

Best Practice for Innovation

# JX Nippon Oil & Energy's Challenges for Best Practice

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Deputy General Manager  
Negishi Refinery



The Future of Energy, Resources and Materials

**JX Nippon Oil & Energy Corporation**

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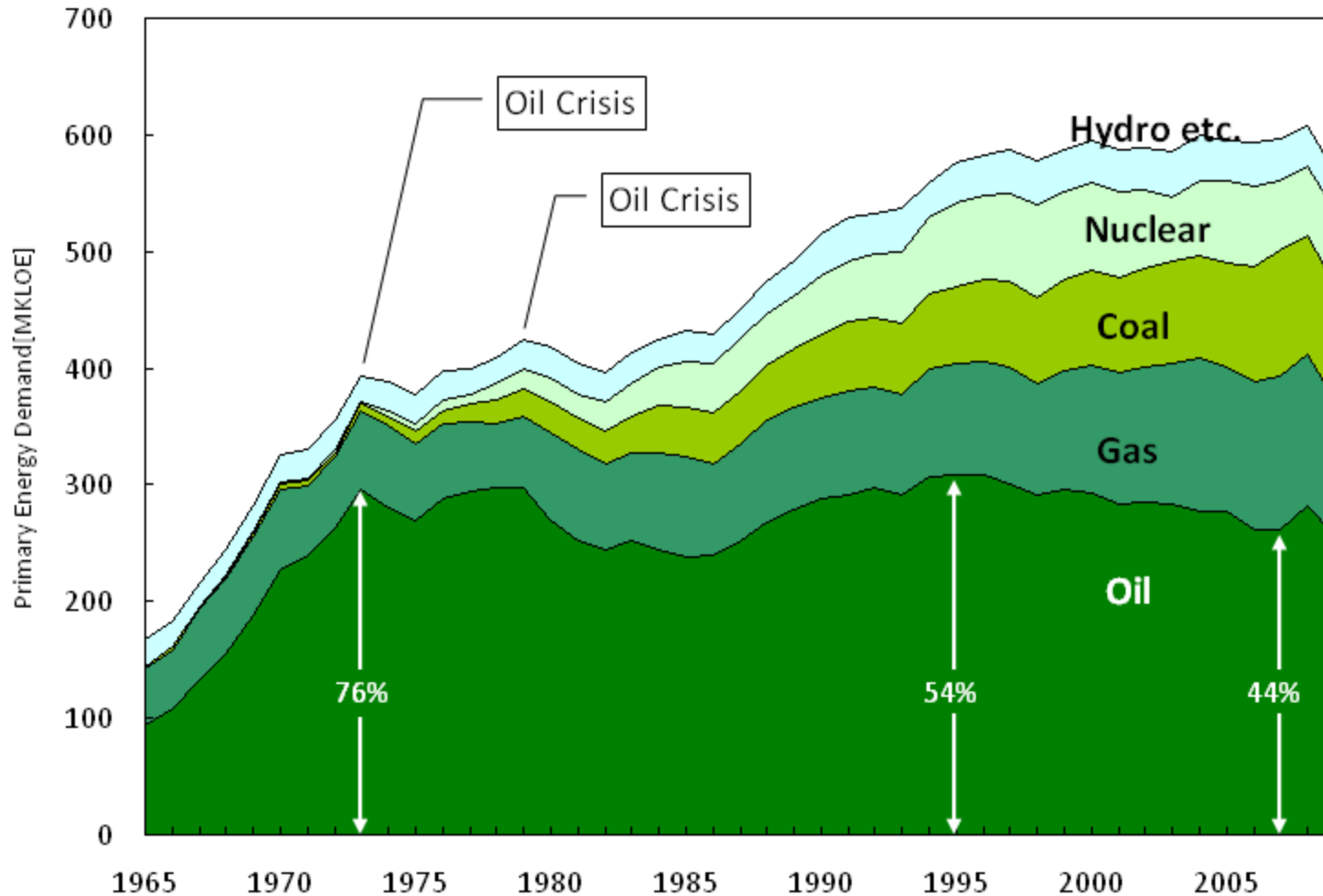
- Oil Supply & Demand Trends in Japan
- JX Nippon Oil & Energy's Challenges - I
  - Business Integration
  - Distillation Capacity Reduction
  - The capacity and the feature of each refinery
    - Features of Negishi Refinery
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  - Best Practice Activities & Cross-Functional Team
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      - (Aroma-operation WG、Maintenance WG)
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# Oil Supply & Demand Trends in Japan

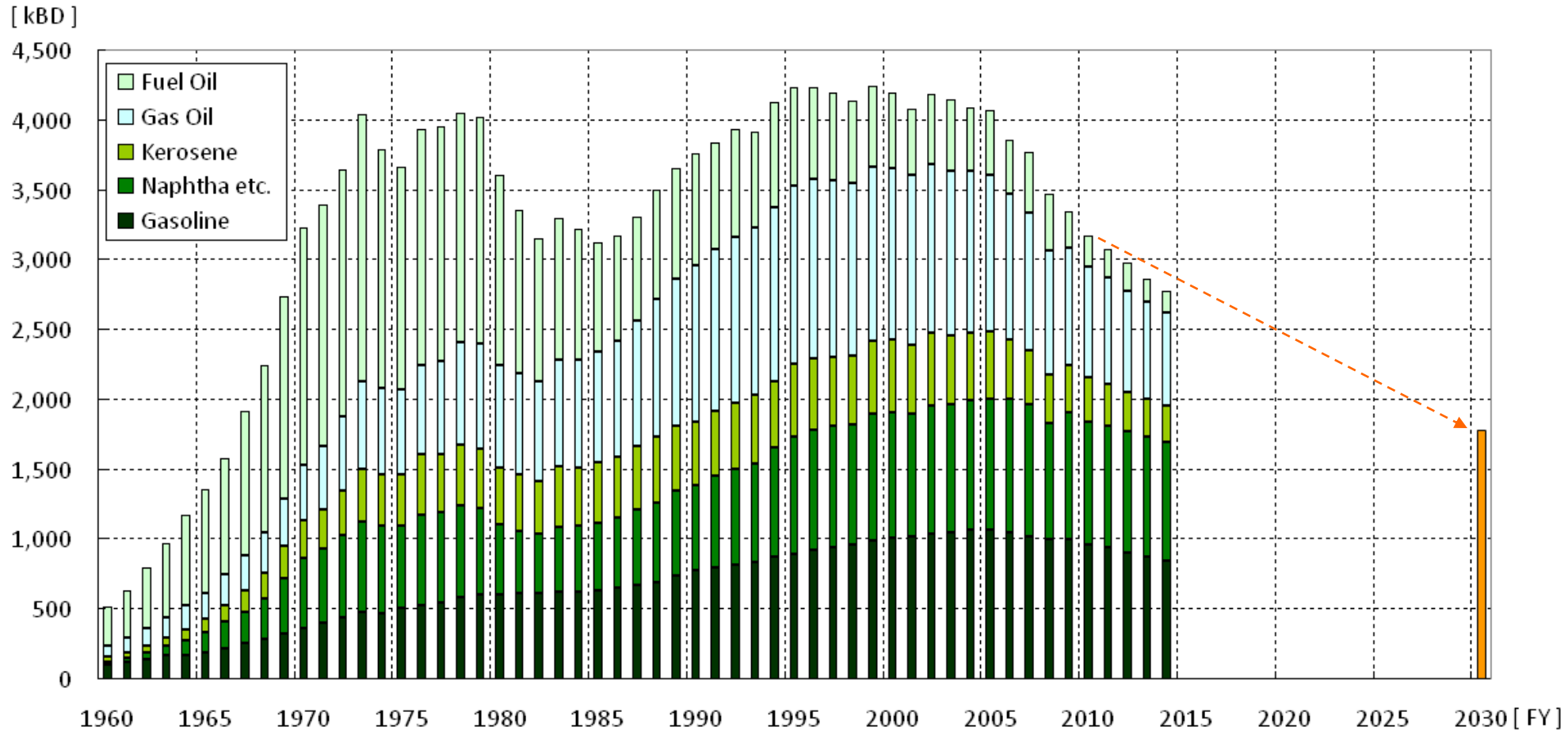
- Primary Energy Demand in Japan



Source : Ministry of Economy, Trade and Industry.

# Oil Supply & Demand Trends in Japan

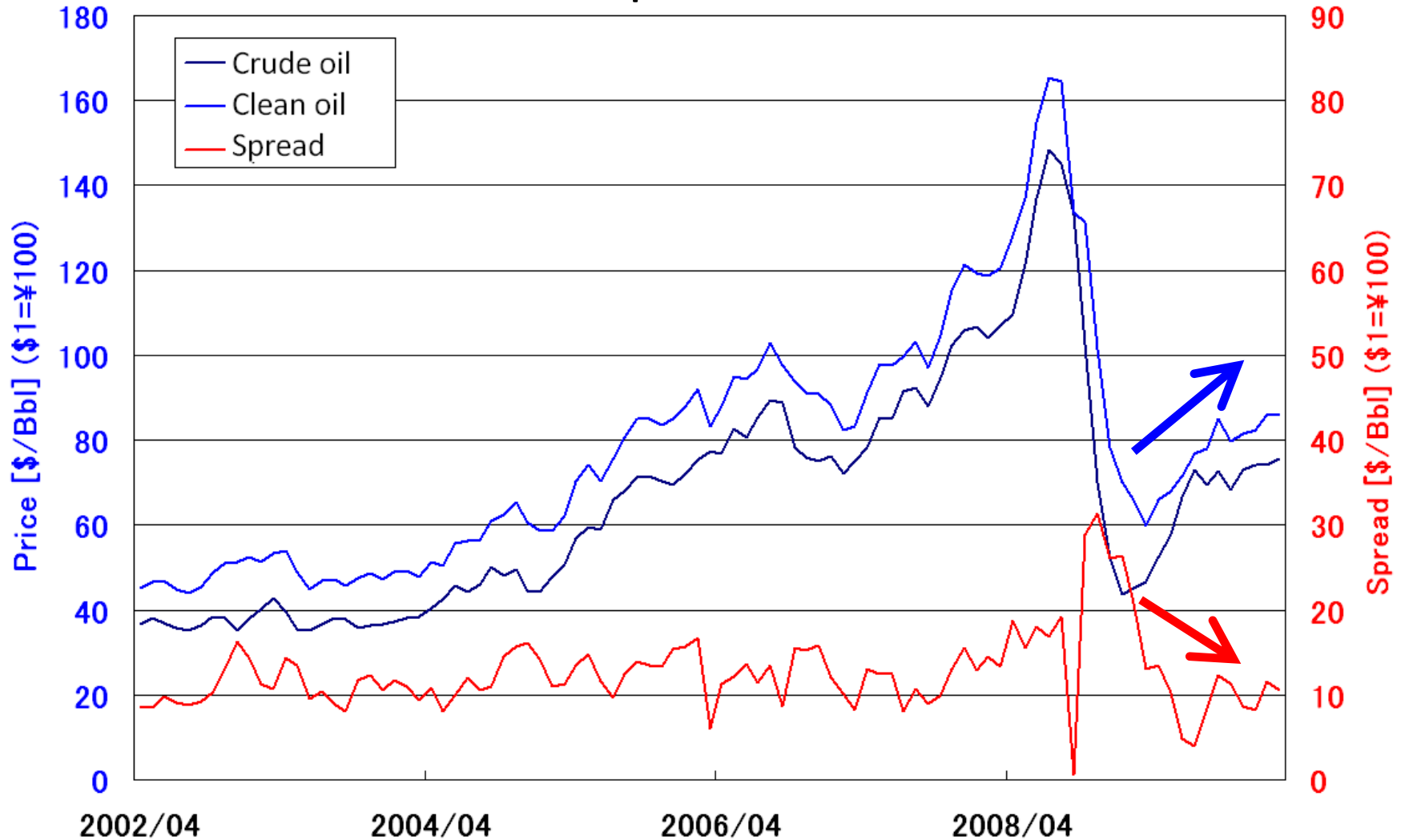
## ● Petroleum Oil Demand in Japan



Source : Ministry of Economy, Trade and Industry. (2010~2014FY Forecast : Estimated by METI. 2030FY Forecast : Estimated by JX Nippon Oil & Energy.)

# Oil Supply & Demand Trends in Japan

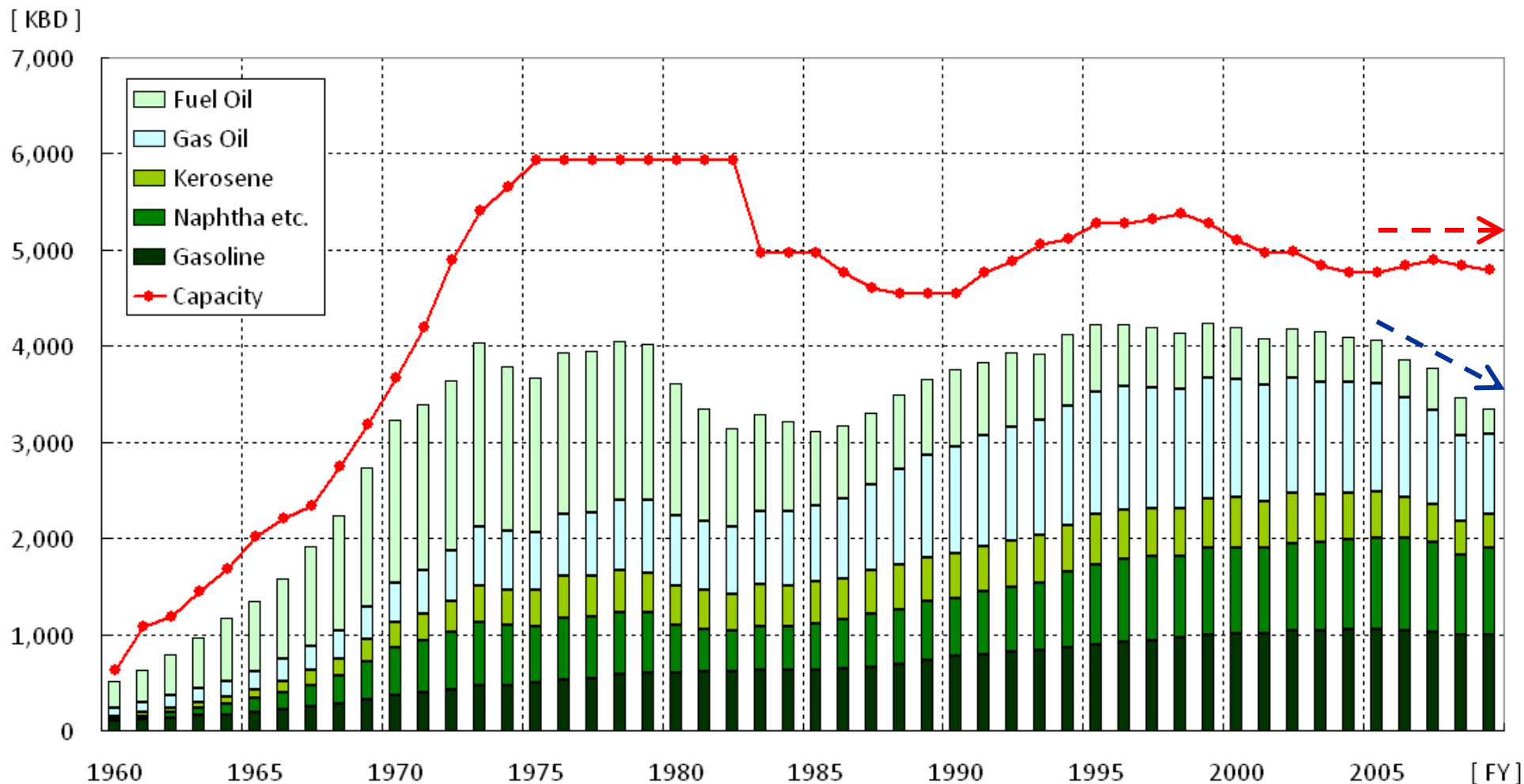
- Petroleum Oil Prices in Japan



Source of Clean oil Price : JX Nippon Oil & Energy.

# Oil Supply & Demand Trends in Japan

## ● Domestic Demand and Crude Capacity



Source : Ministry of Economy, Trade and Industry. Petroleum Association of Japan.

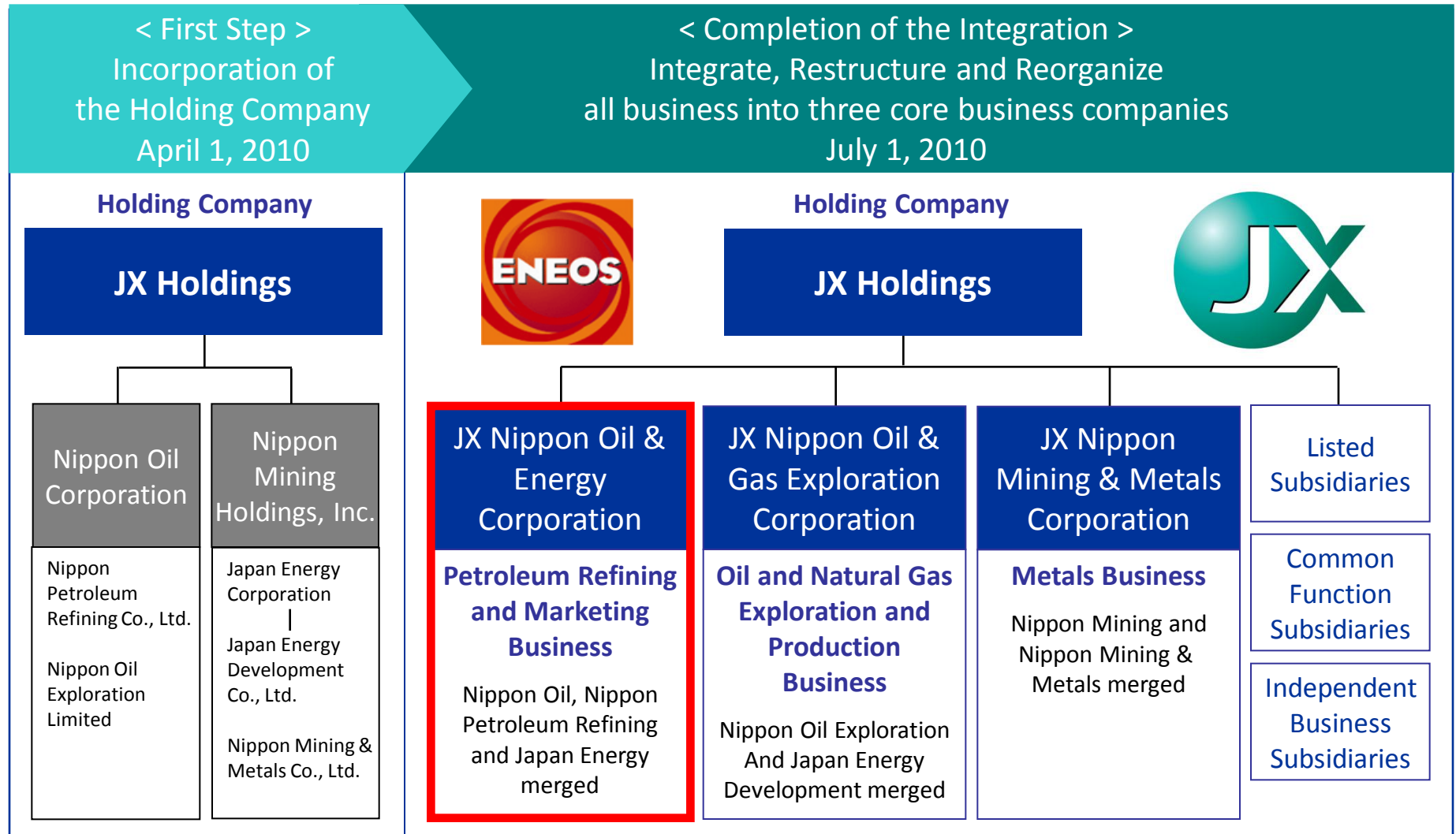
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# Business Integration

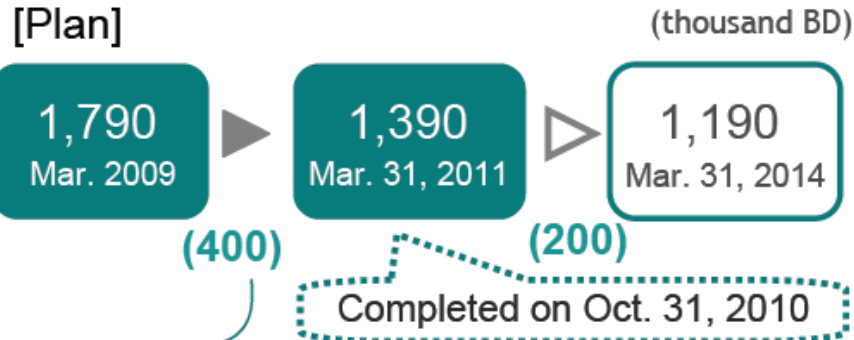
## ● Organization for Business Integration



# Business Integration

## ● JX Group Distillation Capacity Reduction Plan & The Refineries

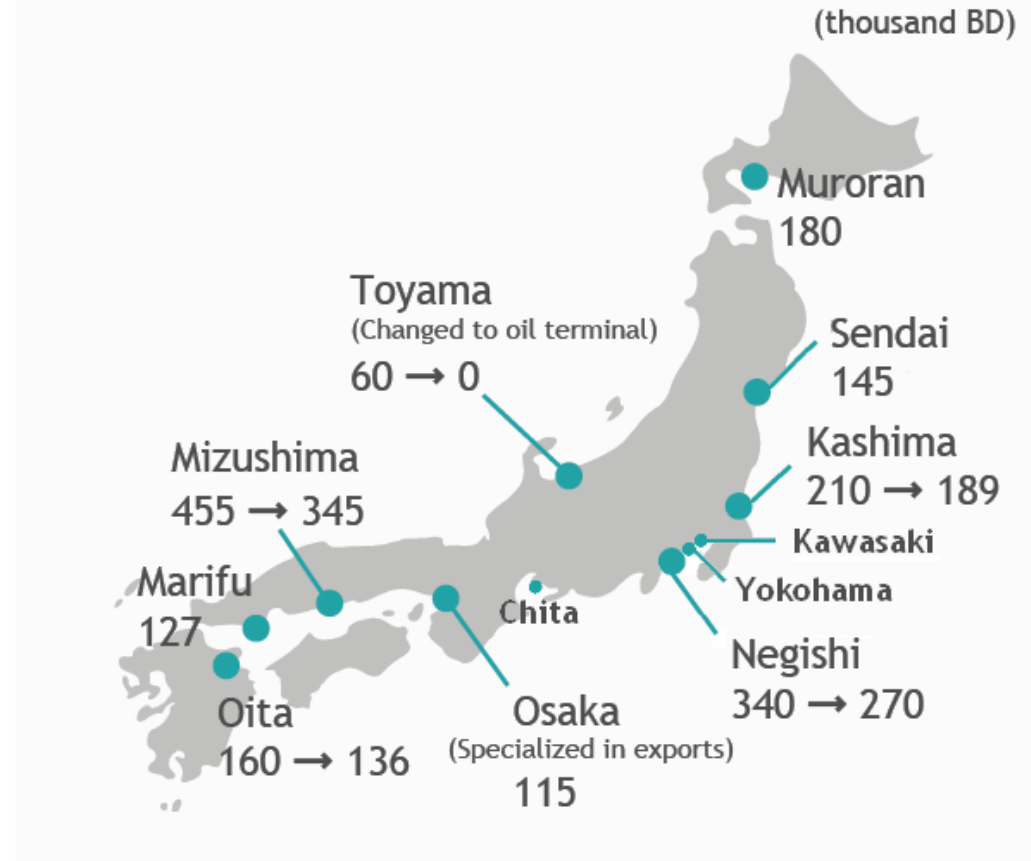
### JX Group Capacity Reduction Plan



### Breakdown of 400 thousand BD reduction

Refinery	Reduction (thousand BD)	Progress
Negishi	70	Oct. 31, 2010 Terminated operation of 2 <sup>nd</sup> CDU
Osaka	115	Oct. 1, 2010 Joint venture with CNPC; Specialized in exports
Mizushima	110	Jun. 30, 2010 Terminated operation of 2 <sup>nd</sup> CDU
Oita	24	May 31, 2010 Terminated operation of 1 <sup>st</sup> CDU
Kashima	21	May 31, 2010 Reduced capacity of 1 <sup>st</sup> CDU
Toyama	60	Mar. 31, 2009 Closed Toyama refinery of Nihonkai Oil Co., Ltd.
<b>Total</b>	<b>400</b>	

### JX Group Refineries (As of Oct. 31, 2010)



Source : JX Holdings.

# Business Integration

- Major Plants & Capacity

	Topper	Vacuum	FCC	Reformer	Feature of Refinery
Muroran	180,000	65,000	30,000	36,000	Cumen、HDC、RDS、IPP
Sendai	145,000	60,000	43,000	54,000	RDS、RFCC
Kashima	189,000	42,000	35,500	22,000	PX、KAC(RIPE-X)、RDS
Negishi	270,000	130,000	83,000	50,000	IGCC、RDS
Chita	-	40,000	-	23,500	PX、Cyclo-hexane、(Specialized Petro-chemical)
Osaka	115,000	60,000	27,000	17,000	IPP
Mizushima A	140,000	77,000	46,000	22,640	PX、SDA、RDS
Mizushima B	205,000	109,000	52,000	44,000	COKER-2series
Marifu	127,000	75,000	28,000	24,000	COKER-2series、IPP
Oita	136,000	66,000	26,000	30,000	RDS、SDA、PX、IPP

# Introduction of Negishi Refinery

- Outline of Negishi Refinery

| **Start of operation:** 1964 / 1972 (Completion of construction)

| **Site area:** 2.2 million m<sup>2</sup>  
(5 times larger than Tokyo Disneyland)

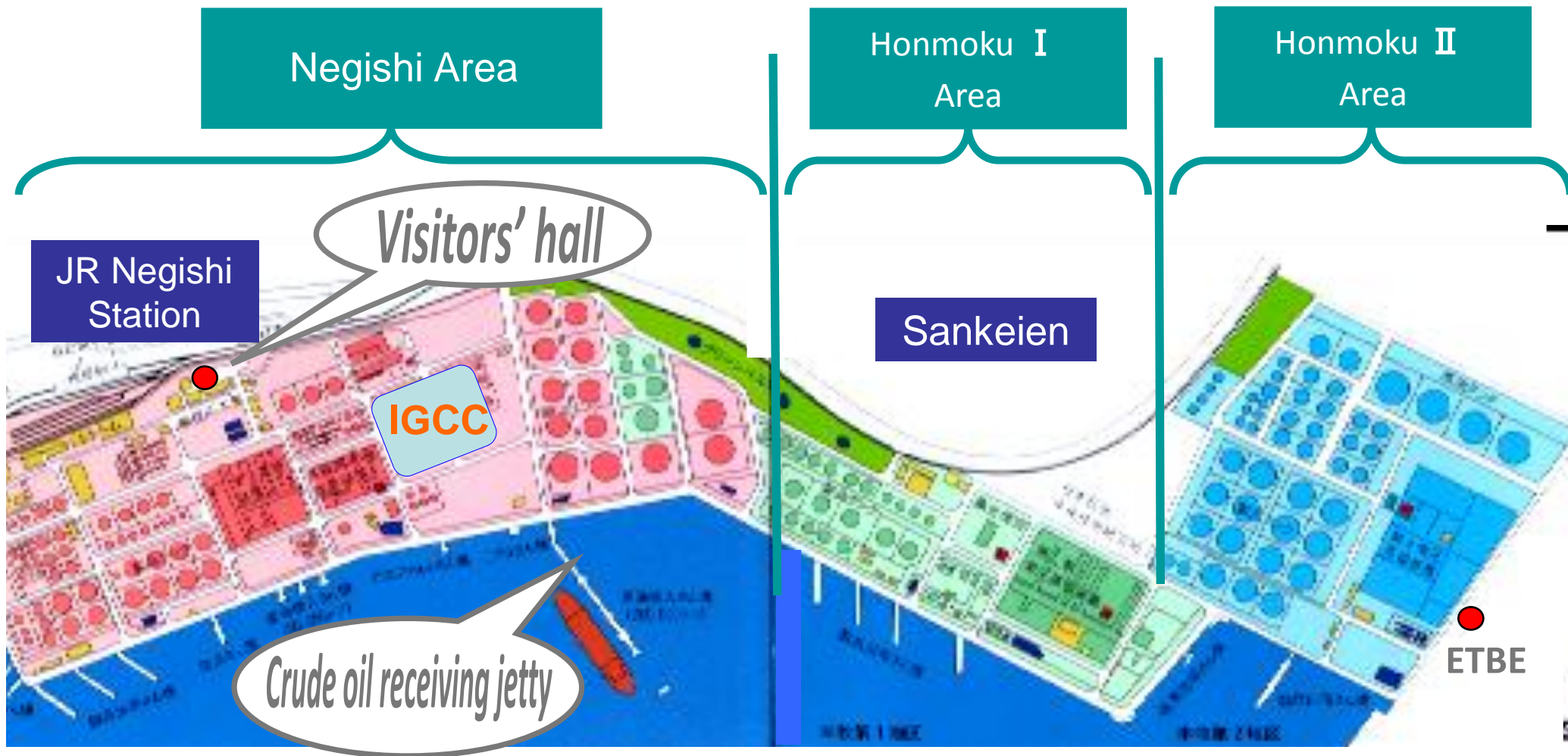
| **Crude oil Distillation capacity:**  
270 k barrels/day (43 thousands kl/day)

| **No. of employees:** 655 Regular employees  
(including about 300 shift workers)  
650 Cooperative companies' employees



# Introduction of Negishi Refinery

- Layout of Negishi Refinery



# Introduction of Negishi Refinery

## ● Outline of Negishi Refinery

### TANK

CRUDE OIL	17	1.2 mil.KL( 7.6mil.BBL)
PRODUCTS / INTERMEDIATES	318	2.7 mil.KL(17.4mil.BBL)

### JETTY

CRUDE OIL	1	314,000 DWT
CRUDE OIL / PRODUCTS / INTERMEDIATES	1	80,000 DWT
PRODUCTS / INTERMEDIATES	16	120 – 6,3000 DWT

### PRODUCT SHIPPING

BY SHIP	54%
BY TRAIN	22%
BY TANK TRUCK	23%
BY DRUM	0.5%



# Introduction of Negishi Refinery

- IGCC for Power Generation Business

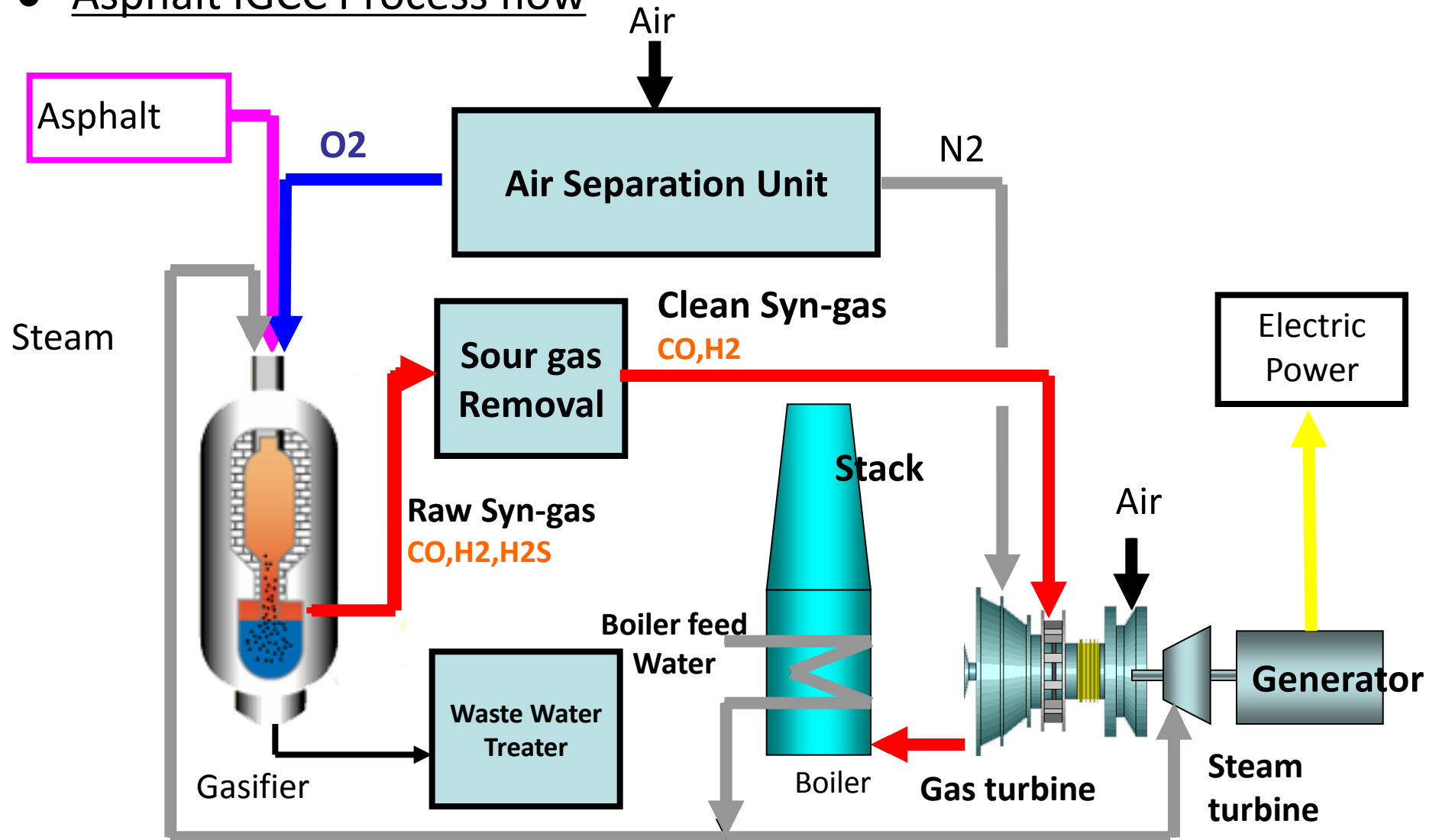
- | Start of operation                      June 2003
- | Generation capacity                      431 MW
- | Net capacity                                342 MW  
(All sold to Tokyo Electric Power Company)
- | Generation system  
    Integrated **G**asification **C**ombined **C**ycle
- | Fuel    Asphalt (extra heavy oil)
- | Net efficiency                                36%  
(based on the higher heating value)
- | Operating hours                              24 hours





# Introduction of Negishi Refinery

- Asphalt IGCC Process flow





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# Best Practice Activity

Leader : Deputy General Manager of Refinery

Member : Selected from each refinery

**“Champion Hearing”**  
Meeting with top management

Held for each subject

Feed back Best Practice

**Cross-Functional Team**

## “Champion Group”

- Executive Vice President
- Refining Technology & Engineering Division
  - Executive Director of Division
  - Deputy Director of Division

Muroran Refinery

Sendai Refinery

Kashima Refinery

Negishi Refinery

Mizushima Refinery

Marifu Refinery

Oita Refinery

Kawasaki Plant

Yokohama Plant

Chita Plant

**Cross-Functional**

# Best Practice Activity

- PDCA of Cross-Functional Team

1st Phase (6~12 months)  
‘Picking up subjects for BP and Planning the application of BP’

2nd Phase (3~5 years)  
‘Follow-up of the execution’

Plan

Subject Selection by “Champion”

Share the goal and objective with “Champion” and WG leaders

Subject Selection by “Champion”

Share the goal and objective with “Champion” and WG leaders

Do

Kickoff Meeting

Study BP

Kickoff Meeting

Follow-up the execution

Check

Interim Report

“Champion Hearing” Meeting with top management

Interim Report

“Champion Hearing” (Held every 6 months)

Final Report

Final Report

Achievement of purpose

Action

Apply BP to each refinery IMMEDIATELY

# Best Practice Activity

- Cross-Functional Working Group List

Maintenance Technology	Operation Technology	Task Force
Rotating Machine	TOPPER/VACUUM	Upgrading process schedule controlling
Instrumentation Apparatus	<b>Reforming(aromatics) Unit</b>	Construction contract
Electric Apparatus	FCC	Upgrading Operation procedure manuals
Inspection	Desulfurizing Unit	Optimization of Production Process and Amount
Column and Vessels	Lubricant Unit	Optimization of sift operation
Heating Furnace	Power Producing Unit/IPP	Optimization of outsourcing
Tank	Advanced Process Control	
	Coker	

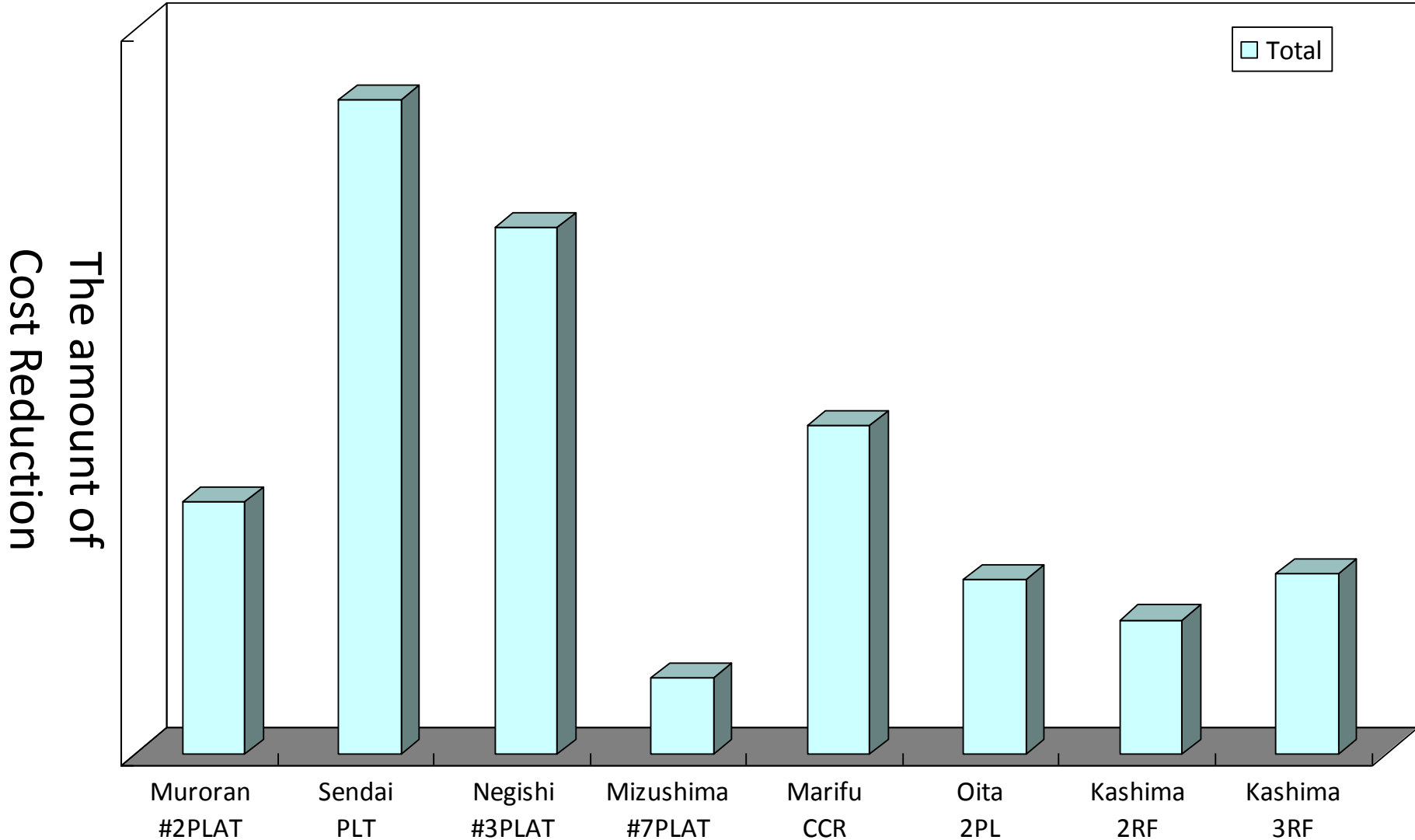
# Best Practice Activity

- Activities for Variable Cost Reduction by Aromatics WG

N-HDS	Heat Exchanger	Washing of RX Feed/Effluent heat exchanger
	Reactor	Energy conservation by N-HDS reaction temperature
		Optimization RX temperature
	Column & Vessels	Low operating pressure and decrease in reflux
Optimization of operating temperature for Cold Separator		
PLAT	Heating Furnace	Reduction of O <sub>2</sub> concentration
		Cleaning: tube, convection, APH, WHB
	Reactor	Lowered heating furnace load and optimize H <sub>2</sub> /Oil ratio
	Rotating Machine	Electric drive operation of condensing turbine
		• • • etc.

# Best Practice Activity

- Results of Variable Cost Reduction by Aromatics WG



# Best Practice Activity

- Cross-Functional Working Group List

## Maintenance Technology

Rotating Machine

Instrumentation Apparatus

Electric Apparatus

Inspection

Column and Vessels

Heating Furnace

Tank

## Operation Technology

TOPPER/VACUUM

Reforming(aromatics) Unit

FCC

Desulfurizing Unit

Lubricant Unit

Power Producing Unit/IPP

Advanced Process Control

Coker

## Task Force

Upgrading process  
schedule controlling

Construction contract

Upgrading Operation  
procedure manuals

Optimization of Production  
Process and Amount

Optimization of sift  
operation

Optimization of  
outsourcing

# Best Practice Activity

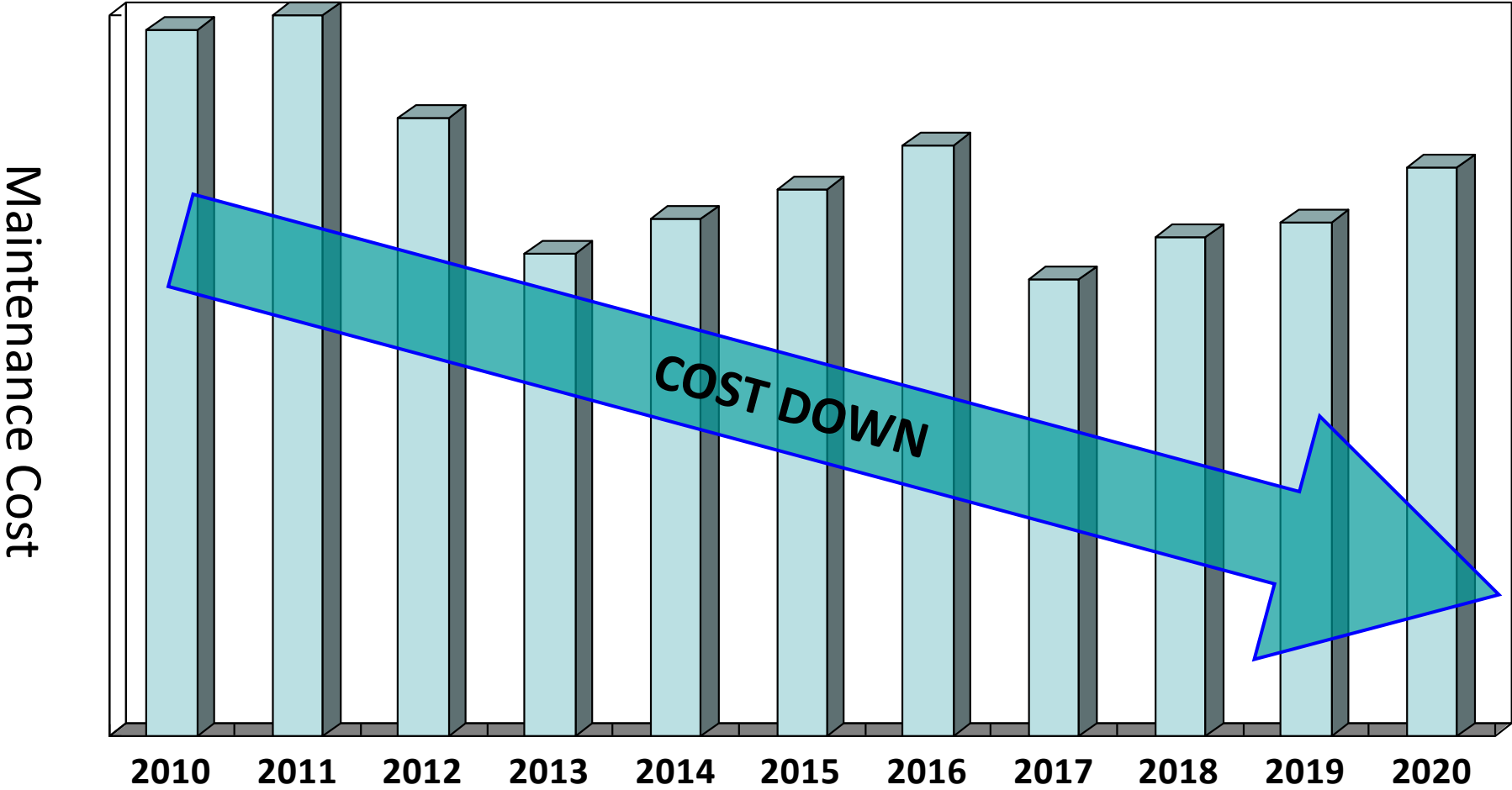
- Follow-up sheet for Column and Vessel WG

Executor (Section)	Subject	Goal	Classification
Refinery Plant	Maintenance Cost Reduction	(1) Overhaul ratio of instrument $\geq \blacktriangle 20\%$ (Compared with the present state)	Set the standard for overhaul
		(2) S/D Maintenance Cost (Column and Vessels ) $\geq \blacktriangle 20\%$	Standardize work selection Optimize overhaul work Shorten process schedule
WG	Shortening of process schedule		Shorten process schedule Utilize MS-PJ
	Maintenance Cost Reduction		Benchmark maintenance cost Consider overhaul procedure Optimize overhaul cycle Standardize work selection “Cold Eye Review”



# Best Practice Activity

- Goal of Maintenance Cost Reduction



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# Conclusion

## JX GROUP Midterm Management Plan for FY2010-2012

### [Basic Policy]

With emphasis on the concept of “**Best Practices,**”

dramatically transform the Petroleum Refining and Marketing Business by realizing integration synergies and rigorously reducing costs,

and maximize corporate value by allocating management resources to highly profitable operations on a priority basis.

**Thank you very much for your attention.**

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