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ABSTRACT

Like any other corporate, state owned enterprises (SOE) main objective is to achieve optimum profit to ensure its sustainability. In Indonesia, electricity business in run by PT PLN (Persero), a corporate owned 100% by Government of Indonesia. Thus, PLN should maximize its effort on cost reduction and sales volume optimization to ensure its profitability growth. Looking at the structure of operational cost and revenue, this study aims to explore the effect of fuel mix and power losses on profitability (operating profit/loss) of PLN, where the moderating role of Indonesia crude price (ICP) and exchange rate on fuel mix effect toward profitability also take into account. By using moderated regression analysis (MRA), this study found out that the effect of fuel mix on profitability, and power losses on PLN's profitability exist negatively. ICP and exchange rate also strengthen the effect of fuel mix on PLN's profitability. This study suggested PLN to continue exploring ways to optimize its fuel mix and power losses, as well as increasing sales volume. This could not be done without Government intervention that favors PLN i.e., tariff adjustment or incentives, especially when exchange rate and ICP value worsen. This is to ensure that PLN has a healthy financial sustainability.

Keywords: PT PLN (Persero), Electricity Tariff, Fuel Mix, Indonesia Crude Price, Exchange Rate, Power Losses, Profitability

INTRODUCTION

Electricity has now shifted to be primary need in our daily life. Every activity needs electricity. The urgency could also be seen in the increasing demand for electricity in public spaces. Moreover, as an infrastucture that affect lives of many people, electricity is not only needed for supporting daily activities, but also as a business driver that supports the growth of economy. It is seen as the mother of investment climate, where its availability, quality and reliability effects the investment significantly (Fontana and Arifin, 2016).

Considering its great economic impact, it is not surprising that major electricity business in Indonesia is run by state owned enterprises (SOE). PT PLN (Persero), further refers to as PLN, is a SOE that runs its business in electricity where its ownership belongs 100% to Government of Indonesia. Its line of business includes generation, transmission, distribution, and other services related to electricity that run by 7 regional operating segments and 11 subsidiaries.

The main purpose of a company, according to Brigham and Ehrhardt (2014), is value maximization to its shareholders. As owner, shareholders surely expect return from the investment. This is the core objective of a company that aims profit gaining. This objective is

also alligned with the purpose of state owned enterprise as stipulated in the Undang-Undang No. 19 Tahun 2013 tentang Badan Usaha Milik Negara (State Owned Enterprise), that is to achieve profit. As a both company and SOE, PLN runs its business with profit maximization as its foundation. A company with big profit indicates good efficiency in terms of operation and invesment, and a company with adequate profit could survive when economic situation worsens and financial pressure increases (Khan, 2017). Profitability in this regard is not narrowly defined as a tool to dividend payment (as this is also PLN obligation) as argued by Gantino and Iqbal (2017); Azmal et al. (2019), that it effects yet significant toward dividend payment policy, as the company use the profit for business expansion purpose. In this regard, to achieve optimum profit, PLN profitability will grow up if electricity sales revenue increases and cost of production reduces (Fontana and Arifin, 2016).

Aforementioned ideal profitability concept is unfortunately not fully applied in PLN. The increasing sales of electricity increased PLN revenue, yet did not automatically increase PLN profitability because electricity selling tariff is regulated by Government. PLN electricity tariff has not risen up since 2015. Tariff adjustment policy for unsubsidized customers as per *Peraturan Menteri Energi dan Sumber Daya Mineral Republik Indonesia* No. 31/2014 should have enabled tariff adjustment to follow economic price.

In that case, the effort to increase profitability (under PLN control) should have been undergoned in terms of efficiency betterment and increasing sales volume. The analysis of cost reduction could be started by identifying PLN operating expenses, and sales volume maximization analysis could be started through operating revenue identification. According to the PT PLN (Persero) Annual Report 2018, the biggest factor that contributed to operating expenses is fuel and lubricant (around 45%). In detail, the unique factor in fuel and lubricant expenses is oil. According to PLN internal data, eventhough oil contributed 6,8% to the whole fuel volume, its cost contributed 23,2% to the whole fuel and lubricant expenses. This contrasted coal that contributed 58,3% in volume yet only 33,8% in expense. From this point of view, oil became the priciest fuel in generating electricity. PLN then should be able to control the oil expenses. PLN could control its consumption volume, known as fuel mix (total energy produced from oil-fueled generators compared to total energy produced). However, oil price is out of PLN control, where it is affected by the fluctuation of exchange rate and Indonesia Crude Price (Waluyo, 2015). In this understanding, the cost reduction effort is seen in both perspectives: internal and external.

The analysis of revenue optimization effort was started by looking at the PLN operating revenue structure. Its 2018 Annual Report stated that 96% of operating revenue came from electricity sales. Sales revenue was calculated by the function of sales volume and selling tariff. The increasing sales volume was seen as the only way to generate more profit because the selling tariff must not be higher. In this regard, PLN should reduce the power losses so that the total generated energy could be optimally absorbed that contribute directly to the increasing of sales volume.

Previous studies on PLN profitability (at corporate level) are found very limited. In order to align with problem identification, this study refers to the finding of several previous studies in other sectors, such as banking, transportation, energy, even agriculture, by identifying its issues. Skalsky et al. (2008) studied the effect of fuel and fertilizer on profitability of plantation sector. Qianqian (2011) studied the effect of oil prices on China's economy. Hoffman et al. (2018) studied the the impact of oil prices on logistics transportation providers' financial

capability. Wattanatorn and Kanchanapoom (2012) studied the effect of oil price on profitability of multisectoral companies listed in Thailand Stock Exchange. Hidayati (2014) studied the effect of inflation, Bank Indonesia rate, and exchange rate on profitability of Islamic banks in Indonesia. Baum et al. (2001) studied the impact the long-term and short-term effect of currency value on profitability. Kandir et al. (2015) studied the effect of exchange rate on energy companies in Turkey. Gawlak studied the profitability of electricity companies. Sadugol (2012) studied the impact of system load factor improvement on the profitability of Karanataka utilities. Kwakwa (2018) studied the impact of power losses on Ghana's economy. This study further comprehended them by applying and analyzing the case of PLN.

From the aforementioned background, the objectives of this study are: (1) To find out the effect of fuel mix on PLN profitability; (2) To find out the ICP role in enhancing the effect of fuel mix on PLN profitability; (3) To find out the exchange rate role in enhancing the effect of fuel mix on PLN profitability; (4) To find out the effect of power losses on PLN profitability; (5) To provide recommendation for both PLN and government as the way forward from the study.

LITERATURE REVIEW

Efficiency

Efficiency refers to the ratio of used resources toward production output (Kurtz and Boone, 2011). Jumono et al. (2019) argued that profitability is used to evaluate the internal performance of a company by determining whether it has succeeded in achieving its ultimate objective. Efficiency happens when human resources, business process and technology altogether utilised to increase productivity and product value of a business operation by lowering the routine operating expenses at some desired level. Operational efficiency, along with asset utilization and financial leverage, could be used to increase company value (Jumono et al., 2016). In other words, efficiency happens when lower input produces same output, or same input produces more output (Mubyarto and Hamid, 1987). According to Tasman and Hafidz (2013), the effort to optimize output with minimum input could be categorized in two: (1) Cost efficiency, related to management decision toward the allocation of overall production input under corporate control; (2) Technical efficiency, related to the corporate permanent resources.

Fuel Mix

In a broader context, the combination of several primary energy resources used to generate electricity within a specific area is called energy mix. The primary energy resources include fossil fuels (coal, oil, and gas), renewable energies (hydro, wind, solar, geothermal, biomass, etc) even waste. In PLN, the percentage of energy produced from oil-fueled power plant is called fuel mix. Fuel mix reducing is one of PLN strategic action toward efficiency enhancement and cost reduction. This is one of risk mitigation effort toward oil price volatility that is significantly affected by various factors out of PLN control. In other sector, such as transportation, the reduction of oil consumption is also a major issue. The rising of oil price affected public transport company where tariff adjustment must take place. For that reason, government should seek alternative transportation system with the lowest oil consumption per passenger, such as broadening railway coverage, MRT for urban transport, and highway development (Abdulkadir, 2000).

Power Losses

Power losses is defined as the total energy loss caused by external and internal factor that happens in the transmission line between power plant and consumers (Anumaka, 2012). Power losses could be categorized as two: technical and non-technical losses. Technical losses is identified as the energy loss when being transformated, transmitted, and distributed through conductors and appliances. Non-technical, or commerical losses, is identified as the total energy loss caused primarily because of theft or any other non-technical issues such as unpaid bills and accounting errors (Smith, 2004).

Power losses could be seen from the perspective of cost reduction and sales volume optimization. In the formulation of electricity production cost, a utility could count power losses as an allowable cost and consider it as sold energy. However, if the actual power losses percentage is higher than the regulated, a utility company should bear the difference and count it as a loss. Thus, the difference of allowed revenue (as per the regulated power losses percentage) with total energy sales (if the actual power losses percentage is lower than the regulated) is considered as additional profit for company (Antman, 2009). In the context of operating revenue, the bigger power losses, the bigger opportunity for gone, eventhough technically, the total transmitted energy could not reach 100%.

Exchange Rate

Exchange rate is defined as the conversion of foreign currency in local currency, or vice versa (Karim, 2013). Exchange rate could affect the economy if the currency is appreciated or depreciated. The high depreciation of exchange rate could cause a company debt denominated in foreign currency rises. This condition threatens company financial capability and also contributes to the country macro economics instability (Salvatore, 2014). Exchange rate fluctuation could potentially affect a company cost structure in running operation and production process, where most of production factors are indexed in foreign currency. The affected components include contract, debt and interest payment in foreign currency.

ICP

Indonesia crude price (ICP) refers to the crude oil price set with formula by government to implement oil and/or gas cooperation contract as well as crude oil sales from government part (Febriyanto, 2016). The primary energy price (oil) is set by referring to the mean of platts Singapore (MOPS) as per the presidential decree No. 55/2005. ICP is affected by global oil price. The first factor (fundamental) is supply and demand mechanism, includes production, stock, refinerery condition, piping facilities, production policy, economic growth, needs, season, and the availability of alternative resources technology. The secord factor (non-fundamental) is issues other than supply-demand mechanism, such as politics disturbance, security, and speculation in oil market (DPR, n.d).

Profitability

Profitability is defined as company ability in generating profit (Sartono, 2014). Profitability becomes an important indicator bearing in mind that a company main purpose is to generate maximum profit. Profitability indicates management capability in company business. Profitability could be understood from the ratio of profit gained toward sales or investment. The bigger profitability ratio, the better organization capability in generating company profit (Jamil, 2013). In general, profitability analysis aims to measure management effectiveness, with the objectives: (1) To detect the cause of profit/loss in certain period; (2) To showcase

company success in terms of management capability and motivation; (3) As a tool to forecast company profit that shows the correlation between profit and investment; (4) As a management control tool to set target, budget, coordination line, evaluation, and also as a justification in decision-making process (Kasmir, 2013).

RESEARCH HYPOTHESIS

Fuel mix or oil consumption affects the overall operating expenses. One of the main sector that easily affected by the fluctuation of oil price is transportation. When the oil price rises, logistic tariffs mostly rises because the previous tariff might no longer provide adequate profit for transportation company to operate. This tariff adjustment is required to maintain the sustainability of transportation company (Soemarno and Darza, 1990). In other sector, such as, industry, the rise of oil price around 29,43% and electricity price in 12%, industries oil and electricity expenses might rise around 20,3% (Abdulkadir, 2000). This also happens to air transportation industry. According to IATA Economic Chart of the Week (2019), the rise of fuel prices affects the outlook of the airline industry profitability. This is also the study finding of Skalsky et al. (2008) that stated that fuel affected profitability. If seen from PLN operating expenses, the production cost of electricity generated from coal was Rp 650, where gas costed Rp 945 (average price was US$ 8 per MMBTU and exchange rate was Rp 13.500), and oil costed Rp 1.600 when its price was RP 6.450/l (Satrianegara, 2018). Seeing the comparison, if oil price rises, PLN operating expenses will also raise significantly that contributes to its operating revenue loss. From above data and literature, the proposed hypothesis is:
H1: Fuel mix affects PLN profitability negatively.

The oil price affects every aspect of national economy: production and consumption, cost and price, trade and investment. The rise of oil price will cause the decreasing of national output (Qianqian, 2011). It also causes the rise of commodities prices that burdens business expenses. This finding second the study by Wattanatorn and Kanchanapoom (2012) that oil price affects company profit. According to PLN internal data, the rise of ICP by USD 1/barrel causes the rise of operating expenses by Rp 268 billion. From aforementioned data and literature, the proposed hypothesis is:
H1a: ICP strengthens the effect of fuel mix on PLN profitability.

Indonesia adopts the free floating exchange rate system. It means if Indonesian Rupiah weakens to US dollar, commodity price might rise. Thus, the exchange rate might also affect company profitability, specifically on export-import transaction using foreign currency as well foreign debt. Rupiah depreciation will cause the bloating of company debt in local currency (Rahardjo, 2009). This finding also found out in Baum et al. (2001), also Hidayati (2014) that say exchange rate affects profitability. Kandir et al. (2015) also found out that exchange rate fluctuation also affect the financial capability of energy companies, eventhough the effect might vary. In transportation sector, the 1997 crisis in Indonesia, for example, the price of imported goods rose, people purchasing power declined, and transportation company revenue was not adequate enough to keep its financial ability (Abdulkadir, 2000). In PLN, if we look at the profit loss structure, the effect of exchange rate could bee seen in operating expenses component, specifically in contract payment and purchase of primary energies (oil and coal) indexed in foreign currency. According to PLN internal data, if Rupiah weakens by Rp

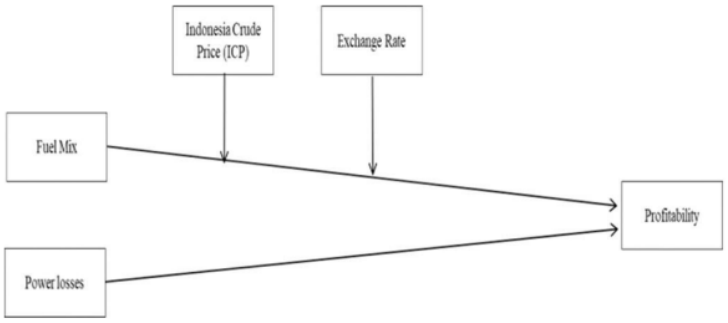
100/USD, the operating expense raises by Rp 1.263 billion. From the aforementioned data and literature, the prtposed hypothesis is:
H1b: Exchange rate strengthens the effect of fuel mix on PLN profitability.

In general, the increasing of power losses rises the utility operating expenses and higher production cost (Anumaka, 2012). Furthermore, Jamil (2013) explains the efefct of the increasing power losses: (1) Losses decreases the utility/ company profitability; (2) Losses prevents the new investment that should aim the company capacity building; (3) Losses affect the electricity reliability; (4) Losses affects the company financial capability. Some study, such as Kwakwa (2018), predicts that the insufficiency and unreliability of electricity cost the country 2-6% loss of gross national product. Gawlak (2019) found out that the losses affects the profitability of electricity company. Sadugol (2012) claimed that the annual savings can be achieved through the improvement of load factor that affects the power losses reduction in Karnataka State. He estimated that the potential annual saving in regards to the improvement of load factor was Rs 220,86 Crores. From the aforementioned data and literature, the proposed hypothesis is:
H2: Power losses affect the PLN profitability negatively.

Based on above explanation, the research model for this study is shown Figure 1

RESEARCH METHODE

Figure 1: Research model



Source: Described by researchers

Indonesia Crude Price. In this study, the exchange rate and ICP acts as moderating variable. The dependent variable is PLN profitability in terms of its net profit margin after interest, tax, and other financial expense. The variables are time series data from 2016-2018.

Measurement

To prove the hypotheses, the data were examined using classical assumption test and MRA test. The classical assumption test included multicollinearity test, autocorrelation test, normality test, and heterokedasticity test. Multicollinearity test is used to examine whether there is an intercorrelation in the regression model, which means a strong correlation between

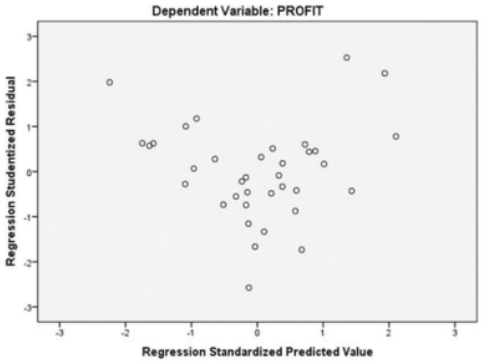
an independent variable with other independent variables. The intercorrelation could be concluded by looking at the correlation coefficient value between independent variables, in which its variance inflation factor (VIF) value must smaller than 10 (Wijaya, 2009). The autocorrelation test is used to examine whether serial correlation among predictors in t-1 period exists. It could be examined through Run Test by identifying its Asymp. Sig (2-tailed) value. If it is higher that 0,05, it is concluded that the autocorrelation does not exist (Ghozali, 2013). Heterokedasticity test is used to examine whether in regression model, the residual variance of one predictor is not the same as the other predictor's (Ghozali, 2013). The result is concluded by looking at its graphic plot between dependent variable predicted value (ZPRED) and its residual (SRESID), where its dots should be scattered above and below 10 in its Y-axis. Meanwhile normality test is used to examine if the data is normally distributed. It could be concluded by examining its P-Plot, where its dots should spread around diagonal line and form a pattern aligning to the line.

The moderrated regression analysis (MRA) is a special technique to examine whether in a multiple linear regression equation, there is an interaction between its regression equations (Ghozali, 2013). This analysis aims to find out the moderating variable effect in strengthening or weakening the effect of the independent variable to dependent variable (Ghozali, 2013). The justification is by looking at the Sig. value that must be smaller than 0,05.

RESULTS

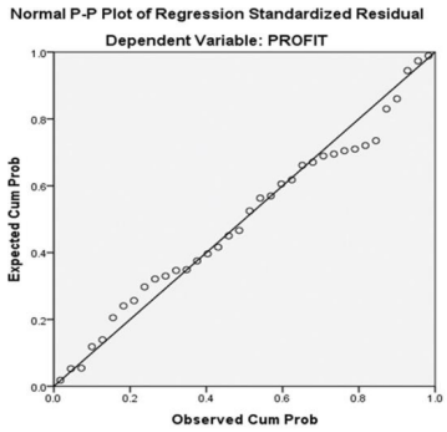
The output of multicollinearity test, autocorrelation test, heterokedasticity test, normality test, and MRA test indicate that the data used suited the justification to prove the effect of independent variables on dependent variable. In multicollinearity test, the VIF value of all independent variables were 1,000 (<10). The Asymp.Sig. (2-tailed) value in autocorrelation test was 0,237 (>0,05). The scatterplot from heterokedasticity test indicated that the data spread randomly and did not form a special pattern can show in Graph 1. The P-plot from normality test also indicated that the data distributed normally can show in Graph 2. P-plot

Graph 1: Scatterplot diagram as heterokedasticity test output



Source: Data is processed by researchers

Graph 2: P-Plot diagram as normality test output



Source: Data is processed by researchers

showed by the dots that spread around the diagonal line and formed a pattern aligning to the line.

The hypothesis testing result by using MRA method is shown in below Table 1:

Table 1: Research model hypothesis test result

Hyphotesis	Hypothesis statement	Sig. value	Remark
H1	Fuel mix affects PLN profitability negatively	0,000	Data supported hypothesis
H1a	Indonesia crude price strengthens the effect of fuel mix on PLN profitability	0,048	Data supported hypothesis
H1b	Exchange rate strengthens the effect of fuel mix on PLN profitability	0,004	Data supported hypothesis
H2	Power losses affect PLN profitability negatively	0,001	Data supported hypothesis

Source: Data analysis output using SPSS

DISCUSSION

From the H1 test result, it is found that fuel mix affects the PLN profitability negatively. Fuel mix, in terms of oil consumption (volume and price), should be managed efficiently to ensure PLN profitability. This result supports the study by Skalsky et al. (2008), that stated that fuel affects profitability. The reducing of oil consumption is also seen as an important effort as per the priority principle of energy development regulated in Rencana Umum Energi Nasional (RUEN)/National Energy General Planning according to Presidential Decree No. 22 Year 2017 stipulating "to minimize the use of oil." From cost perspective, the cost of generating electricity from oil-fueled power plant is 6 times higher than cost of coal-fired power plant. For that reason, PLN should consistently seek the most rational primary energy mix by reducing oil consumption, such as conversion program to non-oil energy resource, ensuring the commerical operation date (CoD) of non-oil power plant project, fostering the use of biodiesel, and other relevant strategies.

The result of H1a test showed that ICP strengthens the effect of fuel mix on PLN profitability. This supports the study of Wattanatorn and Kanchanapoom (2012) that oil price affects the profitability of energy and food industries in Thailand. For that reason, the volume of oil consumption should be reduced at minimum level as a risk mitigation effort towards oil price that affected by the ICP fluctuation. The ICP fluctuation will stress PLN financial ability if it is followed by Rupiah depreciation. It is because the ICP unit is in USD. As a factor that is not under PLN control, PLN should run its operational excellence to minimize the impact. Government, in this case, should provide space for PLN if the ICP threatens PLN financial capability.

The result of H1b showed that exchange rate strengthens the effect of fuel mix on PLN profitability. This supports the study of Baum et al. (2001), also Kandir et al. (2015) that showed that exchange rate affects profitability. This also supports the effort to reduce fuel mix as part of risk mitigation toward oil price fluctuation. With the free floating exchange rate system, it comes as no surprise that the exchange rate always fluctuates. For that reason, PLN should minimize the impact of exchange rate on PLN financial condition. Especially, if we look at its profit loss structure, the exchange rate hits PLN finance twice: in the calculation of operating expense, and financial expense.

The result of H2 test also showed that power losses affect PLN profitability negatively. This supports the study of Nwanna and Oguezu (2017) and Gawlak (2019) indicating that loss affects the profitability of electricity industry. The effect of loss could be seen from two perspectives: its effect on production cost calculation, and electricity sales volume optimization. In case of the actual power losses percentage is above the target set by Government, PLN would count the gap as revenue loss. Thus, PLN should carry out strategies to lower the loss percentage, i.e., providing additional feeder for medium and low voltage network, installation of additional substation in the distribution network, reconducturing, transformers load balancing, maintenance of kWh meter measuring devices, consistently controlling illegal electricity use, intensifying revenue assurance program, improving main distribution materials (MDU) procurement, improving billing management system, and ensuring the completion of power plants and transmission construction.

PLN then should promote efficiency as its core, especially in providing electricity with the least cost through performance improvement. Gantino et al. (2017) argued that performance

improvement aims to improve shareholder wealth, so strategies are need to deal with environmental uncertainty. Restructuring is also essential to adopt with external challenges, as Jumono et al. (2017) argued that restructuring that adjusts with external changes is able to change the asset, financial, and profit structure.

As the managerial implications from the result of hypothesis tests, there are five issues that should be highlighted: (1) Low production cost should be the core output of PLN efficiency strategy, meaning that all action taken should aim to cost less; (2) The significant effect of oil consumption/fuel mix to the PLN operating expense indicates the urgency of fuel switching strategy to cheaper energy resources and ensuring the COD of non-oil-fueled power plants; (3) Urgency of risk mitigation strategies toward the fluctuation of ICP and exchange rate, including hedging, swap, and performing transaction in Rupiah as per the Bank Indonesia regulation; (4) Technology innovation to lower losses percentage; and (5) Tariff restructuring with achieavable targets.

CONCLUSION

The conclusion of this study is: (1) Fuel mix affects PLN profitability negatively; (2) ICP strengthens the effect of fuel mix on PLN profitability; (3) Exchange rate strengthens the effect of fuel mix on PLN profitability; (4) Power losses affect PLN profitability negatively; (5) PLN should optimize the effort to reduce fuel mix and power losses to increase profitability; (6) The fluctuation of ICP and exchange rate affect PLN profitability, yet however these factors are not under PLN control, it needs government intervention that favors PLN to ensure PLN financial sustainability.

RESEARCH LIMITATION AND SUGGESTION FOR FURTHER RESEARCH

Factors that affect PLN profitability are not limited only to fuel mix, ICP, exchange rate, and power losses. Other factors might also affect evenmore if the data period expanded. As an initial study, these 4 factors could represent the analysis of PLN profit. To enhance the study accuracy, further researches should also examine the effect of other factors, be it through quantitative or qualitative analysis. They could be developed from this study, i.e., analysis of other operating expenses component such as personnel and administration expenses, or analysis of the managerial implications such as the analysis of fuel switching or losses reduction strategy from investment point of view. The opportunity to explore this issue is quite wide in order to produce a more comprehensive study.

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