

EDMC Energy Trend Topic

Analyzing Factors Influencing Profitability of Japanese Energy Industries

Factors Influencing Profitability of Power, Gas and Oil Industries

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Profitability of energy companies involving 3E's+S

Japanese energy companies provide most of the energy supply in Japan. Therefore, energy companies' profitability has a close relationship with the so-called 3E's+S – energy security, environmental adaptation, economic efficiency and safety. As for economic efficiency, some profitability is required to expand consumer benefits including energy price drops through energy market competition. Profitability is also required to secure investment necessary for energy security and safety. Indicating environmental adaptation's relationship with profitability are numerous coal-fired power plant plans built by companies to survive competition amid power system reform.

Japan fully deregulated the power system in April 2016 and the city gas system in April 2017. The government's Energy White Paper 2017 states, "Japanese energy companies are expected to contribute to energy safety and stable energy supply, economic efficiency improvement and global environmental adaptation by detecting various changes accurately and growing as competitive companies even amid business environment changes including a slowdown in domestic energy demand growth and energy market deregulation." In this way, energy companies are expected to contribute to the 3E's+S by securing their profitability even under deregulation.

This paper considers factors influencing energy companies' profitability by analyzing profitability differences among Japanese power, city gas and oil industries including oil wholesalers subjected to earlier deregulation.

Profitability of Japanese energy industries

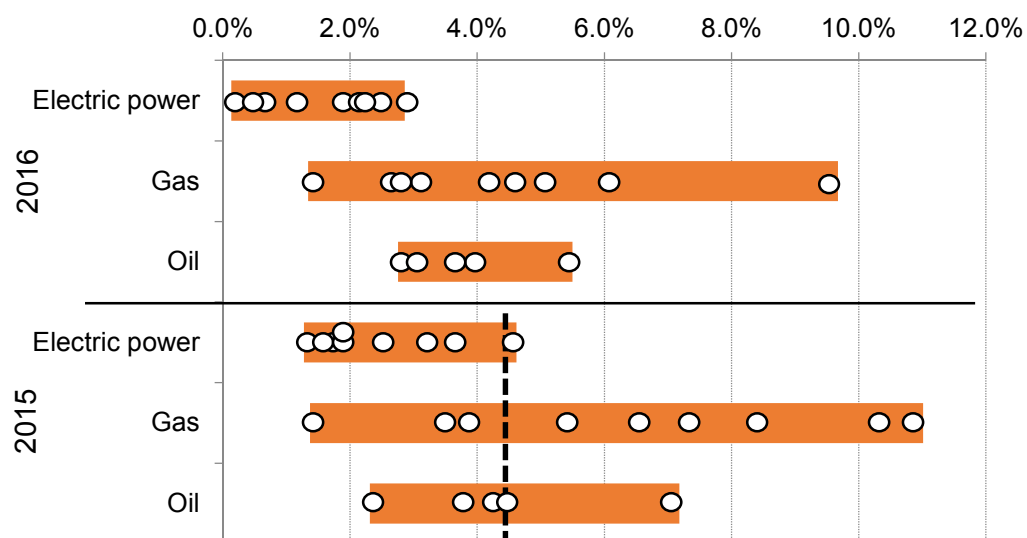
Analysis targets in the electric power industry are nine former general power utilities excluding Okinawa Electric Power Co. Targets in the city gas industry are nine companies left after Otaki Gas Co., which mainly provides domestically produced natural gas, is excluded from the 10 largest gas sellers. Target oil wholesalers are five major companies at the end of FY2016 (four at present after JX Holdings Inc.'s absorption of Tonen General Sekiyu in April 2017) (Table 1)

Table 1 Analysis targets in each industry

Industry	Companies
Electric power	Hokkaido Electric Power Co., Tohoku Electric Power Co., Tokyo Electric Power Company Holdings, Inc., Chubu Electric Power Co., Hokuriku Electric Power Co., Kansai Electric Power Co., Chugoku Electric Power Co., Shikoku Electric Power Co., and Kyushu Electric Power Co.
City gas	Hokkaido Gas Co., Tokyo Gas Co., Keiyo Gas Co., Toho Gas Co., Shizuoka Gas Co., Hokuriku Gas Co., Osaka Gas Co., Hiroshima Gas Co., and Saibu Gas Co.
Oil wholesale	JX Holdings, Inc. (FY2015-2016), Tonen General Sekiyu (FY2015-2016), Idemitsu Kosan Co., Showa Shell Sekiyu K.K., and Cosmo Energy Holdings Co.

Return on assets (ROA) (return divided by assets) is used here as a profitability indicator. Recurring profit including interest payments and other financial costs is adopted as the numerator here to analyze usual profitability (net profit is not adopted here because it includes one-time losses or profits). Consolidated ROAs are used here because some companies do not disclose financial statements for energy segment subsidiaries. For oil wholesalers, inventory assessment losses or profits are excluded from recurring profit to measure real profitability. On these conditions, the analysis target companies' ROAs for the FY2015-2016 analysis period are compiled by industry in Figure 1.

Figure 1 ROA distribution by industry



Sources: Computed by the author from analysis target companies' financial statements, documents for their business results briefings and "Financial Statements Statistics of Corporations by Industry" by the Ministry of Finance

(Notes) ○ marks indicate analysis target companies' ROAs. The left end of each bar indicates the smallest ROA among the target companies and the right end represents the largest ROA. ROAs in the oil industry exclude inventory assessment losses or profits. The dotted line for 2015 indicates the average for all industries.

ROAs in the gas and oil industries are generally higher than in the electric power industry. This may be because electric power companies generally have greater assets including high-value power plants. In FY2015, city gas industry alone exceeds the average for all industries and feature a great gap between the smallest and largest ROAs. Electric

power and city gas companies' earnings decreased slightly in FY2016 after benefiting from a fuel and raw material cost adjustment system¹ in FY2015.

The following analyzes factors influencing ROAs of energy companies by industry. ROAs may be influenced by multiple factors rather than any single factor. If each factor's impact on ROAs can be found, it may be useful for identifying factors that companies should focus on among numerous business indicators.

A regression analysis is used to measure coefficients for multiple rough explanatory variables regarding business sizes, efficiency, sales and purchasing and explore a model for maximizing the degree-of-freedom adjusted coefficient of determination (adjusted R²), an indicator for assessing the balance between fitting and the number of explanatory variables, for the analysis target companies in Table 1. The analysis target period is set at two years from FY2015 to clearly reflect cost structure changes toward power and gas system's full deregulation and effects of nuclear power plant restarting on electric power companies' profitability and meet the availability of explanatory variables. Regression analysis results are described along with major explanatory variable candidates' coefficients of correlation with the ROA.

¹ The system generates deferred profits upon primary energy price drops, like those seen in FY2015. (Upon primary energy price hikes, the system generates deferred losses.)

Key points for power companies include PPS companies' share of regional power sales and oil's share of power generation mix

As for the electric power industry, the nine former general electric utilities other than Okinawa Electric Co. are analyzed as explained above (Figure 2) (Table 2).

Figure 2 Coefficients of correlation with ROAs for electric power companies (FY 2015-2016)

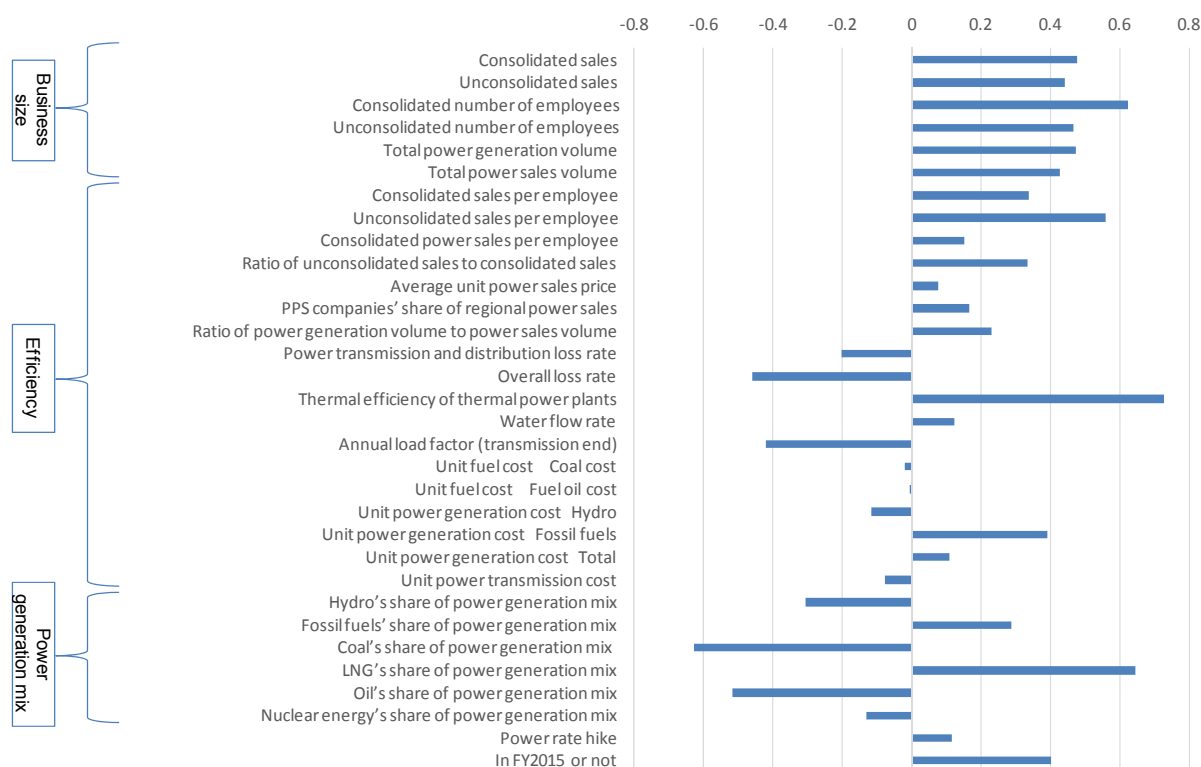


Table 2 Factors influencing electric power companies' ROAs (FY2015-2016)

Explanatory variable	Coefficient	t value
(1) PPS companies' share of regional power sales (%)	-0.20	-2.54
(2) Oil's share of power generation mix [power generation volume] (%)	-0.06	-2.05
(3) Thermal efficiency of thermal power plants (%)	0.32	2.46
(4) Power rate hike [after Great East Japan Earthquake] (%)	0.11	3.51
(5) In FY2015 or not [fiscal year effect]	0.01	1.97
Constant term	-0.11	-2.02

Sources: Computed by the author from analysis target companies' financial statements, Electricity and Gas Market Surveillance Commission "Power Transaction Results," Ministry of Economy, Trade and Industry "Electricity Survey Statics," Japan Electric Power Association "Electric Power Industry Handbook," etc.

(Note) PPS (power producer and supplier) companies' share of regional power sales in FY2015 is their April 2016 share minus a low-voltage portion. Regarding the power generation mix, generally competitive coal power generation has a negative correlation with the ROA apparently because most companies with low coal power generation shares implemented power rate hikes to recover profitability when nuclear power plants were shut down after the Great East Japan Earthquake.

The adjusted R^2 in Table 2 is 0.80.

According to Figure 2, explanatory variables regarding business sizes in the electric power industry have stronger positive correlations with the ROA than in the gas and oil industries. This means that business sizes in the electric power industry tend to exert more positive effects on profitability than in the gas and oil industries. Since this analysis is based on the premise of the integration of power generation, transmission and retail functions, however, business size variables' correlations with the ROA may not necessarily be the same if these functions are separated. Among variables regarding efficiency, unit power generation and fuel costs have no large effects at present but could grow more important on progress in deregulation in the future.

Table 2 means (1) that if PPS companies' share of annual regional power sales volume is 1 percentage point higher, the ROA is 0.20 points lower in the target analysis period, (2) that if oil-fired power generation's share of the power generation mix is 1 percentage point higher, the ROA is 0.06 points lower, (3) that if thermal power plants' thermal efficiency is 1 percentage point higher, the ROA is 0.32 points higher, (4) that if a power rate hike after the Great East Japan Earthquake is 1 percentage point higher, the ROA is 0.11 points higher, and (5) that the ROA in FY2015 is 0.01 percentage points higher (due to the fuel cost adjustment system).

Profitability-enhancing initiatives indicated here include (1) maintaining power sales volume by keeping existing customers, (2) restricting fossil fuel purchase volume by restarting nuclear power plants to reduce oil-fired power generation's share of the power generation mix, and (3) investing in thermal power plants to improve power generation efficiency.

Key points for city gas companies include unit gas material cost and SG&A ratio

City gas industry analysis targets are nine companies left after Otaki Gas Co., which mainly provides domestically produced natural gas, is excluded from the 10 largest former general gas utilities in sales (Figure 3) (Table 3).

Figure 3 Coefficients of correlation with ROAs for city gas companies

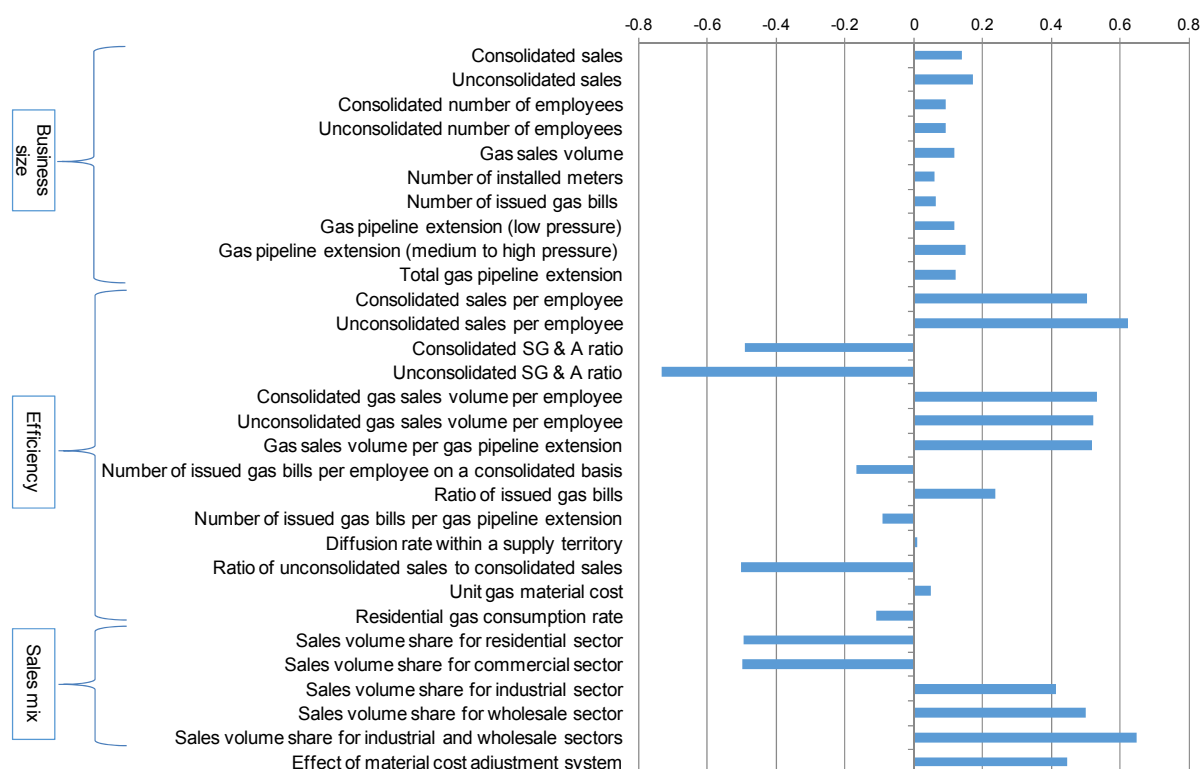


Table 3 Factors influencing city gas companies' ROAs (FY2015-2016)

Explanatory variable	Coefficient	t value
(1) Unit gas material cost (Yen/m³)	-0.0018	-3.55
(2) SG&A ratio (Selling, general and administrative expense ratio) [Unconsolidated] (%)	-0.2142	-3.93
(3) Ratio of issued gas bills (Number of issued gas bills to number of installed meters) (%)	0.3279	2.23
(4) Effect of material cost adjustment system [3-month average – monthly material price] (1,000 yen/t)	0.0003	2.90
Constant term	-0.0867	-0.65

Sources: Computed by the author from analysis target companies' financial statements, a gas business annual report, etc.

(Note) The number of issued gas bills represents the number of customers that actually receive supply. Accordingly, the ratio of issued gas bills indicates gas-receiving customers' ratio to the number of installed meters.

The adjusted R² in Table 3 is 0.75.

Figure 3 indicates that explanatory variables regarding business sizes in the gas industry have weaker positive correlations with the ROA than in the electric power industry, while explanatory variables regarding efficiency in the gas industry have stronger positive or negative correlations with the ROA. This means that business efficiency rather than business sizes in the gas industry has greater effects on profitability than in the electric power industry. For example, Shizuoka Gas posts the FY2015-2016 average ROA of around 10%, the highest among the analysis target city gas companies, and features the highest gas sales volume per employee and the highest gas sales volume per pipeline extension and the lowest SG&A ratio.

Table 3 means (1) that if the unit gas material cost is 1 yen/m³ higher, the ROA is 0.0018 percentage points lower in the target analysis period, (2) that if the sales administration cost ratio is 1 percentage point higher, the ROA is 0.2142 points lower, (3) that if the ratio of issued gas bills is 1 percentage point higher, the ROA is 0.3279 points higher, and (4) that if the effect of the material cost adjustment system² is 1,000 yen/t higher, the ROA is 0.0003 points higher.

Profitability-enhancing initiatives indicated here include (1) lowering the unit gas material cost, (2) restricting the SG&A and expanding gas sales efficiently to boost sales, and (3) increasing the occupancy rate for city gas-ready buildings and making efforts to be chosen by those potential customers. The unit gas material cost accounting for a large share of sales may grow even more important as competition intensifies on full gas system deregulation from FY2017.

² The effect is the three-month average of LNG CIF import prices for three, four and five months earlier minus the LNG CIF import price average for the latest month. As the analysis target companies include those that close annual books in March and December and as the analysis covers multiple years, the material cost adjustment system, though failing to become any factor to differentiate each company from others, has been included into explanatory variables to exclude these difference' effects on earnings.

Key points for oil wholesalers include gasoline sales volume per employee and petrochemical ratio

In the oil wholesale industry as the third analysis target, the abovementioned five largest companies are analyzed (Figure 4) (Table 4). In the computation of ROAs as the objective variable, inventory assessment losses or gains are excluded from each company's recurring profit as described above, based on documents for business results briefings.

Figure 4 Coefficients of correlation with ROAs for oil wholesale companies (FY 2015-2016)

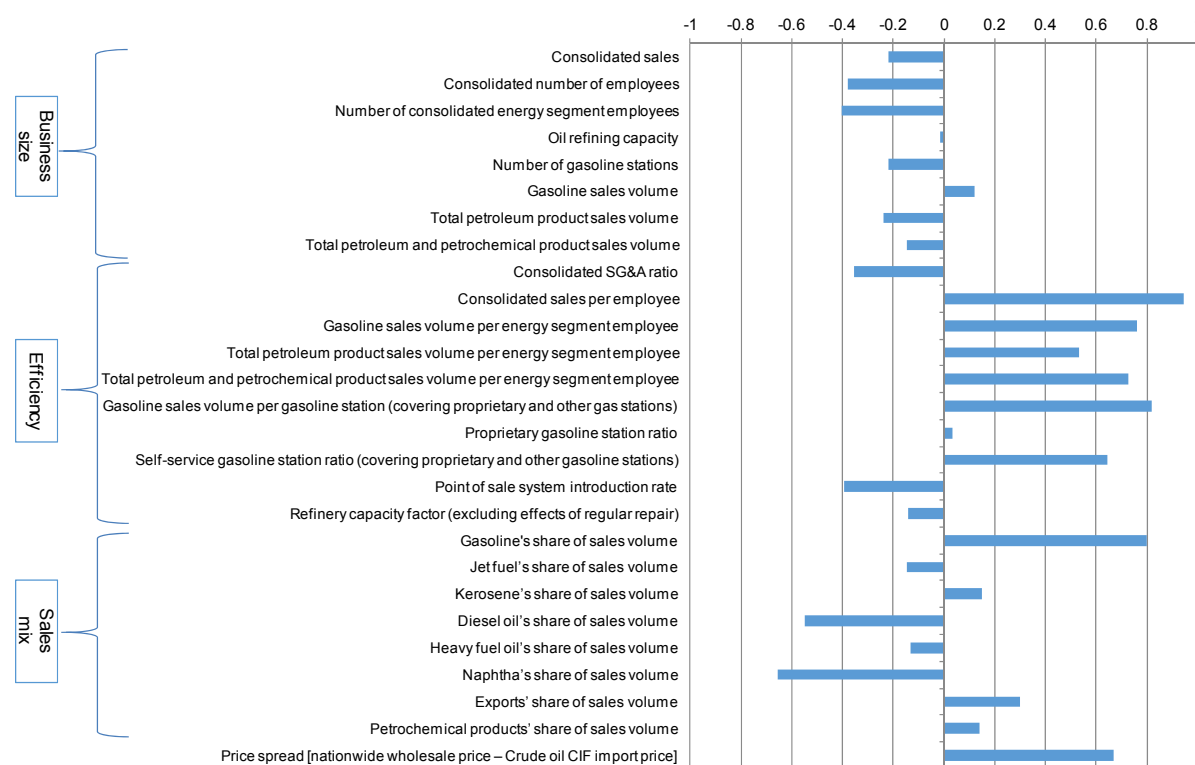


Table 4 Factors influencing oil wholesalers' ROAs (FY2015-2016)

Explanatory variable	Coefficient	t value
(1) Consolidated gasoline sales volume per energy segment employee (1,000 kl per employee)	0.011	6.85
(2) Petrochemical products' share of sales volume (%)	0.294	5.99
(3) Price spread [nationwide wholesale price – Crude oil CIF import price] [fiscal year effect] (yen/L)	0.013	3.85
Constant term	-0.250	-4.00

Sources: Computed by the author from analysis target companies' financial statements, documents for their business results briefings, documents of the Agency for Natural Resources and Energy, documents of the Petroleum Association of Japan, Gasoline Stand (additional volume) by Monthly Gasoline Stand, etc.

(Note) The nationwide wholesale price for computing the price spread is the weighted average of gasoline, kerosene and diesel oil prices.

The adjusted R² in Table 4 is 0.93.

Figure 4 indicates that while explanatory variables regarding business sizes have weak correlations with the ROA, some of those regarding efficiency have strong positive or negative correlations with the ROA. Remarkably, “gasoline sales volume per gasoline station” and the “self-service gasoline station ratio (covering proprietary and other gasoline stations),” which seemingly have little direct correlations with the ROA, actually have strong correlations with the ROA. The strong correlations may be realized in a case in which a company, when realigning gasoline stations in response to falling gasoline demand, concentrates gasoline stations in urban areas with more sales per employee and proactively reforms them into self-service gasoline stations that hold down personnel costs and provide lower-priced gasoline to attract customers and expand sales. In fact, self-service gasoline stations have persistently increased since the lifting of a ban on such gasoline stations in 1998 in Japan while the total number of gasoline stations has continued to decrease. At present, self-service gasoline stations account for more than 30% of all gasoline stations in Japan. Each major oil wholesaler directly controls 20-30% of gasoline stations under its brand. Irrespective of whether gasoline stations are directly controlled by oil wholesalers, however, initiatives to boost sales volume per gasoline station may contribute to expanding wholesalers’ gasoline sales volume. As a result of such initiatives, wholesalers’ gasoline sales volume per energy segment employee increases. As gasoline features a greater profit margin per liter than other petroleum products, sales volume expansion can be expected to boost wholesalers’ overall profitability. The three variables of “wholesalers’ gasoline sales volume per energy segment employee,” “gasoline sales volume per gasoline station” and the “self-service gasoline station ratio (covering proprietary and other gasoline stations)” have strong correlations with each other. For efficient gasoline sales, wholesalers will have to invest in refineries to increase yields for light petroleum products like gasoline.

For example, Tonen General Sekiyu posted the highest average ROA (excluding the effect of inventory assessment losses or profits) at around 6% among the oil wholesalers in the FY2015-2016 period as well as the highest values for gasoline sales volume per gasoline station, the self-service gasoline station ratio (covering proprietary and other gasoline stations), gasoline sales volume per energy segment employee and gasoline’s share of total sales.

Table 4 means (1) that if gasoline sales volume per energy segment employee is 1,000 kl more, the ROA is 0.001 percentage point higher, (2) that if petrochemical products’ share of sales volume is 1 percentage point higher, the ROA is 0.294 points higher, and (3) that if the price spread is 1 yen/l higher, the ROA is 0.013 points higher.

Profitability-enhancing initiatives indicated here include (1) enhancing gasoline sales as described above and (2) enhancing petrochemical production (if profit margins are as firm as in the analysis period). The enhancement of petrochemical production may contribute to stabilizing profitability while petroleum product prices fluctuate.

Future profitability-boosting measures for energy companies

This analysis has found that correlations between business size indicators (including sales value, the number of employees and sales volume) and profitability differ from industry to industry. If power and gas market's full deregulation leads to competition beyond the borders between the three energy industries, however, larger-sized companies may become winners boosting profitability.

Japan's final energy consumption is expected to decline for the eighth straight year since FY2011 just after the Great East Japan Earthquake³, indicating that domestic energy demand has been decreasing gradually. In the face of the deregulation and domestic market shrinkage, Japanese energy companies may expand into other Asian countries, where energy demand is increasing, and develop new businesses for structural reform to boost profitability.

The author would like to closely watch energy companies' moves influencing the 3E's+S in the future as well as in the past. While this analysis targets Japanese energy companies alone, the author believes that analyses on European and other foreign energy companies playing in more deregulated markets would be effective for exploring future prospects in Japan.

³ IEEJ "Economic and Energy Outlook of Japan through FY2018"