

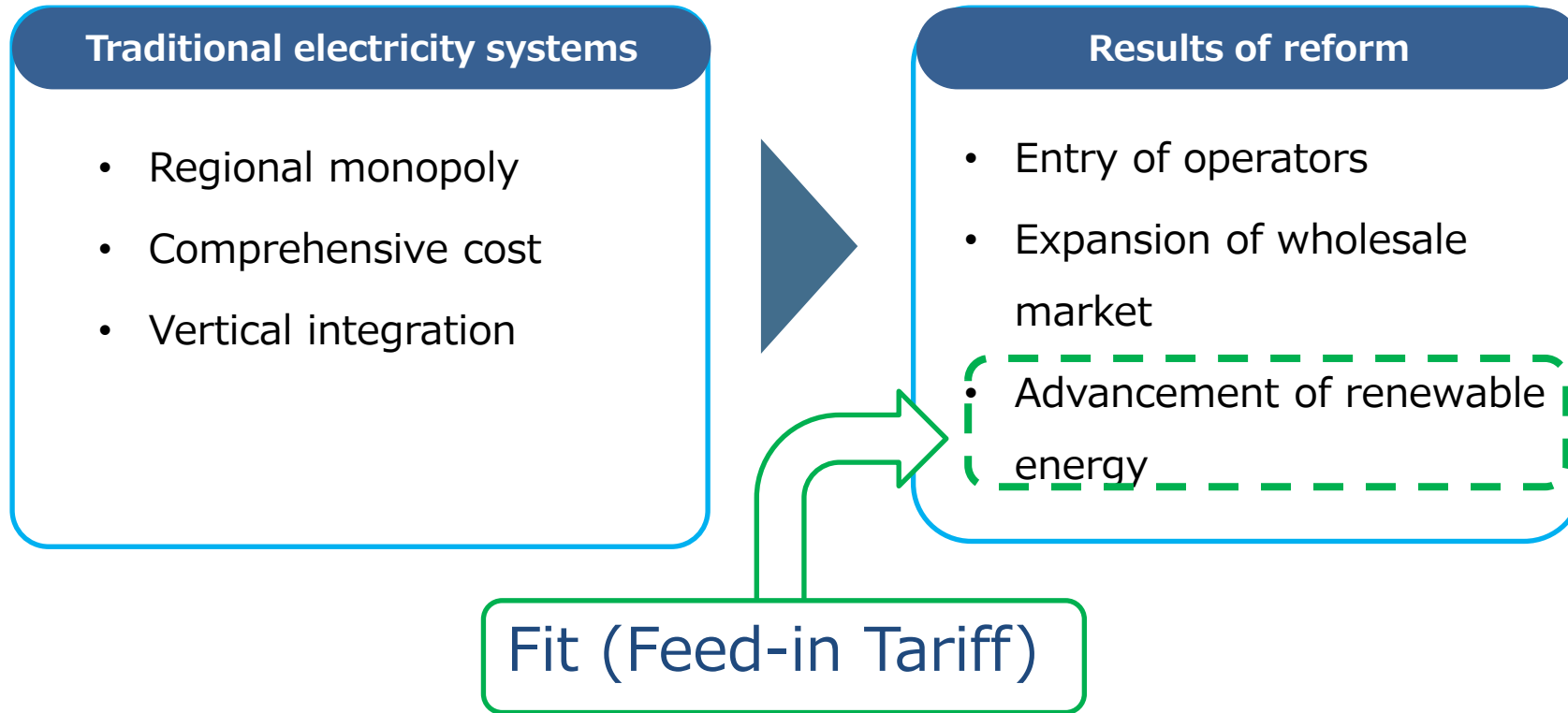
H-UTokyo Lab.

**Hitachi-UTokyo Lab. 5th Industry-Academia Collaboration Forum
Toward Realizing Energy Systems to Support Society 5.0**

Energy Policy toward Carbon Neutrality to Realize Sustainable Society and Industries

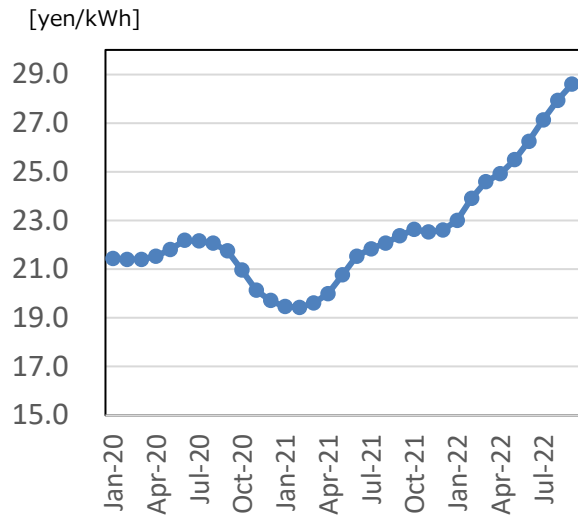
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25 January 2023



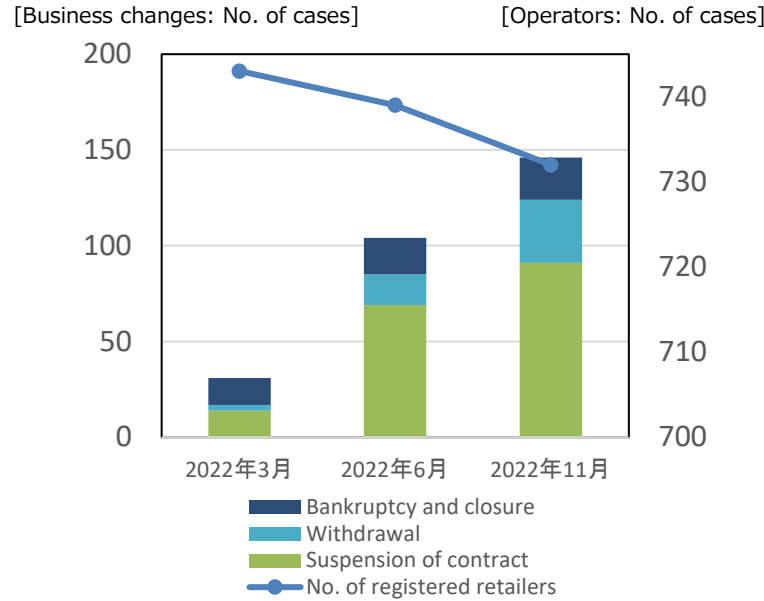
Summary of the first reform

- Expansion of consumer options and business opportunities for operators.
- Increase in liquidity and drop in prices in the electricity market.
- Increase in the ratio of renewable energy.



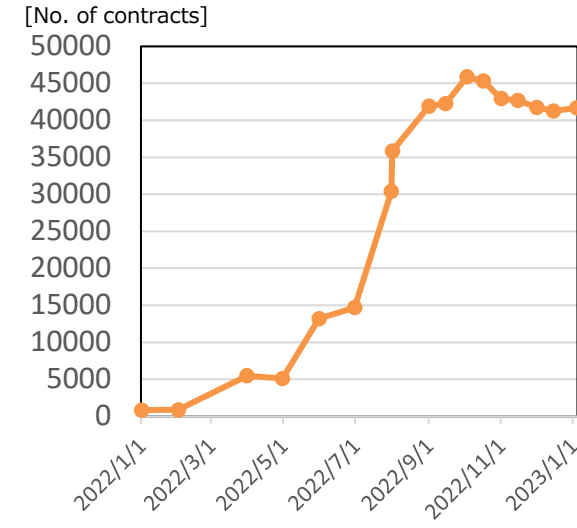
Nationwide average of low-voltage (light) retail charges

Source: Shin Denryoku Net (<https://pps-net.org/>)



No. of registered electricity retailers and business trends

Source: Prepared by Hitachi-UTokyo Lab based on materials from the Agency for Natural Resources and Energy's Basic Policy Subcommittee on Electricity and Gas (November 8, 2022, Document 3-1) and Teikoku Databank (December 5, 2022)



No. of last-resort supply contracts

Source: Electricity and Gas Market Surveillance Commission

Reserve kW

- Long-term shutdown of nuclear power.
- Increase in suspension and discontinuation of thermal power.
- Limitations of the kWh market principle.

Transmission and distribution grid

- Increase in aging facilities.
- Large-scale introduction of renewable energy.

(Response to DC power transmission line and ground congestion)

Reserve kWh

- Increased fuel procurement risk.
- Changes in procurement portfolios and the risk of over-reliance on LNG.

New issues

1. Excessive reliance on short-term market prices

- Contribution to the formation of merit orders. (discovery of efficient operators and power sources)
- But, it may distort medium- to long-term decisions. (fuel procurement, power investment, etc.)
- Direct impact of fluctuations in global resource prices and exchange rates.

2. Lack of cross-market collaboration

- Maintenance of power sources and reduction of incentives for new investment due to failure to recover fixed costs.
- Competition for power supply due to ambiguity of stable supply providers.
- Increase in price volatility faced by consumers.

3. Large-scale introduction of variable renewable energy

- Large-scale introduction of solar and wind power has widened the gap between peak and off-peak output.
- Increasing social needs for adjustment power sources with deteriorating profitability to bridge the gap.



Directions for the second reform

1. Rebuilding the “value of electricity”

- Strengthening of framework for strictly adhering to the same amount at the same time as the planned values in BG.
- Further enhancement of monitoring of market dominance in the wholesale market.
- Construction of a mechanism to handle the volatility of prices in accordance with customer choices.

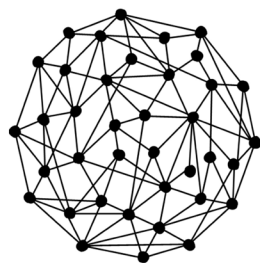
2. Restructuring the role of the market

- Need for early elimination of market distortions caused by asymmetric regulations.
- Transparency and disclosure of power supply operational status.
- Comprehensive market monitoring, including relative markets.
- Clarification of positioning of nuclear power as a joint business.

3. Rebuilding the system of consumer sovereignty

- Transition to a sustainable framework based on the judgment of customers, such as corporate PPA.
- Need to integrate policies related to global warming into the emissions trading scheme towards 2050CN.

- **Instability of supply due to excessive dependence on short-term market prices**
 - Excessive reliance on market procurement and reduction in weight of negotiated transactions.
 - Reduction in weight of negotiated transactions to stabilize prices.
 - (Expansion of) market price volatility
 - Emergence of geopolitical risks.
 - Large-scale introduction of variable renewable energy.
 - Inconsistency with timing of decision-making, such as in fuel procurement and power investments.
- **Instability of supply and soaring prices due to lack of cross-market collaboration**
 - Lack of mutual cooperation, such as in imbalanced prices, wholesale markets, burden of renewable energy transmission and distribution, and capacity markets.
 - Consideration of various measures to reduce the burden has created a creeping cost burden, leading to an increase in the burden on other markets.
 - Lack of investment incentives due to failure to recover fixed costs.
 - Optimal location for supply capacity/demand.
 - Non-discrimination at home and abroad and market dominance.
- **Deterioration in profitability of existing power sources due to large-scale introduction of variable renewable energy**
 - Expansion of variable renewable energy such as solar and wind power.
 - Increase in weight of adjustment capacity power, frequent occurrence of repeated start-up and shutdown of power operations.



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