Quantitative Evaluation of Fixed Assets Use Efficiency of Power Grid Enterprises Under the Transmission and Distribution Price Reform

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Abstract. Under the background of the new round of transmission and distribution price reform, the connection between the profitability of power grid enterprises and their fixed assets is more closely linked. In order to help enterprises effectively manage assets and make scientific asset management decisions while improving asset utilization efficiency, firstly, an evaluation system of fixed asset utilization efficiency of power grid enterprises was established by selecting indicators from two dimensions of operation level and equipment status. Then, it was applied to the quantitative evaluation of fixed asset utilization efficiency of a power supply company. The results show that the asset utilization efficiency of 220 kV CC-LB-2 and 110 kV ST-PC-2 transmission lines of the company is much lower than the average level of similar assets, and these two types of assets need timely technical transformation, which should be included in the list of technical transformation investment projects for the next investment plan implementation and cost reduction Provide reference.

Keywords: transmission and distribution price reform · asset use efficiency · quantitative evaluation

1 Introduction

The new round of transmission and distribution tariff reform has completely changed the profitability model of grid enterprises [1], the profitability of enterprises changed from the original purchase and sale price difference to the level of transmission and distribution price approval [2], and the core basis of the approved transmission and distribution price is the enterprise transmission and distribution fixed assets [3]. Under the new mechanism, effective management of fixed assets and improvement of asset use efficiency can not only increase the scale of effective assets and improve the efficiency of enterprise investment [4], but also pull the level of transmission and distribution prices [5], and provide an important source to promote the growth of enterprise revenue [6]. Current research on fixed asset management has focused on both technology and cost efficiency. Wu Di [7] found that improving technology and management innovation are

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important means to achieve an improved level of asset management. Zhao Xibu [8] argued that combining asset management with budget management and using inventory information as the basis for asset allocation can improve the efficiency of asset use. However, the fixed assets of power grid enterprises are characterized by a large variety of assets and a large scale, and the management of fixed assets is complex, which makes it easy to have idle and wasteful fixed assets and low efficiency in use [9]. How to improve the efficiency of asset management, expand the scale of effective enterprise assets, and achieve asset value preservation and appreciation has become an important issue for this asset-intensive enterprise of power grid [10]. Mo Jinhe [11] argued that different levels of evaluation objects would lead to different evaluation weights, and evaluated and compared the efficiency of power grid asset use in different municipalities from two dimensions: technical efficiency and economic efficiency. Qian, Yun [12] argued that demand analysis for individual assets and reasonable transfer of use to achieve the recycling of idle assets can improve the overall asset utilization efficiency of the enterprise. Based on this, this study combines the characteristics of asset operation and management of power grid enterprises, establishes a fixed asset use efficiency evaluation model for single assets of power grid enterprises, and applies this to the actual case analysis in order to provide reference for power grid enterprises to improve their fixed asset management.

2 Construction of Evaluation System for the Efficiency of Fixed Assets Use in Power Grid Enterprises

Fixed asset use efficiency refers to the effectiveness and adequacy of asset utilization [13]. Effective assets under the transmission and distribution tariff reform refer to the assets formed through the investments of grid enterprises, which are directly related to transmission and distribution business operations and ultimately affect the level of transmission and distribution tariffs. To fully adapt to the transmission and distribution tariff reform and improve the management and operation of enterprises, grid enterprises must put forward higher requirements on the allocation, use, maintenance and disposal of fixed assets. Combining this feature, this study establishes an analysis model of fixed asset utilization efficiency of power grid enterprises for individual assets based on the current situation of asset management and data collection and analysis of local municipal companies of the State Grid.

2.1 Evaluation Index Selection

Asset use efficiency is influenced by many factors and involves the establishment of the structure of the index system. In order to ensure a scientific, effective and standardized asset use efficiency evaluation system, the principles of scientificity, systematicity, consistency and dynamism should be followed when screening evaluation indexes [14, 15].

The efficiency of asset use needs to be considered from 2 aspects: dynamic operating level and static quality level. The hierarchical analysis method is introduced to quantitatively analyze the indicators of qualitative analysis. Target level: asset efficiency assessment. Level 1 indicator layer: 2 major categories of evaluation indicators: operation level and equipment condition. Secondary indicator layer: 8 indicators that have the most critical impact on asset utilization efficiency, selected by splitting the primary indicators.

Operation level: It mainly measures the contribution of fixed assets to the economic benefits of enterprise development and operation, including asset profitability, turnover rate, electricity sales and depreciation level. The profitability of fixed assets is not only affected by production, but also by sales, cost and selling price factors, which is a comprehensive reflection of the enterprise's asset management level, while the asset turnover rate and electricity sales per unit asset reflect the sales revenue and electricity level they can bring, and the depreciation level reflects the depreciation level of the enterprise. The analysis of the above indicators can effectively assess the contribution of assets to the economic benefits of the enterprise and promote. The analysis of the above indicators can effectively assess the contribution of assets to the economic efficiency of the enterprise and promote the overall improvement of assets and management of the enterprise. Therefore, the four factors of fixed assets profitability, fixed assets turnover rate, electricity sales per unit of assets and fixed assets depreciation level are selected as the objects of analysis.

Equipment status: It mainly measures the quality level of fixed assets' own performance in the process of enterprise operation, including equipment life, failure rate and utilization rate. Equipment life is a key indicator to measure the quality of enterprise assets, failure rate and asset utilization rate reflect the level of time when the assets can do work normally, and the active power level reflects the level of the assets' ability to do work. Therefore, four factors are selected as the analysis objects: equipment remaining life level, equipment failure level, fixed asset utilization rate and active power level. The final evaluation index system of asset efficiency of power grid enterprises is shown in Table 1.

Table 1. Grid enterprise fixed assets use efficiency evaluation index system

Target level A	First-level Indicators B	Second-level Indicators C
Asset Efficiency A	Operating level B_1	Fixed Asset Margin C_1
		Fixed asset turnover rate C_2
		Electricity sales per unit of asset C_3
		Depreciation level of fixed assets C_4
	Device Status B_2	Equipment remaining life level C_5
		Equipment failure level C_6
		Fixed asset utilization rate C_7
		Active power level C_8

2.2 Determination of Indicator Weights (Expert Scoring)

Experts were invited to score the weights of the established indicators at different levels. In this study, a total of 10 experts and scholars including electrical, financial, and management professionals were invited to evaluate the importance of the indicators.

(1) Determine the weight of first-level indicators.

1) Construction of judgment matrix.

The two-by-two comparison method was used to determine the weights of the factors in each level to the relevant factors in the previous level. A represents asset utilization efficiency, and B_1 and B_2 represent the second-level indicators of operation level and equipment status, respectively. Construct the judgment matrix A − B as Eq. (1):

$$A - B = \begin{pmatrix} & U_1 & U_2 \\ U_1 & a_{11} & a_{12} \\ U_2 & a_{21} & a_{22} \end{pmatrix} \tag{1}$$

a_{ij} indicates the score given by experts to the relative importance of indicators a_i and a_j.

Using the proportional scaling method to compare the importance of each index after scoring by experts, we get the quantified first-level index weight judgment matrix A − B as Eq. (2):

$$A - B = \begin{bmatrix} 1 & \frac{3}{2} \\ \frac{2}{3} & 1 \end{bmatrix} \tag{2}$$

2) Ranking weights using the geometric mean method.

First, the judgment matrix is multiplied by the elements of each row A − B. Each element is multiplied and squared j times to find the geometric mean of each element of m_i, and then normalize m_i (i = 1, 2,..., j) to find the index weights. In the judgment matrix A − B in.

By calculating the weight values of each indicator, the results are as Eq. (3).

$$W^{(1)} = (0.57, 0.43)^T\# \tag{3}$$

3) Consistency test.

According to Eq. (4), the weights are tested for consistency. In the judgment matrix A − B in which it is calculated that $\lambda_{max} = 2$, CI = 0 < 0.1, and the weight judgment matrix satisfies the consistency test, indicating that the weight results are scientifically valid.

$$\lambda_{max} = \frac{1}{m}\sum_{i=1}^{m}\frac{\sum_{j=1}^{m} a_{ij}w_j}{w_i} \tag{4}$$

(2) Determine the weight of secondary indicators.

1) Operating level indicators.

Establish a comparative judgment matrix of fixed asset profitability, fixed asset turnover, electricity sales per unit of asset, and fixed asset depreciation level as Eq. (5).

$$B_1 - C = \begin{bmatrix} 1 & \frac{6}{5} & 1 & 2 \\ \frac{5}{6} & 1 & \frac{5}{6} & \frac{5}{3} \\ 1 & \frac{6}{5} & 1 & 2 \\ \frac{1}{2} & \frac{3}{5} & \frac{1}{2} & 1 \end{bmatrix} \tag{5}$$

The results of the weights W = (0.3, 0.25, 0.3, 0.15), λmax = 4, CI = 0 < 0.1, and the judgment matrix satisfies the consistency test.

2) Equipment status indicators.

Establish a comparative judgment matrix of equipment remaining life level, equipment failure level, fixed asset utilization rate and active power level as Eq. (6).

$$B_2 - C = \begin{bmatrix} 1 & \frac{5}{4} & \frac{5}{6} & 1 \\ \frac{4}{5} & 1 & \frac{2}{3} & \frac{4}{5} \\ \frac{6}{5} & \frac{3}{2} & 1 & \frac{6}{5} \\ 1 & \frac{5}{4} & \frac{5}{6} & 1 \end{bmatrix} \tag{6}$$

The results of the weights W = (0.25, 0.2, 0.3, 0.25), λmax = 4, CI = 0 < 0.1, and the judgment matrix satisfies the consistency test.

The resulting weights of the evaluation indexes for the efficiency of fixed assets use in power grid enterprises are shown in Table 2.

2.3 Evaluation Model Construction

Combining the meaning of each indicator and historical data, peer data and industry standards, the evaluation is scored by a percentage system to obtain the score of different types of fixed assets, and the score is recorded as Q_{ij} (i = 1, 2; j = 1, 2, 3, 4). The higher the score of each indicator, the higher the efficiency of the evaluated fixed assets, as shown in Table 3. The comprehensive weight of secondary indicators is P_{ij} (i = 1, 2; j = 1, 2, 3, 4), and according to the Eq. (1), the total score E of index evaluation was calculated as shown in Eq. (7).

$$\frac{\sum_{i=1,j=1}^{n} P_{ij} \times Q_{ij}}{100} \times 100\%,\ \ i = 1, 2;\ \ j = 1,\ 2,\ 3,\ 4 \tag{7}$$

When an asset has one of the following conditions, in order to make it meet the requirements of effective assets under the transmission and distribution tariff reform, this asset needs to be technically improved or overhauled, and it will be included in the investment list to revitalize the asset and achieve the recycling of the asset.

(1) The E score of fixed assets is lower than the average efficiency of the use of such assets in the electric power industry or similar industries.

Table 2. Evaluation index weights of fixed assets use efficiency of power grid enterprises

Tier 1 Indicator B	Indicator Weights	Secondary indicator C	Indicator Weights	Combined weights
Operating level B_1	0.57	Fixed Asset Margin C_1	0.3	0.17
		Fixed asset turnover rate C_2	0.25	0.14
		Electricity sales per unit of asset C_3	0.3	0.17
		Depreciation level of fixed assets C_4	0.15	0.08
Device Status B_2	0.43	Equipment remaining life level C_5	0.25	0.11
		Equipment failure level C_6	0.2	0.09
		Fixed asset utilization rate C_7	0.3	0.13
		Active power level C8	0.25	0.11

(2) Depreciation level of fixed assets Q_{14} The score is 0, that is, when the depreciation rate of fixed assets is 100%, the assets will no longer be depreciated.
(3) Equipment remaining life level Q_{22} With a score below 40, i.e., when the equipment remaining life index is below 40%, assets that are too old may result in lower benefits from maintenance than new assets.

3 Case Study

In order to further illustrate the application method of the asset efficiency evaluation system of power grid enterprises constructed in this study, this study takes 110 kV and 220 kV transmission line assets of G Power Supply Company as an example to conduct asset efficiency evaluation research.

3.1 Overview of G Power Supply COMPANY'S Assets

G Power Supply Company, as a large class I power supply enterprise, undertakes large-scale and important power supply tasks, and has a rich variety and large scale of grid assets, which is representative. 2021 G Power Supply Company has an ending balance of RMB 149,018,889,000 and an opening balance of RMB 1357,354,300 in original value of fixed assets, an ending balance of RMB 802,543,900 in accumulated depreciation,

Table 3. Evaluation criteria for the use efficiency of fixed assets of power grid enterprises

Serial number	Indicator Name	Indicator Meaning	Scoring Criteria
1	Fixed Asset Margin C_1	This indicator is evaluated by the ratio of the enterprise's total profit for the period to the average net value of fixed assets, and the higher the ratio, the higher the score of the indicator.	Index score = profit rate of fixed assets in the calculation period × 100 points. Where: Profit margin of fixed assets = total profit / average net value of fixed assets; average net value of fixed assets = (opening net value + closing net value)/2
2	Fixed asset turnover rate C_2	This indicator is evaluated by the ratio of the enterprise's current operating income to the average net value of fixed assets, and the higher the ratio, the higher the score of the indicator.	Index score = Fixed asset turnover rate in the calculation period × 100 points. Where: Fixed asset turnover ratio = operating income / average net fixed assets × 100%; average net fixed assets = (opening net fixed assets + closing net fixed assets)/2
3	Electricity sales per unit of asset C_3	This indicator reflects the level of power supply per unit asset of the enterprise and is evaluated by historical data and peer data of the enterprise; the higher the power sales, the higher the score of the indicator.	Indicator score = × 100 points. Where: electricity sales per unit asset = total electricity sales in the calculation period / average original value of grid fixed assets; average original value of grid fixed assets = (original value of grid fixed assets at the beginning of the period + original value of grid fixed assets at the end of the period)/2

(*continued*)

Table 3. (*continued*)

Serial number	Indicator Name	Indicator Meaning	Scoring Criteria
4	Depreciation level of fixed assets C_4	This indicator reflects the depreciation level of fixed assets of the enterprise, the lower the ratio, the higher the score of the indicator.	Index score = (1 - fixed assets depreciation rate) × 100 points. Where: depreciation rate of fixed assets = depreciation of fixed assets / original value of fixed assets × 100%
5	Equipment remaining life level C_5	This indicator reflects the level of useful life of fixed assets of enterprises, measured by historical data and industry standards; the higher the index, the higher the score of the indicator.	Indicator score = Residual life index of equipment × 100 points. Where: Equipment remaining life index = (useful life of fixed assets - life of fixed assets) / life of fixed assets × 100%
6	Equipment failure level C_6	This indicator reflects the quality of the enterprise's power supply. The lower the equipment failure rate, the higher the indicator score.	Index score = (1 - equipment failure rate in the calculation period) × 100 points. Where: Equipment failure rate = (downtime waiting time + repair time) / total planned use time × 100%
7	Fixed asset utilization rate C_7	This indicator reflects the level of long-term power supply capacity of the enterprise. The higher the utilization rate of fixed assets, the higher the score of the indicator.	The score of the indicator = the utilization rate of fixed assets in the calculation period × 100 points. Where: Fixed asset utilization rate = (used years × days per year × actual hours per day) / (used years × 365 days × hours per day should be used) × 100%

(*continued*)

Table 3. (*continued*)

Serial number	Indicator Name	Indicator Meaning	Scoring Criteria
8	Active power level C_8	This indicator reflects the power delivery level of the enterprise's assets and is evaluated by the enterprise's historical data and peer data, industry standards, and the higher the active power level, the higher the indicator score.	Indicator score = (active power in calculation period-standard value) / standard value × 100 points. Where: Active power = RMS value of voltage across the resistor element × RMS value of current through the resistor element

Table 4. Original value of fixed assets

Projects	Original value of fixed assets (million yuan)			
	Number at the beginning of the year	Increase in the current year	Decrease in the current year	Year-end figures
Transmission lines	299,043.74	44,753.55	1,584.81	342,212.48
220kV	164,650.06	24,596.10	1,582.45	187,663.70
110kV and below	134393.68	20157.45	2.36	154548.77

and an opening balance of 7,107,531,000 Yuan. The ending balance of construction in progress was RMB 350,490,600,000 and the opening balance was RMB 70,608,700,000. The ending balance of intangible assets was RMB64,812,900,000, and the opening balance was RMB55,841,600,000. Specifically for each in-force asset related to transmission and distribution business, taking transmission lines as an example, the assets are shown in Table 4 and Table 5.

3.2 Results of Asset Efficiency Evaluation of Company G

From the above data analysis, it can be seen that the net asset value of 220kV transmission lines of Company J in 2021 at the beginning of the year is $854,753,400, the net asset value at the end of the year is $943,256,300, and the net asset value of 110kV and below transmission lines at the end of the year is $101,672,820. These data are brought into Table 3, and the indicators are assigned according to the calculation results to obtain the scoring table of each secondary indicator (C) of transmission line asset efficiency, and the specific scoring results are shown in Table 6.

The evaluation scores were quantified by Eq. (1), and the results of each asset efficiency score were calculated as shown in Table 7.

Table 5. Accumulated depreciation of fixed assets

Projects	Accumulated depreciation (million yuan)			
	Number at the beginning of the year	Increase in the current year	Decrease in the current year	Year-end figures
Transmission lines	129,496.37	18,223.22	1,505.57	146,214.02
220kV	85,232.44	9,608.96	1,503.33	93,338.07
110kV and below	44263.93	8614.26	2.24	52875.95

Table 6. Transmission line asset efficiency scores for each evaluation index

Evaluation Indicators		Score of each index of transmission line Q_{ij}			
		220kV		110kV and below	
		FX-XW-1	CC-LB-2	ST-PC	ST-PC-2
Operating level B_1	Fixed Asset Margin C_1	59	19	82	9
	Fixed asset turnover rate C_2	86	11	74	9
	Electricity sales per unit of asset C_3	63	12	89	8
	Depreciation level of fixed assets C_4	61	35	89	9
Device Status B_2	Equipment remaining life level C_5	66	26	81	10
	Equipment failure level C_6	65	40	76	10
	Fixed asset utilization rate C_7	67	10	87	9
	Active power level C_8	80	23	90	9

Table 7. Evaluation results of fixed assets efficiency

Type of Fixed Assets	FX-XW-1	CC-LB-2	ST-PC	ST-PC-2
Asset use efficiency evaluation score E	67.96%	19.24%	84.29%	8.63%

As shown in Table 7, for the 110 kV and 220 kV transmission line assets of G Power Supply Company, the utilization rate of 220 kV FX-XW-1 line is 67.96%, CC-LB-2 line is 19.24%, 110 kV ST-PC line is 84.29%, and ST-PC-2 line is 8.63%. At the same time, the average fixed asset utilization efficiency of the overall assets of the power industry and similar industries in the power industry is about 65%. With 220 kV and 110 kV transmission lines being allowed to be fully accounted for in the permitted return, the asset utilization efficiency of 220 kV CC-LB-2 and 110 kV ST-PC-2 transmission lines is much lower than the average level of similar assets. Once the regulator adopts the measurement of utilization efficiency to assess the proportion of effective assets credited to permitted return, the level of transmission and distribution tariffs of the power companies will be reduced. Therefore, the two types of assets, 220 kV CC-LB-2 and 110 kV ST-PC-2 transmission lines, need to be technically improved in a timely manner and should be included in the list of technical improvement investment projects to provide reference for the next step of investment plan implementation and cost write-down.

4 Conclusion

In this paper, the efficiency of fixed assets usage was evaluated and studied in the context of asset management and operation characteristics of power grid enterprises. The results found that:

(1) The level of asset operation and equipment condition can have an impact on the efficiency of fixed assets, and the order of importance of evaluation indicators is operation level > equipment condition.
(2) Compare the comprehensive evaluation score with similar assets in the power industry or similar industries. When the efficiency of asset use is much lower than the average efficiency in the same industry or the equipment depreciation rate reaches 100%, or the equipment remaining life index is lower than 40%, it may pull down the enterprise transmission and distribution price level, and the assets need to be overhauled or technically improved, so as to revitalize the assets and ensure the assets' ability to support the enterprise's good and stable development and value.
(3) Combined with the results of asset efficiency evaluation, it can help enterprises to screen out inefficient assets that need technical transformation and make targeted and differentiated asset management decisions to expand the scale of effective assets and achieve optimal allocation and management of fixed assets in power grid enterprises.

References

1. Tian, K., Dong, W. J. (2021) Construction of an investment decision model for transmission grid frame strengthening in the context of new power system. Intelligent Power, 08 vo 49: 1–7+54. DOI:https://doi.org/10.3969/j.issn.1673-7598.2021.08.002
2. Ding, S. (2022) Study on optimization of fixed assets management strategy of C power supply company in the context of new power reform. University of Electronic Science and Technology, Chengdu. DOI:https://doi.org/10.27005/d.cnki.gdzku.2022.001048
3. Chen, Z. F., Wen, H. J., Wang, J. H. (2022) How to fully recover fixed asset investment costs in power grid enterprises. China Electricity Enterprise Management, 10:82–83. https://www.nstl.gov.cn/paper_detail.html?id=f0c1f2a0cc3c250da44d6c9b1062b045

4. Li, Y. Z., Chen, J. J., Chi, W.L. (2022) Lean investment strategies for grid enterprises to adapt to transmission and distribution price reform. Finance and Accounting, 03:75–76. https://www.nstl.gov.cn/paper_detail.html?id=e864248fe7d26fd7504bf4c17573a9da
5. Zhou, D., Chen, M., (2017) Research on panoramic view management of distribution network projects with "cloud navigation" technology. Electronic World, 17:57-58. DOI:https://doi.org/10.19353/j.cnki.dzsj.2021.17.027.
6. Wang, S. Y. (2022) An introduction to the management of fixed assets of power grid enterprises in the context of transmission and distribution tariff reform. Business News, 23:101–104. https://kns.cnki.net/kcms2/article/abstract?v=3uoqIhG8C44YLTlOAiTRKibYlV5Vjs7iJTKGjg9uTdeTsOI_ra5_XX6WvRdWMHict-Vl5pfNCOWWMlan7QslX9yzyhyS5lhK&uniplatform=NZKPT
7. Wu, D.: Study on the management of fixed assets of YC Coalbed Methane Company Shenyang University of Technology, Shenyang (2017).CNKI:CDMD:2.1017.182040
8. Zhao, X. B., Shao, Z. Q. (2019) Boundary, classification and management framework of government assets. Chinese Administration, 11: 31-37. DOI:https://doi.org/10.19735/j.issn.1006-0863.2019.11.05.
9. Wang, S. H. (2022) Construction and improvement of internal control mechanism of fixed assets management in state-owned enterprises. Quality and Market, 20:157–159. https://kns.cnki.net/kcms2/article/abstract?v=3uoqIhG8C44YLTlOAiTRKibYlV5Vjs7iJTKGjg9uTdeTsOI_ra5_XU4tFAPeEDy5uCRDFGjrvNNDqKT_1Nin8XowDAx0qomP&uniplatform=NZKPT
10. Shen, W. (2021) Research on the whole life cycle cost attribution and apportionment method of assets based on grid equipment. Southern Energy Construction, S1 vo 8:53–58. DOI:https://doi.org/10.16516/j.gedi.issn2095-8676.2021.S1.008.
11. Mo, J. H., Fan, X. D. (2017) Research on the analysis model of fixed assets usage efficiency of power grid enterprises. Enterprise Management, S2: 72-74. CNKI:SUN:QIGL.0.2017-S2-030
12. Qian, Y. (2018) From the problems of enterprise fixed asset management to the fine management of assets. Modern Economic Information, 05:208-209. DOI:CNKI:SUN:XDJZ.0.2018-05-161
13. Su, Y. (2016) Strategy-based financial analysis [D]. Tianjin University of Finance and Economics, Tianjin. https://xueshu.baidu.com/usercenter/paper/show?paperid=fd80829174bab638fe7a272303e32ffd&site=xueshu_se
14. Li, D., Yao, Y., Han, M. (2012) The Analysis and Application of AHP in a Construction Project Evaluation. In: Trends in Civil Engineering. Stafa-Zurich. pp.3740–3744. DOI:https://doi.org/10.4028/www.scientific.net/AMR.446-449.3740.
15. Chen, R. X. (2016) Schumann H. Research on a case study in project management using the AHP . In: Industrial Engineering and Management Innovation in New- Era. Beijing. pp.60–64. https://www.webofscience.com/wos/alldb/full-record/WOS:000243868800011.

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