

BSR'S NEW BUSINESS OPPORTUNITY AND SUSTAINABLE DEVELOPMENT STRATEGY

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**PETROVIETNAM GROUP
BINH SON REFINING &
PETROCHEMICAL JSC**



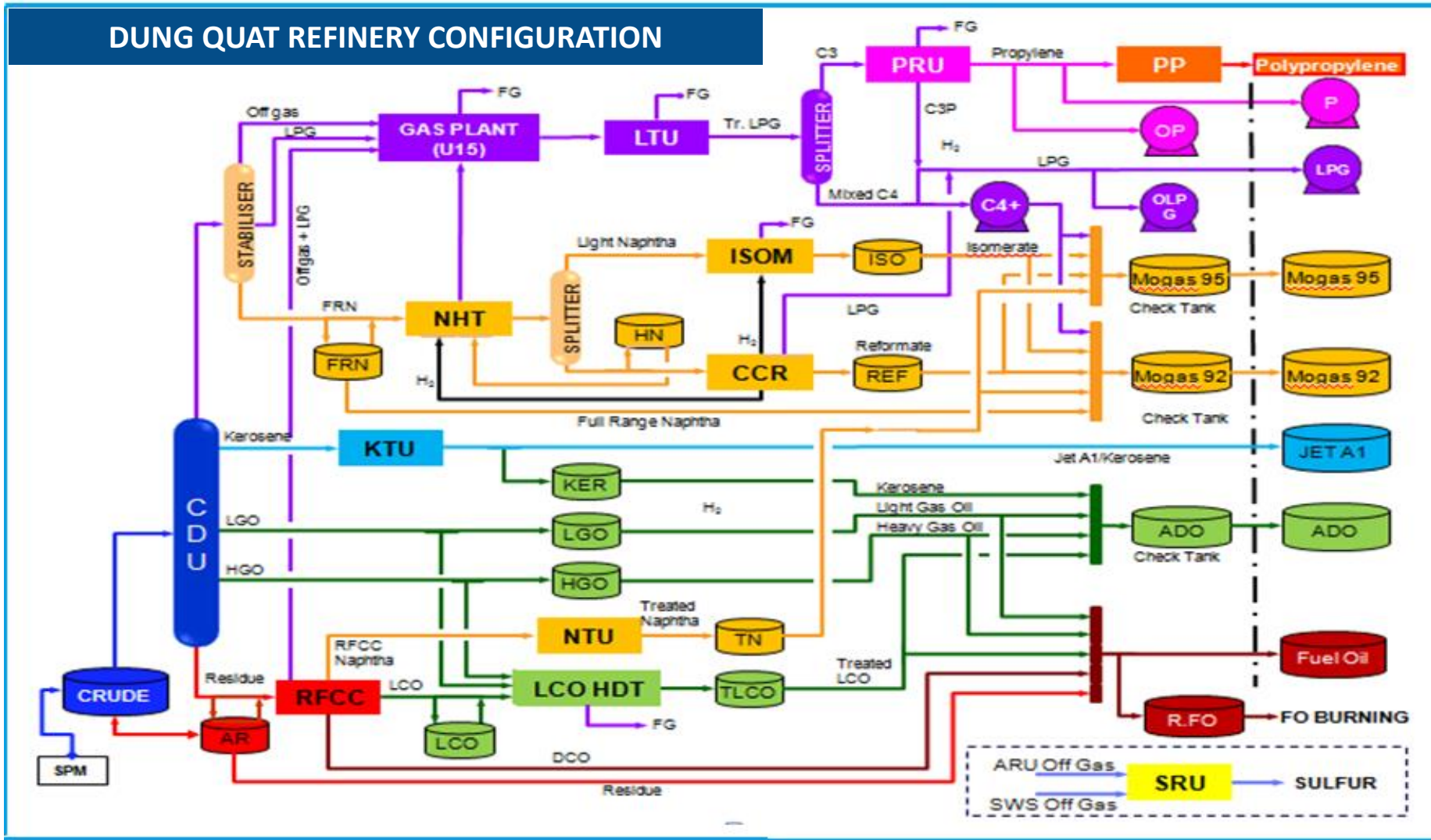
INTRODUCTION TO BSR AND DUNG QUAT REFINERY

LAYOUT OF DUNG QUAT REFINERY



- **Owner:** Binh Son Refining & Petrochemical Company JSC (BSR) – A subsidiary of PVN. Started in operation in February, 2009.
- **Location:** Dung Quat Economic Zone, Binh Thuan & Binh Tri Communes, Binh Son District, Quang Ngai Province.
- **Main business:** Production and trading of Petroleum & petrochemical products including: LPG, Propylene, Gasolines, JetA1, Diesel, Fuel Oil and Polypropylene.
- **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.

INTRODUCTION TO BSR AND DUNG QUAT REFINERY

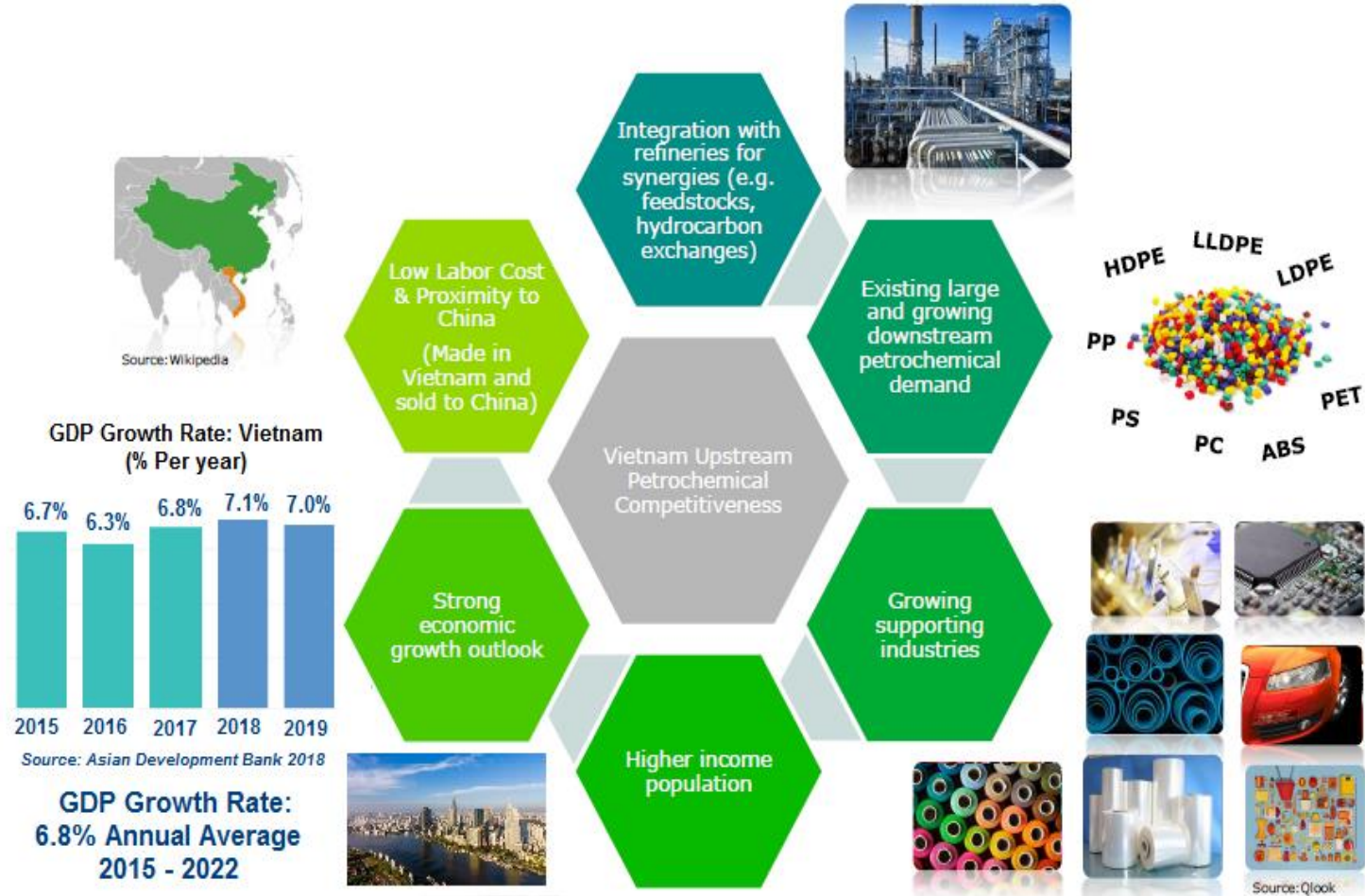


- 800 Oil Tankers offloaded, 64 million tons crude processed.
- 59 million ton of petroleum and petrochemical products sold in the domestic & oversea market.
- 3 Turnarounds implemented successfully in 2011, 2014 and 2017.

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).

Competitiveness of Vietnam Refining & Petrochemical Industry

Supporting Factors:



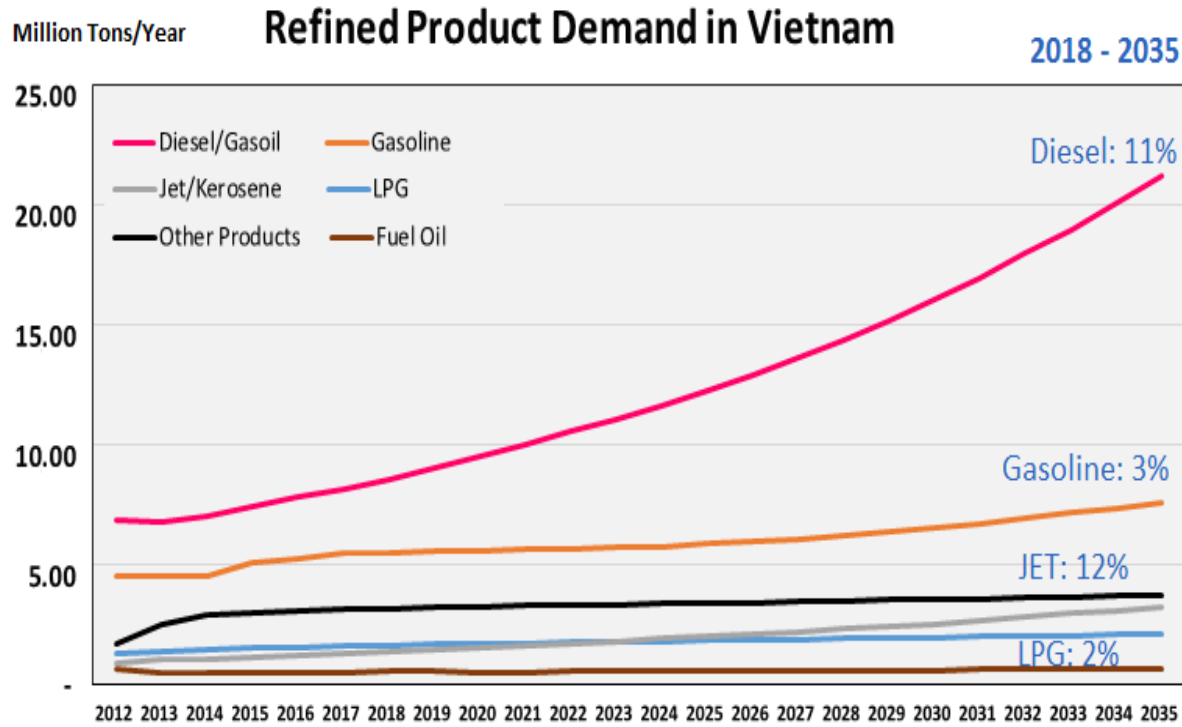
- High GDP growth, one of the highest in the world with the anticipated average of 6.8% in next 5 years.
- Big market by an increased income population of ~ 96 million people in accompany with larger middle class.
- Increasing urbanization growth from 38% to over 50% by 2030.
- Booming infrastructure, 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.

- Advantages of existing upstream and downstream industries

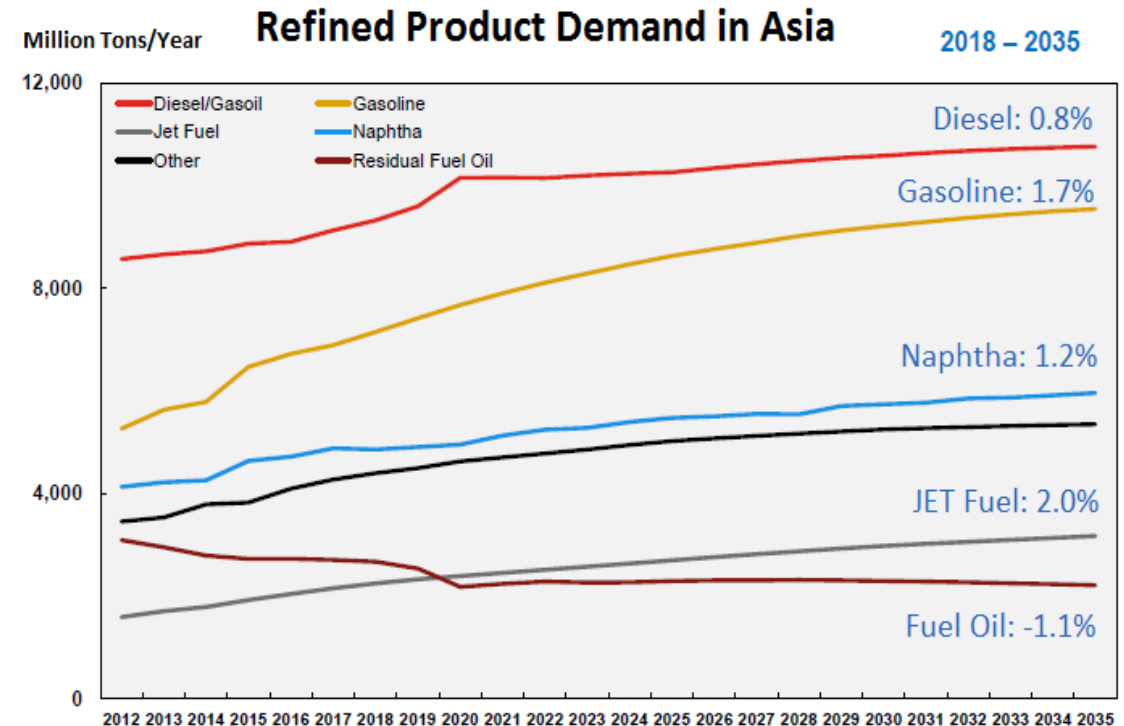
BSR'S NEW BUSINESS OPPORTUNITY



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.



Source: Wood Mackenzie

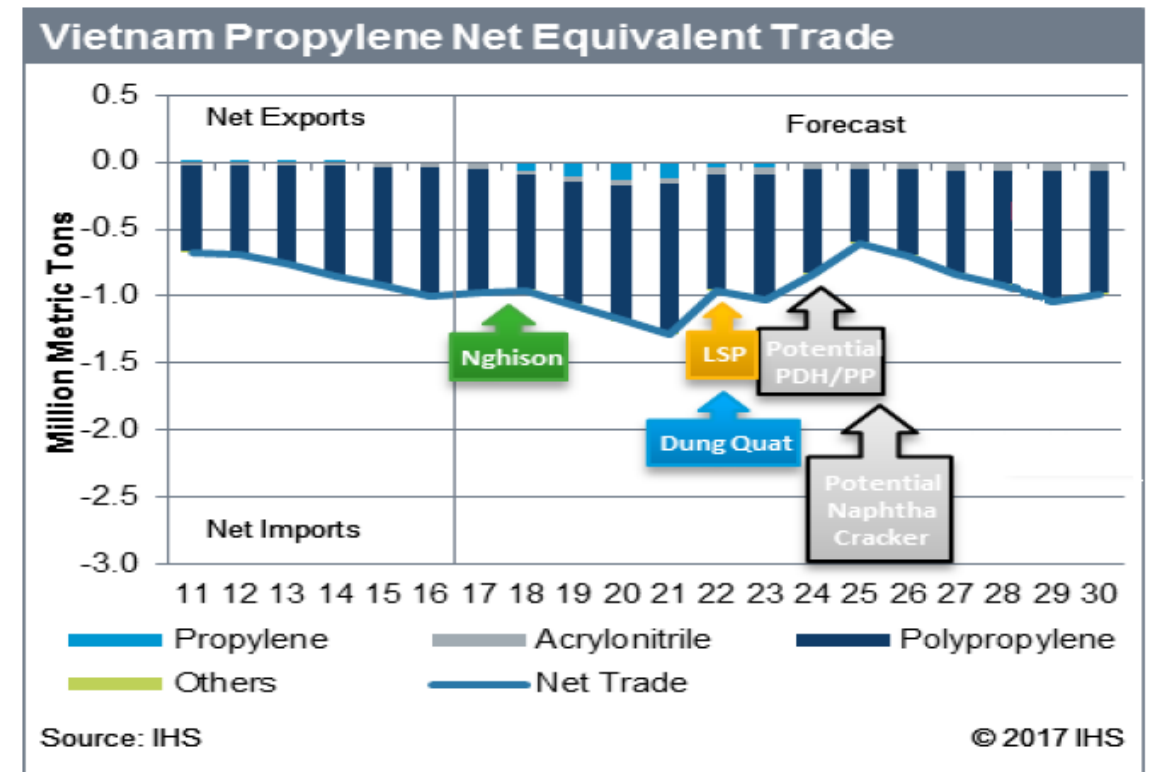
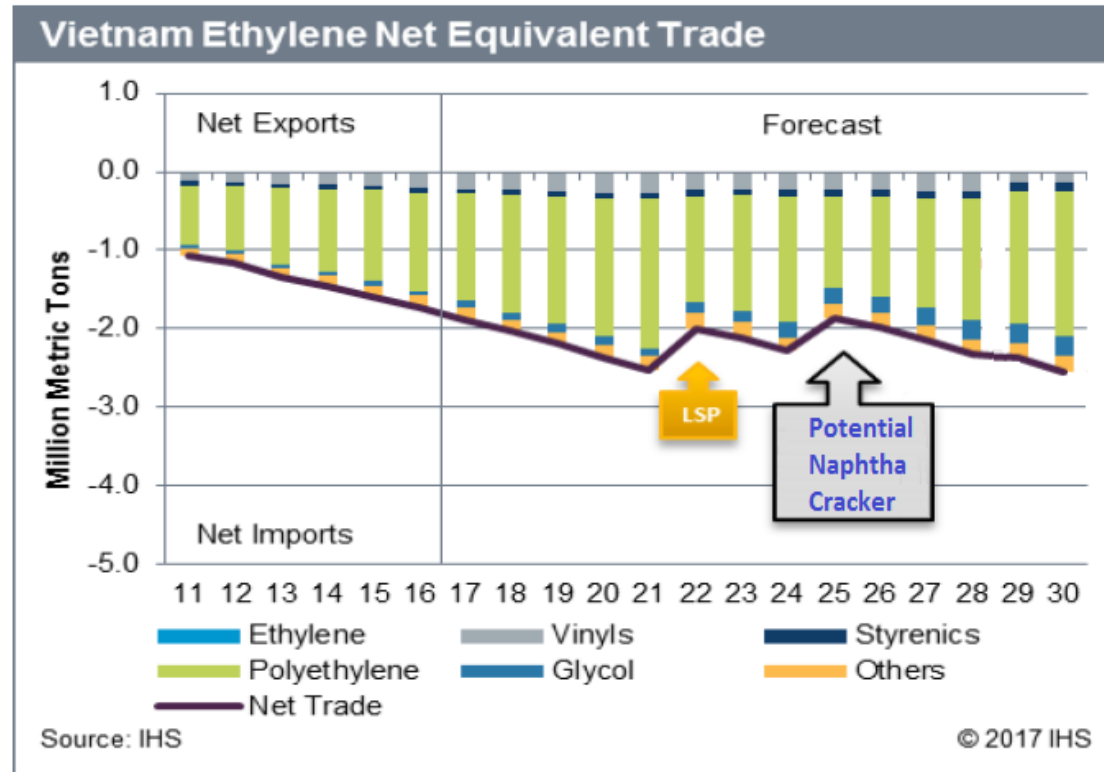


Source: IHS Markit

- 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.



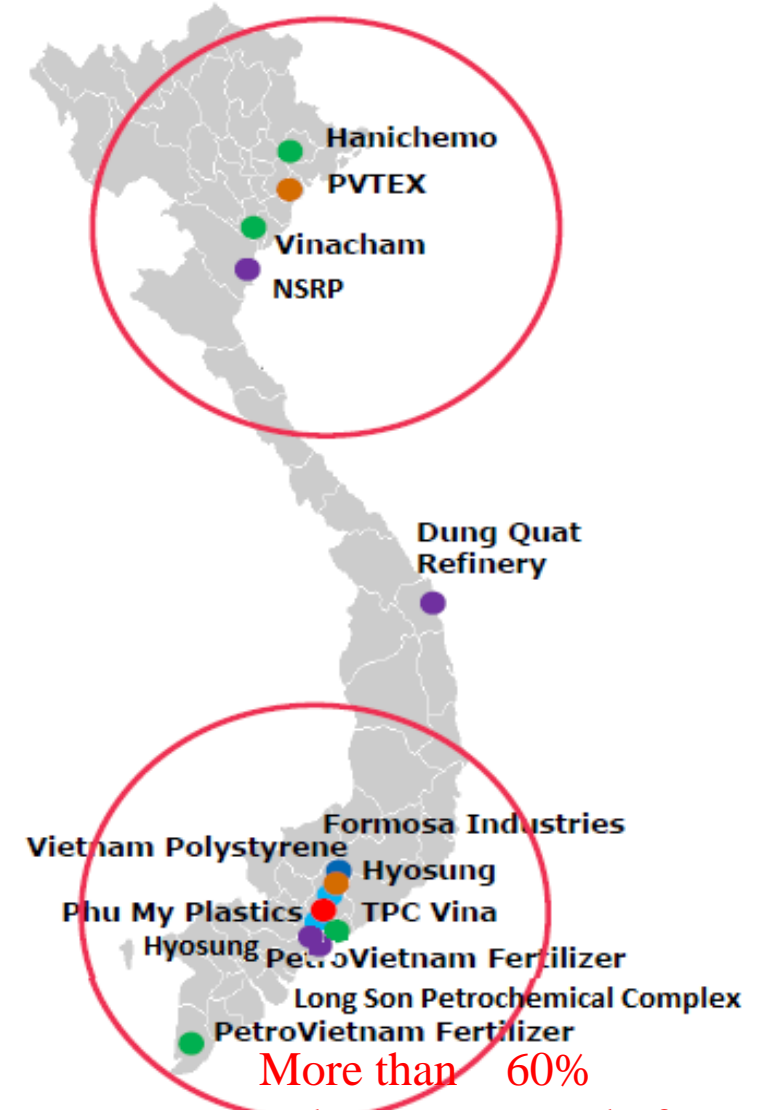
- Vietnam is forecasted to import 2.0 – 2.5 million tons of Ethylene and 1.0 – 1.5 million tons of Propylene equivalent through 2030.

Continued prosperous opportunity for the petrochemical industry in Vietnam and Dung Quat Refinery.

BSR'S NEW BUSINESS OPPORTUNITY

Vietnam Petrochemical Industry Overview

Company	Product Chain	Product	Cap.(kta)	Location
Hanichemo	Fertilizers ●	Ammonia/Urea	300/500	Bac Giang
PetroVietnam Fertilizer		Ammonia/Urea	480/800	Ca Mau
		Ammonia/Urea	900/800	Phu my
Vinachem		Ammonia/Urea	320/560	Ninh Binh
Phu My Plastics	Vinyls ●	PVC	150	Ba Ria-Vung Tau
TPC Vina		PVC	200	Dong Nai
Dung Quat Refinery	Olefin/Polyolefin ●	Propylene/PP	150/150	Dung Quat
Formosa Industries	PET/Polyester ●	Polyester SF	75	Dong Nai
		Polyester Textile F	50	Dong Nai
		PET Bottle	125	Dong Nai
	Nylon ●	Nylon 6	50	Dong Nai
Hyosung	PET/Polyester ●	Polyester Ind. F.	100	Dong Nai
PVTEX		Polyester SF	144	Hai Phong
		Polyester Textile F.	36	Hai Phong
Vietnam Polystyrene	Styrenics ●	PS	62	Vung Tau
		EPS	40	Vung Tau
NSRP	Olefin/Polyolefin ●	Propylene/PP	400	Thanh Hoa
Long Son Complex	Olefin/Polyolefin ●	PP/PE	1,500	Vung Tau
Hyosung	Olefin/Polyolefin ●	Propylene/PP	600	Vung Tau
PetroVietnam Fertilizer	Styrenics ●	PS		
	Olefin/Polyolefin ●	Propylene/PP	700	Vung Tau



- Petrochemical Plants closed to feedstock areas and demand centers, concentrated in the south.

More than 60%
Polymers Demand of
Vietnam

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.**

BUSINESS STRATEGY



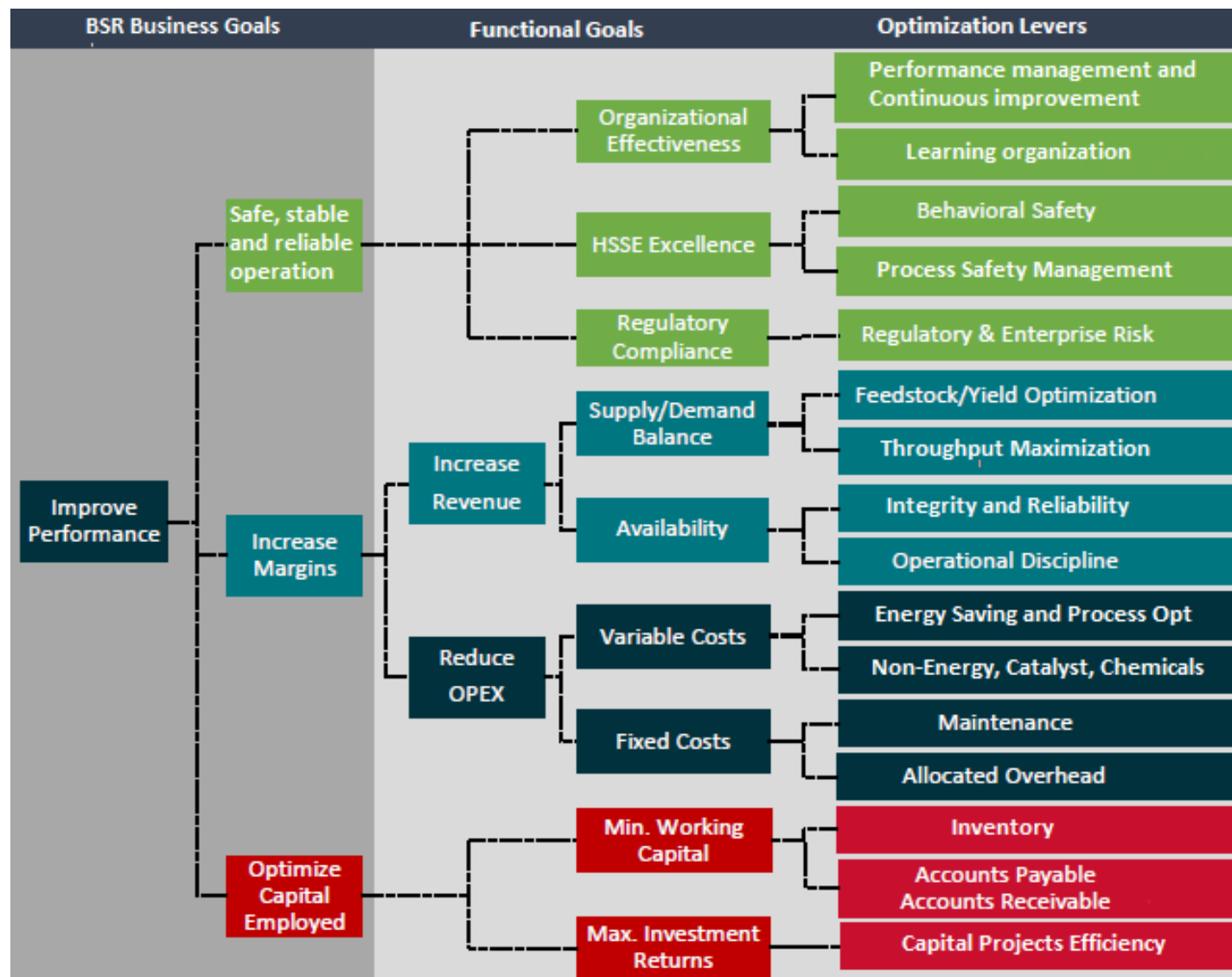
SHORT TERM

- 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.

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.

BSR's Human Resource Development and Management Strategy to meet the increasing demand and challenges



- 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.

No	Qualification	Employees
1	MA/MSC/Doctorate	168
2	Engineer/BSc... (university graduate)	729
3	College certificate (3 years after high school)	186
4	Technical School (2 years after high school)	127
5	Vocational technical school	333
Total manpower		1543

BSR'S SUSTAINABLE DEVELOPMENT STRATEGY

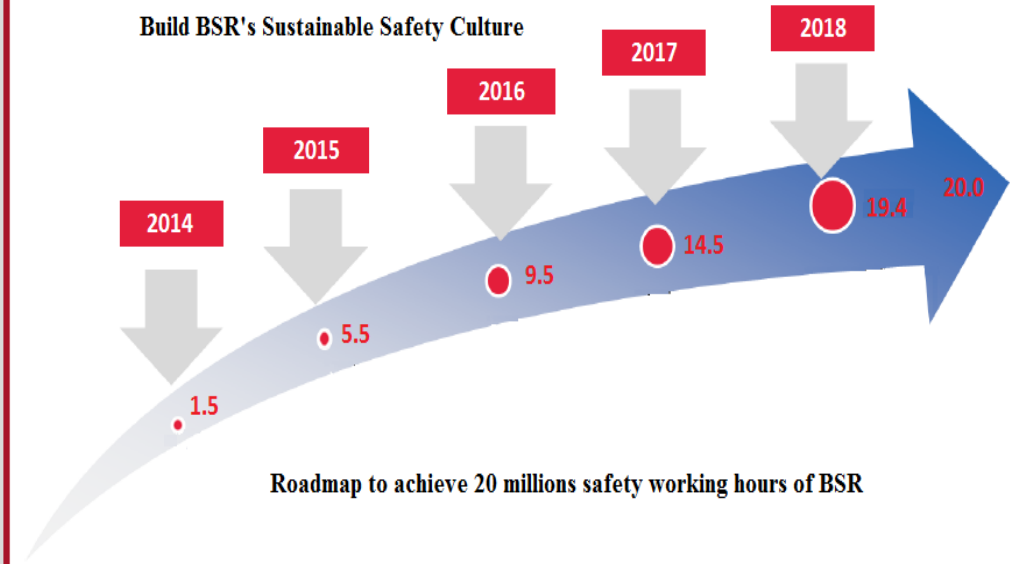


Strongly cooperating with licensors, vendors and other oil and gas companies around the world to implement the accelerated and intensive training programs and benchmarking for experience and best practices sharing.

No	Year	Number of trainees by JCCP	Number of trainees by JXTG	Training Programs by JCCP/JXTG- Main topics
1	2012	14	N/A	Refinery Management/LP Model, Energy Saving/ Planning & Production
2	2013	13	3	Advanced Technologies in a Transforming Energy Market
3	2014	6	5	Energy Saving/Gas Processing for LNG/ Advanced Process Control
4	2015	4	15	Equipment Materials and Corrosion, Reliability Welding Technologies
5	2016	12	10	Inspection and Reliability Evaluation/ Turnaround and Inspection
6	2017	4	10	Instrumentation and Control in Refinery/ Utilization of Information & DCS
7	2018	4	10	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
Total		57	53	



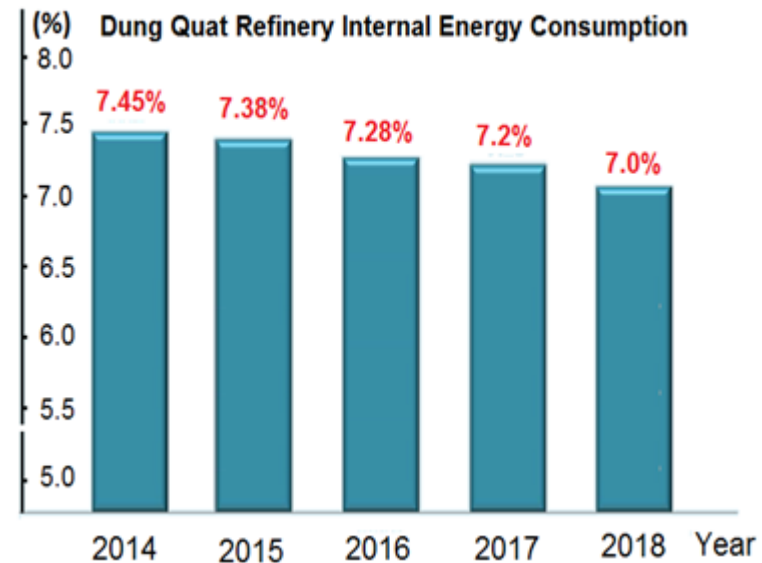
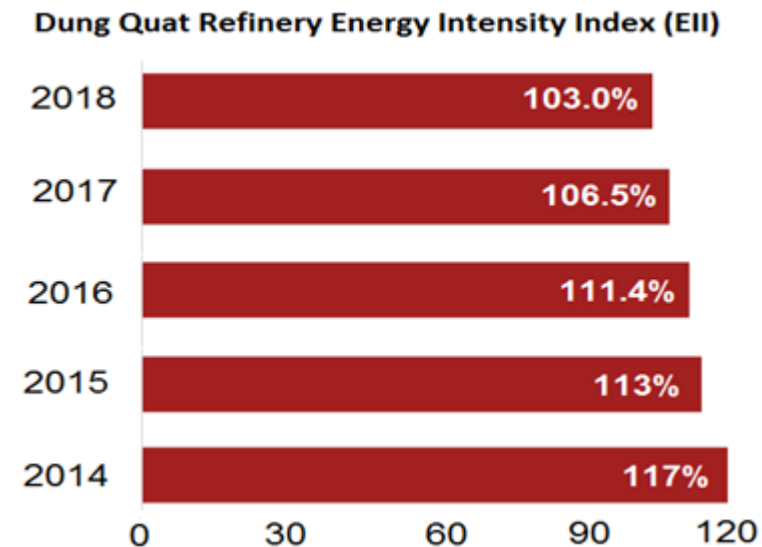
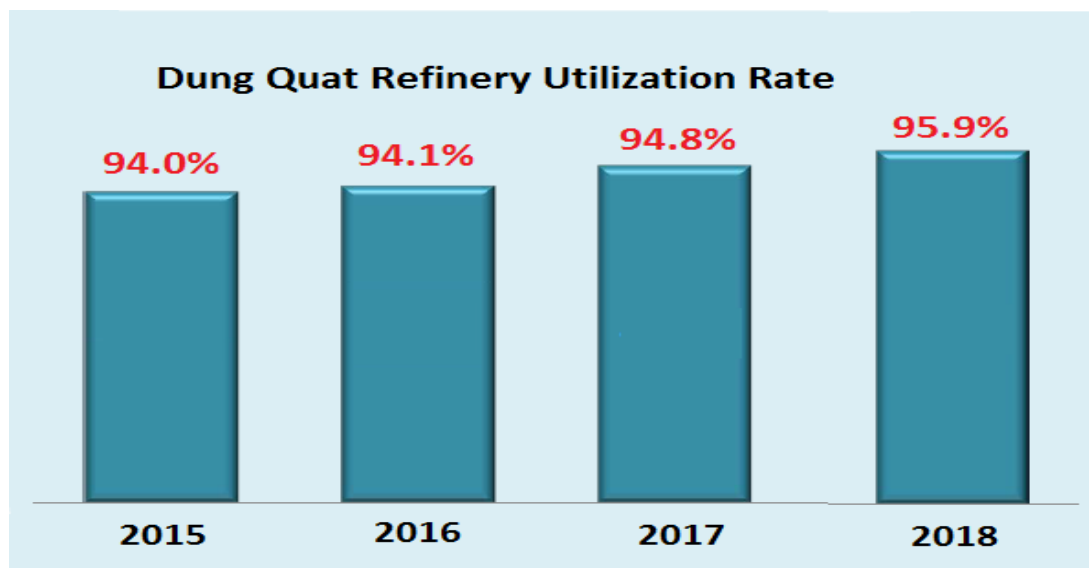
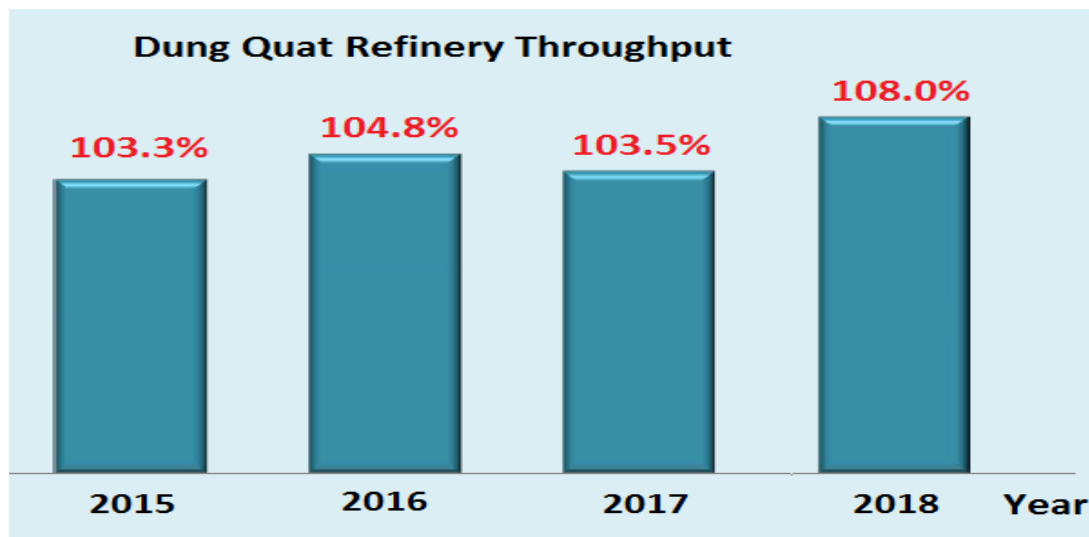
Improved BSR's Process Safety Management



BSR has achieved 645 day continuous run in 2014 and awarded Operation Excellence certificates by Licensors and Insurers.

- 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 operational performance in terms of energy saving, process optimization and utilization.



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.

- 21/07/2015, JCCP/JXNRI and BSR signed MOA to implement the project : “ Technical Operation for quality improvement of petroleum products in Vietnam”, the project started from 7/2015 – 7/2018 in Ha Noi.
- 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.

BSR's IPO SUCCESS

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).

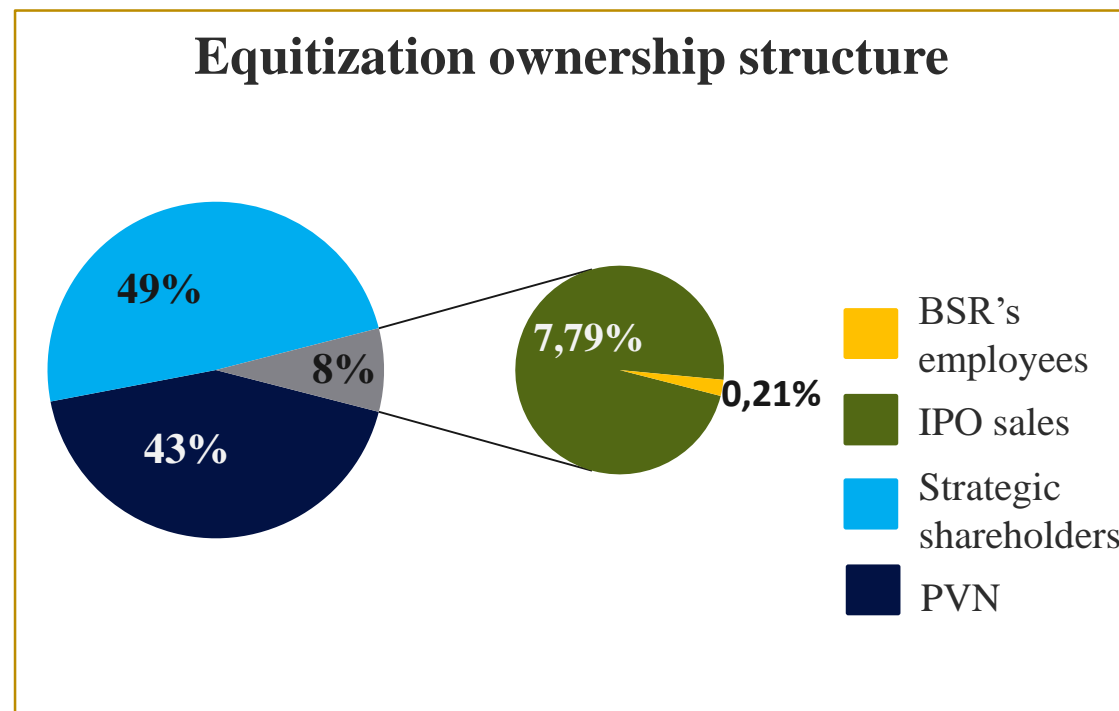
Since 1st June 2018, Binh Son Refining & Petrochemical Ltd started to become Joint Stock Company.

BSR's STRATEGIC SALES

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.

According to the Equitization Plan of BSR, the ownership structure of BSR after IPO and strategic sales as follows:



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.

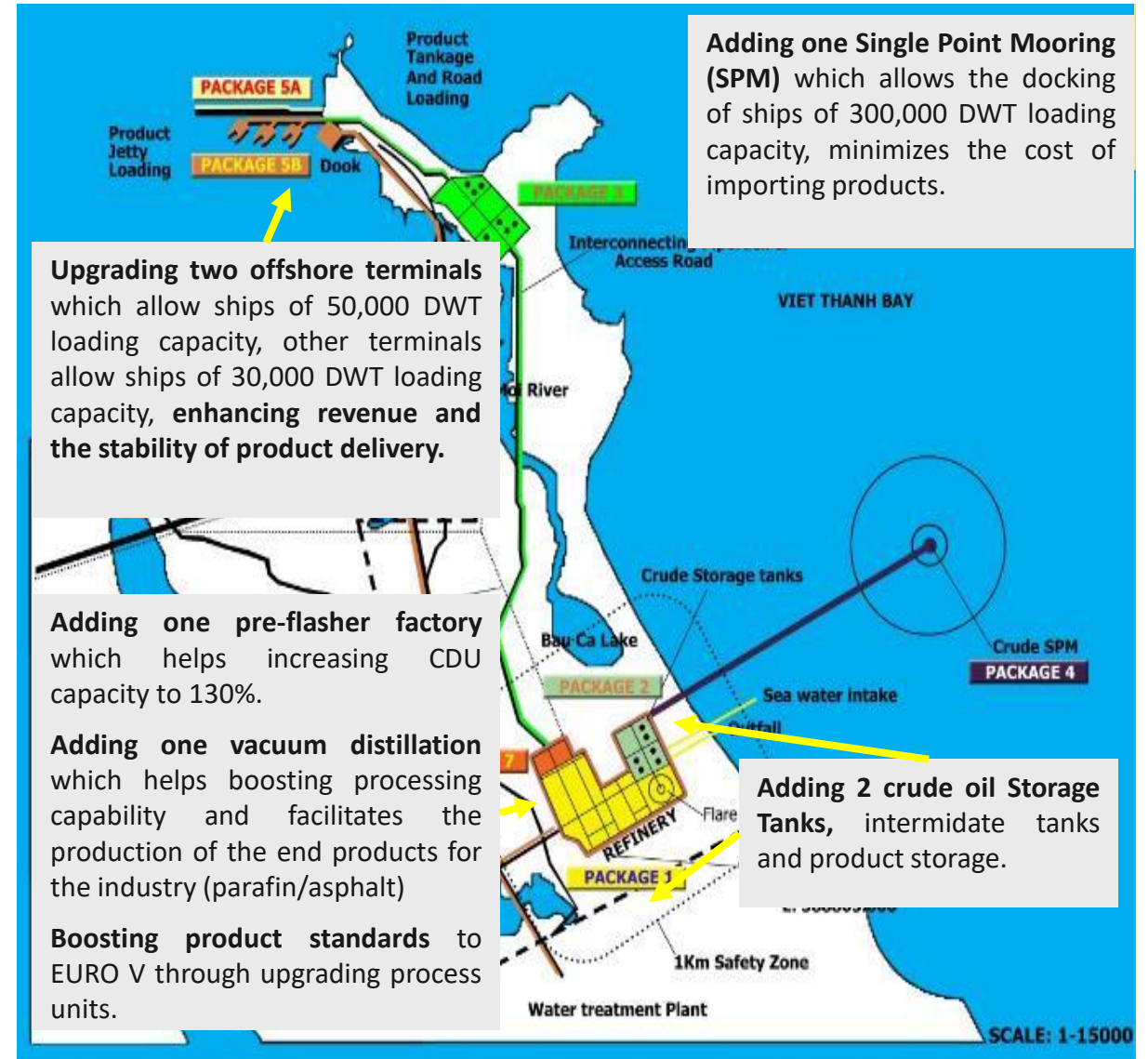
Crude mix: ESPO & Murban

Total investment: 1.8 billion USD

IRR = 10.24%, NPV > 0

Products:

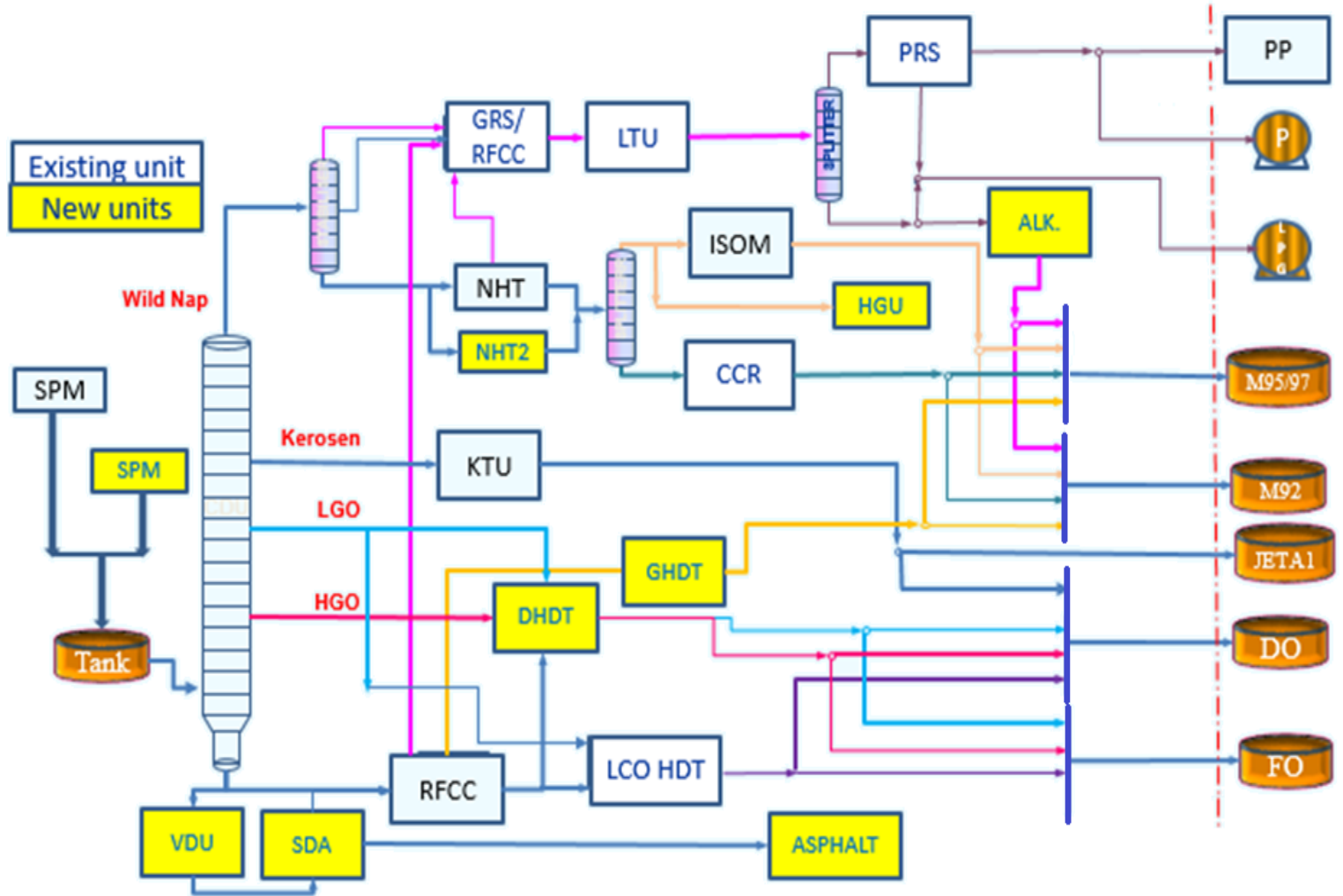
- A92, A95, A97 (high quality gasoline), DO, LPG, Polypropylen, Kerosene/Jet A1, FO, Asphalt, sulfur.



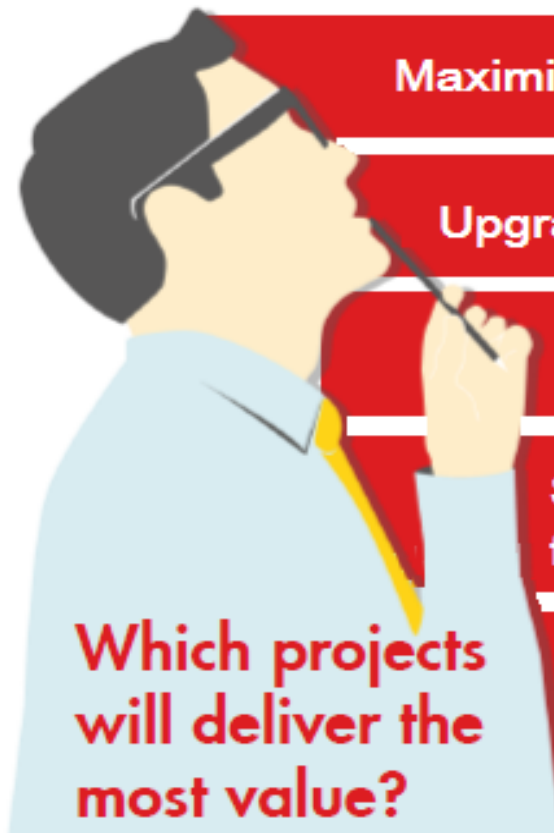
Project Status:

- 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

CONFIGURATION OF THE UPGRADED AND EXPANDED REFINERY



There are numerous **Refining - Petrochemical Integration** project options to BSR



Maximize propylene and olefins production from RFCC

Upgrade Reformate to BTX Aromatics & Derivatives

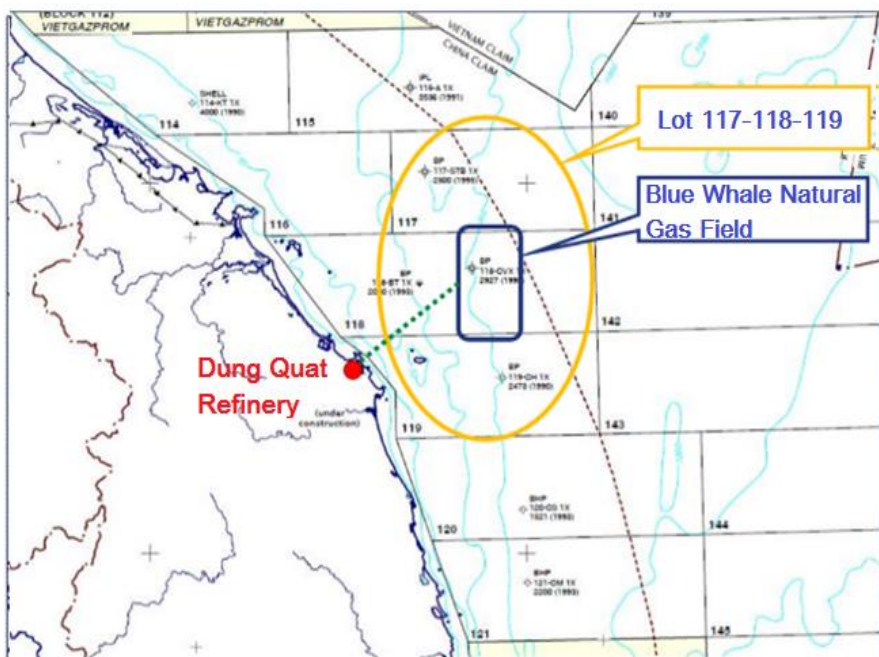
Integrate Blue Whale natural gas field for petrochemical

Steam/Naphtha Crackers with available flexible feedstocks to produce Olefins

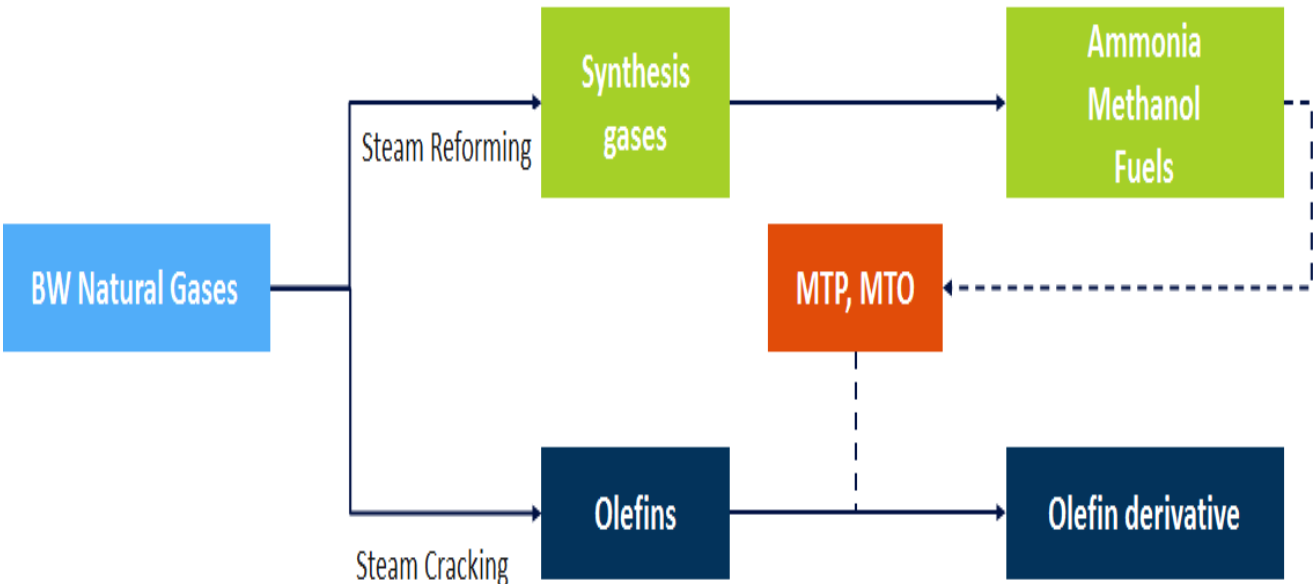
Integrate Crude Cracker for petrochemicals and chemicals



Which projects will deliver the most value?



BLUE WHALE NATURAL GAS FOR DUNG QUAT REFINERY



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!

