



Dawn of Deregulated Power Systems in Japan



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OUTLINE

1. **Objective**
2. **Particularity of Energy Utilities in Japan**
3. **Conventional Deregulation**
4. **Current Status of Energy Policies and Outage of Nuclear Power Plants**
5. **Current Power System Deregulation**
7. **Conclusion**

I. OBJECTIVE

To Present Current Status of Deregulated Power Systems in Japan and Related Topics

Note) This Talk Is Based on Report on Power System Reform Subcommittee of Advisory Committee for Natural Resources & Energy of ANRE (Agency for Natural Resources and Energy) under METI (Ministry of Economy, Trade & Industry) in Japan

2. Particularity of Energy Utilities in Japan

(1) Mix-up of Industry and Energy Policies

-ANRE (Agency for Natural Resources and Energy) Is Placed under METI (Ministry of Economy, Trade & Industry)

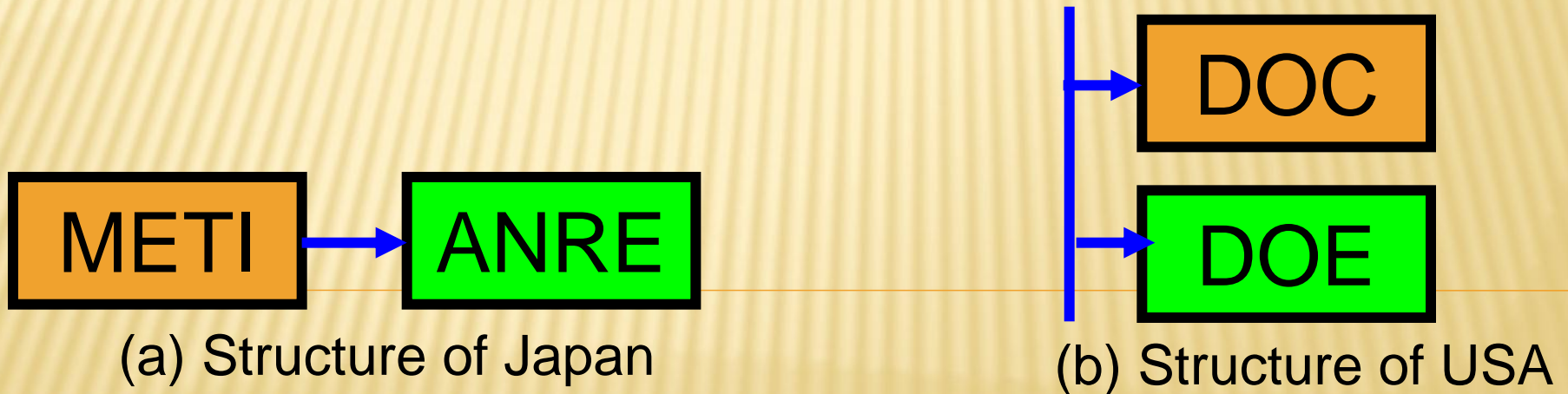


Fig. 1 Difference of Control Authority between Japan and USA

- Energy Policies Have Been Discussed as a Part of Industrial Ones, Which Means Industrial Policies Run Short of Customer Protection
- There Is No Organization That Strictly Regulates And Monitors Electric Utilities Like Consumer Advocate of State Public Utility Commission in USA
- The Idea of Mix Should be Regarded as Conflict of Interest

(2) Industry Policies And Electric Utilities

-METI Had Allowed Electric Utilities to Strike a Lot of Profits And Promoted Them to Raise Related Companies and Asked Other Manufacture Companies to Develop New Technologies

-That Have Spoiled the Manufacture Companies So That They Have Lost Their Own International Competitive Power.

(3) Adversary Relationship between Electric And Gas Utilities

-Severe Sales War: Until March 11, 2011 Electric Utilities Had Promoted Consumers to Install Electric Appliances (IH Cooking Heaters, Ecocute, Dish Washers, Air Conditioners, Floor Heating, PV Panels) Called “Totally Electrified House” While Gas Utilities Have Taken Counter plans



IH Cooking Heater



Ecocute

3. Conventional Deregulation

Nov.1950: Reformulation of Electric Utilities After World War 2 by GHQ (Nine Blocks of Utilities Were Organized)<Potsdam Government Decree>

Nov.1951: Nine Electric Utilities Were Established (Bundling, Regional Monopoly, and FDC ([Fully Distributed Cost)Method)

May1972 Okinawa Power Company Was Set Up by the Okinawa Reversion Agreement

1995: Deregulation of Wholesale Market (Emergence of IPP (Independent Power Producer); IPP Has Been Allowed to Generate)

March 2000: Partial Deregulation of Retails for Customers with More Than 2000KW Loads(Emergence of PPS(Power Producer and Supplier); PPS Have Been Allowed to Generate and Sell by Retail)

3. Conventional Deregulation

Regional Monopoly

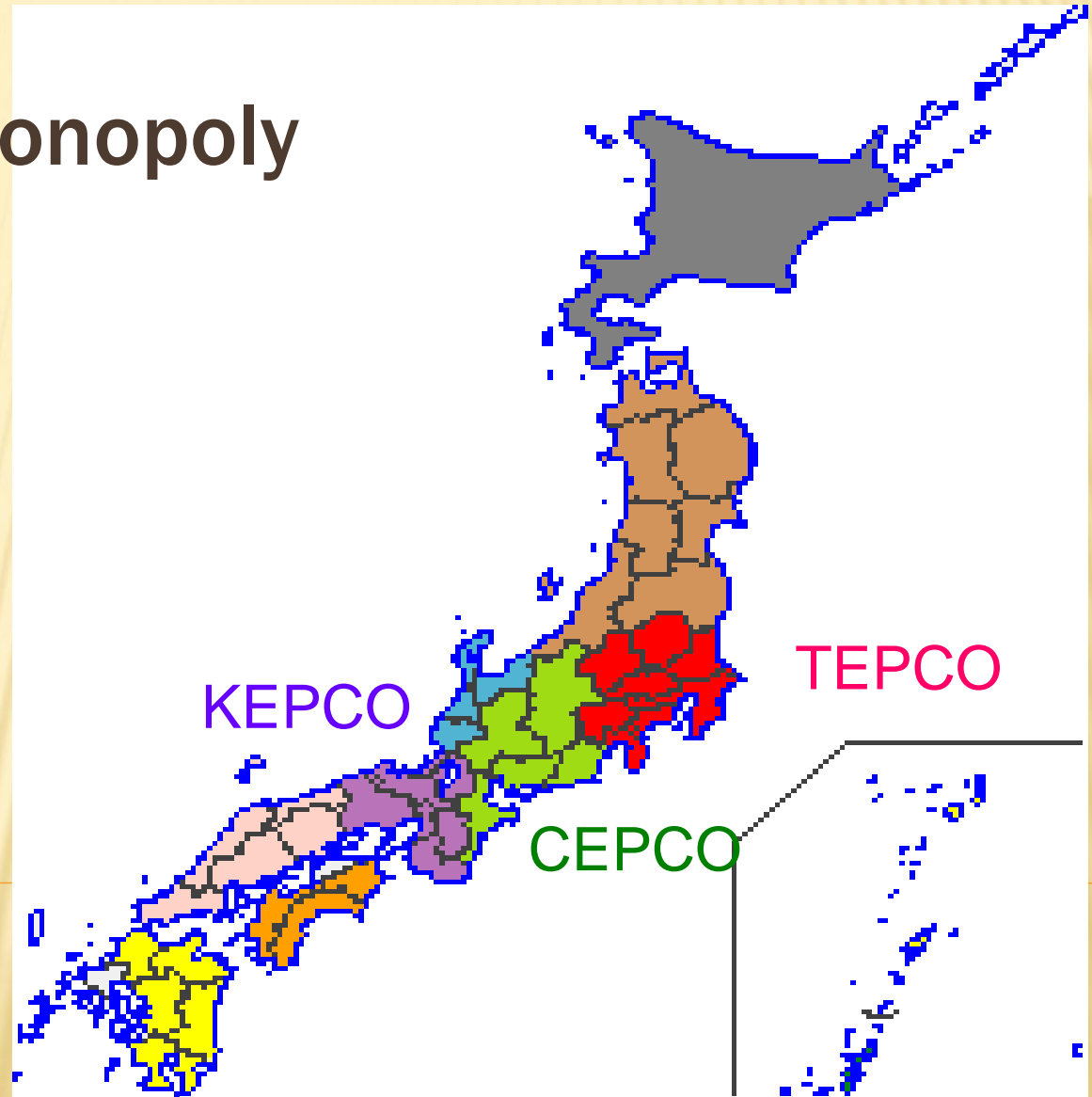


Fig. 2 Ten Electric Utilities in Japan

FDC Method

Construction Cost of Plants & Transmission Lines
Maintenance Cost
Fuel Cost (Crude Oil, Currency Exchange Rates)
Operation Cost
Business Cost (Employee Salary, Office Cost)

$$\times \text{Revenues} = \text{Initial Cost} + \text{Reward}$$

Big Facility Investment
Makes Big Reward

$(\text{Initial Cost}) \times 0.03$

- To Apply FDC Method to Fare of Public Service Such as Electricity, GAS, Water, etc.
- To Guarantee a Profit Rate

Table 1 Advantages and Drawbacks of FDC

FDC Method	Items
Advantages	Easy to Understand Cost Reasons
	For Utilities Not to Obtain a Lot of Profits or Damages
	For Customers Not to Pay a Lot of Charges
	To Long-term Incentive to Keep Security/Reliability & Improve Service
	Easy to Make Middle or long-term Business Planning Due to Assured Future Profits
	To Get Loan at Low Rates from Banks Due to Management Stabilization
Drawbacks	Difficult to Promote Business Efficiency
	Unevenly Distributed Information on Initial Cost
	Difficult for Employers to Change the Fare According to Economic Situations
	Possibility of Excess Plant and Equipment Investment

3. Conventional Deregulation

Yardstick Method

- ✘ To Evaluate the Standard Cost by Comparing the Fare at a Group of Companies like Railway Companies and Electric Utilities and Determine Their Own Fare
- ✘ To Aim at Promoting Business Efficiency by Indirect Competition between the Companies, Which Means to Compare their Own Management Performance
- ✘ To Add Yardstick Method to FDC Method since 1996

Table 2 Difference between Electric Utilities and Private Companies

	Electric Utilities	Private Company
Markets	Monopolistic	Competitive
Selling Prices	Determined by FDC	Determined by Markets
Initial Cost	To Sum up Operational Cost	Reduced by Management Strategies
Revenues	To Clap on Initial Cost	To Strike a Profit by Reducing Initial Cost

As It Turned Out,....

-Oct. 2011, Inappropriate Initial Cost Was Pointed out at TEPCO Management and Finance Investigation Committee. The Sales Promotion Fares for Electric Appliances Were Included in the Initial Cost Although the Electrify Price Should Have Been Reduced.

-ANRE Did Not Have Function to Check the Electricity Price at ALL.

3. Conventional Deregulation

2001 Discussion on Unbundling of Electric Utilities at METI

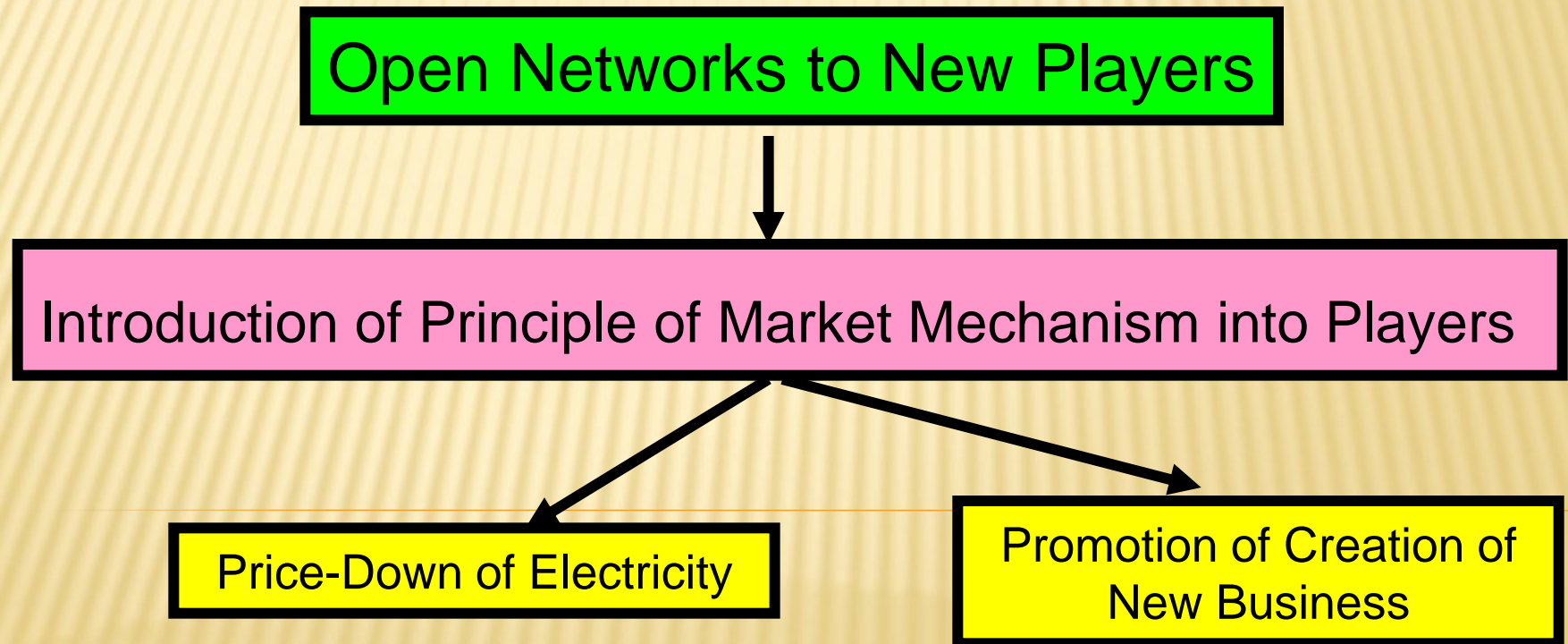


Fig. 3 Advantages of Deregulation

3. Conventional Deregulation

Dec. 2002 Advisory Committee for Natural Resources & Energy Submitted a Report to Continue Bundling of Electric Utilities, Which Means Frustrated Deregulation in Practice.

“Reasons “Why Electric Utilities Were Against Unboudling

- × Deregulation of Electric Utilities Failed in California, USA in 2000 (Special Case of Market Design Issue, Heat Waves, Unavailable DC Lines due to Forest Fire, Network Congestion by Enron etc.)
- × Potential Blackout Due to Unstable Supplied Power (Limitations to Receive Power from Other Companies; Weak Tie Lines; No idea of Wide Area Monitoring and Control)
- × Transmission Network Does Not Become Profitable (Bad Idea to Strike a Lot of Profits with Infrastructure)

3. Conventional Deregulation

2003: Foundation of JPEX (Japan Electric Power eXchange for Promoting the Diversity of Procurement)

2004: Reduction of Generation Capacity to 500KW

2004: Foundation of ESCJ (Electric Power System Council of Japan) for Realizing the Fair Usage of Transmission Networks

2005: Reduction of Generation Capacity to 50KW

2005: Opening the Market by JPEX

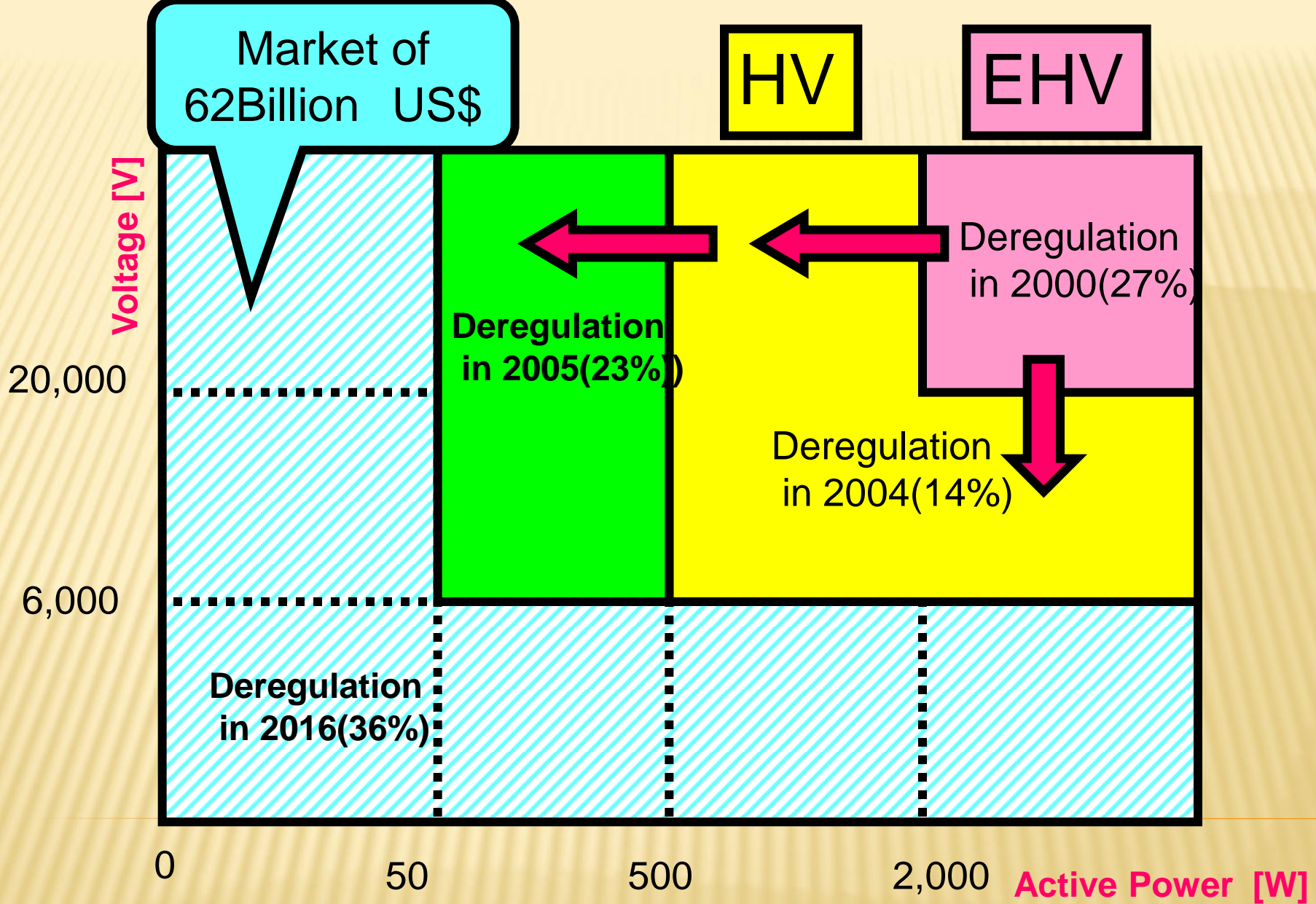


Fig. 4 Advance of Deregulation in Japan

3. Conventional Deregulation

Cooped-up Feeling of Deregulation

- ✘ Electric Utilities Have Advantage over IPP and PPS.
- ✘ PPS Had only 2% of Power Market in Fiscal 2011 (9.2% , Jan. 2015).
- ✘ IPP Has Played a Role to Supply Power to Electric Utilities in Low Rates, Which Means IPP Is Just a Subcontractor.

4. Current Status of Energy Policies and Outage of Nuclear Power Plants

- ✘ Energy Policies Are Related to Complicated Factors

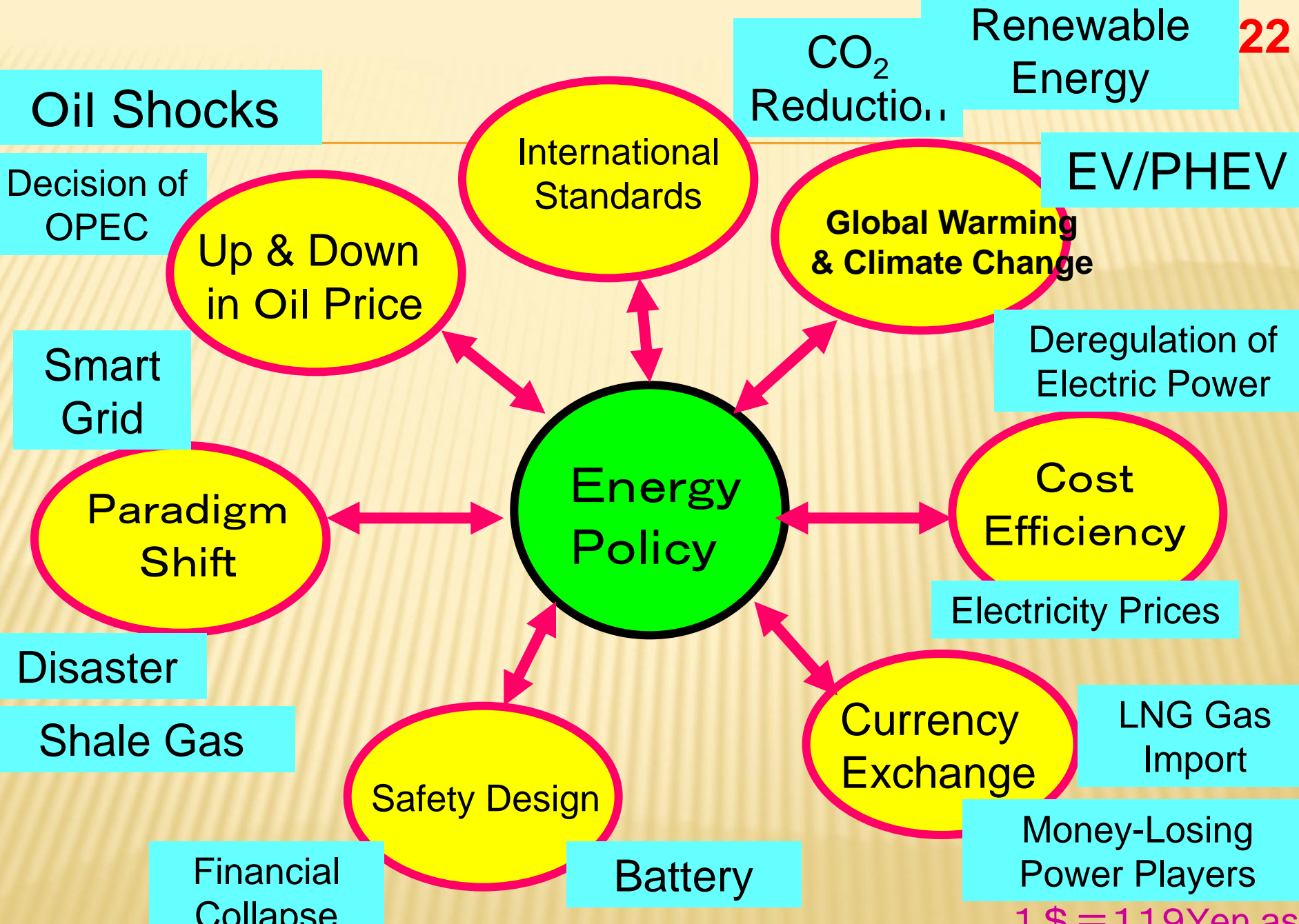


Fig. 5 Factors of Energy Policies

1 \$ = 119 Yen as of 08/05/2015²²

4. Current Status of Energy Policies and Outage of Nuclear Power Plants

Reasons Why Japan Is Positive to Deregulation

1. Trigar of Fukushima 3.11

- The Myth of Safety on Nuclear Power Plants Has Collapsed in Japan.
- Actually the Melt Down Occurred Although the Government and TEPCO Said “NO” at First
- We Experienced Rolling Blackout March, 2011
- Need of More Advanced Wide Area Control Because Current Wide Area Control Is Insufficient.



Fig. 6 Pictures of Fukushima Daiichi Accident

4. Current Status of Energy Policies and Outage of Nuclear Power Plants

× 2. Promotion of Renewable Energy

- To Transmit Power to Metropolitan Areas through Sufficient Tie Lines Because the Sites of Renewable Energy Are Unevenly Located in Hokkaido, Tohoku, Kyusyu, etc,

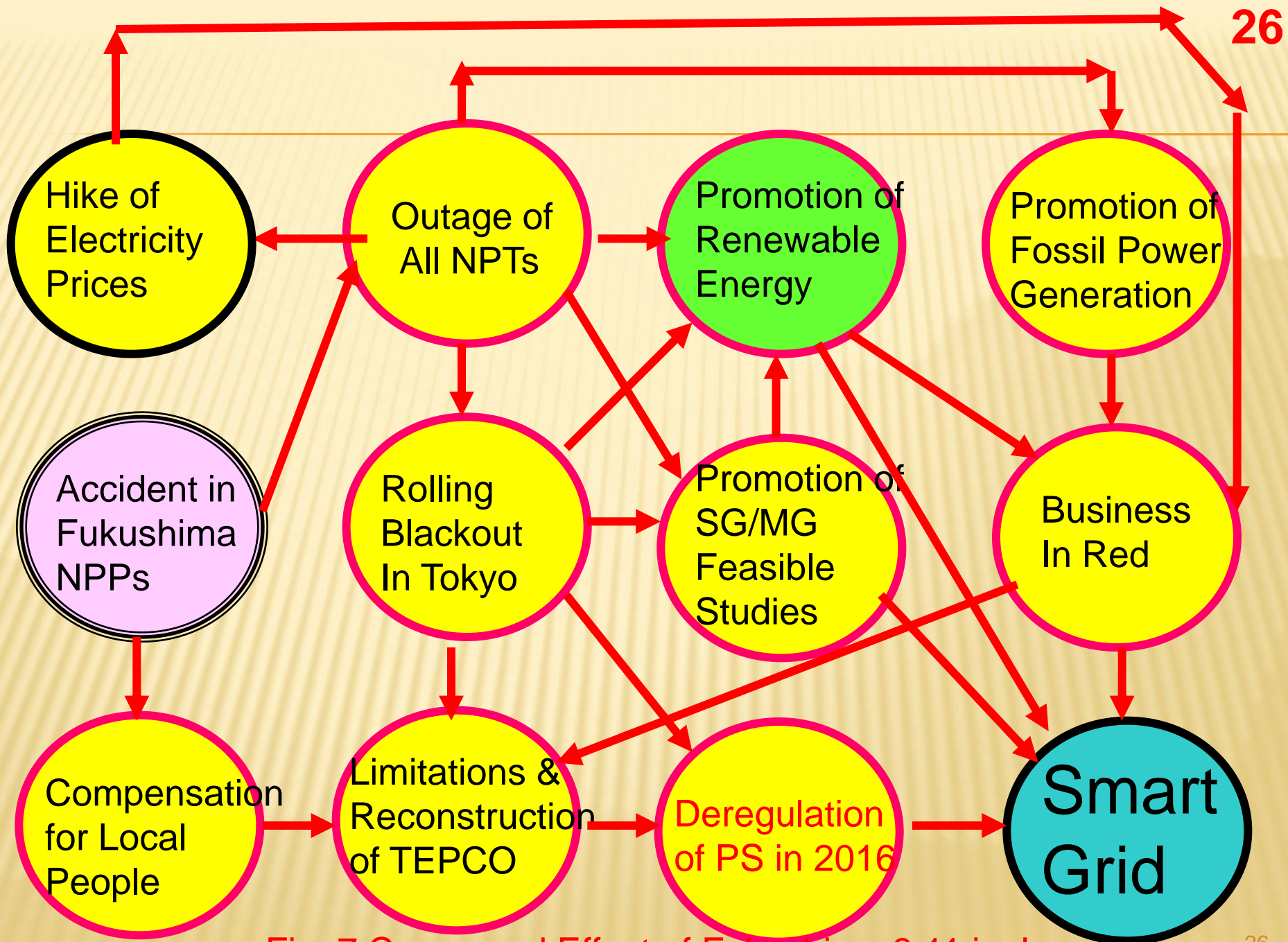


Fig. 7 Cause and Effect of Fukushima 3.11 in Japan

4. Current Status of Energy Policies and Outage 27 of Nuclear Power Plants

Status of Nuclear Power Plants in Japan as of May 5, 2015

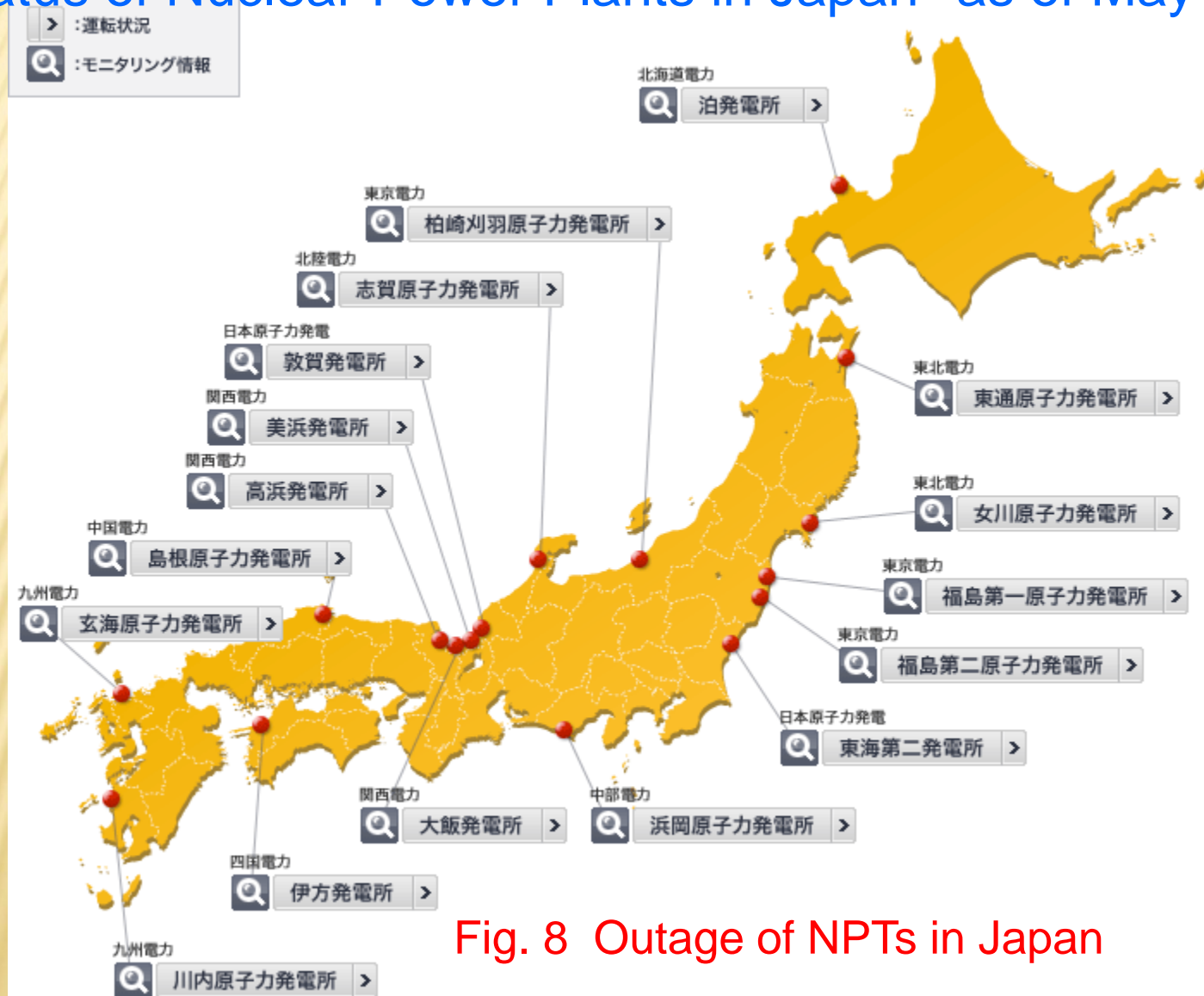


Fig. 8 Outage of NPTs in Japan

4. Current Status of Energy Policies and Outage of Nuclear Power Plants

Table 3 Status of Nuclear Power Plants in Japan as of May 5, 2012

原子力発電所運転状況 2012/05/05現在

		設備容量 万kW	運転中	停止中	形式	運転開始	備考
北海道電力	泊	1号	57.9	57.9	PWR	1989年6月	停止・定期検査(2011/4/22~)
		2号	57.9	57.9	PWR	1991年4月	停止・定期検査(2011/8/26)
		3号	91.2	91.2	PWR	2009年12月	停止・定期検査(2012/5/5~)
東北電力	女川	1号	52.4	52.4	BWR	1984年6月	停止・東日本大震災
		2号	82.5	82.5	BWR	1995年7月	停止・東日本大震災
		3号	82.5	82.5	BWR	2002年1月	停止・東日本大震災
	東通	1号	110.0	110.0	BWR	2005年12月	停止・定期検査(2011/2/6~)
東京電力	福島第一	1号	46.0	46.0	BWR	1971年3月	2012年4月19日廃炉
		2号	78.4	78.4	BWR	1974年7月	2012年4月19日廃炉
		3号	78.4	78.4	BWR	1976年3月	2012年4月19日廃炉
		4号	78.4	78.4	BWR	1978年10月	2012年4月19日廃炉
		5号	78.4	78.4	BWR	1978年4月	停止・東日本大震災
		6号	110.0	110.0	BWR	1979年10月	停止・東日本大震災
	福島第二	1号	110.0	110.0	BWR	1982年4月	停止・東日本大震災
		2号	110.0	110.0	BWR	1984年2月	停止・東日本大震災
		3号	110.0	110.0	BWR	1985年6月	停止・東日本大震災
		4号	110.0	110.0	BWR	1987年8月	停止・東日本大震災
	柏崎刈羽	1号	110.0	110.0	BWR	1985年9月	停止・定期検査(2011/8/6~)
		2号	110.0	110.0	BWR	1990年9月	停止・中越沖地震で
		3号	110.0	110.0	BWR	1993年8月	停止・中越沖地震で
		4号	110.0	110.0	BWR	1994年8月	停止・中越沖地震で
5号		110.0	110.0	BWR	1990年4月	停止・定期検査(2012/1/25~)	
6号		135.6	135.6	ABWR	1996年11月	停止・定期検査(2012/3/26~)	
7号		135.6	135.6	ABWR	1997年7月	停止・定期検査(2011/8/23~)	
中部電力	浜岡	3号	110.0	110.0	BWR	1987年8月	停止・政府要請により運転再開見送り
		4号	113.7	113.7	BWR	1993年9月	停止・政府要請により
		5号	133.0	133.0	ABWR	2005年1月	停止・政府要請により

4. Current Status of Energy Policies and Outage of Nuclear Power Plants

関西電力	美浜	1号	34.0		34.0	PWR	1970年11月	停止・定期検査(2010/11/24-)
		2号	50.0		50	PWR	1972年7月	停止・定期検査(2011/12/18-)
		3号	82.6		82.6	PWR	1976年12月	停止・定期検査(2011/5/14-)
	高浜	1号	82.6		82.6	PWR	1974年11月	停止・定期検査(2011/1/10-)
		2号	82.6		82.6	PWR	1975年11月	停止・定期検査(2011/11/26-)
		3号	87.0		87.0	PWR	1985年1月	停止・定期検査(2012/2/20~)
		4号	87.0		87	PWR	1985年6月	停止・定期検査(2011/7/21-)
	大飯	1号	117.5		117.5	PWR	1979年3月	停止・定期検査(2010/12/10-)
		2号	117.5		117.5	PWR	1979年12月	停止・定期検査(2011/12/16-)
		3号	118.0		118.0	PWR	1991年12月	停止・定期検査(2011/3/18-)
		4号	118.0		118	PWR	1993年2月	停止・定期検査(2011/7/22-)
	中国電力	島根	1号	46.0		46.0	BWR	1974年3月
2号			82.0		82	BWR	1989年2月	停止・定期検査(2012/1/27~)
四国電力	伊方	1号	56.6		56.6	PWR	1977年9月	停止・定期検査(2011/9/4-)
		2号	56.6		56.6	PWR	1982年3月	停止・定期検査(2012/1/13~)
		3号	89.0		89.0	PWR	1994年12月	停止・定期検査(2011/4/29-)
九州電力	玄海	1号	55.9		55.9	PWR	1975年10月	停止・定期検査(2011/7/21-)
		2号	55.9		55.9	PWR	1981年3月	停止・定期検査(2011/1/29-)
		3号	118.0		118.0	PWR	1994年3月	停止・定期検査(2010/12/11-)
		4号	118.0		118	PWR	1997年7月	停止・定期検査(2011/12/25~)
	川内	1号	89.0		89.0	PWR	1984年7月	停止・定期検査(2011/5/10-)
		2号	89.0		89	PWR	1985年11月	停止・定期検査(2011/9/1-)
日本原電	東海	第二	110.0		110.0	BWR	1978年11月	停止・東日本大震災
	敦賀	1号	35.7		35.7	BWR	1970年3月	停止・定期検査(2011/1/26-)
		2号	116.0		116.0	PWR	1987年2月	停止・定期検査(2011/8/25-)
合計		kW	4,896.0	0.0	4,896.0			
		基	54	0	54			

0.1 Billion

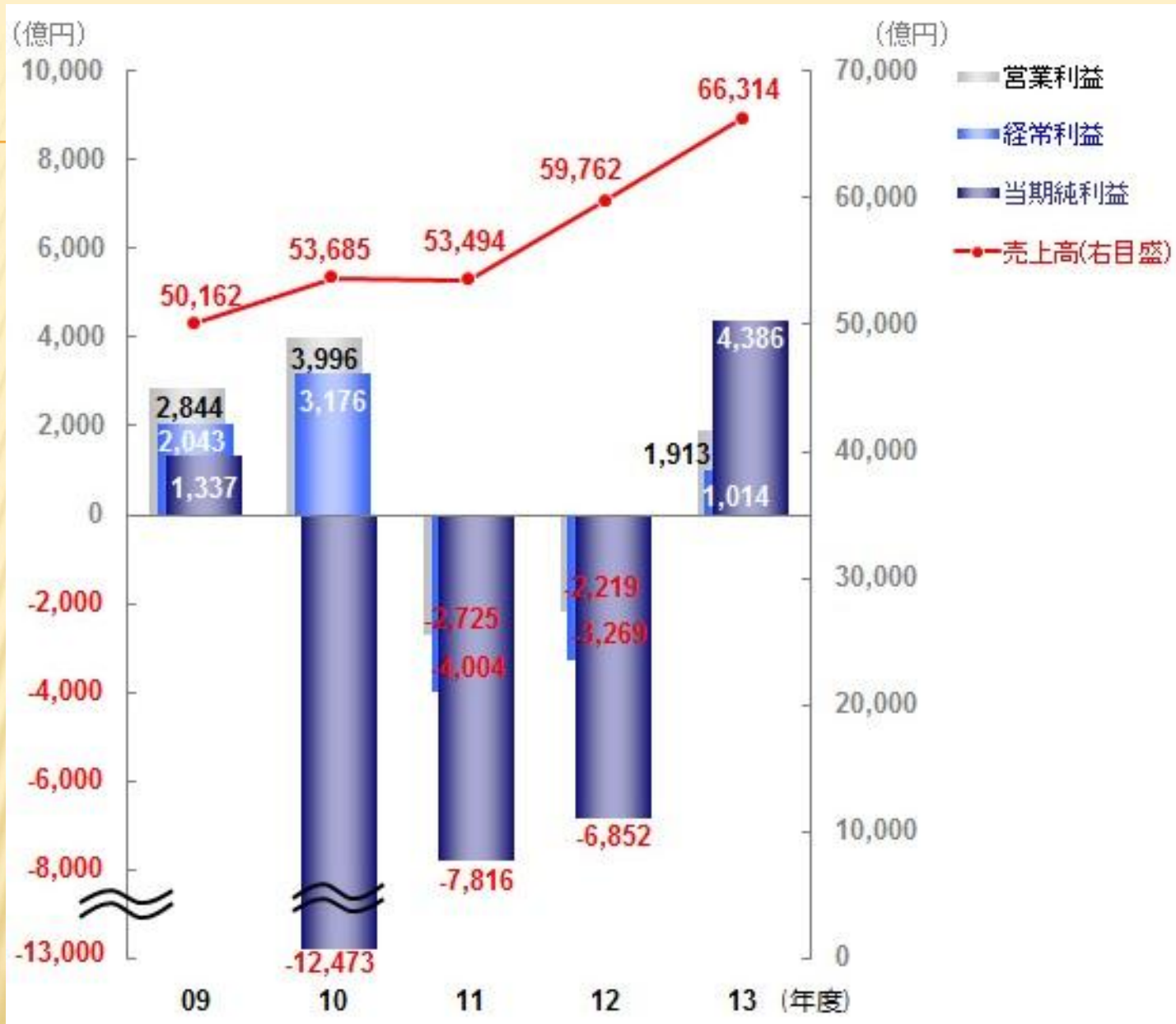


Fig. 9 Settlement of Balance of TEPCO

Table 4 Compensation Money of TEPCO for the Fukushima

	個人	個人（自主的 避難等に係る損 害）	法人・ 個人事業主など
ご請求について			
ご請求書受付件数（延べ件数）	約758,000件	約1,303,000件	約326,000件
本賠償の状況について			
本賠償の件数（延べ件数）	約673,000件	約1,291,000件	約282,000件
本賠償の金額 [*]	約2兆1,907億円	約3,533億円	約2兆2,139億円
これまでのお支払い金額について			
本賠償の金額 [*]	約4兆7,578億円 ①		
仮払補償金	約1,519億円 ②		
お支払い総額	約4兆9,097億円 ① + ②		

Total Payment as of 1/5/2015=41.25 Billion US\$

Reconstruction of TEPCO

- ✘ July, 2012 TEPCO Became the Government-Owned Company

Power System Deregulation

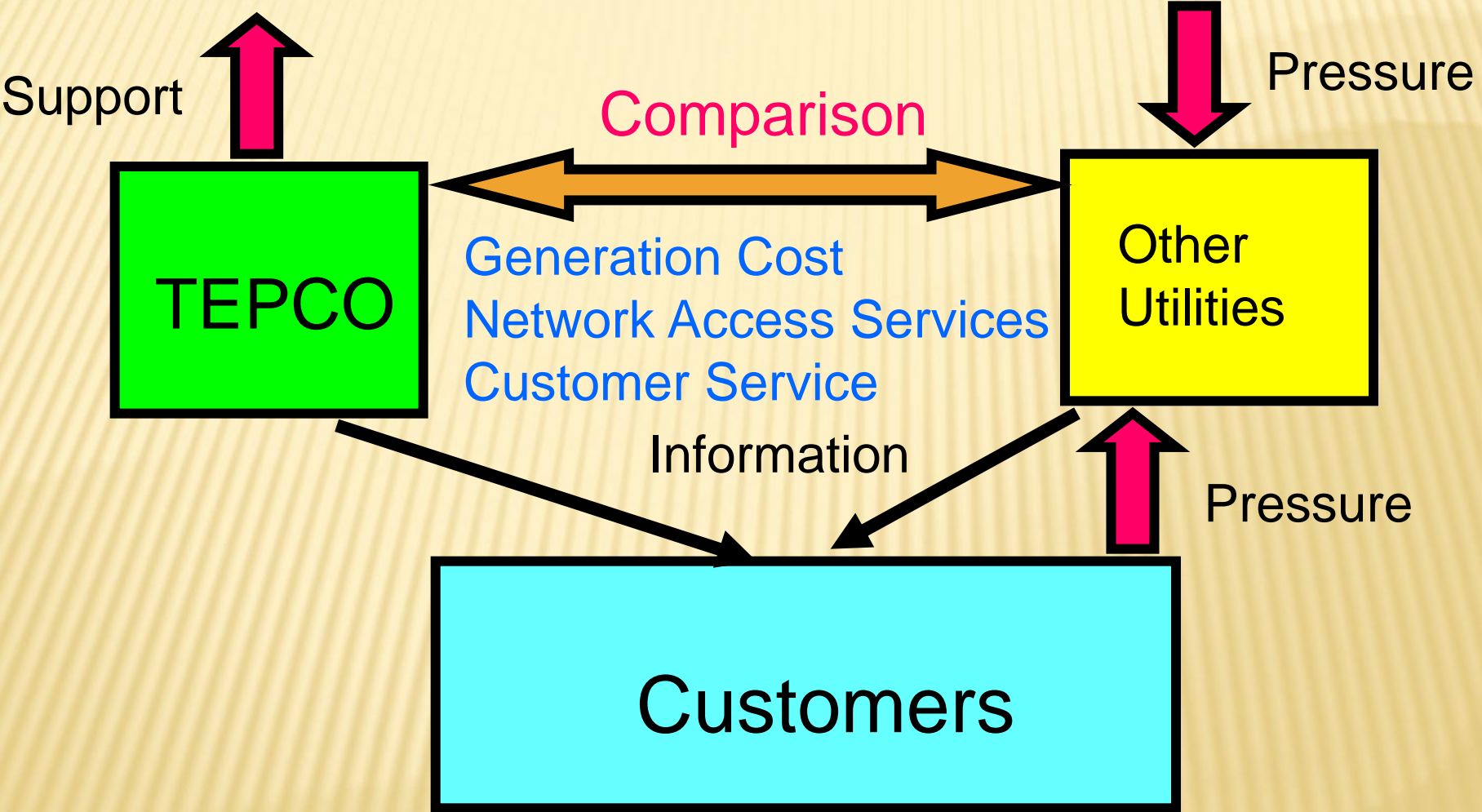


Fig. 10 Competition of Utilities

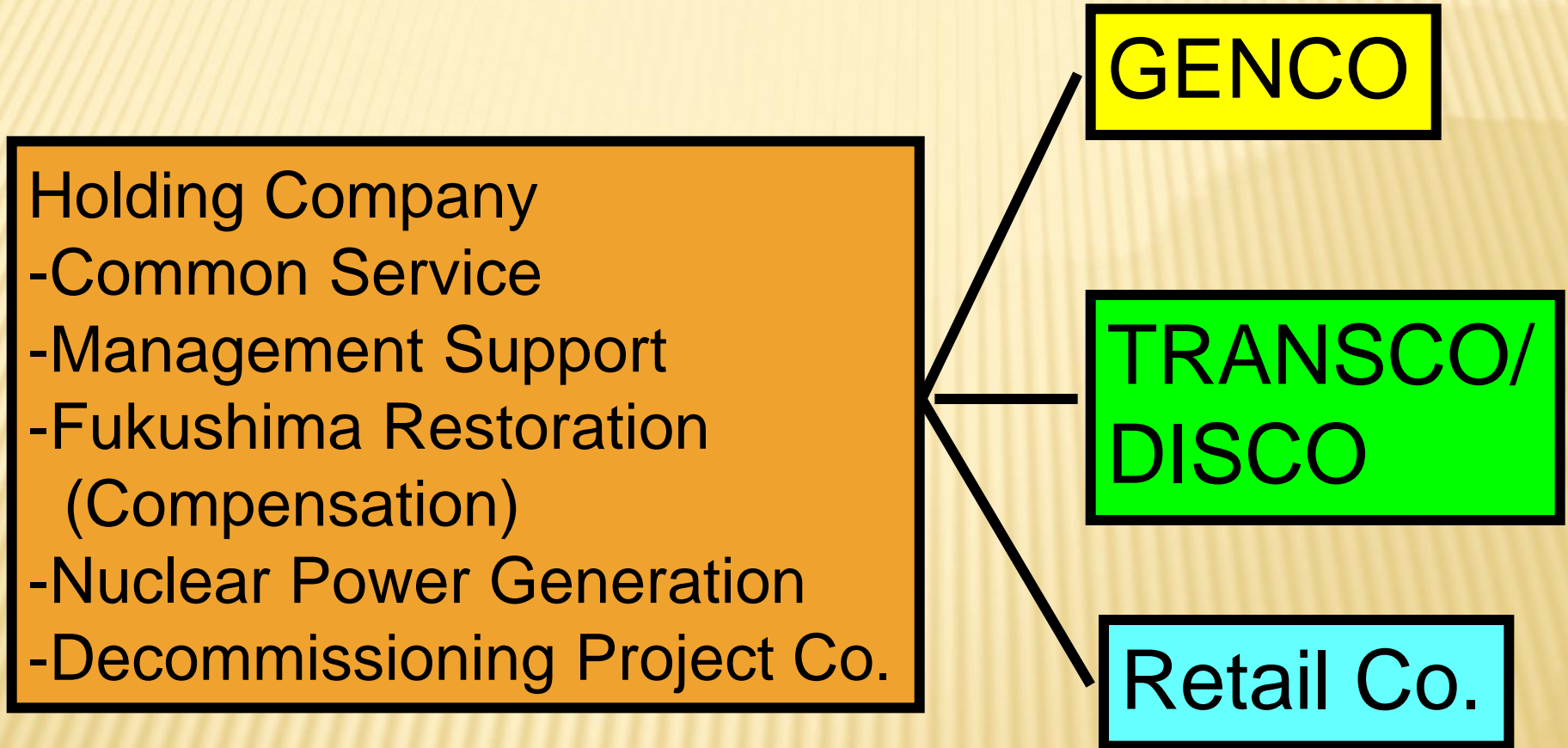
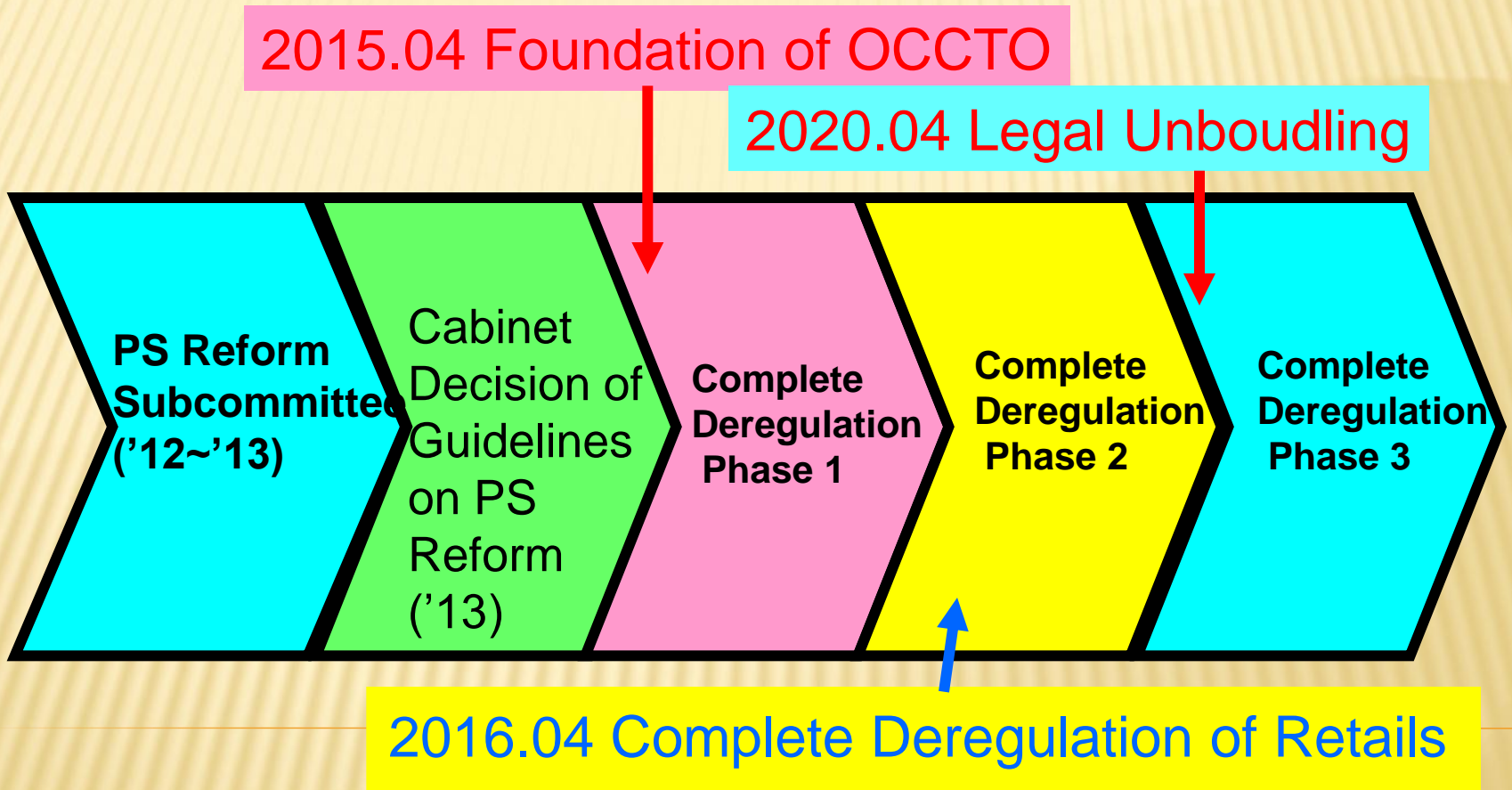


Fig. 11 Split-Up of TEPCO

5. Current Power System Deregulation



OCCTO: Organization of Cross-Regional Coordination of Transmission Operators, Japan

Fig. 12 Transition of Policies on Deregulation

5. Current Power System Deregulation

Scenario of Power System Deregulation

- × **Phase 1: Extension of Wide Area Operation in 2016**
 - × **Phase 2: Complete Deregulation of Retail in 2016**
 - × **Phase 3: Legal Unbounding in 2020**
-

5. Current Power System Deregulation

Phase 1: Roles of OCCTO

(1) To Promote Wide Area Power System Operation

Tasks

- To Improve the Efficiency of Generation
- To Support Emergent and Restorative Conditions for Unexpected Faults
- To Make a Plan of Tie Lines and Wide Area Dispatching
- To Control Transmission/Distribution Networks

5. Current Power System Deregulation

Phase 1: Roles of OCCTO

- (2) To Adjust the Imbalance between Loads and Generation under Tight Power System Conditions in a Time of Disaster
- (3) To Give Players Network Information through OASIS
- (4) To Resolve Conflicts between Players by Arbitration
- (5) To Recruit Erectors of Power Plant in Case of Deficiency in Power Supply

5. Current Power System Deregulation

Table 5 Members of OCCTO

Type of Members	No. of Members
Electric Utilities	10
IPP(\geq 2000MW)	2
IPP($<$ 2000MW)	5
PPS	596
Total	613

5. Current Power System Deregulation

Phase 2: Complete Deregulation of Retail

	Stage1 (Transition)	Stage 2
PPS	Free Payment Method	Free Payment Method of Retailers
Electric Utilities	Controlled Payment Method (Free Payment Method)	

5. Current Power System Deregulation

Phase 2: Complete Deregulation of Retail

- ✘ All the Customers Are Allowed to Select a Power Supplier
- ✘ It is Expected That PPS Offers More Reasonable “Menu” Including Peak-Shift, Unit Price, Loyalty Programs, *etc.*)
- ✘ *Each Electric Power Company Make a Plan to Sell Electricity to Other Areas through Subsidiary Firms*

5. Current Power System Deregulation

Phase 3: Legal Unboudling

- ✘ To Separate Division of Transmission and Distribution from Division of Generation and Retail While They Are Able to Form Capital Tie-Up with Each Other

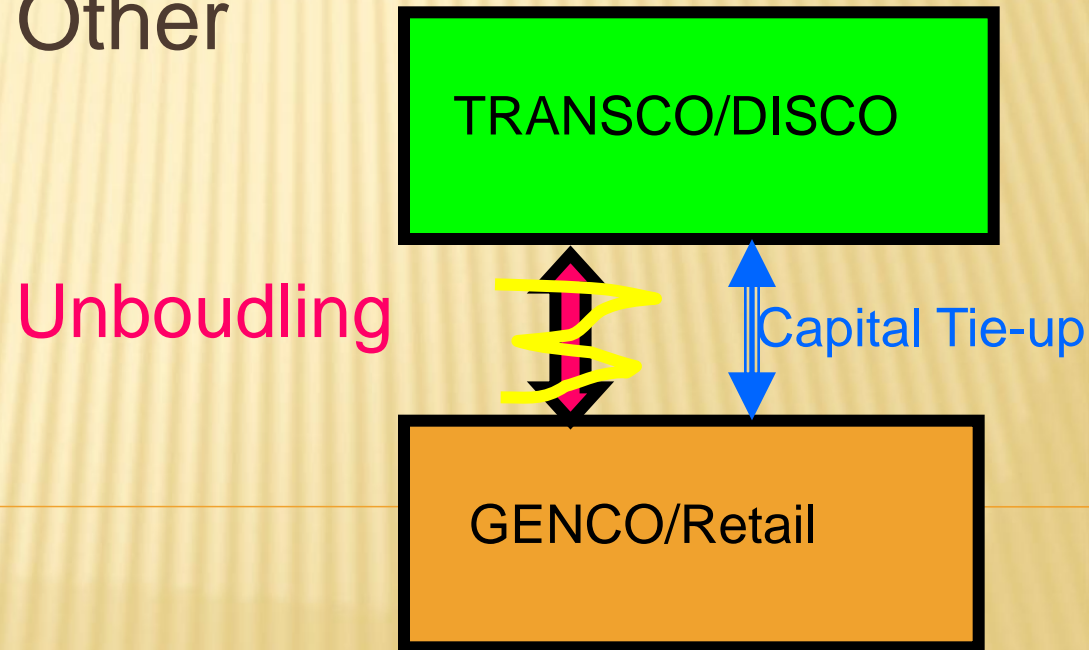


Fig. 13 Concept of Legal Unboudling

5. Current Power System Deregulation

Phase 3: Legal Unboudling

- ✘ To Prohibit TRANSCO/DISCO from Pursuing GENCO/Retail by Legal Unboundling
- ✘ To Set up Order on Personnel Affairs and Transactions to Make TRANSCO/DISCO More Neutral
- ✘ To Abolish Regulations on Electricity Bill If Completion of Retail Is Appropriate
- ✘ For J-Power to Carry out Legal Unboundling on Transmission Networks

6. CONCLUSION

- × **This Talk Provided the Background and the Current Status of Deregulation of Power Systems in Japan.**