# Technological Innovation and Infrastructure in the LNG Industry

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International Organizers

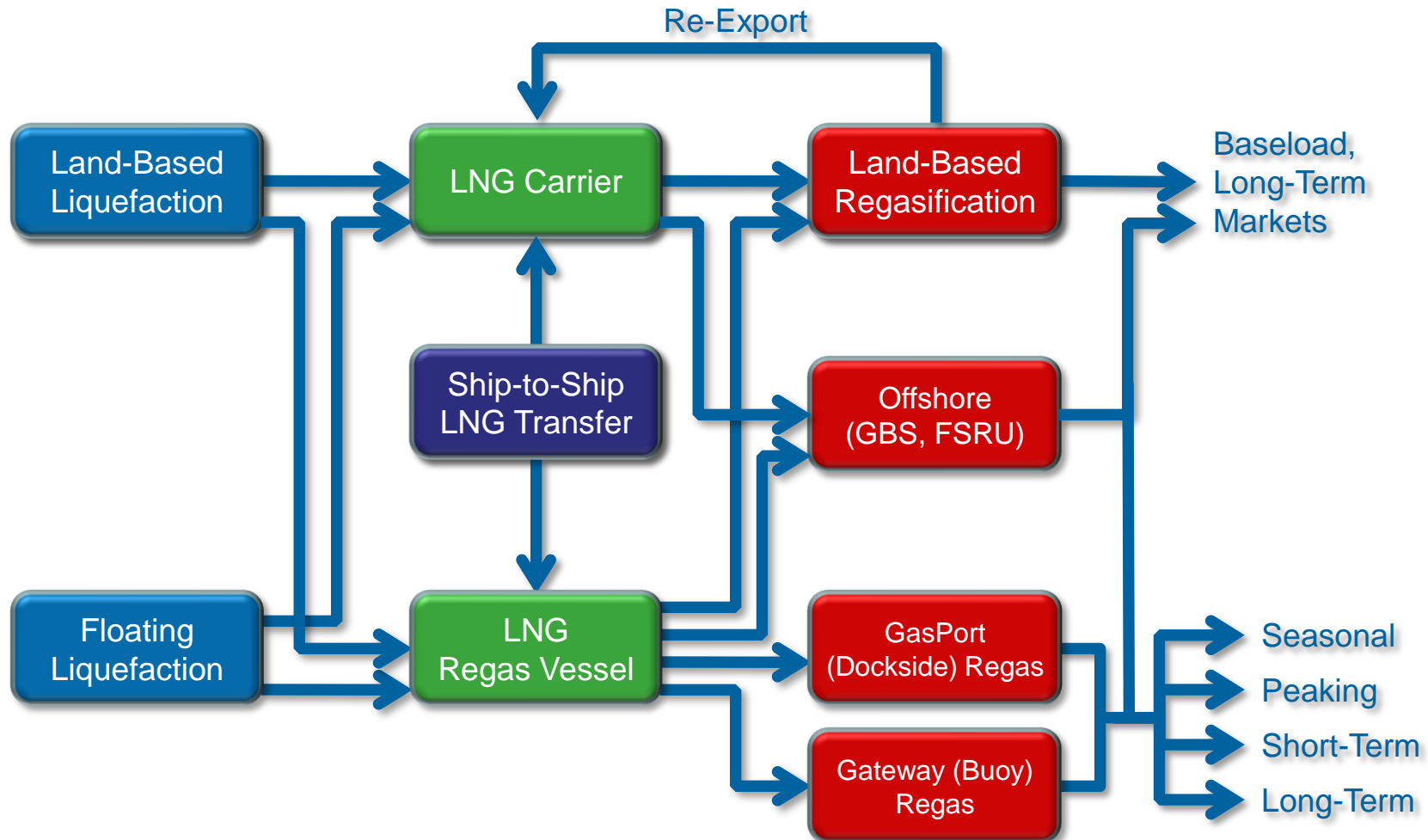IGU
INTERNATIONAL GAS UNION
UNION INTERNATIONALE DU GAZ

gti®

iif
iir

Host Association

AGA
American Gas Association

# Industry Change

# Technological Advances

- Floating LNG is seeing advances in:
  - Regas vessel flexibility and performance
  - Regas terminal configurations
  - Cargo transfer solutions
  - Distributed / smaller load servicing
  - Offshore LNG production
- All of these help to more efficiently meet market demands and open new markets

# Vessel Flexibility and Performance

- Flexibility
  - Ability to operate as FSRU or LNGC
  - Combination with land-based infrastructure
  - Operability in a multitude of environments
- Performance
  - Regas range from <100 to >1,200 mmcfd
  - Storage capacity of 265,000 $m^3$
  - Increased uptime and reliability

# Terminal Configurations

- Fast-track solutions in varying situations

- Key success factors
  - Reduced design time
  - Quick realization of long lead items
  - Rapid identification of key project risks

**Single Vessel**   **Side-by-Side**   **Tandem/Across-Dock**   **Sea Island**   **Offshore Buoy**

# Cargo Transfer Solutions



**STS - Summary as of: 03/18/13**

| Operation | Count | Total (CuM) |
|---|---|---|
| **Open Water** | 11 | 1,114,033.303 |
| Gas In / Cool Down | 3 | 25,571.850 |
| **In Port** | | |
| Double Banking | 212 | 20,339,431.641 |
| Tandem - Along Dock | 114 | 15,269,762.853 |
| Across Dock | 29 | 2,245,888.355 |
| **Total** | **369** | **38,994,688.002** |

| Operator | Count | Total (CuM) |
|---|---|---|
| EE Vessels | 62 | 6,230,192.83 |
| 3rd Party Vessels | 307 | 32,764,495.18 |
| **Total** | **369** | **38,994,688.002** |

Ship-to-ship LNG transfer has become an accepted solution

# Distributed / Small Loads

- Opening up smaller markets
  - STS from LNGC to small scale LNG carriers/barges
  - Small vessels deliver LNG to land-based satellite facilities in constrained areas
  - Land-based facilities provide storage and access to gas grid and/or power plants

# Offshore LNG Production



FLSO™ - Floating Liquefaction Storage & Offloading Vessel

Lavaca Bay LNG Project
Point Comfort, Texas
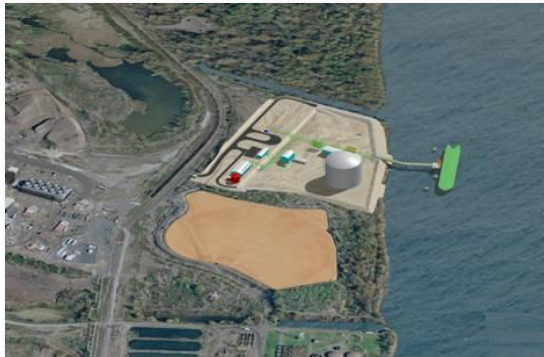
# Offshore LNG Production

**Completed** FEED Results:
Cost:  <$600/tpa of production
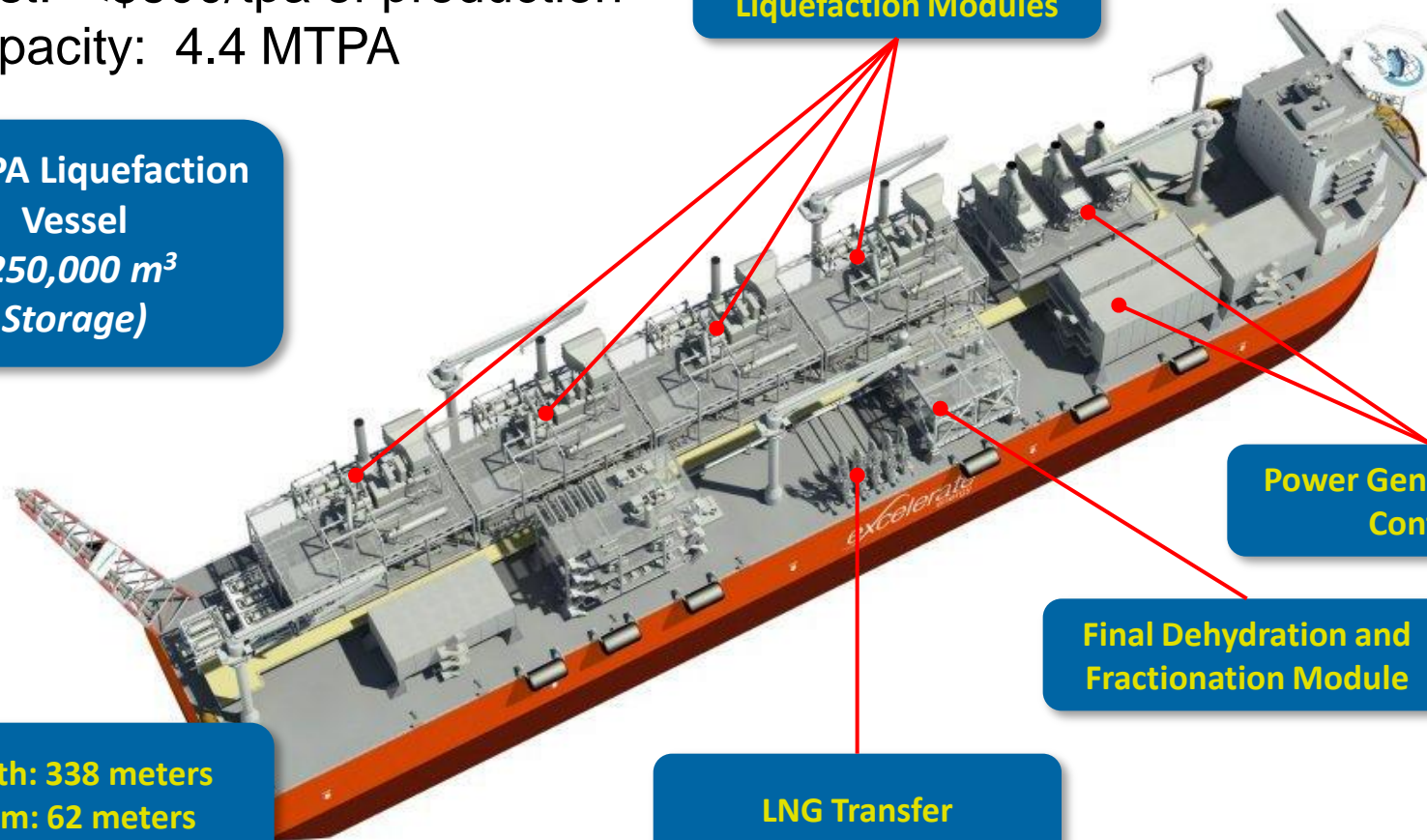Capacity:  4.4 MTPA

**4 x 1 MTPA Liquefaction Modules**

**4 MTPA Liquefaction Vessel**
*(250,000 m³ Storage)*

**Power Generation and Controls**

**Final Dehydration and Fractionation Module**

**LNG Transfer**

**Length: 338 meters**
**Beam: 62 meters**

# What's Next?

- Excelerate's goal is to recognize a full floating value chain – from production to consumption



**Liquefaction** → **Transport** → **STS Transfer** → **Regasification**

- Many other opportunities for efficiency and optimization exist in the industry - the trick is to <u>recognize</u> them and <u>act</u>