity (kbpd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR East</td>
<td>420</td>
</tr>
<tr>
<td>RR West</td>
<td>417</td>
</tr>
<tr>
<td>ADRD</td>
<td>90</td>
</tr>
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</table>

### Pre-expansion Production (000’ tpa)

<table>
<thead>
<tr>
<th>Product</th>
<th>Pre-expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPG</td>
<td>560</td>
</tr>
<tr>
<td>Naphtha</td>
<td>5,500</td>
</tr>
<tr>
<td>Gasoline</td>
<td>2,600</td>
</tr>
<tr>
<td>Jet Fuel</td>
<td>5,600</td>
</tr>
<tr>
<td>Diesel</td>
<td>5,500</td>
</tr>
<tr>
<td>Fuel Oil/Residue</td>
<td>1,100</td>
</tr>
</tbody>
</table>

### Post-expansion Production (000’ tpa)

<table>
<thead>
<tr>
<th>Product</th>
<th>Post-expansion</th>
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<tbody>
<tr>
<td>Naphtha</td>
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<tr>
<td>Diesel</td>
<td>11,000</td>
</tr>
<tr>
<td>Base Oil</td>
<td>600</td>
</tr>
<tr>
<td>Carbon Black</td>
<td>40</td>
</tr>
<tr>
<td>Anode Coke</td>
<td>430</td>
</tr>
<tr>
<td>Fuel Oil/Residue</td>
<td>0</td>
</tr>
</tbody>
</table>

Other Facilities:

- Power – 660 MW
- Desal Water – 14 MM Gallons/day
- Waste Treatment (BeAAT) – 26 KMT/year

Refinery Expansion and Fuel Oil reduction resulted in increase of more than **USD 10 billion** per annum in Gross Product Worth.
BOTTOM OF THE BARREL UPGRADATION
BOTTOM OF THE BARREL STRATEGY – HEART OF REFINERY & PETROCHEMICAL INTEGRATION

RR (EXPANSION)

- Atmospheric Residue from RR (West)
- Vacuum Residue from RR (East)

- RFCC (Resid Fluid Catalytic Cracking)
- Slurry Oil
- To Mild Hydrocracker (For upgrading to Diesel)
- WCN (Wax Cracking Unit)
- C3/C4
- C2-
- C2= Recovery
- WCNHT (Wax Cracking Naphtha Hydrocracking Unit)
- C3= Recovery
- Distillate
- Distillate Blending
- Gasoline Blending
- Olefin Conversion
- C4= Recovery
- C4 from GASCO
- C4 from CBDC
- C3 from GASCO
- C3 from CBDC
- PDH Unit
- C3=
- C3= Propane
- Propylene
- Carbon Black
- Distillate Blending
- Anode Coke

CB&DC

- Coke Calciner
- DCU (Direct Contact Unit)
- Vacuum Residue from RR (East)
- Carbon Black Calciner
- Distillate HT
- Carbon Black Unit
- Mixed C4=
- N butane & Iso butene
- 2-Butene

Atmospheric Residue from RR (West)

- Slurry Oil
- Slurry HT
- Carbon Black Unit
- Distillate HT
- Carbon Black
- Distillate Blending
- Gasoline Blending
- Olefin Conversion
- C4= Recovery
- C4 from GASCO
- C4 from CBDC
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BOTTOM OF THE BARREL STREAMS ARE CONVERTED TO HIGH VALUABLE PRODUCTS – Processes involved

**Base Oil Unit**

- Hydrocracking Unit
  - Unconverted Oil (UCO)
- Isodewaxing/Catalytic dewaxing
- Noble metal Hydro finishing
  - Base Oil

**Residual FCC (RFCC)**

- Crude Distillation Unit
  - Atmospheric Residue
- RFCC
  - Lighter products
  - LCO
  - Slurry Oil
- Mild Hydrocracker
  - Products

**Carbon Black & Delayed Coker**

- Carbon Black
- Delayed Coker
  - RR (East) Vac. Residue

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BLOCK FLOW DIAGRAM OF BASE OIL UNITS
BLOCK FLOW DIAGRAM OF RFCC UNITS
STATE OF ART PROCESSES AND SCALE
## RUWAIS REFINERY EXPANSION HAS STATE OF THE ART TECHNOLOGIES

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASE OIL UNIT</td>
<td>Latest technology minimizing CAPEX &amp; OPEX, improve catalyst life, quality base oil, higher Viscosity Index, low pour point, higher yields, producing Grp. II and III base oil stocks</td>
</tr>
<tr>
<td>RFCC</td>
<td>World’s Largest unique Petroriser to boost Propylene Yield</td>
</tr>
<tr>
<td>SLURRY HYDROTREATER</td>
<td>First Licensed Unit in the world</td>
</tr>
<tr>
<td>CARBON BLACK</td>
<td>Produces N-220 (UV Grade) &amp; N-115 (Semi Conductive grade) carbon black</td>
</tr>
<tr>
<td>DELAYED COKER &amp; CALCINER</td>
<td>Converts low value VR from RR-E and Slurry Oil to High Value Anode Grade Calcined coke</td>
</tr>
<tr>
<td>PROPANE DEHYDROGENATION</td>
<td>Converts Propane from RRE, RRW, GASCO, BOROUGE to Polymer Grade Propylene</td>
</tr>
<tr>
<td>ARDS (POCP)</td>
<td>12 reactors to de-sulphurize Atmospheric Residue from Upper Zakum crude and feed to RFCC</td>
</tr>
</tbody>
</table>

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Ruwais Refinery expansion project has helped ADNOC achieve its Strategic Objectives through:

• Value Maximization and improve profitability:
  • Reduction of Fuel Oil production
  • Production of quality feedstock for petrochemicals, Lube Oil & Coke

• Achieve improved performance & efficiency through optimal use of assets and natural resources – re-routing of heavier residues to upgrading units and processing of relatively distress crude oil in future

• Enhance technical knowhow of work force through use of state of art process & technology

• Contribute to Nation’s Development
Thank You