

J-Power(ing) down on five coal plants

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Electric Power Development Co., commonly known as J-Power (ticker ELPWRD), is Japan's largest coal power operator. J-Power is targeting carbon neutrality by 2050, to be achieved by cutting 9.2mm tonnes of emissions from its domestic power generation business by 2025 and 22.5mm tonnes by 2030, a 46% reduction from 2013 levels.[1] In May 2024, J-Power announced plans to decommission five of its power plants by 2030 as part of its decarbonisation strategy and in response to shareholder pressure. This announcement is a commendable step towards reducing J-Power's emissions and provides some clarity to investors as to how its carbon neutrality plan will be achieved. In addition, it was cited as an example of successful shareholder engagement.[2]

In this note we analyse J-Power's decarbonisation objectives, compared to its recent commitments on coal decommissioning and on broader ambition in the region. We consider capital needs for each scenario, which present opportunities for investor engagement.

- **There remain concerns around J-Power's decarbonisation trajectory.** J-Power's 2030 target requires more than the recently promised coal decommissioning and is less ambitious than the emissions intensity targets set by Japan's Electric Power Council for Low Carbon Society (ELCS), which promotes decarbonisation in the Japanese power sector.
- **The two largest coal plants may be repurposed into a reserve power source, thus significantly reducing the emissions savings potential of this strategy.** Parallel commitments to reduce emissions via investment in renewables will only deliver full decarbonisation if high-intensity generation is completely decommissioned.
- **The company regularly issues into the bond market; the importance of bond investors' in J-Power's decommissioning and renewables investment is substantial.** J-Power's transition-linked finance framework could be enhanced with more ambitious targets, or targets directly linked to decommissioning, which could support a lower cost of capital.[3]
- **The company's capital structure and generation assets provide an interesting case study in 'green bond carbon footprint accounting.'** We illustrate how to use project-based carbon footprint for J-Power's green bonds. This approach offers better accountability for the impact of green bond capital, but could also support tighter funding spreads if investors are able to recognise the value of assets with lower financed emissions.

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[1] Through the implementation of J-POWER "BLUE MISSION 2050," which was announced in February 2021. "Creating a path toward carbon neutrality and a hydrogen society as envisioned in "BLUE MISSION 2050"", J-Power website, accessed 24 Jul 2024.

[2] "J-POWER responds to shareholder pressure: five coal-power units to close by 2030", ACCR, 15 May 2024.

[3] For more details on Sustainability-Linked Bonds please download our handbook.

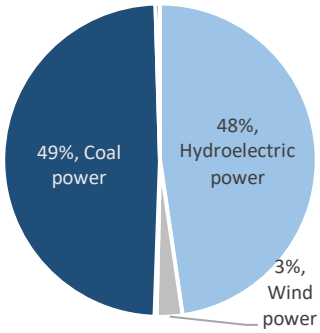
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J-Power background

Electric Power Development Co., also known as J-Power, is Japan's largest coal power operator. As of Mar 2023, J-Power's domestic coal assets total approximately 9 GW, representing 49% of its overall power generation capacity, while hydroelectric power accounts for 48%.

In addition to its domestic operations, J-Power owns around 8 GW of power generation assets spread across Thailand, the United States, and China. These overseas facilities consist of approximately 70% natural gas, 20% coal, and 10% renewable energy, including hydroelectric power.[4]

Figure 1 : Dometic Power Generation Capacity . Source : J-Power



Decarbonisation strategy

J-Power aims to achieve carbon neutrality by 2050. Interim targets are a reduction of 9.2 mm tonnes of emissions from its domestic power generation business by 2025 and of 22.5 mm tonnes by 2030, which represents a 46% reduction from 2013 levels.

The company plans to achieve these targets by gradually phasing out aging power plants, developing renewable energy, implementing coal gasification, ammonia/biomass co-firing, and rolling out carbon capture and storage (CCS) technologies.[4]

2030 target lacks ambition compared to ELCS

J-Power's 2030 target represents a step in the right direction. However, at an estimated 0.324 $kgCO_2/kWh$, J-Power's target is 1.3 times[5] greater than the national target of 0.25 $kgCO_2/kWh$ set by the Electric Power Council for a Low Carbon Society (ELCS)[6], which aligns with the national objective of achieving a 46% reduction in greenhouse gas emissions by fiscal year 2030.[7,8,9]

The ambition of J-Power's interim targets is crucial for clarifying the pace of its transition and the credibility of its decarbonisation trajectory. When comparing these interim targets to those set by the ELCS, **J-Power's target appear unambitious**. (Table 1).

[4] "J-Power Integrated report 2023", J-Power, Sep 2023.
[5] "Investor Briefing – Electric Power Development Co., Ltd (J-POWER) 2023 AGM", ACCR, May 2023.
[6] "The Electric Power Industry in Japan", Japan Electric Power Information Center (JEPIC), 2023.
[7] J-Power has been a member of ELCS since 2016. ELCS promotes power companies to implement effective measures to achieve a low-carbon society. A further discussion of the national -46% target is available in "Transition power, A JGB SLB, prints in USD", AFII, 7 Feb 2024. (Japanese language version).
[8] "Establishment of the Electricity Business Council for a Low-Carbon Society", Federation of Electric Power Companies of Japan (FEPC), 8 Feb 2016.
[9] There is a possibility that emission intensity (kg-CO2/kWh) can be met if J-Power increases power generation. These estimates are based on J-Power's disclosures and projections of electricity generated in Japan. "J-Power Integrated report 2023", pg 51, J-Power, Sep 2023.

Table 1. J-Power's emission intensity target compared against ELCS and peers. Source: Various.

	ELCS	J-Power	Kyushu	JERA
Base year	2013	2013	2021	2019
Base performance (kg-CO2/kWh)	0.569[1]	0.774[2]	0.351	0.493
Target year	2030	2030	2031	2030
Target performance (kg-CO2/kWh)	0.25	0.324[3]	0.183	0.477
Target relative to ELCS	-	1.3x	0.7x	1.9x
Annualised reduction (kg-CO2/kWh)	0.015	0.021	0.017	0.001

1. Some figures are estimated based on targeted absolute emissions reductions or the latest available data.
2. The power generation for year 2013 was estimated from J-Power's 2023 Integrated Report.
3. Some figures are estimated based on targeted absolute emissions reductions or the latest available data. Source: ACCR.
Note: Based on our estimation, J-Power's emission intensity by 2030 would be 0.441 kg-CO_2/kWh. However, we have opted for a more conservative figure.

Decommissioning five coal plants by 2030

In May 2024, J-Power floated plans to decommission five of its power plants by 2030 as part of its decarbonisation strategy and in response to shareholder pressure.[2] This announcement is a commendable step towards reducing emissions and provides some clarity to investors. However, it is important to assess the strength of the commitment and its contribution to J-Power's targets.

The five units identified represent 30% (or 2.7 GW) of J-Power's total installed capacity of coal-fired power in Japan. These are detailed in Table 2. We note these power plants are old, and the first two are extremely old, at 55 and 56 years, respectively. This is significantly above the average age for the region, reported to be 21 years by the International Energy Agency (IEA), and even older than the 41 year average for the US, which has the longest-lived coal plants.[10] It is also well above the general operational life of 40-50 years, and the forecast average operational age of 42 years in Japan, as determined through an academic study into power plant retirement.[11]

Table 2. Coal assets with a potential retirement plan. Source: J-power's Medium-Term Management Plan 2024-2026, Global Energy Monitor

Coal Assets	Commenced Operation (Year)	MW	Plans
Takasago Thermal Power Plant Unit 1	1968	250	To be decommissioned
Takasago Thermal Power Plant Unit 2	1969	250	To be decommissioned
Matsushima Thermal Power Plant Unit 1	1981	500	To be decommissioned by 2024
Takehara Thermal Power Unit 3	1983	700	To be decommissioned or repurposed
Matsura Thermal Power Plant Unit 1	1989	1,000	To be decommissioned or repurposed

The largest two units, 63% (or 1.7 GW) of total capacity, have not definitively been committed for decommissioning. According to J-Power's Medium-Term Management Plan 2024-2026, J-Power has kept the option of repurposing those into a reserve power source.[12] Therefore, only three of these units are confirmed to shut down by 2030.

Alongside this, J-Power has also indicated that the remaining 70% of its coal capacity will continue to operate until 2050, albeit through co-firing with biomass and ammonia. **In conclusion, the company's commitment to reducing thermal generation is not fully comprehensive.**

[10] "Average age of existing coal power plants in selected regions in 2020", IEA, 13 Oct 2021.
[11] "Forecasting coal power plant retirement ages and lock-in with random forest regression", Achmed Edianto et al, CellPress, Vol. 4, No.7, 14 Jul 2023.
[12] "J-Power Group Medium-Term Management Plan 2024 -2026", J-Power, 9 May 2024.

Emission impact

We will now estimate the impact of the decommissioning on J-Power's emissions, relative to its targets. We analysed the emission impact of decommissioning three and five coal plants.

Our analysis estimates that retiring five plants will result in an emission reduction of 12.1mm tonnes from a 2022 baseline, as shown in the bottom row of Table 3. However, if only three coal plants are decommissioned, the estimated reduction will be significantly lower, at 4.5mm tonnes (middle row, Table 3). Due to the different capacities of the five plants in question, closing all five generates 2.7x emission reduction of closing only the smallest three.

Table 3. Estimated coal generation and emissions reduction. Source: J-Power, CDP and AFII

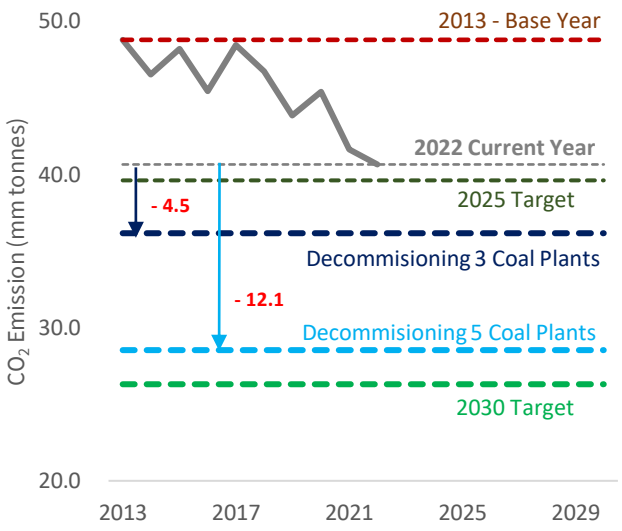
	Coal Capacity	Emissions (mm tCO_2)*	Emissions Reduction (mm tCO_2)
2022 Current Year	9.45	40.64	-
A/f Decommissioning 3 Coal Plants	8.45	36.17	- 4.47
A/f Decommissioning 5 Coal Plants	6.75	28.56	-12.08

*It refers to domestic emissions and a coal emission intensity of 892g CO_2/kWh was applied.

Figure 2 shows J-Power's historic emission trajectory, plus the estimated potential impact of closing three or five power stations.

The interim 2025 target can easily be achieved even under the three plant decommissioning scenario. 2022 reporting shows 88%, or 8.13mm tonnes, of the required reduction since 2013 has already been achieved.

Figure 2 : J-power historical CO_2 emission and impact of decommissioning coal plants by 2030 . Source : J-Power, AFII



Even though J-Power's 2030 emissions intensity target may be unambitious compared to some peers, decommissioning all five plants alone will not ensure this target is met. **Purely adding renewables to its generation capacity, without additional closure of high-emitting assets, will have limited additional impact.**

J-Power has also stated in its integrated report that it intends to withdraw from some thermal projects, discontinue thermal power, and expand biomass co-firing, which may help achieve its target. However, the full details of these plans and the proposed timeline remain unclear.[4]

In summary, J-Power's 2025 target appears easy to achieve, and progress thus far has been driven by historic emissions reductions since the 2013 baseline. Its 2030 target, which is not aligned with industry best practice, will require additional reductions over and above closing all five plants and current planned investment in renewables.

Capital is needed for transition

To fund its decarbonisation plans, J-Power has projected a capital expenditure (capex) of approximately JPY 700bn (around USD 4.5bn) between 2023 -2030. It aims to make strategic investments of JPY 300bn over the next three years. These investments will focus on global renewable energy development, thermal power transition, and advancements in nuclear and hydro power.[4]

Estimated cost of decommissioning coal plants

Based on the average decommissioning costs for power plants aged 30-40 years in India and the United States, we estimated a decommissioning cost of USD 112,524 (JPY 17 mm or INR 0.94 cr) per MW.[13,14] The estimated cost included debt, equity, and workforce-related payouts.

As a result, to finance the decommissioning of all five of its coal plants, J-Power would need around USD 0.3bn (JPY 48.37bn), which represents around 7% of its projected capex, as detailed in Table 4.

Table 4. Estimated Decommissioning Cost. Source: Resources for the Future, Centre for Energy Finance, AFII

Coal Assets	MW	USD (bn)	JPY (bn)
Takasago Thermal Power Plant Unit 1	250	0.03	4.48
Takasago Thermal Power Plant Unit 2	250	0.03	4.48
Matsushima Thermal Power Plant Unit 1	500	0.06	8.96
Takehara Thermal Power Unit 3	700	0.08	12.54
Matsuura Thermal Power Plant Unit 1	1,000	0.11	17.91
Total MW for retirement	2,700	0.30	48.37

A mere USD 300 mm cost for decommissioning 2.7GW of coal seems like a bargain, but it should be noted that the number is an estimate based on decommissioning costs from case studies in India and the United States. The specifics of J-Power's coal plants may require further evaluation to account for more complexities such as plant-level economic conditions, power purchase agreements, and both regional and national power supply and demand, although we note again the age of the plants in question.

Replacing with renewables

J-Power also aims to increase renewable energy generation by 4bn kWh/year,[15] and has identified a capex need of JPY 200bn against this aim and global renewable energy development.

In order to meet power demands, the decommissioned assets need to be replaced, and doing so with renewables will lead to a reduction in emissions intensity (sales volume/kWh), which could support emissions reductions among power generators and consumers throughout Japan through electricity sales.[4]

[13] "Decommissioning US Power Plants", Table 1, Resources for the future, Oct 2017.
[14] "Mapping Costs for Early Coal Decommissioning in India", Centre for Energy Finance, Jul 2021.
[15] J-Power can meet this target either by increasing the utilisation rate of its renewable energy power generation or by increasing renewable energy capacity. In our scenario analysis, we applied the latter approach and treated the increase in power generation as an increase in renewable energy capacity, which translates to 3.074 GW.

The decommissioning of coal plants and the renewable energy development combined suggests that J-power needs significant capital to fund its decarbonisation strategy.

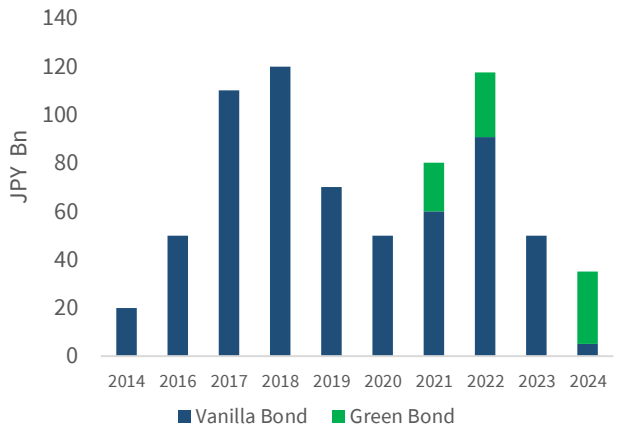
An active bond issuer

In the past 10 years (2014-2024), J-Power has issued nearly JPY 807.6bn (USD 5.4bn) into the JPY market, making it a fairly active participant. Issuance has been on an almost annual basis (see Figure 3). J-Power has been issuing green bonds since 2021, with the most recent issuance in Apr 2024. These green bonds are primarily intended to fund renewable energy development, aligning with J-Power's decarbonisation strategy.[16]

Out of the total JPY 807.6bn issued, nearly 58%, or JPY 472bn (USD 3.13bn), is expected to reach maturity by 2030. These upcoming maturities could influence J-Power's strategy for refinancing or raising new capital.[17]

Given J-Power's consistent track record of bond issuances, it is clear that the company has established a robust capability in raising capital through the bond market. **This presents an opportunity for investor engagement.**

Figure 3. Total bond issued by J-Power from 2014-2024. Note: Issuances are denominated in JPY. Source: Bloomberg, accessed on 23 Jul 2024.



Transition finance

J-Power has reported its aim to lower capital costs by employing various financing frameworks designed to support the transition to a carbon-neutral society.[4] In addition to its use of green bonds, J-Power published a Green/Transition finance framework in 2023 including KPIs which could be used for sustainability-linked borrowing either in bond or loan format.[18] J-Power reported using this framework for a transition-linked loan in Feb 2023,[19] but we have not seen any Sustainability-Linked Bond issuance so far.

According to the framework, shutting down and decommissioning outdated or deteriorating thermal power plants, along with other "transition" activities, could enable J-Power to access transition financing. This may include transition bonds and transition-linked bonds or loans.

[16] For an illustrative example on potential green bond carbon accounting for J-Power's green bonds please see Appendix 1: J-Power Green Bonds.
[17] Bloomberg, accessed on 23 Jul 2024.
[18] "J-Power Group Green/Transition Finance Framework", DNV, 13 Jul 2023.
[19] "J-Power Group's Sustainability Initiatives", J-Power 2023 Integrated report, accessed 24 Jul 2024.

Table 5. Possible candidates for KPI and SPT. Source: DNV, J-Power.

KPI: Key Performance Indicator	SPT: Sustainability Performance Target
CO_2 emissions reduction from J-Power Group's domestic power generation business	FY 2025 = **-9.2** mm tonnes compared to FY 2013
	FY 2030 = **- 46% / -22.5** mm tonnes compared to FY 2013

Note: The SPT trigger events may be set by linear interpolation between the actual emission for the base year of FY2013 and targets by FY2025 and/or FY2030 or may be set individually when future detailed plans are drawn up.

We note the Sustainability Performance Targets referenced in the Green/Transition finance framework are aligned with J-Power's 2025 and 2030 emissions targets, the first of which is nearly achieved, and the second of which lacks alignment with the emissions intensity targets of the Electric Power Council for a Low Carbon Society.

As illustrated in our recent case study on JERA, a Japanese thermal power generation company, more ambitious targets can drive a tighter cost of capital for issuers.[20] If J-Power aligned its targets to a more ambitious trajectory, this could result in lower financing rates.

J-Power requires significant financing to achieve its transition objectives. As a frequent bond issuer, fixed-income investors will have ample opportunities to engage with the company, and potentially seek commitments around thermal decommissioning.

Use of Sustainability-Linked financing tied to more ambitious targets could lower capital costs for J-Power. Investors could also propose a KPI linked directly to the successful decommissioning of all five coal plants, an action which has not yet been comprehensively committed to by J-Power. [21]

Conclusions

J-Power's recent announcement to decommission five coal power plants represents a step forward in its climate ambitions. However, the two largest plants may be scheduled to stay operational until at least 2030, at which point they may be repurposed into a reserve power source.

J-Power's 2030 target requires an emissions reduction larger than that achievable through the decommissioning of all five plants. Moreover, this action would not put J-Power on track with the emissions intensity trajectory set by ELCS, potentially indicating a lack of ambition.

With approximately JPY 700bn projected for capital expenditure, including coal plant decommissioning, J-Power may raise transition funds through the bond market, where it is a frequent issuer. This could be an opportunity for investors to require stronger decommissioning commitments or more ambitious emissions reduction targets.

J-Power's outstanding transition financing framework, which to our knowledge has not yet been used for bond financing, is linked to its 2025 and 2030 targets. More ambitious reductions could increase the SLB option value for investors, and therefore reduce the financing cost for J-Power, if it hopes to raise transition financing to meet its investment needs.

[20] For a full discussion on this topic please see "JERA: An enhanced SLB proposal for ambitious transition", AFII, 29 Feb 2024. (Japanese language version).
[21] For a longer discussion, see the chapter "Setting sustainability performance targets" in the AFII SLB Handbook.

Appendix 1 : J-Power green bonds

J-Power has been issuing green bonds since 2021, with the most recent issuance in Apr 2024 (bonds are listed in Table 6). As of Jul 2024, the green bond page of J-Power's website only has published allocation details for its first issuance.[22] This report, verified by its Second Party Opinion provider DNV, confirmed that 100% of the bond was allocated by Mar 2021 for 136MW of wind power development construction and operation. The environmental impact was a saving of 166,000tCO_2/year.[23] The two bonds issued in 2022 have also been allocated towards wind construction, which has been reported separately.[24] No emissions impact has yet been disclosed.[25]

Table 6. J-Power green bond issuance. Source: Bloomberg, J-Power, accessed 7Jul 2024.

ISIN	Issue Date	Maturity	Coupon (%)
JP355120AQ43	Apr 2024	Apr 2034	1.121
JP355120BQ26	Feb 2024	Feb 2034	1.106
JP355120AN12	Jan 2022	Jan 2032	0.310
JP355120ANB2	Nov 2022	Nov 2032	1.000
JP355120AM13	Jan 2021	Jan 2031	0.350

Calculation details for the 166,000tCO_2/year savings have not been disclosed, however J-Power's integrated reporting suggests the formula uses average Japan emissions factors multiplied by utilisation rates. Using an emissions intensity factor of 436g[26] implies an estimated capacity factor of 32%, which seems in line with external estimates.[27]

It is worth noting these emissions have not been 'saved' unless an equivalent amount of emissions intensity general capacity is decommissioned and replaced with the wind generation. This is one limitation of the avoided emissions approach.[28]

Table 7. J-Power green bond issuance. Source: J-power and Ministry of Environment, accessed 7 Dec 2024

ISIN	JPY (bn)	Use of Proceeds	Estimated Emission Reduction t-CO2/yearly
JP355120AQ43	10	Allocated to new investment and refinance for renewable energy-related businesses	n.a
JP355120BQ26	20	Used for new investments and refinancing of businesses related to renewable energy	n.a
JP355120AN12	10	Used to refinance construction costs for the Kuzumaki No.2 (44.6MW) and Kaminokuni No.2 (28 MW) onshore wind power plants	n.a
JP355120ANB2	17	Used for the development and operation of Kuzumaki No.2, Kaminokuni No.2, Minami Ehime No.2, and new Shimamaki Wind Farm	n.a
JP355120AM13	20	Setana Osato Windfarm, the Nikaho No. 2 Windfarm, and the Kuzumaki No. 2 Windfarm, which are onshore wind power projects with a total capacity of 136 MW.	166,000

[22] Only the 1st J-POWER Green Bonds are listed on J-Power's website under its green bond issuances, accessed 22 Jul 2024.
[23] "Green bond eligibility for post-issuance", DNV, Aug 2021.
[24] "Environmental initiatives", J-Power, accessed 24 Jul 2024 and "2023 Integrated Report", J-Power, accessed 24 Jul 2024.
[25] In the 2023 integrated report it was explained that environmental improvements would be announced after the start of operation of eligible projects.
[26] "The Electric Power Industry in Japan 2023", JEPIC, accessed 24 Jul 2024.
[27] For example a range of 35-45% is given in "Offshore wind in Japan: The untapped potential", Zero Carbon Analytics", 1 Jun 2023.
[28] Another potential issuer with over-reporting of saved emissions is illustrated in "The Accounting Flaw at the Heart of 'Financed Emissions'", Bloomberg, 24 Jul 2024.

Looking more broadly within Japan, the proceeds of all issued green bonds were generally allocated to refinancing or the development of renewable energy (hydro, wind, geothermal, and/or solar power).[29]

Carbon footprint of green bonds

One challenge in understanding the impact of green bonds is the lack of a standardised approach for reporting their financed emissions.[30] We will use this case study to explore a hypothetical calculation for J-Power's green bonds under different decommissioning scenarios.

Financed emissions

Financed emissions are generally calculated as the total emissions of an investment. The denominator used to allocate emissions across financing parties is total debt + market capitalisation. Some investors prefer to use Weighted Average Carbon Intensity (WACI), where the denominator is typically revenue, making it is an average measure of the carbon intensity of all portfolio companies. Anecdotally, in the absence of a generally accepted alternative, green bonds are often accounted for with equivalent WACI to traditional bonds, even if impact reporting is available. This presents a lost opportunity both to look through to the true impact of green bond capital, and also lowers the hurdle rate for investors with carbon budgets. We will estimate financed emissions across J-Power's debt stack to present an alternative method of reporting.

Emissions scenarios

Table 8 summarises 2023 CDP reporting from J-Power, with generation figures and emissions intensities provided for each power source. For comparison, some figures from its 2023 integrated report are included, which shows that the totals are close. This also confirms that J-Power reports all renewables with zero emissions, and zero emissions intensities.

Using these emission intensities, we have applied scenarios to assess the potential impact on emissions that J-Power's reduction strategies could have.[31]

Table 8. J-Power emissions and intensities for different generation methods. Source: CDP 2023 reporting.

	Capacity	Gross generation	Net generation	Scope 1 emissions	Emissions intensity
	MW	GWh	GWh	Metric tonnes CO_2	Metric tons CO_2 per GWh
Coal	9,415	50,811	46,810	42,132,000	829
Gas	6,139	15,390	15,923	6,001,000	415
Sustainable Biomass	12	104	94	0	0
Geothermal	38	177	168	0	0
Hydropower	9,087	11,003	9,219	0	0
Wind	715	1,696	1,644	0	0
Solar	59	1	1	0	0
TOTAL	25,464	79,182	73,860	48,733,000	611

[29] "Major Green Bond Issuance Cases in Japan", Ministry of Environment, 28 Jun 2024.
[30] For a full discussion on this topic please see "The Forensic Carbon Accountant: green bond carbon footprint", AFII, 28 Jun 2023.
[31] We have applied the same emission intensity and utilisation factors to all coal generation capacity.

Our illustrative analysis uses three scenarios as detailed in Table 9. We have separated them to simplify the example, but to achieve maximum emission reduction impact a combination of decommissioning (Scenario A / B) plus renewables (Scenario C) would be required.

Table 9. Scenario descriptions. Source: Bloomberg, J-Power, CDP, accessed 7Jul 2024.

Scenario	Description	Costs (JPY bn)	Funded by	Emissions impact
Scenario A	Decommissioning of 3 coal plants (1 GW)	17.9	traditional debt	-4,474,987
Scenario B	Decommissioning of 5 coal plants (2.7 GW)	48.4	traditional debt	-12,082,464
Scenario C	Increase renewables (3.074GW)	202.7	green bonds	0

To estimate the financed emissions of the existing green bonds, we will allocate the zero emission assets in priority. Zero emissions capacity represents 38.9% of J-Power's total, and green bonds are only 6.4% of its financing (see Table 10), so we will assign only zero emissions assets to the green bonds. Table 11 shows the calculations.

Table 10. J-Power debt and equity totals. Source: Bloomberg accessed 7Jul 2024.

Funding	JPY (Bn)
Market Cap	389
Vanilla Bond	730
Green Bond	77
Total	1,196

Firstly, when applying emissions flat across the financing, Scenario B gives the highest financed emissions reduction, and is associated with the largest absolute emissions reduction. Scenario C, despite offering no net emissions reduction, does reduce the financed emission by 10.8% due to investment in zero emission generation capacity.

In the next scenario, where zero emissions are applied to green bonds and all emissions are allocated to non-green financing, the impact of this compared to a flat allocation is unsurprisingly related to the size of the total green bonds, i.e. it changes substantially in Scenario C when extra green bonds are issued to fund the renewables expansion. In this scenario, no emissions reduction is allocated to non-green investors, and if this emissions reduction is allocated to green bond investors, that could support a tighter cost of capital for issuers.

Table 11. J-Power financed emissions calculation. Source: AFII.

	Unit	Base Case	Scenario A	Scenario B	Scenario C
Total Scope 1 emissions	Metric tons CO2	48,733,000	44,258,013	36,650,536	48,733,000
Total financing	JPY bn	1,196	1,214	1,244	1,340
Average financed emissions	Metric tons CO2/ USD bn	265	237	192	237
Change in average financed emissions			-10.5%	-27.7%	-10.8%
Green Bond	JPY bn	77	77	77	221.4
Green bond allocated emissions	Metric tons CO_2	0	0	0	0
Green bond emissions intensity	Metric tons CO_2/ USD bn	0	0	0	0
Non-green financing	JPY bn	1,119	1,137	1,167	1,119
Non-green allocated emissions	Metric tons CO_2	48,733,000	44,258,013	36,650,536	48,733,000
Non-green financed emissions	Metric tons CO_2/ USD bn	283	253	204	283
Change in non-green financed emissions due to green bond carbon accounting		6.9%	6.8%	6.6%	19.8%

This case study illustrates the significance of asset-based emissions allocation. In Scenario C, where green bonds are issued to fund an expansion of zero emission generation, if the emissions are not allocated by project then all investors enjoy a 10.8% reduction in financed emissions. If the emissions of the new investment are allocated to green bonds, then traditional investors are unchanged, but the green bond holders have 'claim' to a zero financed emissions investment.

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