Financing Petrochemical Projects: 
*Key Issues Fuelling Future Growth & Bankability*

February 2016

Mizuho Bank, Ltd.
Global Project Finance Division

Mizuho Bank
Financing Petrochemical Projects: Key Issues Fuelling Future Growth & Bankability

Introduction to Mizuho

Mizuho Financial Group is one of the largest financial institutions in the world, offering a broad range of services.

GPFD is a global network of project finance professionals to serve our clients worldwide. In Singapore there are three dedicated sector teams:

- Natural Resources team is headed by Wijnand Van Eck, an experienced project finance banker in Oil and Gas, with a long-standing advisory experience on large-scale energy projects.
- Lim Suy Meng, the head of Power and Utilities has extensive experience in project finance in South East Asia over 20 years.
- Eza Mesra, the head of Infrastructure team strongly supports the project finance deal execution.

### Ratings 2014

<table>
<thead>
<tr>
<th></th>
<th>Moody’s</th>
<th>S&amp;P Long</th>
<th>Fitch Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mizuho Financial Group</td>
<td>-</td>
<td>A</td>
<td>A-</td>
</tr>
<tr>
<td>Mizuho Bank</td>
<td>A1</td>
<td>A+</td>
<td>A-</td>
</tr>
</tbody>
</table>

### BIS Capital Ratio (Basel 3) 2014/6

<table>
<thead>
<tr>
<th></th>
<th>Common Equity Tier 1 Capital Ratio</th>
<th>Tier 1 Capital Ratio</th>
<th>Total Capital Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mizuho Financial Group</td>
<td>9.20%</td>
<td>11.75%</td>
<td>14.86%</td>
</tr>
</tbody>
</table>
Financing Petrochemical Projects: Key Issues Fuelling Future Growth & Bankability

Global Petrochemical Trends: Ethylene – Better Than Expected Margins in 2015 but Some Headwinds Ahead

**Ethylene.** Most common chemical building block and one of the largest volume commodity produced

**Stronger than expected margins in 2015.** Ethylene-naphtha margins were better than expected due to the delayed start-ups of a few new plants (CTO/MTO in China), confluence of various cracker turnarounds in 2Q and better-than-expected demand growth (selectively for its derivatives). Using data from IHS/PLATTS, we estimate that incremental supply came in just above half of incremental demand, which effectively pushed up capacity utilization near 90% in 2015

**Possible margin pressure in the next 1-2 years with supply catch-up and demand risks.** Ongoing supply tightness should be relieved as we move into end 2016/2017 with a number of world-scale ethylene crackers coming on stream (Mexico, India, Iran, Saudi). Furthermore, with the demand uncertainty amongst key incremental consumers from non-Japan Asia (especially China), realized demand growth could fall towards 3.5-4% for 2016/2017E, versus the trend growth of 4-5% p.a.

Source: Datastream, IHS, PLATTS, Bloomberg, Company data, Mizuho estimates
Propylene. 2nd most important commodity chemical. Downstream: PP, ACN, PO and Cumene.

Soft margin due to ample capacity adds. Like ethylene, propylene is typically produced from naphtha plants. However, in the wake of the supply glut from the additions from on-purpose plants (OCU, PDH, etc.), propylene margins have slipped. As we can see above, margins was well below average in 2H2015.

Tightness to only come back in 2017/2018. As we are still in the midst of on-purpose propylene capacity expansion (particularly MTO, PDH in China), we are unlikely to see market tightness until 2017/2018. According to industry data and our analysis, we modelled for supply growth to peak during 2015 and 2016 at ~6.2 mn MT/year, which will then subside to ~3.2 mn MT/year from 2018E onwards vs demand growth of 4.0 mn MT/year from FY15E to FY17E. Thus, we will see the utilization rate gradually showing an uptick from its trough at 80.9% in 2016 (vs 82.7% in 2014) to 83%+ from 2018 onwards.

Source: DatastrDatastream, Bloomberg, Company data, Mizuho estimates
Financing Petrochemical Projects: Key Issues Fuelling Future Growth & Bankability

Indian Petrochemical Trends: Strong Underlying Potential Underpins Future Polyolefin Demand

- **India – Large population, large potential.** Petrochemical covers an all facets of an economy (from agriculture to infrastructure to consumer durables). While per capita consumption have reached saturation point in developed economics, India offers huge growth potential given the stage of its development cycle.

- **Polyolefin – main commodity resin in India.** Polyolefin accounts for ~75% of commodity resins’ apparent consumption in India. The low base effect, build-up of manufacturing bases (autos, clothing, etc.), increased urbanization (i.e. building of 100+ smart cities) and the large infrastructure projects planned underpins the ‘conservative’ medium term assumptions of a CAGR growth of 7% from 2015-2020E.

- **Capacity additions and net imports.** Taking into account new capacity (MRPL, OPAL, BPCL-Assam) and de-bottlenecking (RIL) planned in 2015-2017, net polyolefin imports (mostly ethylene derivatives) should reduce in the coming years. However, under a demand CAGR of ~7 CAGR (2015-2020), net polyolefin imports should increase towards the end of 2020.

Source: ICIS, Chemicals & Petrochemicals Manufacturers’ Association (India). Polyolefin include Polyethylene (LLDPE, LDPE, HDPE, EVA) and Polypropylene (PP)
Financing Petrochemical Projects: Key Issues Fuelling Future Growth & Bankability

Indian Petrochemical Trends: Import Balance of Main Polymers, Feedstock Pricing & Key Issues

- **Net import dependency of key polymers.** Breaking down the net polymer imports into India, we can see that, given strong demand growth (relative to downstream polymer capacity expansion), import dependency changes depending on domestic capacity growth trends (e.g. PVC does not see much capacity growth, implying rise in dependency rates). While LLDPE/HDPE net imports is expected to fall in 2015/2016E due to new capacity addition, this will rise again if strong demand is sustained as we move towards 2020.

- **Falling naphtha prices reduces advantage of domestic gas based crackers.** There are both naphtha (oil linked), gas based or dual-feed crackers in India. Given that wholesale petrochemical prices are based on import parity price (i.e. adjusting international prices for import tariffs, INR, Cess, etc.), the falling oil prices will erode the advantage of gas based crackers (assuming domestic gas availability is not an issue).

- **Key issues.** 1) Feedstock cost, availability & flexibility; 2) Coal-to-chemicals (given India’s resource), 3) Technology for plant yield improvement, 4) Infrastructure/Utilities, 5) Refinery maturity & efficiency.

Source: Bloomberg, Chemicals & Petrochemicals Manufacturers’ Association (India).
Financing Petrochemical Projects: Key Issues Fuelling Future Growth & Bankability

Export Credit Agency Participation in Petrochemical Projects

**Vietnam Refinery / Petrochemical Project (2013)**
- Project Cost: USD 9.0bn
- Total Debt: USD 5.0bn
- ECAs: JBIC, K-Exim, NEXI, Coface, ECGD, Hermes, SACE
  » Total amount of ECA direct / covered loans: USD 5.0bn (100.0%)

**Middle East Petrochemical Project (2013)**
- Project Cost: USD 19.1bn
- Total Debt: USD 12.4bn
  » Total amount of ECA direct / covered loans: USD 9.73bn (78.5%)

**Mexico Petrochemical Project (2012)**
- Project Cost: USD 4.7bn
- Total Debt: USD 3.2bn
- ECAs: IFC, IDB, EDC, BNDES, Bancomext, Nafinsa, SACE
  » Total amount of ECA direct / covered loans: USD 3.2bn (100.0%)

Source: Mizuho, PFI
Financing Petrochemical Projects: Key Issues Fuelling Future Growth & Bankability

Key Drivers for Petrochemical Projects

Robust Financing Plan
- Optimal debt finance arrangement
- Strong commitment on equity investment

Sponsor Support
- Completion support
- Contractual commitments in relation to feedstock, off take/marketing support, operations, etc.
- Operating “knowhow”

Commercial Structure
- Firm, long-term feedstock supply contracts
- Take-or-pay off take agreements with credible offtakers
- USD dollarized payments

Cost Competitiveness
- Competitive access to feedstock and infrastructure
- Optimal material balance and product mix to maximize value
- Outlined in more detail on the following slide

Local / State Support
- Tax exemption support
- Availability of skilled labor
- Supporting infrastructure

Source: Mizuho
### Financing Petrochemical Projects: Key Issues Fuelling Future Growth & Bankability

**Key Drivers for Petrochemical Projects – Cost Competitiveness**

<table>
<thead>
<tr>
<th></th>
<th>1. Project Size</th>
<th>• Project of significant size to provide economies of scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Upstream Integration</td>
<td>• Integrated refining and petrochemical complexes offer operational efficiencies in a competitive environment</td>
</tr>
<tr>
<td></td>
<td>3. Operating Knowhow &amp; Technology Selection</td>
<td>• Accurate read of future market demand and ability to perform at high levels of operating efficiency</td>
</tr>
<tr>
<td></td>
<td>4. Competitive Feedstock</td>
<td>• Global competitiveness of exports dependent on naphtha/oil price fluctuations</td>
</tr>
<tr>
<td></td>
<td>5. Ancillary Infrastructure &amp; Labour</td>
<td>• Availability of transportation, utilities and skilled labour</td>
</tr>
<tr>
<td></td>
<td>6. Strategic Product Selection</td>
<td>• Individual Project performance will be dependent on the product mix and configuration of the plant</td>
</tr>
</tbody>
</table>

**Source:** Mizuho

---

**Project’s Cost Competitiveness**
Financing Petrochemical Projects: Key Issues Fuelling Future Growth & Bankability

Petrochemical Projects Bankability: Key Considerations (from International Lender’s Perspective)

1. Supply & Offtake Structure
   - Lenders will require sufficient sales volumes to be secured through long term offtake agreements with reliable and credible offtakers
   - Long term feedstock supply agreement with stipulated supply quantity. Duration of feedstock supply must be longer than loan tenor
   - Sponsors to consider availability of alternative feedstock

2. EPC Contract
   - The EPC contract should be awarded to highly experienced and reputable company with strong track record
   - EPC should be on a lump-sum, fixed price and date certain basis, and with single point responsibility
   - Project can also consider appointing a management contractor to coordinate the works to ensure that the construction is carried out in accordance with the agreed specifications, schedule and within the agreed lump sum price. Timely completion of interfacing infrastructure will also be key (incl. power facilities, supply/export routes via pipelines /rail/roads/port)

3. Shareholder Support
   - Completion Support: undertaking to contribute funds for cost overrun and make up shortfall in debt service during time overrun period.
   - Marketing Support: in the case where offtake credit is not fully acceptable and/or the volumes under the offtake agreements do not fully met the required debt capacity payments, shareholders may need to step in

Source: Mizuho
## Financing Petrochemical Projects: Key Issues Fuelling Future Growth & Bankability

### Petrochemical Projects Bankability: Key Project Risks and Mitigants

<table>
<thead>
<tr>
<th>Category</th>
<th>Risk</th>
<th>Mitigant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Financial Close</strong></td>
<td><em>Increase in CAPEX</em></td>
<td>• Early Works Agreement, LSTK contracts</td>
</tr>
<tr>
<td></td>
<td><em>Delay to financing schedule</em></td>
<td>• Early start of technical and commercial “Invitation to Bid”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Early approach to ECAs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Over funding strategy</td>
</tr>
<tr>
<td>Environmental &amp; Social</td>
<td></td>
<td>• Early start of EIA in line with international bank / ECA requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(if international financing is envisaged)</td>
</tr>
<tr>
<td><strong>Pre-Completion</strong></td>
<td><em>Construction delay</em></td>
<td>• Strong Sponsors Project Management Team and robust LSTK contracts</td>
</tr>
<tr>
<td></td>
<td><em>Delay in start up</em></td>
<td>• Completion guarantee or DSU to mitigate against lender interference</td>
</tr>
<tr>
<td></td>
<td><em>Cost overrun</em></td>
<td>• USD denominated EPC contracts</td>
</tr>
<tr>
<td>Foreign exchange</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Post-Completion</strong></td>
<td><em>Operational (technology, feedstock supply)</em></td>
<td>• Utilisation of proven technology at the envisaged scale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Secure robust and strong supply agreements</td>
</tr>
<tr>
<td></td>
<td><em>Market</em></td>
<td>• Value-added products, take-or-pay obligation by creditworthy offtakers</td>
</tr>
<tr>
<td></td>
<td><em>Financing (foreign exchange, interest rates)</em></td>
<td>• Optimum utilisation of dollarized nature of operations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Movements in interest rates follow movements in commodities</td>
</tr>
<tr>
<td>Environmental &amp; Social</td>
<td></td>
<td>• Post Closing monitoring reports</td>
</tr>
</tbody>
</table>

*Source: Mizuho*
Importance of Working Capital

- A comprehensive understanding of working capital needs in conjunction with the development of appropriate working capital arrangements is very important for Petrochemical projects.

- A careful analysis is typically required on the time difference between the lifting and actual payment due dates of crude (shortening of period for payment from offtakers has a beneficial effect on the working capital requirement).

- Due to the margin volatility, the Project’s working capital requirements could increase or decrease significantly over time, therefore, it is also be important to accommodate for a change in working capital requirement during the operation phase.

- Working capital could be funded by either a revolving working capital facility or by a term loan (funding the initial working capital requirement as a part of Total Project Cost).

Source: Mizuho
## Financing Sources

<table>
<thead>
<tr>
<th>Financing Sources</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Export Credit Agencies</td>
<td>• Maximise ECA involvement to tap additional liquidity and optimize the overall financing plan</td>
</tr>
<tr>
<td>2. Indian Local Funding Sources</td>
<td>• Optimise funding from local sources to achieve competitive debt finance terms and an efficient and timely financial close</td>
</tr>
<tr>
<td>3. International Commercial Tranche</td>
<td>• Optimise funding from international commercial lenders to maximise tenor, achieve better loan pricing, and optimize Sponsors’ return on investment</td>
</tr>
<tr>
<td>4. Debt Capital Markets</td>
<td>• Subject to market conditions, debt capital markets could be considered as an alternative funding source</td>
</tr>
<tr>
<td>5. Senior Shareholder Loans</td>
<td>• Consider senior shareholder loans to compliment the funding plan or to bridge project finance / debt capital markets, if required</td>
</tr>
</tbody>
</table>

Source: Mizuho
Key Drivers for Bankability

- Strategic importance
- Experienced Sponsors who pro-actively drive the project
- Cost competitiveness (cash cost – feedstock, OPEX; capital cost; meeting competition from Middle East suppliers)
- Demand / offtake arrangements (domestic market demand; export; competitive feedstock supply)
- Robust contract structure

» Financing with USD will significantly help funding the Project (in terms of pricing and tenor)
» If the Project is funded with USD then Sponsors should engage early with international commercial banks and ECAs to ensure early buy-in and support
Disclaimer

- This document has been prepared solely for discussion purposes and does not constitute an offer, a solicitation, an invitation or a recommendation to enter into any transaction. This document is provided without any commitment on the part of Mizuho Bank, Ltd. and any of its affiliates (collectively, “Mizuho”) to provide any financing, advice or services for this proposed project/transaction (“Project”), and is not meant to be, nor shall it be construed as an attempt to define all the terms and conditions of the Project. Instead it is intended to outline certain basic points of business understanding around which a transaction could be structured. Since any terms quoted are indicative, they are subject to change at any time without notice. Although the information herein has been obtained from sources believed to be reliable, Mizuho does not warrant its accuracy, completeness or fairness. The final terms and conditions of the Project are subject to, inter alia, satisfactory due diligence checks (without limitation, satisfactory searches), internal credit approvals and completion of satisfactory documentation. Nothing herein creates a legal relationship between Mizuho and any of the persons referred to herein or any other person and Mizuho shall have no liability to any person whatsoever in connection with this document.

- You should obtain independent professional, legal, financial, tax or other advice, as appropriate. Mizuho, its head office, branches, subsidiaries and affiliates accept no liability whatsoever for any direct or indirect loss or damage of any kind arising out of the use of all or any part of this Document.

- This document may not be reproduced, distributed, transmitted, displayed, published or broadcasted in whole or in part, nor may any of its contents be disclosed to third parties, without prior written consent of Mizuho.
Thank You