



# Exposed

Overcompensation of KEPCO's  
Coal Fired Power Plants





Solutions for Our Climate(SFOC) is an independent policy research and advocacy group that aims to make emissions trajectories across Asia compatible with the Paris Agreement 1.5°C warming target.

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## Background

### Power Market Favoring Fossil Fuels

Generation subsidiaries of the Korea Electric Power Corporation (KEPCO) are compensated under a cost-plus-markup scheme. As specified in the *Electricity Market Operation Rules*, a settlement adjustment factor is applied to the power market settlement payments for power plants in which generation subsidiaries of KEPCO have more than 50% stakes. The reason for adopting the settlement adjustment factor was to prevent the power plants with relatively low fuel costs such as coal and nuclear from receiving excessive compensation – if these power plants were to receive the market clearing price that is usually set by the fuel costs of LNG power plants, it would lead to huge overcompensation.

In practice, however, the mechanism has deteriorated in ways that guarantee fossil fuel power plants steady and excessive compensation. With investment recovery effectively guaranteed, KEPCO's power generation subsidiaries have little incentive to reduce costs, such as by decreasing their reliance on power sources with highly volatile fuel costs. The resulting inefficiencies are ultimately passed on to electricity consumers as additional cost burdens.

#### **Electricity Market Operation Rules, Annex 23: Settlement Payment Adjustment for Electricity Price Stabilization**

##### Section 4.4

##### Article 21-10, Paragraph 1, Subparagraph 3

As a rational mechanism for encouraging cost-reduction efforts, settlement payments to generators shall be adjusted to enable the recovery of fuel costs, O&M expenses, construction investments, investment returns, and other eligible costs, taking into account factors such as the generator's base-load share and the System Marginal Price (SMP), with further details provided under the "Detailed Operation Rules for Cost Evaluation" in Article 2.2.2.8.

Concerns have been raised that due to the issues outlined below, the powermarket has become increasingly favorable to fossil fuels, with coal-fired and LNG power plants receiving excessive compensation.

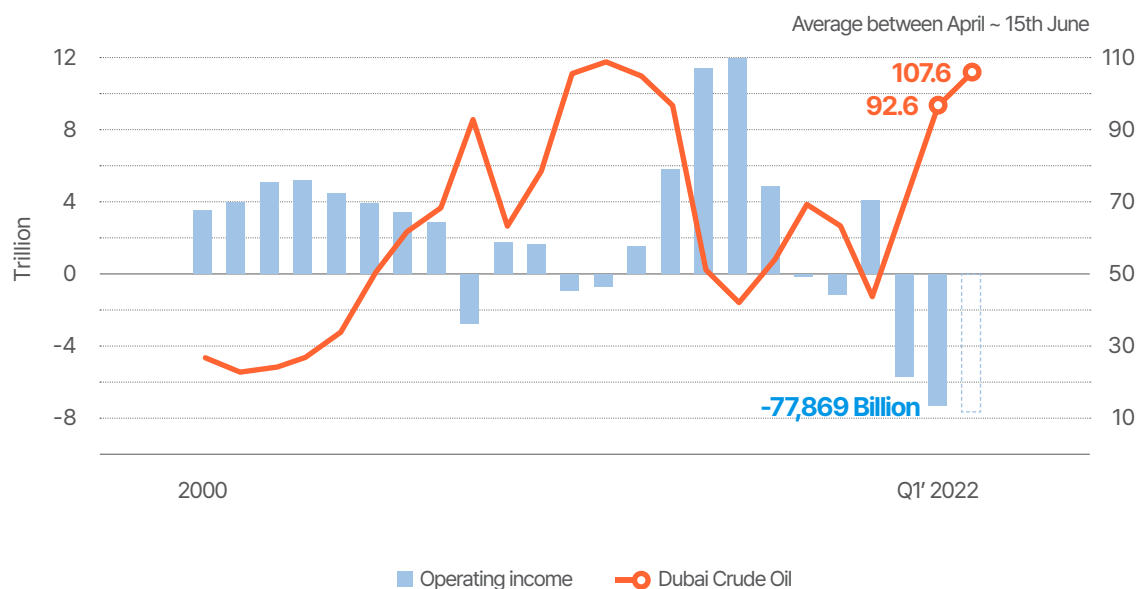


### Problem #1: Excessive Guaranteed Recovery of Fossil Fuel Power Plants' Fuel Costs

Under the wholesale power market that operates on a cost-based pool (CBP) model, generators' fuel costs are fully recovered, effectively shielding fossil fuel power plants from one of their core risks—volatile fuel prices. These risks are ultimately transferred to KEPCO and electricity consumers.

This market structure was a key factor behind the deepening of KEPCO's deficit when global fuel prices surged following the Russia-Ukraine war.<sup>1</sup> While KEPCO's losses expanded rapidly, its power generation subsidiaries remained insulated from risk, with their cost-plus-markup guaranteed for recovery. This case illustrates how the current market framework ensures stable profits for fossil fuel power generation.

#### KEPCO's Profit vs. Dubai Crude Oil



Source: The Joonggang

Critics point out that the settlement adjustment factor—originally introduced to limit excessive profits stemming from fuel cost disparity among generators—is now being used to safeguard the profitability of KEPCO's power generation subsidiaries.<sup>2</sup> Given that the Cost Assessment Committee responsible for administering the mechanism is composed largely of representatives from KEPCO and its affiliates,

<sup>1</sup> SFOC, *Challenges Facing Korea's Power Sector in a KEPCO-Weakened Era: Debt Risk Analysis 2025*, Aug 7, 2025.

<sup>2</sup> SFOC, *[Press Release] KPX's Invisible Hand Under Scrutiny: Will the Opaque Settlement Adjustment Factor Calculation End*, 2024.

skeptics contend that the settlement adjustment factor has been deliberately adjusted upward to preserve their profit levels.<sup>3</sup>

### Problem #2: Inefficiencies in the Operation of Capacity Payment Scheme

Capacity payments are provided to available generators even when they do not produce electricity, and generators can continue receiving these payments for more than thirty years as long as they remain in the market. Problems emerged in 2016 when inflation adjustment was introduced to the Reference Capacity Price (RCP), a core factor in determining capacity payment levels; this resulted in a 90% increase in the RCP between 2016 and 2024. In contrast, another key component of the RCP calculation, which is the fixed costs of LNG power plants, declined over the same period. This structural inconsistency of declining costs and rising compensation signals that the capacity payment scheme is not enhancing market efficiency but instead sustaining the profitability of fossil fuel power generation.<sup>4</sup>

### Problem #3: Limits on the Expansion of Flexible Resources and Virtual Power Plants (VPPs)

An adequate compensation framework for distributed and flexible resources such as renewable energy, Energy Storage System (ESS), and VPPs has yet to be established. These renewable and flexible resources are evaluated unfairly, as the same market rules designed around fossil fuel generation are applied to their bids despite the significant differences in cost structures, technological maturity, and facility lifespans.<sup>5</sup> Because the current power market restricts the entry of new technologies and flexible resources, the compensation scheme must be reformed to enable the expansion of renewable energy.

#### Gas-Fired Generation vs. ESS

Criteria	Gas Power Plants	ESS
Life Cycle	Over 30 years	10 to 15 years
Maturity of technology	Very high	Medium
Variable cost	Very high	None
Fixed cost	Low	High

Source: Solutions for Our Climate (SFOC)

3 OK Giwon, Make Public the Factor Behind Electricity Prices: The Settlement Adjustment Factor, Aug 13, 2024.

4 SFOC, *Fossil Fuel Subsidy: Korea's Excessive Capacity Payment Scheme Fuels Gas Power Expansion*, Nov 7, 2024.

5 SFOC, *VPPs: The Key to Korea's Transition to a Renewable Energy-Based Power System*, Aug 28, 2025.

## Research Methodology

To assess whether coal-fired generators of KEPCO's generation subsidies are earning an appropriate level of profit, actual settlement data for each generator were collected and analyzed in collaboration with an accounting firm.<sup>6</sup> For this study, project IRRs were calculated using revenue, operating expenses, and financial statement data submitted by the subsidiaries between 2015 and 2024.<sup>7</sup> For years in which supporting data were not available, the following methodology was applied to project revenue and expenses.

Category	Before 2000	2000-2014	2015-2024	After 2024
Summary	Projected because the past power market structure differed from the current variable-cost-based system and performance was not disclosed	Projected from 2015-2024 data, as no performance information was disclosed for this period	Applied disclosed performance data	Projected based on 2015-2024 performance
Revenue	<ul style="list-style-type: none"> <li>Assumed revenue to be the same as in 2000</li> </ul>	<ul style="list-style-type: none"> <li>Power price settlement: Projected using two factors—generation volume and the average System Marginal Price (SMP)</li> <li>Capacity payment: Fixed</li> </ul>	<ul style="list-style-type: none"> <li>Applied disclosed performance data</li> </ul>	<ul style="list-style-type: none"> <li>Power price settlement: Projected based on the 10-year average performance, assuming that the SMP increased by 2% annually and was maintained at KRW 129 per kWh.</li> <li>Capacity Payment: Fixed at the 2024 level</li> </ul>
Operating Expenses <sup>8</sup>	<ul style="list-style-type: none"> <li>Fuel costs &amp; other variable costs: Assumed the disclosed 10-year average cost ratio</li> <li>D&amp;A: Assumed the disclosed 2015 data</li> <li>Other fixed costs: Applied inflation to the 2015 fixed-cost level</li> </ul>	<ul style="list-style-type: none"> <li>Fuel costs &amp; other variable costs: Assumed the disclosed 10-year average cost ratio</li> <li>D&amp;A: Assumed the disclosed 2015 data</li> <li>Other fixed costs: Applied inflation to the 2015 fixed-cost level</li> </ul>	<ul style="list-style-type: none"> <li>Applied disclosed performance data</li> </ul>	<ul style="list-style-type: none"> <li>Fuel costs &amp; other variable costs: Assumed the disclosed 10-year average cost ratio</li> <li>D&amp;A: Assumed the disclosed 2024 data</li> <li>Other fixed costs: Applied inflation to the 10-year average fixed costs</li> </ul>

6 Data secured through the office of Assembly Member SEO Wangjin.

7 Project IRR is the discount rate identified by examining a project's cash inflows and outflows such that the present value of those cash flows equals the initial investment. As a metric indicating a project's profitability, it is used alongside other financial metrics in investment decision-making. In short, it is a method for identifying the discount rate that sets the project's net present value (NPV) to zero.

8 Irregularities were adjusted for following a review of the performance trend



Category	Before 2000	2000-2014	2015-2024	After 2024
Other Cash Flows	<ul style="list-style-type: none"> <li>CAPEX: Applied the disclosed total project cost</li> <li>Changes in net working capital: Assumed the disclosed 10-year average turnover days</li> <li>Corporate tax rate: Applied corporate tax of the given year to the operating income before tax</li> </ul>	<ul style="list-style-type: none"> <li>CAPEX: Applied the disclosed total project cost</li> <li>Changes in net working capital: Assumed the disclosed 10-year average turnover days</li> <li>Corporate tax rate: Applied corporate tax of the given year to the operating income before tax</li> </ul>	<ul style="list-style-type: none"> <li>Applied disclosed performance data</li> </ul>	<ul style="list-style-type: none"> <li>Corporate tax rate: Applied corporate tax of the given year to the operating income before tax</li> <li>Changes in net working capital: Assumed the disclosed 10-year average turnover days</li> </ul>

Source: Solutions for Our Climate (SFOC)

## Analysis Findings

In this study, compensation was deemed excessive when the IRR exceeded 4 percent, which was the Weighted Average Cost of Capital (WACC)<sup>9</sup>. An analysis of all compensation paid through 2024 shows that 36 coal-fired generators earned returns above this threshold, having fully recovered their investment. Most of these facilities were receiving excessive compensation despite operating for less than 20 years. To address overcompensation and meet the 2040 coal phase-out policy targets, such facilities should be prioritized for retirement.

### Coal-Fired Generators With Returns Above 4% as of End-2024

Generation Companies	Commissioning Year	Generator Name	Return Rate (2024)
Korea South-East Power (KOEN)	2008	Yeongheung #3	14.5%
Korea South-East Power (KOEN)	1998	Samcheonpo #6	14.5%
Korea Southern Power (KOSPO)	2009	Hadong #8	13.6%
Korea South-East Power (KOEN)	2008	Yeongheung #4	11.9%
Korea East-West Power (EWP)	2007	Dangjin #8	11.0%
Korea Southern Power (KOSPO)	2009	Hadong #7	10.5%
Korea Western Power (KOWEPO)	1997	Taeon #3	10.4%
Korea East-West Power (EWP)	2007	Dangjin #7	10.3%
Korea Southern Power (KOSPO)	2001	Hadong #6	10.3%
Korea South-East Power (KOEN)	1994	Samcheonpo #4	10.1%

9 Adopted the WACC of benchmark public enterprises such as KEPCO (see Appendix 1-1 for WACC calculation details)

Generation Companies	Commissioning Year	Generator Name	Return Rate (2024)
Korea Western Power (KOWEPO)	1997	Taeon #4	9.9%
Korea East-West Power (EWP)	2006	Dangjin #6	9.8%
Korea Western Power (KOWEPO)	2007	Taeon #7	9.8%
Korea Southern Power (KOSPO)	2000	Hadong #5	9.3%
Korea East-West Power (EWP)	2005	Dangjin #5	9.2%
Korea South-East Power (KOEN)	1993	Samcheonpo #3	9.1%
Korea Southern Power (KOSPO)	1998	Hadong #3	9.1%
Korea East-West Power (EWP)	2000	Dangjin #3	8.9%
Korea Western Power (KOWEPO)	2001	Taeon #5	8.9%
Korea Western Power (KOWEPO)	2007	Taeon #8	8.9%
Korea South-East Power (KOEN)	1997	Samcheonpo #5	8.5%
Korea Midland Power (KOMIPO)	2008	Boryeong #7	8.4%
Korea Southern Power (KOSPO)	1999	Hadong #4	8.2%
Korea Midland Power (KOMIPO)	1993	Boryeong #3	8.1%
Korea Western Power (KOWEPO)	2002	Taeon #6	7.9%
Korea Midland Power (KOMIPO)	2009	Boryeong #8	7.6%
Korea Midland Power (KOMIPO)	1993	Boryeong #4	7.6%
Korea Southern Power (KOSPO)	1997	Hadong #1	7.5%
Korea Southern Power (KOSPO)	1997	Hadong #2	7.5%
Korea Midland Power (KOMIPO)	1994	Boryeong #5	7.3%
Korea Midland Power (KOMIPO)	1994	Boryeong #6	7.3%
Korea East-West Power (EWP)	2001	Dangjin #4	6.5%
Korea Western Power (KOWEPO)	1995	Taeon #1	4.7%
Korea East-West Power (EWP)	2000	Dangjin #2	4.7%
Korea South-East Power (KOEN)	2004	Yeongheung #2	4.4%
Korea South-East Power (KOEN)	2004	Yeongheung #1	4.2%

When these generators reach 30 years of operation, 44 out of 53 coal-fired generators owned by KEPCO's power generation subsidiaries will have received excessive compensation, amounting to KRW 53.2280 trillion. Even if the return threshold is raised to 6%, 39 out of 53 coal-fired generators will have still been overcompensated, corresponding to KRW 40.5692 trillion.

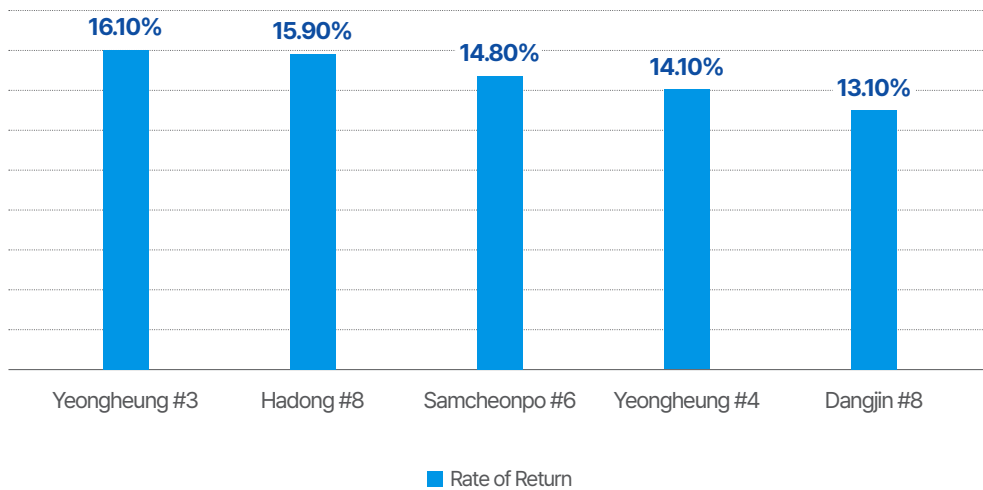
In particular, the rate of return for the top five generators was exceptionally high, hovering around 13 percent.

### Summary of the Analysis

Rate of Return	Overcompensation Amount for Coal-Fired Generators (KRW)
4% Threshold (WACC)	53.2280 trillion
5% Threshold	47.1028 trillion
6% Threshold	40.5692 trillion

Source: Solutions for Our Climate (SFOC)

### Top-Profiting Coal-Fired Generators at 30 Years of Operation



Source: Solutions for Our Climate (SFOC)



## Conclusion and Recommendations

Analysis indicates that retiring coal-fired plants that have already recovered their investment and a fair rate of return, would not require any additional financial support. This approach offers the fastest and most cost-efficient path toward the 2040 coal phase-out goal.

As a regulated market, the cost-plus-markup-based power market is intended to limit compensation to a reasonable level. The analysis, however, shows that coal-fired generators are receiving excessive compensation, highlighting the need for a comprehensive overhaul of the market. This report therefore puts forward the following recommendations:

### Policy Recommendations

#### 1. Eliminating the system overcompensating coal-fired generators

The Cost-Based Pool (CBP) market requires fundamental reform—such as the removal of the cost-plus-markup compensation mechanism—following a thorough investigation into the overcompensation of fossil fuel plants owned by KEPCO subsidiaries and Independent Power Producers (IPPs).

#### 2. Retiring overcompensated coal-fired generators and accelerating coal phase-out

The Korean government's coal phase-out target must be reached ahead of the current 2040 schedule to meet the 2050 net-zero objective. Accordingly, coal-fired generators that have already recovered their investment and an adequate return—and are now being overcompensated—should be retired to minimize financial impacts while ensuring a successful energy transition.

#### 3. Enhancing compensation for renewable energy and flexible resources

The current compensation scheme is insufficient for Korea's energy transition to renewable energy. Excessive compensation previously directed to fossil fuel plants should be reinvested in flexible resources such as ESS, which would require a power market that allows value stacking to ensure appropriate compensation for these resources.

## Appendix 1-1

### WACC Calculation Method

Weighted Average Cost of Capital												=	4.0%
Guideline Public Company(1)	Country	Observed Beta(2)	Currency (Millions)	MKT Cap(3)	IBD(4)	Lease Liabilities	D/E Ratio	Debt TIC	Lease TIC	Tax Rate	Unlevered Beta	Re-Levered Beta	
한국전력공사	KR	0.82	KRW	26,374,703	131,861,593	3,249,359	512.3%	81.7%	2.0%	23.1%	0.13	0.58	
지력난방공사	KR	0.34	KRW	970,299	4,113,426	107,324	435.0%	79.2%	2.1%	23.1%	0.08	0.36	
Maximum		0.82					512.3%	81.7%	2.1%		0.13	0.58	
Average		0.48					473.6%	80.4%	2.0%		0.10	0.47	
Median		0.48					473.6%	80.4%	2.0%		0.10	0.47	
Minimum		0.34					435.0%	79.2%	2.0%		0.08	0.36	
Selected								80.4%	2.0%		0.10	0.47	
Cost of Equity (KE)													
Risk Free Rate(5)	+	Beta	x	Equity Risk Premium(6)	+	Country Risk Premium(7)	+	Size Premium	+	Specific Premium (8)	=	Cost of Equity	
2.89%		0.47		8.0%		0.0%		0.0%		5.5%		12.2%	
After-Tax Cost of Debt (KD)													
Pre-Tax Cost of Debt(9)	x	(1 - Tax Rate)	=	After-Tax Cost of Debt									
2.9%		78.9%		2.3%									
After-Tax Cost of Lease Liabilities (KL)													
Pre-Tax Cost of Lease(9)	x	(1 - Tax Rate)	=	After-Tax Cost of Debt									
2.9%		78.9%		2.3%									
Weighted Average Cost of Capital													
				Capital Structure(10)	x	Cost of Capital	=	Contribution					
				80.4%		2.3%		1.8%					
				Debt		2.3%		0.0%					
				Lease Liabilities		12.2%		2.1%					
				Equity									
				목표 D/E Ratio		471.0%							
										WACC	=	4.0%	

Category	Source
(1)	Selected companies operating in a business line similar to that of the target company
(2)	Applied the average weekly adjusted beta for the past year as of June 30, 2025 (Source: Bloomberg)
(3)	Used market capitalization as of June 30, 2025 (Source: Bloomberg)
(4)	Applied interest-bearing liabilities from the most recent balance sheet as of June 30, 2025 (Source: Bloomberg)
(5)	Applied the average yield on 10-year Korean government bonds over the past 12 months as of June 30, 2025 (Source: Bloomberg)
(6)	Adopted the median value (8%) from the market risk premium guidance (7-9%) issued by the Korean Institute of Certified Public Accountants (KICPA)
(8)	Added a 5.5% specific risk premium at the evaluators' discretion, as the evaluation pertains to individual plants—not the companies—although the plants are owned by KEPCO or the Korea District Heating Corporation (KDHC)
(9)	Applied the 5-year unsecured corporate bond yield, reflecting the target company's credit rating (Source: Kofia Bond)
(10)	Applied the average capital structure of comparable companies

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