BSR’S NEW BUSINESS OPPORTUNITY AND SUSTAINABLE DEVELOPMENT STRATEGY

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CONTENTS

1. Introduction to BSR and Dung Quat Refinery
2. BSR’S New Business Opportunity
3. BSR’S Sustainable Development Strategy
4. Key Takeaway
INTRODUCTION TO BSR AND DUNG QUAT REFINERY


Location: Dung Quat Economic Zone, Binh Thuan & Binh Tri Communes, Binh Son District, Quang Ngai Province.


Size: 965 ha (485ha off-shore & 471ha on land)

Capital Investment: 2.5 billion USD. Capacity: 6.5 million tons/annual ~ 148,000 BPSD

Number of employees: 1543 engineers and technicians.
All process units built at Dung Quat Refinery were designed by global leading licensors: NHT/CCR/ISOM (UOP, USA); RFCC/LCO-HDT (AXENS, France); KTU/LTU/NTU (Merichem, USA); PP Plant: MCI (Japan).
BSR’S NEW BUSINESS OPPORTUNITY

Competitiveness of Vietnam Refining & Petrochemical Industry

- High GDP growth, one of the highest in the world with the anticipated average of 6.8% in next 5 years.
- Big market by an increased income population of ~ 96 million people in accompany with larger middle class.
- Increasing urbanization growth from 38% to over 50% by 2030.
- Booming infrastructure, industries, packaged food, processed food and agriculture productions etc.
- Double digit growth in motorbike and automobiles.
- Low labor cost and proximity to biggest consumers (China, India, etc) for potential exportation.
- Strong Government supports.

Supporting Factors:

- Advantages of existing upstream and downstream industries

GDP Growth Rate: Vietnam (% Per year)

- 6.7% (2015)
- 6.3% (2016)
- 6.8% (2017)
- 7.1% (2018)
- 7.0% (2019)

Source: Asian Development Bank 2018

GDP Growth Rate: 6.8% Annual Average 2015 - 2022


Integration with refineries for synergies (e.g. feedstocks, hydrocarbon exchanges)

Low Labor Cost & Proximity to China
(Made in Vietnam and sold to China)

Existing large and growing downstream petrochemical demand

Vietnam Upstream Petrochemical Competitiveness

Growing supporting industries

Strong economic growth outlook

Higher income population

Supporting Factors:

- High GDP growth, one of the highest in the world with the anticipated average of 6.8% in next 5 years.
- Big market by an increased income population of ~ 96 million people in accompany with larger middle class.
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Advantages of existing upstream and downstream industries
BSR’S NEW BUSINESS OPPORTUNITY

Growth in petroleum demand continues in Asia and increasing fuel demand in Vietnam through 2035 will bring the potential opportunity to the expansion of Dung Quat Refinery.

- Dung Quat Refinery is supplying about 30% of the country’s fuel demand & 15% of PP product for the domestic market.
- Gasoline, Diesel, JET and PP products contribute the most value to the refinery in terms of revenue and profits.
- Dung Quat Refinery and Nghi Son Refinery, which began commercial production in October, 2018, are together expected to meet approximately 80 – 85 % of Vietnam’s refined oil product demand by 2019.
BSR’S NEW BUSINESS OPPORTUNITY

Vietnam has been a net importer of all olefins and other petrochemical products and this trend is expected to continue and expand larger in the future with the average increase of around 12% per year. Petrochemical Products are significantly high values compared to Refining Products.

- Vietnam is forecasted to import 2.0 – 2.5 million tons of Ethylene and 1.0 – 1.5 million tons of Propylene equivalent through 2030.

**Continued prosperous opportunity for the petrochemical industry in Vietnam and Dung Quat Refinery.**
BSR’S NEW BUSINESS OPPORTUNITY

Vietnam Petrochemical Industry Overview

<table>
<thead>
<tr>
<th>Company</th>
<th>Product Chain</th>
<th>Product</th>
<th>Cap.(kta)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanichem</td>
<td>Fertilizers</td>
<td>Ammonia/Urea</td>
<td>300/500</td>
<td>Bac Giang</td>
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<tr>
<td>PetroVietnam Fertilizer</td>
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<td>Ammonia/Urea</td>
<td>480/800</td>
<td>Ca Mau</td>
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<tr>
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<td>900/800</td>
<td>Phu my</td>
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<tr>
<td>Phu My Plastics</td>
<td>Vinyls</td>
<td>PVC</td>
<td>150</td>
<td>Ba Ria-Vung Tau</td>
</tr>
<tr>
<td>TPC Vina</td>
<td></td>
<td>PVC</td>
<td>200</td>
<td>Dong Nai</td>
</tr>
<tr>
<td>Dung Quat Refinery</td>
<td>Olefin/Polyolefin</td>
<td>Propylene/PP</td>
<td>150/150</td>
<td>Dung Quat</td>
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<tr>
<td>Formosa Industries</td>
<td>PET/Polyester</td>
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<td>75</td>
<td>Dong Nai</td>
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<tr>
<td></td>
<td></td>
<td>Polyester Textile F</td>
<td>50</td>
<td>Dong Nai</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PET Bottle</td>
<td>125</td>
<td>Dong Nai</td>
</tr>
<tr>
<td>Hyosung</td>
<td></td>
<td>Nylon</td>
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<td>PVTEX</td>
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<td>Polyester Ind. F.</td>
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<td>Polyester Textile F</td>
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<td>Vietnam Polystyrene</td>
<td>Styrenics</td>
<td>PS</td>
<td>62</td>
<td>Vung Tau</td>
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<td></td>
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<td>EPS</td>
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<td>NSRP</td>
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<td>PetroVietnam Fertilizer</td>
<td>Styrenics</td>
<td>PS</td>
<td>700</td>
<td>Vung Tau</td>
</tr>
</tbody>
</table>

- Petrochemical Plants closed to feedstock areas and demand centers, concentrated in the south.
BSR’S NEW BUSINESS OPPORTUNITY

Competitive advantages of Dung Quat Refinery

- Vietnamese government is promoting to build up a major refining and petrochemical cluster & national energy center in Dung Quat area. It would be a good opportunity for BSR and investors to develop the petrochemical sector.

- Abundant feedstocks for petrochemicals from the existing refinery such as LPG, Naphtha, Kerosene, etc. and Natural Gas from Blue Whales Gas field.

- Dung Quat Refinery configuration is favorable to integrate with a petrochemical complex thanks to processing of the light and sweet crudes and large capacity of CCR and RFCC.

- Infrastructure available to support the expanding petrochemical facilities:
  - Convenient accessibility of highways, ports for product movements
  - Availability of land and utilities such as water, power and natural gas.

- Less risks of natural issues in terms of flooding, tsunami, earthquake or heavy typhoon.

- Qualified and experienced manpower in downstream industry.
BSR’S SUSTAINABLE DEVELOPMENT STRATEGY

BUSINESS STRATEGY

SHORT TERM

▪ Achieving operation excellence to maximize performance in business and improve the company’s efficiency and profitability.
▪ Continuing equitization plan and strategic sale.
▪ Meeting EURO V fuel standards and increasing blending ratio with sour/heavy crude sources after finishing the Dung Quat Refinery Upgrading and Expansion Project.

LONG TERM

▪ Focusing on petrochemicals and deep processing petroleum products based on advanced technologies used in the industry.
▪ Taking advantages of available natural gas (Blue Whale) as a supplementary feedstock for Dung Quat refinery and petrochemical orientation.
▪ Penetrating the international market of petroleum and petrochemical products.
BSR’S SUSTAINABLE DEVELOPMENT STRATEGY

Operation Excellence To Attain Business Excellence

- Demonstrate strong commitment to safe and reliable operation. Strengthen the company’s safety culture.
- Improve our effective operating performance continuously.
- Focus on process optimization and energy saving activities.
- Optimize margins with the refinery’s diversified feedstocks and product market flexibility.
- Prioritize higher-value, higher-growth opportunities/projects to capture benefits of advantaged resources and enhance future returns.
- Update Business Process and IT Master Plan to take into account the impact of industry 4.0 on data flows, response times and tasks assignments.
From 2009 to 2012 BSR focus has been on Operation and Maintenance handover training (knowledge, skills, experience via OJT and hands-on) from O&M contractor to BSR.

During 2013 BSR fostered OJT, and handover training, and also started to receive more training from outside:
- Management Training
- Intensive Training
- Soft-Skills Training

Launched the Accelerated Training Program to quickly qualify specialists for 29 key subject areas.

Since 2014, BSR started applying Competency Based Training Programs to ensure employees are able to do the work effectively and to increase efficiency. This is to impact on the succession and promotion plan.

Building an advanced management and learning culture in the company in order to attract and retain the highly qualified workforce.
BSR’S SUSTAINABLE DEVELOPMENT STRATEGY

Strongly cooperating with licensors, vendors and other oil and gas companies around the world to implement the accelerated and intensive training programs and benchmarking for experience and best practices sharing.

<table>
<thead>
<tr>
<th>No</th>
<th>Year</th>
<th>Number of trainees by JCCP</th>
<th>Number of trainees by JXTG</th>
<th>Training Programs by JCCP/JXTG - Main topics</th>
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<tbody>
<tr>
<td>1</td>
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<td>14</td>
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<td></td>
<td></td>
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<td></td>
<td>Advanced Technologies in a Transforming Energy Market</td>
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<td>13</td>
<td>3</td>
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<tr>
<td>3</td>
<td>2014</td>
<td>6</td>
<td>5</td>
<td>Equipment Materials and Corrosion, Reliability Welding Technologies</td>
</tr>
<tr>
<td>4</td>
<td>2015</td>
<td>4</td>
<td>15</td>
<td>Inspection and Reliability Evaluation/Turnaround and Inspection</td>
</tr>
<tr>
<td>5</td>
<td>2016</td>
<td>12</td>
<td>10</td>
<td>Instrumentation and Control in Refinery/Utilization of Information &amp; DCS</td>
</tr>
<tr>
<td>6</td>
<td>2017</td>
<td>4</td>
<td>10</td>
<td>Logistics System and Distribution Network/Upgrading of Heavy Oil</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Maintenance Management/TPM/Quality Management/HRM</td>
</tr>
<tr>
<td>7</td>
<td>2018</td>
<td>4</td>
<td>10</td>
<td>Noteworthy Future Technology for Petroleum Industry and Society</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Power Plant Instrument and Control for Refinery and Petrochemical Plant</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>57</td>
<td>53</td>
<td>Project Management for High Value Added Petroleum Industry</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Reliability Enhancement &amp; Maintenance Management of Rotary</td>
</tr>
</tbody>
</table>

No Year Number of trainees by JCCP Number of trainees by JXTG Training Programs by JCCP/JXTG - Main topics

- Refinery Management/LP Model, Energy Saving/Planning & Production
- Advanced Technologies in a Transforming Energy Market
- Energy Saving/Gas Processing for LNG/Advanced Process Control
- Equipment Materials and Corrosion, Reliability Welding Technologies
- Inspection and Reliability Evaluation/Turnaround and Inspection
- Instrumentation and Control in Refinery/Utilization of Information & DCS
- Logistics System and Distribution Network/Upgrading of Heavy Oil
- Maintenance Management/TPM/Quality Management/HRM
- Noteworthy Future Technology for Petroleum Industry and Society
- Power Plant Instrument and Control for Refinery and Petrochemical Plant
- Project Management for High Value Added Petroleum Industry
- Reliability Enhancement & Maintenance Management of Rotary
• April 2018, 20 PSM RBPS CCPS elements have been in place and implementing. It results in increasing awareness, mindsets & behavior and knowledge of employees on 20 PSM elements in line with BSR’s business objectives.
• Top to Bottom involvement and engagement.
• PSM implication drives improvement and enhancement of BSR’s strong safety culture in order to achieve safety operation excellence and zero incident workplace.
BSR’S SUSTAINABLE DEVELOPMENT STRATEGY

BSR’s operational performance in terms of energy saving, process optimization and utilization.

**Dung Quat Refinery Throughput**

<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>103.3%</td>
<td>104.8%</td>
<td>103.5%</td>
<td>108.0%</td>
</tr>
</tbody>
</table>

**Dung Quat Refinery Energy Intensity Index (EI) Index**

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>117%</td>
<td>113%</td>
<td>111.4%</td>
<td>106.5%</td>
<td>103.0%</td>
</tr>
</tbody>
</table>

**Dung Quat Refinery Utilization Rate**

<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>94.0%</td>
<td>94.1%</td>
<td>94.8%</td>
<td>95.9%</td>
</tr>
</tbody>
</table>

**Dung Quat Refinery Internal Energy Consumption**

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>7.45%</td>
<td>7.38%</td>
<td>7.28%</td>
<td>7.2%</td>
<td>7.0%</td>
</tr>
</tbody>
</table>
BSR’S SUSTAINABLE DEVELOPMENT STRATEGY

BSR continuously implement the operating energy saving, process optimization, improvement programs and always desire to collaborate and cooperate with outside leading companies in Oil & Gas industry such as: SGS, KBC, JGC, Idemitsu, Exxon Mobil, IOC, Petronas, etc. Especially, BSR has established a very good relationship and cooperation with JCCP and JXNRI since Refinery’s commissioning to date.

- To continue the cooperation program between BSR and JCCP/JXNRP, dated 24/07/2018, BSR and JCCP signed MOA regarding the second Technical Cooperation Project:”Technical Operation to improve refinery competitiveness in Viet Nam” in period of 2018 – 2021.

BSR and JCCP/JXNRI will be focusing on:

1. Improve BSR’s products quality
2. Energy saving and Optimization
3. Petrochemical configuration
4. Capex optimization for Upgrading & Expansion Project
5. RFCC capacity and Catalyst Optimization

Training workshop, experience sharing, technical exchange and conference.
According to the Equitization Plan of BSR, the ownership structure of BSR after IPO and strategic sales as follows:

<table>
<thead>
<tr>
<th>Ownership Structure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSR’s employees</td>
<td>49%</td>
</tr>
<tr>
<td>IPO sales</td>
<td>7.79%</td>
</tr>
<tr>
<td>Strategic shareholders</td>
<td>8%</td>
</tr>
<tr>
<td>PVN</td>
<td>0.21%</td>
</tr>
</tbody>
</table>

BSR conducted its IPO to sell 242 million shares in 17th January 2018. As a result, 623 investors among 4,079 registered investors won the auction, including 62 organisations and 561 individuals.

The average selling price was VND 23,043 ($1.01), 57.8 per cent higher than the initial price. The lowest selling price was VND 20,800 ($0.92).

Since 1st June 2018, Binh Son Refining & Petrochemical Ltd started to become Joint Stock Company.

Investors can own up to 49 per cent of BSR’s charter capital. This represents a unique opportunity for foreign partners to take control and execution in BSR business.

The main objective of equitization is to arrange financing for effective strategic investing projects in the future focusing on deep processing segment and petrochemicals, enhance the transparency in enterprise management and create added value for stakeholders.
UPGRADING & EXPANSION PROJECT

Strategic goal

- Increase the capacity to 8.5 million tones per year (130% of existing CDU capacity).
- Diversify sour and heavy crude slates (More than 200 types).
- Increase operational utilization of current facilities Increase products’ quality to meet with Euro V standards.

Crude mix: ESPO & Murban

Total investment: 1.8 billion USD

IRR = 10.24%, NPV > 0

Products:

- A92, A95, A97 (high quality gasoline), DO, LPG, Polypropylene, Kerosene/Jet A1, FO, Asphalt, sulfur.
BSR’S SUSTAINABLE DEVELOPMENT STRATEGY

Project Status:
• DFS contractor: JGC Corporation.
• FEED contractor: Amec Foster Wheeler (Wood Group).
• Feed completion: 24 March 2017.
• Feed approval: 1st Quarter, 2019
• Financial arrangement: Working with financing institutions.
• EPC: 1st Stage bidding on-going
• EPC contract finalization: Expected in January, 2020
• EPC completion: Expected in December, 2023
There are numerous Refining - Petrochemical Integration project options to BSR

- Maximize propylene and olefins production from RFCC
- Upgrade Reformate to BTX Aromatics & Derivatives
- Integrate Blue Whale natural gas field for petrochemical
- Steam/Naphtha Crackers with available flexible feedstocks to produce Olefins
- Integrate Crude Cracker for petrochemicals and chemicals

Which projects will deliver the most value?
BLUE WHALE NATURAL GAS FOR DUNG QUAT REFINERY

BSR’S SUSTAINABLE DEVELOPMENT STRATEGY

Blue Whale Natural Gas Field:

- Located offshore nearly 100km from the Quang Nam & Quang Ngai Coastline.
- Commence commercial operation from 2024 onwards.
- Reserves: 150 billions m³, biggest NG reservoir in Vietnam
- Usage: Mainly supply the fuel to 2 Power Plants (3000MW), and around 1.7 billion m³ per year for Dung Quat Refinery.

BSR plans to develop the petrochemical segments with the main raw materials from Blue Whale Gas field from 2025 onwards.

Utilize Steam Reforming or Steam Cracking Technologies to convert Natural Gases into petrochemical materials.
KEY TAKEAWAY

Only competitive refinery shall survive by looking at ways and means to sustainably improve efficiency and profitability through Operational Excellence.

Refinery and Petrochemical integration will further enhance the competitiveness and profitability for Refiners due to strong petrochemical growth.

Vietnam Petrochemical capacities lag behind demand, resulting net import positions for all key petrochemical products. The time is now for downstream investment to capture the potential domestic demand.

BSR’s sustainable development strategies are to achieve the operation excellence in business, upgrade our fuel products meeting the required standards and focus on deep processing segment and petrochemical sector.

BSR are looking for strategic partners, together with BSR as partnerships and alliances to grow the refining and petrochemical sector in Vietnam and to penetrate into the domestic and international market of petroleum and petrochemical products.
Sincerely thanks!