Integrated Project for Development of NH3 fuel Ship with Fuel Supply Chain

ITOCHU Corporation
Marine Department
1. **Introduction**

Founded: 1858 (incorporated 1949) as of Apr 1, 2020  
Number of employees: 4,319  
Number of offices: 94 (oversea) & 9 (domestic)  
Website: [http://www.itochu.co.jp](http://www.itochu.co.jp)

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<table>
<thead>
<tr>
<th>Company</th>
<th>Business Activity</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Machinery Company              | - Ship Trading / Finance  
|                                | - Ship Owning  
| Textile Company                | - Investment of LNGC & Off-shore unit  
| Metals & Minerals Company      | - Internal partnership for NH3 fuel value chain        |
| Energy & Chemicals Company     |                                                         |                                            |
| ITOCHU ENEX Co., Ltd.         |                                                         |                                            |
| Food Company                   |                                                         |                                            |
| General Products & Realty Company |                                         |                                            |
| ICT & Financial Business Company |                                         |                                            |
| The 8th Company                |                                                         |                                            |

**Marine Department**
2. Integrated Project

Joint Development for Pilot Project
- Joint Development of Pilot Project with ammonia fuel
- Joint Development of Ship design with ammonia fuel engine
- Ship type to be determined based on potential partners

<table>
<thead>
<tr>
<th>Company</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imabari</td>
<td>Development of ships equipped with Ammonia-fueled Engine</td>
</tr>
<tr>
<td>MAN</td>
<td>Development of an Ammonia-fueled Engine</td>
</tr>
<tr>
<td>Mitsui E&amp;S Machinery</td>
<td>Support for MAN's development &amp; Supply of Ammonia-fueled Engine</td>
</tr>
<tr>
<td>ClassNK</td>
<td>Safety assessment with developing guidelines</td>
</tr>
<tr>
<td>ITOCHU ENEX</td>
<td>Setting up an ammonia fuel distribution network</td>
</tr>
<tr>
<td>ITOCHU</td>
<td>Materialization of the integrated project(s) with potential partners</td>
</tr>
</tbody>
</table>

Additional partner(s) for “Pilot Project” to be required for development:-
- Shipper & Shipping Company
- Ammonia Producer
- Industrial partner(s) related to Fuel Supply Chain
3. Integrated Project with partnership

- **Shipbuilding**
  - ClassNK
  - Imabari
  - Engine Supply
  - Mitsui E&S
  - MAN

- **Fuel Supply**
  - ITOCHU
    - Partnership
    - Producer

- **End-User**
  - Shipping Co

- **Charter**
  - ITOCHU
    - Partnership
    - Shipping Co
  - Bunkering (Japan)
    - ITOCHU
      - ENEX
        - Local Partner
        - Shipping Co
  - Bunkering (Singapore)
    - ITOCHU
      - ENEX
        - Local Partner
        - VOPAK
        - Shipping Co

- **Bunkering (Other)**
  - ITOCHU
    - Local Partner
    - Shipping Co

- **Local Partner**
  - ENEX
  - Shipping Co

- **NTU**
  - ABS
  - ASTI
4. Establishment of NIHON SHIPYARD

Name : NIHON SHIPYARD CO., LTD.
Business : Design & Sales of all commercial ships (except LNGC)
Office : Tokyo / Yokohama / Marugame / Imabari
Share ratio : 51% Imabari / 49% JMU
Opening : January 2021

After Jan 2021, marketing for newbuilding with NH3 fuel shall be made under the name of NSY, but based on actual construction of ship at shipyard under Imabari group or JMU group at their option.

It means that work flow of NH3 fuel ship after 2021 to be as follows :

- NSY
  - Sales Marketing
  - Product development
  - Basic Design
  - Functional Design

- JMU
  - Production Design
  - Procurement
  - Construction

- Imabari
  - Production Design
  - Procurement
  - Construction
## 5. Target for Pilot Project

<table>
<thead>
<tr>
<th>Item</th>
<th>Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept</td>
<td>■ Dual Fuel (NH3 &amp; LSFO)</td>
</tr>
<tr>
<td>Ship Type</td>
<td>■ To be determined after discussion with potential shippers among :-</td>
</tr>
<tr>
<td></td>
<td>• Bulk Carrier (Cape and/or Kamsarmax type)</td>
</tr>
<tr>
<td></td>
<td>• Tanker (VLCC and/or MR)</td>
</tr>
<tr>
<td>Number</td>
<td>■ 10 units in total (for arrangement of supply chain)</td>
</tr>
<tr>
<td>Delivery</td>
<td>■ 2025 – 2026 for 10 units (but subject to Rules below)</td>
</tr>
<tr>
<td>NH3 Bunkering</td>
<td>■ Limited Bunkering Ports for NH3 fuel such as :-</td>
</tr>
<tr>
<td></td>
<td>• Singapore</td>
</tr>
<tr>
<td></td>
<td>• Japan</td>
</tr>
<tr>
<td></td>
<td>• Others</td>
</tr>
<tr>
<td>Rules</td>
<td>■ Alternative Design Approval under SOLAS to be considered</td>
</tr>
</tbody>
</table>

**Key Factor is “COST & RULES”, which require :**

- ■ Support from Shippers
- ■ Establishment of rules & regulation for ship design & bunkering
- ■ Economical Incentive for Shippers & Ship owners
6. Idea of Global NH3 Bunkering Network

Basic Concept
- Local Partner with existing NH3 facility
- Maximum Utilization of existing NH3 facility
- Singapore & Japan as first target

Europe / Middle East / USA
- Under discussion with potential partners
- Bunkering at Production site (or nearby)
- Ship-to-Ship or Shore-to-Ship

Japan
- Local Partner with existing NH3 facility
- Ship-to-Ship concept
- Demand of NH3 fuel for Power Plant

Singapore
- Local Partner with existing NH3 facility
- Ship-to-Ship concept
- Joint study with NTU / ABS / ASTI

Malaysia
- Under discussion with potential partners
# 7. Target for NH3 Procurement

<table>
<thead>
<tr>
<th>Item</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH3 specification</td>
<td>- Current specification (but subject to further study)</td>
</tr>
<tr>
<td>NET CO2 Emission</td>
<td>- NET CO2 Emission to be less 1-CO2-ton against production of 1-NH3-ton&lt;br&gt;- Producer’s Statement how to achieve such level to be required&lt;br&gt;- Expecting “Certificate of Blue NH3” at later stage</td>
</tr>
<tr>
<td>Terms</td>
<td>- Multiple years basis with INDEX link</td>
</tr>
<tr>
<td>Price INDEX</td>
<td>- Price INDEX as NH3 fuel to be introduced</td>
</tr>
</tbody>
</table>

Commercial Terms for NH3 fuel to be discussed through development of Pilot Project for 10 units, which might be benchmark for next projects.
8. Key for decarbonisation

**International**

- Safety Rules (Ship)
- Emission Control (EEDI / EEXI / CII)
  - Long Term Plan including rules & regulations for Newbuilding / Existing ships
- Linkage with Country’s Responsibility
  - Compliance with the IMO global regulations
  - Reliable and objective standards supported by survey and certification as to ship performance
- Incentive
  - End-User & Ship-owner from IMRF
- Carbon Levy
  - To be required if no “Incentive”

**Local**

- Safety Rules (Bunkering)
- Incentive (End-User)
- Incentive (Ship-owner)
- Carbon Levy

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“COST & REGURATION” is KEY for decarbonisation
THANKS