Management of Technology
In Pertamina Refining Business
Creating & Maximising Values

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Agenda

- Introduction to Pertamina
  - Current Pertamina Refining Business Challenges
  - Technology solution for business sustainability
  - Refinery reconfiguration proposal to improve profitability
Pertamina is Indonesia’s largest corporation, active in all segments of the energy value chain.

**Overview of Pertamina**

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Largest company and major refiner in Indonesia</td>
<td>2014 revenues of USD ~71 bn</td>
</tr>
<tr>
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<td>15,000 employees</td>
</tr>
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<td>Number 130 in Fortune 500 in 2015</td>
</tr>
<tr>
<td>Number 130 in Fortune 500 in 2015</td>
<td></td>
</tr>
</tbody>
</table>

**Overview of Activities**

- **Exploration**
  - 5 bn+ barrels of oil reserves (Indonesia)
  - ~450 MBOE/day of oil & gas production

- **Development & Production**
  - ~450 MBOE/day of oil & gas production

- **Refining and Petchem**
  - 6 refineries with utilized capacity of 820,000 BPD

- **Transportation**
  - ~5,000 retail fuel stations
  - ~95% market share in Retail fuel
  - ~75% market share in Industrial fuels
  - ~60% market share in Lubricants

- **Storage**

- **Marketing/Retail**

**SOURCE:** Pertamina
Agenda

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- **Current Pertamina Refining Business Challenges**
  - Technology solution for business sustainability
  - Refinery reconfiguration proposal to improve profitability
## Current Pertamina Refining Business Challenges

### External challenges

**Feedstock supply**
- **Domestic crude availability will decrease** and only able to cover less than 50% of Pertamina’s total refining capacity
  - Domestic crude production is projected to decline by ~27% between 2012 and 2020
  - In 2020 domestic crude’s total entitlement volume is only 449 MBD, which is less than 50% of total refining capacity
- Pertamina will **increasingly import crudes that are more sour**, driving the need to **release sulfur constraints to maintain competitiveness**
  - In 2020 sour crudes will account for ~77% of the total production capacity for import crudes
  - Sour crudes are cheaper than sweet crudes, therefore driving Pertamina’s need to release sulfur constraints to maintain competitiveness

### Refining market
- Indonesia’s demand for gasoline and diesel will continue to grow significantly
  - **Gasoline demand** will grow by about 8% per year from 2012 to 2025
  - **Diesel demand** will grow by about 5% per year from 2012 to 2025
- **Product quality specifications** will become more stringent in the next 5-10 years

### Security of energy supply
- **Indonesia and ASEAN** will be short in gasoline and diesel, hence potentially requiring Indonesia to import from sources outside ASEAN
  - Indonesia will continue to have growing gasoline and diesel deficit
  - ASEAN will also be in deficit for gasoline and diesel
- There is **government support** for increasing domestic production of gasoline and diesel to limit dependency on imports

### Refinery configuration
- Going forward refineries will have to increase its complexity and sulfur handling capacity to become more competitive (technology application)

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1 Based on UNEP, FACTS and McKinsey analysis
2 Not including new refineries and RDMP initiatives
Indonesia faces a significant shortage in the refining capacity, equivalent to ~5-8 refineries by 2025

Indonesia refinery product supply and demand

<table>
<thead>
<tr>
<th>Year</th>
<th>Existing supply</th>
<th>Additional supply from RU IV RFCC</th>
<th>Base case</th>
<th>High case</th>
<th>Low case</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012-13</td>
<td>529</td>
<td>529</td>
<td>1,050</td>
<td>2,250</td>
<td>1,626</td>
</tr>
<tr>
<td>2020</td>
<td>529</td>
<td>529</td>
<td>1,908</td>
<td>2,250</td>
<td>1,908</td>
</tr>
<tr>
<td>2025</td>
<td>529</td>
<td>529</td>
<td>2,250</td>
<td>2,250</td>
<td>2,250</td>
</tr>
</tbody>
</table>

CAGR

- **6.0%**
- **4.7%**
- **3.4%**

Implication

- Future shortage varies significantly depending on:
  - Economic growth
  - Fuel subsidy elimination
  - Substitution of gas/bio-fuel based vehicles

- Estimated shortage by 2025 is between 5 and 8 refineries
  - High case: ~1,700 KBD
  - Base case: ~1,400 KBD
  - Low case: ~1,100 KBD

**SOURCE:** Pertamina M&T, team analysis

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1 Includes gasoline, gas oil and diesel
2 Based on base case demand scenario per Pertamina M&T
3 Assumed each refinery produce 200 KBD of fuel products from 300 KBD of crude run
A long-term solution is needed to secure domestic fuel supply as Indonesia’s domestic coverage will become even smaller.

Indonesia’s domestic product coverage is substantially low compared to other neighboring countries and can potentially pose a threat in security of fuel products.

Increasing the domestic production will increase the domestic fuel product coverage.

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1. Production [gasoline, diesel, gasoil] / Demand [gasoline, diesel, gasoil]
2. Assumed 400 KBD refinery at 95% utilization; 50% of the production will be gasoline, diesel and gasoil.
3. Assumed 300 KBD refinery at 95% utilization; 67% of production for petroleum products, and 67% of this will be gasoline, diesel and gasoil.

SOURCE: ICIS Supply & Demand Database; Pertamina M&T (only for Indonesia 2030); Team analysis
Existing Indonesian refineries’ profitability is low, largely driven by complexity of refineries.

More complex portfolio (presence of units like coking, etc.) indicates ability to convert higher proportion of output to light products.

- Light products typically yield higher margins.
- Hence, higher complexity portfolio indicates ability to generate higher margins.

1 Nelson’s complexity index; weighted average by capacity as of 2012
2 Average capacity as of 2012
Domestic crude: Woodmac projected domestic crude production to decline by ~27% between 2012 and 2020

### Nov 2012 Woodmac crude projection

**Production volume, MBD**

<table>
<thead>
<tr>
<th>Area</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2017</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ardjuna</td>
<td>853</td>
<td>810</td>
<td>779</td>
<td>828</td>
<td>765</td>
<td>619</td>
</tr>
<tr>
<td>Belanak</td>
<td>35</td>
<td>32</td>
<td>33</td>
<td>20</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Belida</td>
<td>19</td>
<td>28</td>
<td>25</td>
<td>33</td>
<td>140</td>
<td>154</td>
</tr>
<tr>
<td>Banyu urip</td>
<td>30</td>
<td>22</td>
<td>16</td>
<td>13</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Duri</td>
<td>168</td>
<td>154</td>
<td>140</td>
<td>122</td>
<td>125</td>
<td>619</td>
</tr>
<tr>
<td>SLC/ Minas</td>
<td>189</td>
<td>173</td>
<td>156</td>
<td>137</td>
<td>114</td>
<td>91</td>
</tr>
<tr>
<td>Other Crudes</td>
<td>316</td>
<td>309</td>
<td>304</td>
<td>278</td>
<td>299</td>
<td>255</td>
</tr>
<tr>
<td>Other Condensates(^1)</td>
<td>75</td>
<td>74</td>
<td>74</td>
<td>71</td>
<td>70</td>
<td>64</td>
</tr>
</tbody>
</table>

\(^1\) Other condensates includes, Senipah, Bontang, Arun and Geragai

**SOURCE:** Woodmac
Import crude: By 2020, sour crudes above 0.5%S dominate but Pertamina refineries currently unable to process them

**Crude availability in 2020**
- Categorized by sulfur content, MBSD

**Sample of crude in feedstock basket**
- Sweet crude
  - Up to 0.5%
    - Azeri
    - Saharan
    - Es Sider
    - Bonny light
    - Qatar condensate
  - 0.51-1.5%
    - ESPO
    - Murban
    - Oman
    - Umm Shaif
    - Zakum
  - Above 1.5%
    - Arab light
    - Upper Zakum
    - Basrah Light
    - Kuwait
    - Arab Heavy

**2020 PROJECTIONS**
- Light (API>37)
- Medium (27<API<37)
- Heavy (API<27)

**Import crude: By 2020, sour crudes above 0.5%S dominate but Pertamina refineries currently unable to process them**

1 Based on Pertamina’s 102 import crudes of interest

**SOURCE:** COMS, FACTS, Woodmac, team analysis
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Pertamina Refining is at cross-roads

**Status-quo**

- No upfront capital spends
- Fewer resources required (e.g., people)
- Longer-term low competitiveness
- More difficult competitive sourcing for M&T
- Increasing import dependency

**Upgrade to compete & sustain**

- Profitable refineries
- Competitive, low-cost products for M&T
- Reduce imports
- Upfront capital spends
- Technology, resource and capabilities needed

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Majority of domestic demand will be covered by the implementation of existing refineries upgrading (RDMP) and GRR

Refining Development Master Plan (RDMP)

- **Description**: Upgrading 5 existing refineries to increase the capacity and competitiveness
- **KBD**
  - Supply in 2013: 541
  - Supply in 2025: 1,393
  - Increase: 2.5x

Grass Root Refinery (GRR)

- **Description**: Building 2 new refineries to meet west and east Indonesia’s growing demand
- **West**
  - 1 x 300 KBD (Ref + PC)
  - Current: 946
  - After RDMP: 1,136
  - After GRR: 1,273
- **East**
  - 1 x 300 KBD (Ref only)
  - Current: 447
  - After RDMP: 695
  - After GRR: 675

Complexity

- **NCI**
  - Current: 5
  - After RDMP: 9

BPP

- **% MOPS**
  - Current: 104
  - After RDMP: 94

Notes:
1. Medium Growth case (4.9%)
2. Region I to IV
3. Region V to VIII
4. Nelson Complexity Index
5. May be pushed to second phase
6. Including additional supply to come online from RU VI RFCC

SOURCE: Team analysis
Reconfiguration proposal for RU V Balikpapan

- **CDU IV**
  - 200 / 300

- **CDU V**
  - 60

- **VDU II**
  - 81 / 121

- **CDU V**
  - 60

- **VDU III**
  - 25

- **NHT I**
  - 20

- **NHT II**
  - 35

- **PL I**
  - 20

- **PL II**
  - 35

- **Isom**
  - 27

- **ln NHT**
  - 27

- **KHT**
  - 55

- **DHT**
  - 108

- **HCU**
  - 55 / 72

- **VRHDS**
  - 66

- **RFCC**
  - 63

- **PP plant**
  - 132 KTA

- **GSH**
  - 34

- **H2 plant I**
  - 81 kNm³/h

- **H2 plant II**
  - 111 kNm³/h

- **Alkylation**
  - 8
Process Unit Licensors

- Process Licensors are technology provider for every specific process unit.
- Pertamina has degree of freedom in selection of process licensors in order to keep competitiveness and gaining more values.
- In order to conduct licensor selection, Pertamina considers the following:
  - Number of commercial scale on the project implemented
  - License unit with advantage on life cycle cost
  - Safety & reliability historical record
  - Operability
  - More added value of product (yield, quality, selectivity)
  - After sales service performance
  - Availability of technical services
  - Historical record on past project implemented
Dilarang mengutip, menyebarluaskan dan menggunakan materi yang ada di dalam presentasi/tulisan/data/informasi ini diluar keperluan untuk Agenda hari ini dengan Direktur Pengolahan PT. PERTAMINA (Persero).

PT. PERTAMINA (Persero) merupakan Badan Publik yang terikat dengan Undang Undang (UU) no. 14 tahun 2008 tentang Keterbukaan Informasi Publik (KIP).

Apabila larangan ini dilanggar maka sesuai dengan Bab XI pasal 51 sampai pasal 57 didalam UU KIP tersebut, bahwa seseorang/pihak yang melanggar dapat dikenakan Hukuman (Pidana) Penjara hingga 3 tahun dan/atau denda hingga Rp. 20 juta.