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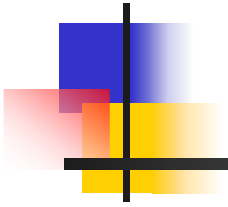
Towards Solution for the Problems in the East Asian Gas Market



—East Asia Natural Gas Workshop—

January 20, 2005

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Presentation Topics

- The problems
- Need for and Future Possibility of Natural Gas Cooperation in East Asia (Outline)
- Effects of Spot Market Expansion
- Exploitation of Cargo Swaps and Its Effects
- Changes in LNG-Pricing Formulas and Their Effects
- Possibility and Impact of Natural Gas Pipeline Development in East Asia
- Changes and Problems in the East Asian Gas Market

The Problems

- **Supply Inflexibility**
  - **Limited numbers of players**
  - **Long term contract with Take or Pay Clause**
  - **Destination limitation, etc.**
- **Price competitiveness**
  - **Higher LNG prices in Asia**

Need for and Future Potential of Natural Gas Cooperation in East Asia (1)

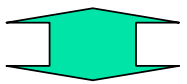
- **Factors Supporting Basic Understanding toward Natural Gas Cooperation**
  - **Natural gas's growing share in primary energy supply (natural gas's growing role)**
  - **Increasing natural gas imports (importance of gas supply security)**
  - **Structural changes in world LNG flow (globalization, diversification, increasing flexibility)**
  - **Power and gas market liberalization and its impact**

Need for and Future Possibility of Natural Gas Cooperation in East Asia (2)

- **Possible Areas for Cooperation and Partnerships**
  - **Inter-government cooperation (bilateral or multilateral)**
    - **Developing and deepening common understanding and setting up a framework for dialogue**
    - **Discussions on how to set up market rules**
    - **Supporting private sector cooperation**
  - **Partnerships in the private sector (in terms of real business operations)**
    - **LNG swap and other supply adjustment**
    - **Cooperation in LNG transportation (exploiting surplus tanker capacity)**
    - **Joint participation in various segments of the LNG chain**

Need for and Future Possibility of Natural Gas Cooperation in East Asia (3)

- **Constraints on and Impediments to Promotion of Cooperation**
  - **Differences in necessity of and seriousness about cooperation, emerging from gaps between national conditions (⇒Difficulties in implementation of specific programs)**
  - **Existence and realities of international "competition"**
  - **Existing political disputes in East Asia**
  - **Economic efficiency of cooperation projects**



Lessons learned from European experiences

⇒Importance of "political will"

⇒Significance of institutional setting

Effects of Spot Market Expansion (1)

- In 2002, spot LNG transactions increased by 6.4% from the previous year to 11.44 BCM, accounting for 7.8% of total LNG transactions.
- Of spot LNG transactions, 30% are made in North America, 53% in Europe and 18% in Asia (some 90% of spot LNG transactions in Asia are for South Korea).
- Factors behind increasing spot transactions:
  - Need for adjusting demand-supply imbalances
  - Market liberalization prompting buyers to seek flexibility in procurement
  - Existing surpluses on the supply side
  - Response to emergency

World LNG Spot Trading (1992-2002)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total	1.05	1.59	2.34	3.27	2.33	1.64	2.12	4.72	7.58	10.75	11.44
Importer											
Belgium	-	0.23	0.08	0.15	-	-	-	-	-	0.15	0.27
France	-	-	-	0.87	0.23	-	-	0.08	0.08	0.53	1.17
Italy	0.53	0.26	0.2		-	-	0.12	0.54	0.48	0.38	0.28
Portugal	-	-	-	-	-	-	-	-	0.08	-	-
Spain	-	0.27	0.94	1.05	0.98	0.99	0.83	1.69	1.43	2.29	4.16
Turkey	-	-	-	0.23	0.08	-	0.58	0.3	-	-	-
Total Europe	0.53	0.76	1.22	2.3	1.29	0.99	1.53	2.61	2.07	3.26	5.88
U.S.	-	-	-	-	0.23	0.3	0.53	1.66	3.73	3.24	3.42
Puerto Rico											0.05
Total North	-	-	-	-	0.23	0.3	0.53	1.66	3.73	3.24	3.47
Japan	0.38	0.39	0.08	0.08	0.15	0.28	-	0.15	0.32	2.23	0.32
South Korea	0.15	0.45	1.05	0.9	0.68	-	0.08	0.31	1.47	1.87	1.79
Taiwan	-	-	-	-	-	-	-	-	-	0.08	-
Total Asia	0.53	0.84	1.13	0.98	0.83	0.28	0.08	0.46	1.79	4.15	2.11
Spot share in total LNG trading	1.3	1.9	2.7	3.5	2.3	1.5	1.9	3.9	5.5	7.8	7.8

Effects of Spot Market Expansion (2)

- Spot LNG transactions have been increasing. But traditional LNG transactions are still the mainstream.
- In Asia, spot transactions are still limited (to 2% of total LNG transactions).
- Background Factors:
  - Contractual constraints including take-or-pay and destination clauses
  - Limited number of players in the supply side (Market Power)
  - Small surpluses of LNG tanker capacity
  - Lack of infrastructure and institutions to support flexible gas transactions (difference from the U.S. market)

Effects of Spot Market Expansion (3)

- Conditions for Future Expansion of Spot Transactions
  - Expansion and diversification of market players
  - Buyers' pursuit of increased flexibility (competitive conditions)
  - Shipment changes including increases in LNG carriers and FOB contracts
  - Relaxation of contractual constraints (destination clause)

⇒Spot transactions are expanding. The pace of expansion depends on progress in conditions cited above.

- Impact of Spot Transaction Expansion
  - Increased liquidity of LNG markets
  - LNG's increased competitiveness ⇒ Possible demand expansion
  - New players and development of new business models
  - Possible emergence of gas-to-gas competition
  - Increased linkage with other LNG markets (including the U.S.)

Exploitation of Cargo Swaps and Its Effects (1)

- **LNG Cargo Swap**

  "Cargo swaps between different term LNG contracts"

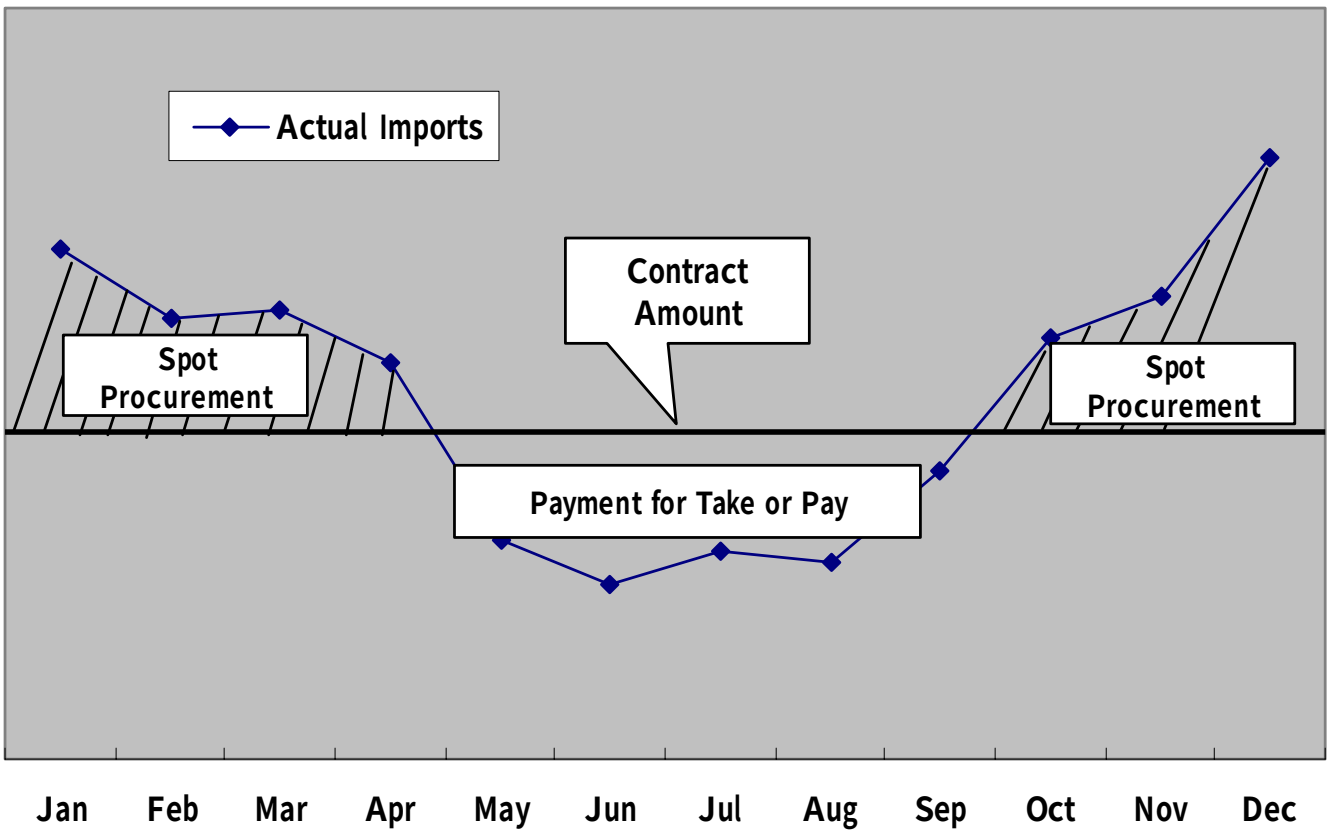
- **Cargo Swaps Divided into Two Categories**
  - **Swaps for demand/supply adjustment (swaps between seasons)**
  - **Swaps for shortening transportation distances**

Exploitation of Cargo Swaps and Its Effects (2)

- **Swaps for Demand/Supply Adjustment**
  - **Outline: LNG buyers (and sellers) with different demand patterns swap cargoes in cooperation toward adjusting seasonal demand-supply imbalances.**
  - **Examples:**
    - **(A)Chubu Electric Power and CPC, (B)Tohoku Electric Power and KOGAS, (C)Chubu Electric Power and KOGAS, etc.**
  - **Advantages:**
    - **Avoiding costs for unnecessary cargoes (buyers with demand less than contracted lifting volume)**
    - **Avoiding procurement costs for additional cargoes (buyers with demand larger than contracted lifting volume)**
    - **LNG storage tank savings to reduce costs**

⇒Great potential for cost reductions exist.

Conceptual Image of "The Opportunity Costs"



An Estimate for Cost Reduction

- Potential opportunity cost savings through seasonal swaps can be estimated at US$ 615 million (some JP¥ 68 billion) for South Korea under various assumption.

- (Facts and Assumptions)
  - South Korea's annual average spot purchases totaled 1.25 million tons between 2000 and 2003.
  - It is assumed that all those spot purchases can be swaps. South Korea is thus presumed to receive that quantity from other buyers in demand seasons (January-February and November-December) and deliver the same quantity back to them in a non-demand season (March-October).
  - South Korea is presumed to pay cargoes that it cannot receive in a non-demand season.
  - The average import price during a demand season for the 2000-2003 period (US$ 247.3 per ton) and an average during a non-demand season (US$ 245.1 per ton) are applied for the estimation.

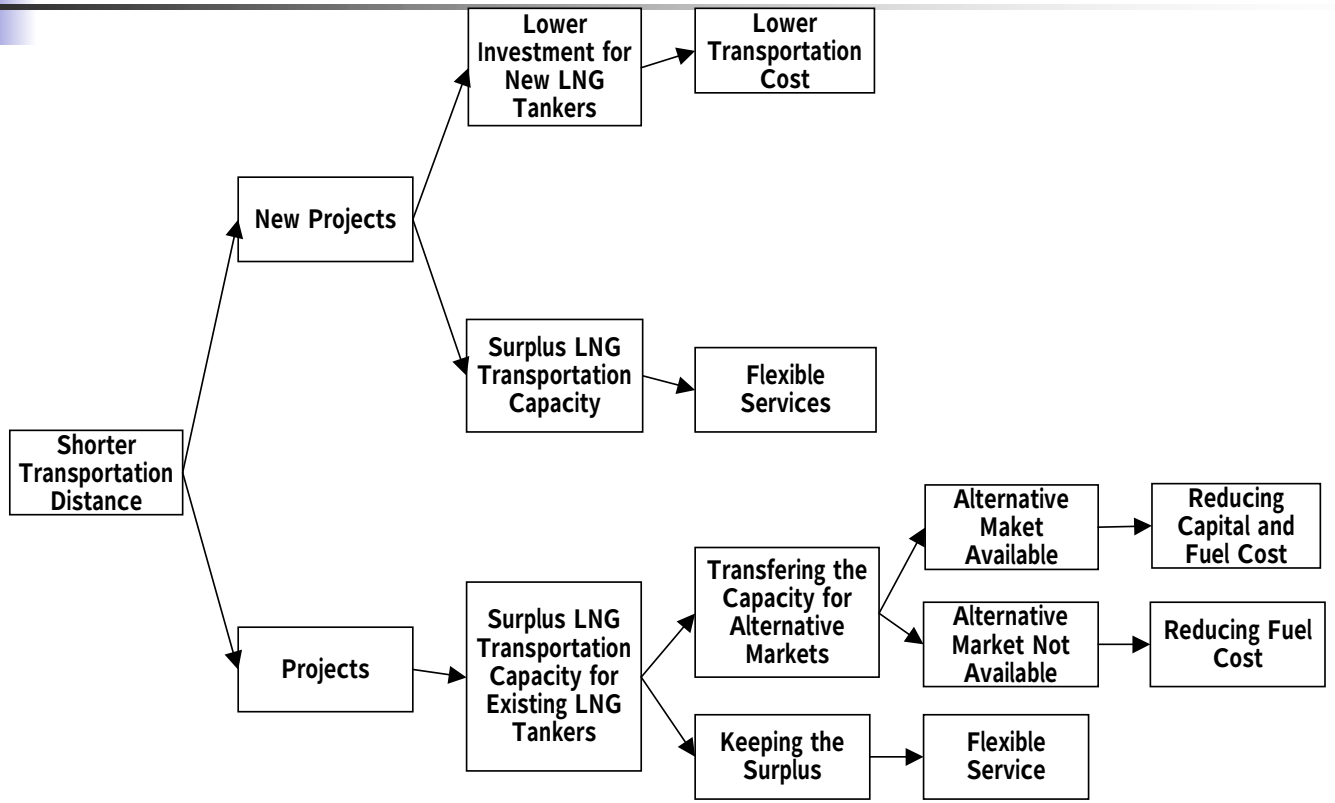
Exploitation of Cargo Swaps and Its Effects (3)

- **Swaps for Shortening Transportation Distances**
  - **Outline: Swaps between cargoes for different destinations under different contracts to shorten transportation distances**
  - **Examples:**
    - **Examples are seen in the Atlantic market, but not in the Asian market. (Atlantic market example: Swap between ①Algeria →U.S. and ② Trinidad and Tobago →Spain)**
  - **Advantages:**
    - **Shortening transportation distances to reduce costs (transportation costs)**
    - **Making effective use of surplus LNG tanker capacity for existing projects**
    - **Potential investment savings (cost savings) for new LNG projects**

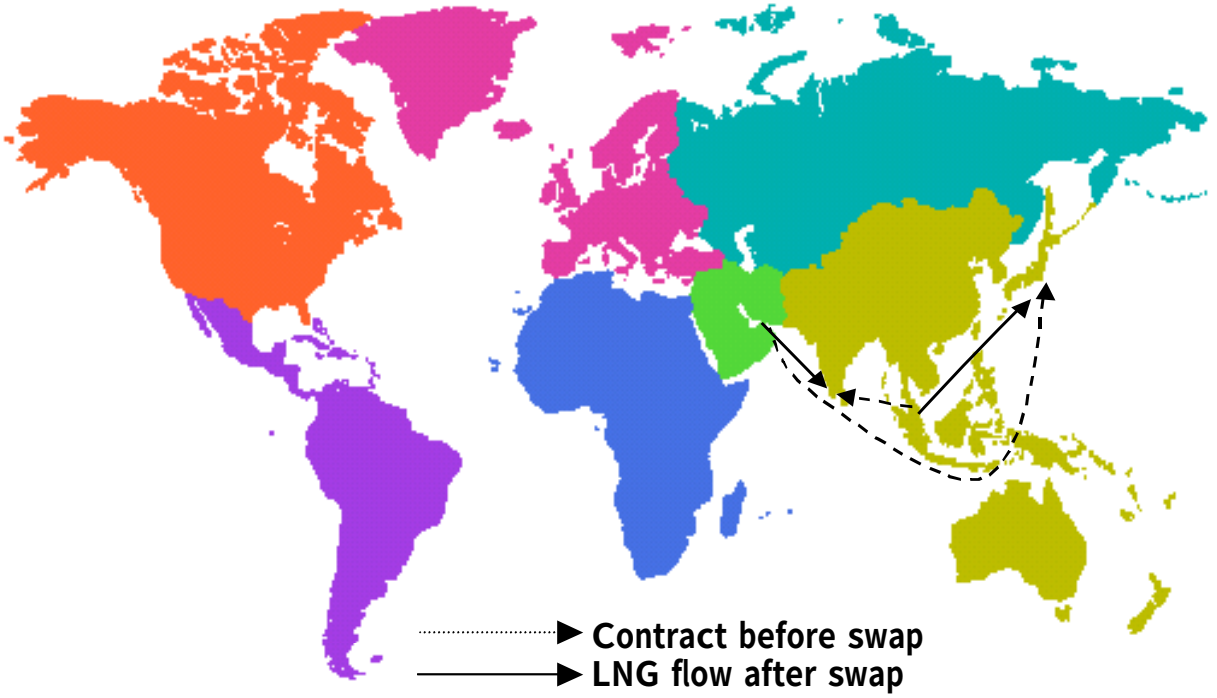
⇒Great potential for cost savings exists (In the Atlantic market case cited above, a cost reduction of some ¥3 billion is estimated for a deal for 1 million tons a year).

⇒In the Asian market, cargo swap potential will rise on the emergence of new flow points including India and Sakhalin.

Benefits from Shortening of Transportation Distances

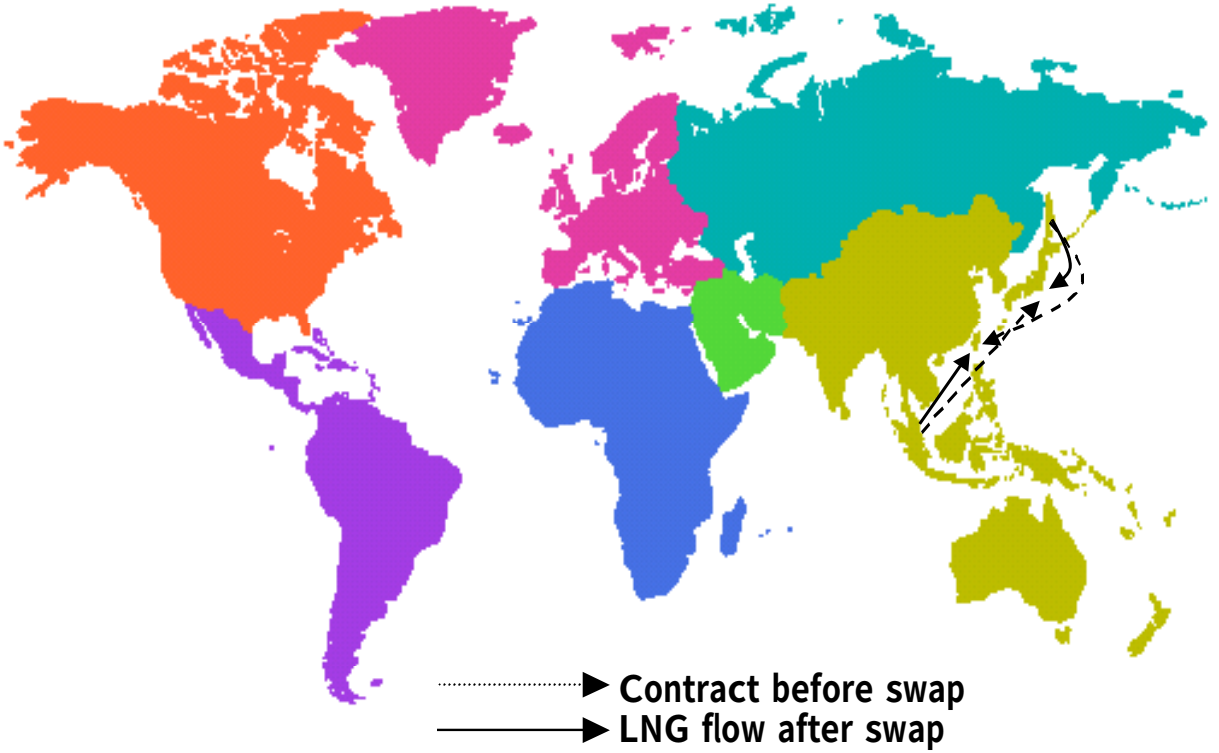


Swap Case 1 (Middle East, Japan, Southeast Asia, India)



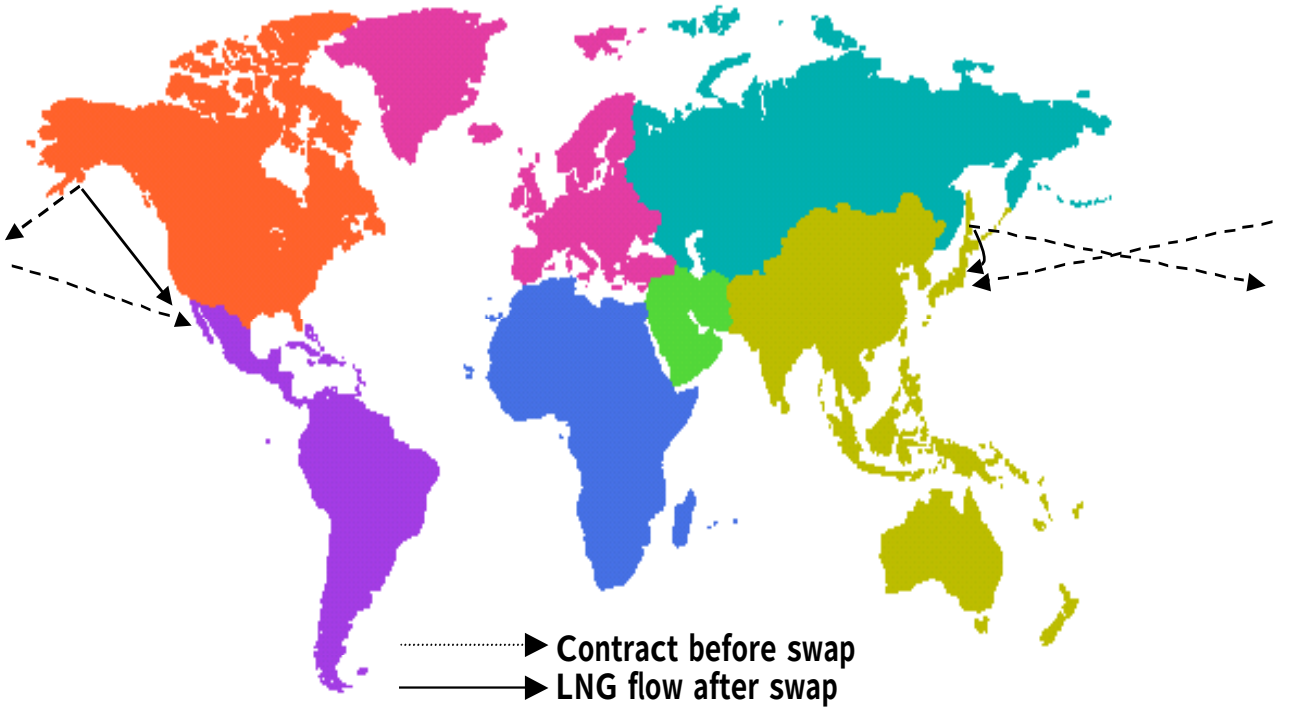
The number of necessary LNG tankers declines to some 42% of the pre-swap level

Swap Case 2 (Sakhalin, Japan, Southeast Asia, Taiwan)



The number of necessary LNG tankers declines to some 63% of the pre-swap level

Swap Case 3 (Sakhalin, Japan, Alaska, North American West Coast)



The number of necessary LNG tankers declines to some 50 % of the pre-swap level

Moves to Change Present LNG-Pricing Formulas (1)

- The LNG-pricing formula for Japan has shifted from:
  - the fixed-price formula to;
  - the link to GSP and to:
  - the JCC link.
- Present Basic JCC-Linked Pricing Formula
  - P = a X + b + s
    - P: LNG price for a month
    - a: Fixed factor
    - X: JCC for a certain period of time
    - b: Fixed factor
    - s: s curve factor
- South Korean, Taiwanese and other existing Asian LNG contracts have adopted the JCC-linked formula.

Moves to Change Present LNG-Pricing Formulas (2)

- The contract for China (Guangdong) reportedly features a sharp discount while adopting the JCC-linked pricing formula.
  - At the JCC level of $20, the price is reported at $3.1/MMBTU (a 20% discount).
  - The JCC-linkage factor is reportedly limited.
- The contract for India Petronet project reportedly adopts combination of the JCC link and the ceiling and floor price formula
  - The ex-ship LNG price fluctuates in a $2.03-3.04/MMBTU range.
- Existing buyers are required to pursue competitive prices and respond to diversified needs.
- In response to the developments as cited above, existing buyers in East Asia are reviewing pricing and delivery conditions (the above precedents are seen as “benchmarks”).
  - New projects
  - Existing projects for renewal of contracts (NWS, Arun, Badak, etc.)

Moves to Change Present LNG-Pricing Formulas (3)

- **Toward Future LNG Pricing Formula**
  - **Reduction of price levels**
  - **Looking for new pricing formulas**
    - Formula reducing link to crude prices
    - Fixed price
    - Adopting non-crude benchmarks (coal, power, petroleum products, etc.)
    - Formula linked to the U.S. market (NYMEX futures prices)
    - Combination of flexible-price and fixed-price portion, etc.
- **Background factors**
  - **Liberalization of power and gas markets**
    ⇒ Intensification of competition (seeking competitive price) and diversification of users' needs
  - **Response to volatility (sharp rise) of crude prices**
  - **Response to structural demand/supply changes in world LNG markets**

⇒Moves are likely to be activated to review pricing conditions.

Possibility and Impact of Natural Gas Pipeline Development in East Asia (1)

- Plans to construct international, long-range pipelines are under consideration in East Asia
  - Sakhalin 1
  - Kovykta and other projects
- Reasons for their limited progress (constraints on future development)
  - Priority has been given to LNG supply and relevant infrastructure development.
  - Huge investment is required for pipeline construction.
  - Impact of falling LNG supply costs on economic efficiency.
  - Impact of power and gas market liberalization on demand security.
  - Political risks and lack of mutual confidence between East Asian countries.

Possibility and Impact of Natural Gas Pipeline Development in East Asia (2)

- **Impact and advantages of progress in international pipeline construction on resolution of above-cited problems:**
  - **New supply sources meeting large long-term growth in gas demand in East Asia**
  - **Supply security through diversification of supply forms and sources**
  - **Promotion of gas-to-gas competition and its downward pressure on supply costs**
  - **Supply cost reductions stimulating demand (growing role of gas)**
  - **Enhanced linkage between East Asian gas (energy) markets**
  - **Enhanced political and economic relations between East Asian countries**
- **Key factors for pipeline development:**
  - **Enhancement of competitiveness through project cost reductions**
  - **Coordination between relevant countries and companies, and establishment of "political will"**
  - **Changes in the natural gas demand-supply balance**

Prospects for Future Structural Changes in the East Asian Gas Market

- **Process of Future Changes (Transitional Changes)**
  - **Through around 2010**
    - (A)Expansion of swaps for demand/supply adjustment
    - (B)Expansion of swaps for shortening transportation distances and of spot and short-term transactions
    - Securing supply surpluses through start-up of new LNG projects
    - Continued buyers' market
    - Enhanced cooperation between LNG buyers (including their governments) in easing destination clauses and sharing information
  - **From 2010 to 2020**
    - Substantial expansion in gas demand will be sustained.
    - Sufficient LNG supply capacity will continue to exist basically.
    - The supply-demand balance may change depending on U.S. and Chinese situation.
    - Construction of long-range international pipelines may become more feasible as a means to secure long-term supply surpluses.
    - Gas-consuming countries will have to enhance their partnerships to realize pipeline construction.
    - Pipeline development may contribute to secure supply surpluses and trigger competition between pipeline gas and LNG, promoting structural LNG market changes.
    - Spot deals' share of LNG transactions will rise (may become close to the present European level).

Future Changes and Problems in the East Asian Gas Market

- Buyers' pursuit of flexibility and competitive prices, and intensified gas-to-gas competition factor
- Increasing liquidity of gas markets (commoditization of gas)
- Lowered gas (LNG) prices (in average)+ greater price volatility
- The supply side will have to enhance price competitiveness, respond to requests for greater supply flexibility, secure sales outlets and meet price risks.
- The gas market will expand further through structural market changes (including enhanced price competitiveness and greater flexibility).
- In order to further develop the East Asian gas market, relevant governments and companies (particularly, on the buyer side) will have to strengthen partnerships and cooperation.

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