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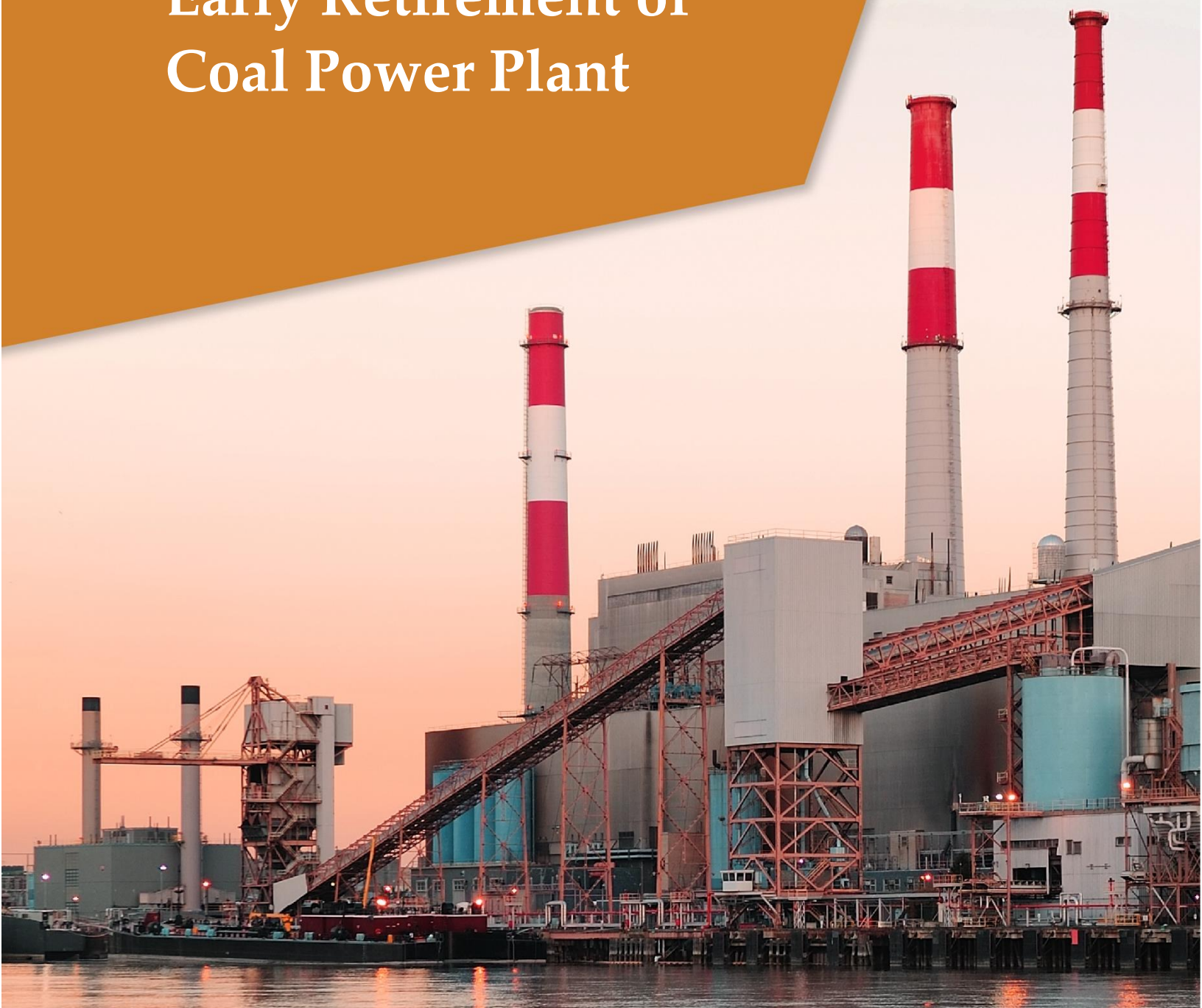
The Economic and Justice Standards for Early Retirement of Coal Power Plant



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Our Mission :
To support the realization of energy transisition programs with financial transparency and strandarization in Indonesia

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Endorsement

Executive Summary

Indonesia has determined to achieve net zero emissions (NZE) by 2050 for electricity and 2060 for other energy usage. To achieve this target, Indonesia has developed a long-term program in the form of an equitable, a fair, a just energy transition. Among the energy transition programs is the early closure of CPP.

In general, the energy transition program and early closure of CPPs uses two basic principles, namely economic and justice. Economic principles require that all energy transition programs must be effective in reducing emissions at minimal and affordable public costs. Then the principle of justice requires that the costs of the energy transition must be distributed proportionally and fairly so that no party is sacrificed or left behind.

We created a "model, quantification, and qualification" so that these two main principles become parameters that can be implemented. We call it "Economic and fair standards" for early closure of CPPs. As the name suggests, this standard aims to (1) make the CPP early closure program (and other energy transition programs) reduce emissions as much as possible (effective), (2) with the lowest public costs (efficient), and (3) costs are distributed proportionally and fairly.

Broadly speaking, this standard is divided into two parts, namely main standards and general standards. The main standards are the modeling, quantification and qualification of economic and justice principles. Meanwhile, general standards are administrative standards in the form of information transparency and procedures.

The main standard consists of 4 parts, namely economic standards, funding standards, valuation standards and coherence standards. In economic standards we use the basic principles of economic, namely achieving the maximum benefit at the lowest possible cost. We use the emission reduction cost ratio (ERCR) as a parameter. In simple language, "the greater the ratio of emission reductions per closure costs, the more effective the CPP early closure program will be."

For funding standards, we use the principle of justice as the main basis. That the most relevant party to finance the early closure of a CPP is the party that (1) emits the most (accumulated) emissions and (2) the party with the highest income. Based on this principle, we created a hierarchy of funding sources from the most ideal to the least ideal. The most ideal source of funding comes from industrialized countries and from companies and other economic actors that emit the largest emissions, whether in the form of grants, cooperation or taxes. And the least ideal source is public or government funds.

Valuation standards use the principles of economic and justice at the same time, namely to achieve minimal and fair costs. We use a model that is commonly used in Finance that is the present value of future cash flow (PVFC). Apart from that, we also include other factors such as contracts, discounts from CPP owners, and standard domestic and foreign interest rates.

Then the coherence standard uses the principle of economics in general and justice in particular,

that the CPP early closure program and other energy transition programs will only be effective if they do not conflict, or contradict, or neutralize each other, with other programs. Early closure of CPPs will only be effective if no new CPPs are built.

The standards of economic and justice do not judge whether a program is feasible or not. Neverthelesss, they aim to help policymakers make their programs effective, efficient, and fair.

Based on this standard, we see two actual conditions in Indonesia that are quite far from ideal. First, most of the costs of early closure of CPPs will most likely involve the last alternative in the financing hierarchy, namely using government funds or becoming a public burden. Second, to this day, the Indonesian government is still issuing new permits for the construction of CPPs within the industries, which contradict the plans to retire the CPPs earlier.

Therefore, we recommend that, first, governments and other interested parties as optimally as possible explore funding sources from the most relevant parties, they are, governments of industrialized countries and economic entities that emit the largest emissions (both domestic and foreign), both in the form of grants, cooperation, and regulatory-based funds such as taxes. Second, the government aligns all policies including the downstream industry with the target of an emission-free Indonesia, so that no more new CPPs will be built. Third, we also recommend that this standards be used by stakeholders in preparing CPP early closure programs (and other energy transition programs) at the planning, implementation and evaluation levels, so that the program is effective, efficient and based on the principles of justice. And fourth, to obtain optimal best practice, the government can initiate early closure of CPPs at a small, low-cost pilot project.

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1 INTRODUCTION

1.1 Background

During the 2022 G20 meeting in Bali, the Indonesian government and the International Partners Group (IPG) have signed an MoU and launched the Just Energy Transition Partnership (JETP) program. In this MoU, Indonesia commits to achieving the target of zero emissions or net-zero emissions (NZEs) in the electricity sector by 2050, and other energy by 2060. To achieve this target, the IPG consortium recommends stopping the construction of new coal-fired power plants in Indonesia, increasing construction of the new and renewable energy (EBT) power plants, and CPP's early retirement.

The International Partner Group (IPG) and GFANZ committed in providing funds of 20 billion dollars (around 310 trillion rupiah) consisting of grants, loans from non-profit institutions and commercial loans. Based on the experience of African countries that have run similar programs, the amount of grant funding is "only" around 3% of the total project. Most likely, the amount of grant funds for Indonesia will also be in that range. Thus, the majority of JETP program funding will be in the form of debt.

In early November 2023, the JETP Secretariat issued the CIPP (Comprehensive Investment and Policy Plan), which is, so far, the most complete document to achieve the target of an emissions-free Indonesia. The CIPP document only provides an explanation and is not binding on either the Indonesian government or investors. Apart from that, CIPP is also a live document, which can change according to conditions.

The CIPP document stated that, to achieve the emission-free target, Indonesia will increase its renewable energy mix, increase energy efficiency, and retire early several CPPs. Please note that the electricity sector contributes 43% of total CO2 emissions in Indonesia in 2022 (Santika, 2023). To achieve Net Zero 2050, Indonesia is targeting peak emissions from the electricity sector of 290 MT CO2 in 2030. Reducing emissions from the baseline of 357 MT CO2 is achievable among others by increasing the renewable energy mix by 34% in 2030 (JETP Indonesia, 2023). Until 2023, the renewable energy mix in Indonesia amounted to 13.09% (Ahdiat, 2024).

CIPP stated that apart from early closure, several other programs can also be carried out in parallel or alternatively, such as repurposing CPPs, reducing capacity factors, renegotiating IPP contracts with PLN, co-firing with biomass, integrating captive power into PLN network, and others.

1.2 The Just and Economic Principles

In general, the energy transition uses two main principles, namely economic (effectiveness) and justice. These two principles are elaborate into 3 main points:

1. First, economic principles, that is the benefits or maximum impact with minimal cost. This means that all programs in the energy transition must achieve maximum benefits with minimum costs. For example, the energy transition program must be able to reduce emissions significantly. However, the program must also be low cost, in terms of not being a burden to the public, thus energy price remains affordable. Low costs can also mean non-financial. For example, not reducing the availability and reliability of energy, not causing a major unemployment, and not causing a major loss of economic activities, etc.
2. *Second*, the principle of just or fairness based on income. This means that the costs of the energy transition must be distributed proportionally based on income. Those with high incomes receive more burdens than those with low incomes. In the energy transition process, no one become the victim, no one is left behind.
3. Third, the principle of jus or fairness based on roles. This means that the costs of the energy transition must be distributed proportionally based on the burden of emission. The party that emits a lot of emissions must bear more costs than those that emits little.

1.3 Early Closure of CPP

One important way to achieve zero emissions is to close early CPPs that is still in operation. Early closure of CPPs in various countries is generally driven by environmental reasons, public health, energy diversification, and the pursue of emission-free commitments. South Africa, for example, as one of the countries running the JETP program, has planned to close 9 out of 15 power generation by 2035 to pursue emission-free targets (Zhou, Ma, Liu, & Carter, 2023).

As part of its plan to become emission-free, Indonesia plans to close several CPPs early. Apart from the general reasons above, Indonesia has three additional reasons:

First, electricity generation capacity in Indonesia is generally excessive. PLN statistics 2022 shows the power capacity (*daya mampu*)[1] of PLN Jawa Bali generator reached 42,7 GW while the peak load decreased by 6.28% to 24,2 GW so there was a difference of 18,5

[1] Power capacity / Daya mampu is the generator's actual installed capacity

GW or about 43% *reserve margin* (Sekretariat PLN, 2023). Meanwhile, the average reserve margin for other networks ranges from 30% -70%. According to the International Energy Agency (IEA), ideally the *reserve margin* is in the range of 20% - 35%. Please note that around 70%-80% of the *reserve margin* uses a *take or pay* clause. This means that PLN must pay for the power plant, whether it is used or not (Wahyudi, 2023). For each gigawatt of generating capacity for the unused, PLN must pay between 2-3 trillion rupiah per year (Antara, 2023). Apart from being expensive, this overcapacity indirectly hinders the opportunity to build Renewable power plants. PLN cannot build additional Renewable generators while the existing generating capacity is in excess.

Second, in recent years air quality in big cities in Indonesia has degraded significantly. This is shown by various air quality indicators accessible to the public. The decline in air quality is closely related to the operation of giant coal-fired power plants on the island of Java and coal-producing central areas which have only been operating in the last few years (Myllyvirta, Kelly, Uusivuori, Hasan, & Tattari, 2023). Deteriorating air quality causes huge losses to society. A study from the Center for Research on Energy and Clean Air (CREA) reported that air pollution from CPP Suralaya – Banten causes 1,470 deaths every year and causes health losses of up to IDR 14.2 trillion. In the *maximum value scenario*, the study estimates that the death rate could increase to 1,640 per year and health losses increase to IDR 15.8 trillion (Kelly, Myllyvirta, Tattari, & Hasan, 2023).

Third, most of the CPPs operating in Indonesia are new CPPs built within the 35,000 MW program and are part of the Nawa Cita. Based on IESR records, around 60% of CPPs in Indonesia are under 10 years old or in the construction and planning period (Cui, et al., 2023). This means that the operational period of the new CPPs is still long.

The three reasons above give Indonesia a stronger reason to close several CPPs earlier than other countries in general.

High Cost

Nevertheless, early retirement of a CPP is expensive. There are at least three main causes:

First: The goal of investors in building a CPP is to make a profit. If the CPP is closed early, then there must be compensation for lost profits, or "profit compensation". The cost of early closure of a CPP will not just be replacement of investment costs, or buying a power plant installation that is no longer in use. It could also mean replacing investors' lost

profits according to the contract period.

Second, early retirement of a CPP is a non-commercial project that does not generate profits in the future. Yet, it eliminates the potential profits of CPP owners. Accordingly, there is no commercial benefits that would cover or reimburse such closing costs. Ultimately, like it or not, closing costs must be borne by society or the government as the "buyer of last resort.".

Third, Indonesia does not have regulations governing *mandatory* CPP retirement scenarios. A regulation that can make operators retire independently when criteria are met. Based on the JET-P document, Indonesia also does not have regulations related to carbon tax which suppresses CPP business profits.

These three reasons make early retirement of a CPP expensive, especially when compared to construction of renewables facilities.

This is the dilemma we face. On the one hand, early closure of CPPs is very important due to excessive generating capacity, rapid increase in air pollution, and the CPP's long operational period. To continue CPPs operation will burden the public in the long term. It poses harm to health (Kelly, Myllyvirta, Tattari, & Hasan, 2023), environment and economy. However, on the other hand, CPP early retirement is expensive because it is a project that does not provide financial benefits, while the CPP owners would like compensation.

Opportunity Cost

In economics, real costs are *opportunity costs*. When we use money to buy something, the real cost is not the money we spend, but the lost opportunity to use that money for other needs. This means that to buy these goods, we sacrifice our opportunity to fulfil other needs.

In the context of early closure of CPPs, the real cost is not merely the funds paid by the government or the public, but the lost opportunity to use these funds for other purposes, among which the most relevant is the construction of renewable energy plants and electricity networks.

It is as if we had to choose whether to use the available funds for early retirement of CPPs or construction of renewable power plants and network. If we choose to close the CPP early, then we might lose the fund needed to build the renewables.

Achieving the optimal allocation mix

In principle, the early closure of CPPs and the construction of a network of renewable power plants have the same goal. Both aim to reach zero emissions. Yet, capital is limited. We need to carefully consider its allocation. How much is needed for CPP's early retirement and those needed to build the renewable energy network.

The key question to answer is: how effective early retirement of CPPs at reducing emissions compared to other programs. We need to look for the most efficient and effective investment allocation mix to optimally achieve the emission-free target amidst limited capital.

1.4 The Just and Economic Standards

The just and economic standards function to assist process evaluation of CPP's early retirement. The process needs to fulfil the main principles of energy transition as mentioned above. The standards aim to reach effectiveness, efficiency, maximum benefits, minimum costs. They aim for proportional cost distribution and optimal justice principles. The objectives of transparency standards are:

1. Maximize CPPs' early retirement benefit, by reducing emissions as much as possible, and providing other benefits such as job creation.
2. Minimize CPP's early retirement cost, both the basic costs of closure and other public costs, including other negative impacts.
3. Optimize the distribution CPP's retirement costs, proportionally and equitable to all parties.

1.5 Primary Source of Fund

The primary funding source is the party that covers the retirement costs. For example, a CPP is closed with replacement funds from the bank. The government then assumes and pays the debt along with interest to the bank. Therefore, the primary funding source in this case is the government's the state budget (APBN). Meanwhile, banks only provide temporary funding.

Based on the primary source of fund, in general, there are four possible models for CPP early retirement, they are:

First, self-closure or *self-retirement*, i.e. the CPP owner, on his own behalf or for other reasons, closes his CPP early and bears the full costs of closure. This can be due to various motives, including environmental awareness, operational losses, political reasons, legal reasons, and other reasons.

In 2019, a CPP in Arizona, USA, Navajo Generating Station (NGS) stopped operating. The owner and operator closed the 2.25 GW capacity plant citing operational losses and did not obtain a permit extension (which was previously planned until 2044). The owner covered all closing costs of US $ 150 million (Navajo Hopi, 2019).

From the perspective of justice based on roles, the self-retirement model is the most ideal. The reason is that the CPP owner is the party who emits the most emissions. Therefore, they are the most relevant party to finance the early closure of the CPP.

Second, a closure funded by grant retirement or carbon credits. In this model third party finances CPP retirement costs. The third party can be the state, non-governmental organization, or individual. If the CPP is in a low- or middle-income country, then the grant generally comes from an industrial country. If the CPP to be closed is in an industrial country, then generally the grant comes from an economic entity that has emitted large amounts of emissions or other entities that have high social and environmental awareness.

In the spirit of fairness, based on the role and income, a closure model with grants and carbon credits is the most ideal. Economic entities (industries) and industrial countries are the ones that emit the most emissions. They also generally have high incomes, when compared with the rest of the world. Therefore, they are the most relevant party to finance CPPs' early retirement.

Third, government initiative, that is, the government took the initiative to retire the CPP using the state budget (APBN) or public funds.

Fourth, third party loans or *retirement loans*, namely a third party provides debt financing for CPP retirement costs. Later on, the government or society pays the debt. The loans may or may not be interest-bearing.

Most of the CPP early closure plans initiated in the CIPP document use a blended financing model. However, since the early closure of the CPP is a non-commercial project, there must be a party who is willing to bear the debt and pay the interest (Guild, 2023). And when there is no economic entity willing to bear the costs, the last option available is the government or the public as the payer of last resort. Therefore, most financing scenarios with third party loans falls in the fourth model, where the government or public pay the debt and the interest.

Hybrid Financing

CPPs' early retirement often uses hybrid financing or mixed financing. In these models, several parties provide loans and bear the costs. The owner can negotiate with investors or banks who financed the construction of the CPP. For the debt that has not been paid off, the owner can negotiate for loan interest discount (Guild, 2023). This can reduce interest costs for the CPP owners. Thus, investors or banks indirectly bear the costs of CPP retirement. After getting a discount from the first investor, the CPP valuation can be lowered. After providing a discount on replacement costs, CPP owners can then ask the government for the remaining replacement costs. Funding in cases like this comes from at least three parties. They are the bank (which finances CPP construction), the CPP owner, and the government. In cases like this the first, second and fourth funding models occur at the same time.

1.6 The Cost of Early Retirement

CPP early retirement costs include all costs incurred as a result of early CPP closure, which are a public burden, both directly and indirectly. In general, CPP early closure costs are divided into two, namely, (1) basic closing costs and (2) other costs.

The basic closure costs or replacement costs are all costs paid to the CPP owner as compensation for CPP early retirement. The largest part of these cost is the basic cost of replacement.

Other costs are all costs resulting from the closure of the CPP outside of replacement costs which are a public burden, for example the costs of lost jobs, lost business opportunities, etc.

2 MAIN STANDARD

2.1 Economic Standard

The aim of CPP early retirement is to reduce greenhouse gas (GHG) emissions. Based on economic principles, early closure of a CPP must be able to reduce emissions as much as possible at the lowest possible cost. There are two parameters related (1) reducing emissions as much as possible and (2) at the lowest possible closure costs.

2.1.1 Other Emission Reduction Ratio per Cost

We can combine these two parameters into one quantitative ratio. We call this quantitative ratio the "emission reduction per cost ratio" or "emission removal cost ratio" (ERCR). We can write ERCR as a mathematical equation:

$$\boldsymbol{ERCR} = \frac{\boldsymbol{TER}}{\boldsymbol{TC}} \text{ ... equation 1}$$

TER : Total emissions eliminated if the CPP is shut down

TC : Total costs for early closure of CPP

Total closing costs are all costs that are a public burden consisting of basic closing costs and (2) other costs. The calculation of basic closing costs will be discussed in more detail in Subchapter 2.3 Valuation Standards.

The ERCR figure shows how much emissions can be eliminated at a certain cost. The greater the ERCR number, the more economically effective it is. We call these standards economic standards. ERCR economic standards can be used to select plants to close. Based on ERCR standards, the generator that (should) be selected is the one with the largest emissions per cost ratio.

2.1.2 Other Emission Reduction Alternatives

Apart from early closure of CPPs, several other programs can also reduce emissions. Among these alternative programs are (1) reducing the *capacity factor* of CPPs, (2) reducing operational emissions or (l*ower emissions continuous output/LECO*), and (3) additional *carbon capture* facilities, and so on. In general, ERCR standards can also be used to measure the effectiveness of these programs.

First, reduction of factor capacity. To reduce emissions directly, we can reduce the working hours or generating capacity of CPPs. This reduction can be done by reducing

operational time and can also be done by only starting part of the machine. Various parties have conducted investigations to determine the effectiveness of factor capacity reduction. In general, the results of this research conclude that reducing factor capacity is quite effective in reducing emissions.

Factor capacity reduction can be carried out at government expense or at the expense of the CPP owner, this can be based on regulations, the provision of tax incentives, or based on an agreement. If some or all of the costs of reducing factor capacity are borne by the government, we can use the ERCR standard to test its effectiveness.

Second, reducing emissions can also be done by changing combustion techniques, for example changing the fuel mix or *lower emissions continuous output* (LECO). One example of a change in combustion technique is mixing fuel (co-firing) with lower emissions such as biomass together with coal. This blending technique can reduce emissions and affect the cost structure. We can also use ERCR standards to test the effectiveness of co-firing in reducing emissions.

The Tren Asia Study states that *co-firing* only cuts a small number of emissions. However, it can lead to more deforestation. Furthermore, the *co-firing* plan in Indonesia only uses 10% biomass, the rest remains coal (Tren Asia, 2022). Other studies in various countries state that co-firing can reduce emission in the short term, but will not eliminate it (Roni, et al., 2017). Therefore, co-firing cannot replace the early retirement of the CPP. Co-firing will only be effective if carried out in parallel with the early retirement of the CPP.

Third, addition of carbon capture facilities. To reduce emissions, we can also add carbon capture facilities to each CPP. Additional facilities can also be based on regulations or agreements, or at the expense of the CPP owner or the government, depending on the agreement. ERCR standards can also be used to assess the effectiveness of additional carbon capture facilities.

The study is quite comprehensive, by Jacobson, 2019, found that carbon capture facilities were able to recover around 10.8% of carbon in a 20-year span, far below the current expectation of 90% (Oreskes, 2024). Same as co-firing techniques, carbon capture facilities can reduce carbon but not significantly, let alone eliminate it. Therefore, this facility will only be effective if it is run in parallel with the early retirement of the CPP.

Standard ERCR can be used to measure the effectiveness of all emission reduction programs such as early closure of CPPs, reduction of CPP factor capacity, changes to

combustion systems, addition of carbon capture facilities, and other programs. The greater the ERCR value, the more effective the program is in reducing emissions. The ERCR standard can be used by the government to choose the program mix that is most effective in reducing emissions.

2.2 Financing Standards

The early closure of the CPP is a public project that is not commercial. On the one hand, early closure provides benefits to the public by reducing carbon in the earth's atmosphere. This provides benefits to society and the environment at both local and global levels. At that stage, if the CPP is not closed, everyone will suffer losses. If it is closed, losses will be reduced and may even disappear. The implementer party cannot charge the closing costs to the public directly so they cannot make a profit.

2.2.1 Hierarchy of Alternative Financing

In conditions like this, the business model cannot work. There will be no business entity that will finance the early closure of the CPP because the business cannot make a profit. Therefore, we need alternative non-business funding.

First Alternative

Based on the principle of justice, the most relevant party to finance the early closure of a CPP is the party that historically (1) emits the most emissions and (2) parties whose income is relatively high. Funding can be in the form of grants, cooperation, programs, or *regulation-based funds* such as taxes, tariffs, royalties, etc.
If the CPP is located in a low- and middle-income country (where accumulated emissions are still relatively low and income is also relatively low), then ideally funding comes from a high-income country or an economic entity whose accumulated emissions are already high and income is also relatively high. If the CPP is located in high-income countries, ideally funding comes from the economic entity that emits the most in that country or in other rich countries.

Included in this category are carbon credit facilities. In principle, carbon credits are a financing model from economic entities that emit a lot of emissions to other entities that emit less. Industrialized countries and economic entities that emit a lot are obliged to purchase "emission credits" from other countries or other economic entities that emit little. These carbon purchase funds can be allocated for CPP's early retirement.

However, in implementing the carbon credit model, it faces many problems. The most important problem is that the carbon credit facility actually becomes a justification or free pass for industrial countries and economic entities that emit a lot of emissions to continue their "dirty industrial activities" because they feel they have "sold" these emissions to developing countries. Other factors that pose challenges are the absence of a credible baseline calculation regarding carbon prices, poor governance and regulation, and low trust (Burzec & Lewis, 2021; Kajosaari, 2023).

Second Alternative

If grants and other funds as above are not available, then the next alternative is a non-commercial loan. Loans can come from non-commercial institutions such as world banks, development banks, other countries' governments, and other non-commercial institutions, or they can also come from commercial institutions or individuals who provide non-commercial funding. Non-commercial loans should ideally be interest-free. This loan then becomes public (government) debt.

Third Alternative

If the two financing models above are not available, then the third alternative is financing with public (government) funds and commercial loans. Funding with public funds and commercial debt is in principle equivalent. The choice between the two is usually based on government interests and costs.

The priority shall be the first, second and third alternatives. The second and third alternatives will only be used when the alternatives above them are not available or insufficient.

Example:

Early retirement of the CPP costs IDR 1 trillion. Grants (first alternative) are available at 500 billion rupiah, non-commercial loans (second alternative) are available at 600 billion rupiah, and commercial loans (last alternative) are available at 1 trillion rupiah. So, we will choose grants of 500 billion and non-commercial loans of 500 billion. In this case, the retirement cost is financed by the first and second alternatives, the last alternative is not needed.

2.2.2 *Forms of Financial Transaction with Debt*

Financing CPP's early retirement with loans (commercial and non-commercial) forms a three-party transaction model, namely (1) CPP owner, (2) investor, and (3) government (public).

CPP Owner: is the party who will receive the replacement costs. In the Indonesian context, the owners of CPPs are private companies (Independent Power Producer - IPP) and state-owned companies (PT PLN). In this transaction, the CPP owner is the "seller".

Investor: is the party that will provide temporary financing for replacement costs. Investors pay replacement costs to the CPP owner. Then the investor collects the debt and the interest (commercial loan) from the public. Investors consist of donor countries, non-profit financing institutions and commercial companies. In this transaction, the investor acts as a "banker" or "financing service provider".

Government and public: is the party who will pay the debt and interest to investors. In this case the public is represented by the government. The public is the final payer (payer of the last resort). The public is the actual payer, bearing all replacement costs along with interest. In this case the public is the "buyer".

Transactions involving these three entities can be simplified as follows:

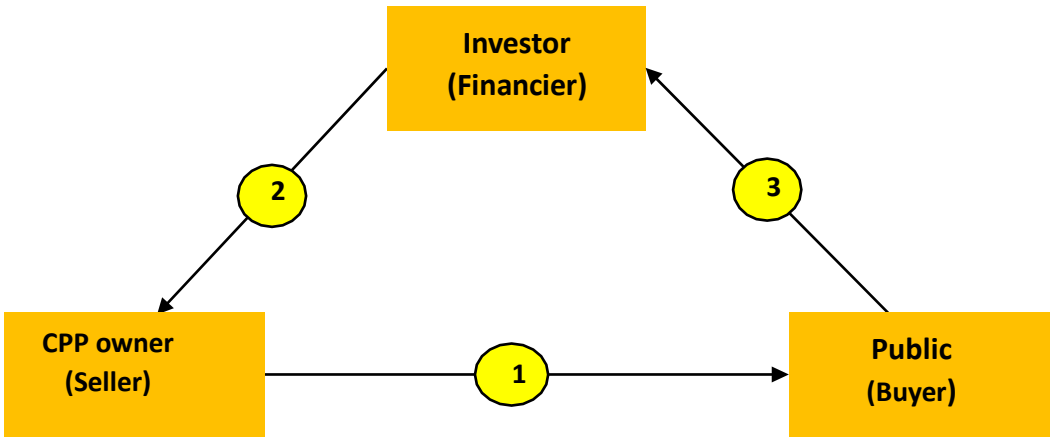

Figure 1 Form of closing transaction at CPP using debt financing

1. CPP owners sell CPPs to the public for early retirement.
2. Investor pay replacement costs (fees) to the seller, on behalf of the buyer.
3. Public (buyers) pays replacement costs including interest to investors.

The form of early closure transaction for a CPP with a loan funding model (commercial and non-commercial) is a "sale and purchase transaction between the owner of the CPP (seller) and the public (buyer)". The investors act as providers of financing services.

As a buyer, the public has the right to carry out a due diligence audit of the CPP they will purchase based on applicable standards.

Since the buyer is the public, and the government represents the public, this transaction is generally *business to government* or B to G. And since the final financing uses public funds, this transaction also follows general public disclosure standards, based on applicable laws.

2.2.3 *Standard of Interest Expense Feasibility*

Commercial financing of non-profitable public projects requires stricter standards. Therefore, to minimize interest costs, we created additional standards for the appropriateness of interest costs which we call “standard of interest expense feasibility”.

When is Debt Financing Necessary ?

In economics, there are two types of entities. Some have a credit surplus (extra money, like banks) and some have a credit deficit (need money, like a typical company). Economic entities with a credit surplus tend to pay in advance for costs incurred in the future to obtain discounts. For example, a bank rents a building for office operations for 10 years. Rental bills are due annually. If the building owner provides an alternative payment in advance with a discount, then the bank will tend to choose to pay in advance with a discount. Because banks are economic entities that have abundant liquidity or credit surplus.

On the other hand, economic entities that have a credit deficit will tend to pay behind for all costs incurred up front. As compensation, they are willing to pay interest. For example, a contractor company buys heavy equipment for operations. If the heavy equipment seller provides an alternative payment of instalments with interest (which is feasible) then the company will tend to choose to pay in instalments. Because contractor companies are generally companies that need liquidity for their operations.

The government is an economic entity that has a credit deficit, or an entity that lacks and needs money. Therefore, normally, the government tends to pay in advance for costs incurred up front and is willing to pay interest. Governments also tend to borrow to meet current spending.

In principle, CPP closure costs occur at the back end, namely when the loss of cash flow (IPP profits) occurs. For example, based on the contract, a CPP will operate until 2040. Then the CPP will be closed 10 years earlier, only until 2030. So, the IPP will lose profits between 2031 - 2040. Thus, the actual closing costs will occur between 2031 and 2040.

As an economic entity with a credit deficit, ideally the government will pay the costs of early closure of the CPP based on the event, namely between 2031 - 2040. It is even possible that the government will pay in advance, for example at the end of 2040 or later, and accompanied by interest costs.

If we follow the pattern of the State Revenue and Expenditure Budget (APBN), the government does not need investor loans for CPP closure costs.

CPP retirement costs follow the State Budget APBN's pattern. They occur at and are paid at the back end.

Prepayment model

CPPs' early retirement is currently developing prepayment model. The government pays in advance the costs of closing CPPs that occur behind and gets a discount. This model is not align with the APBN pattern which usually pays in advance and the characteristics of a government with a credit deficit. Therefore, the government needs investor loans for this financing. Meanwhile, investor financing contains interest costs.

This model will only be feasible for the government if there is added value (profit) for the government. If not, then it would be better for the government to return to its original pattern. That is to finance CPP closure costs when they are due or even paid later on.

There must be added value for the government

The prepayment model will only work for the government if it is profitable. This profit comes from the gap between discounts and interest costs. This financing model will only be feasible if the loan interest costs are lower than the closing cost discount. We symbolize the loan interest costs by ri and the closing cost discount by r^g, then we can write the interest cost feasibility standard with the equation:

$$\boldsymbol{r^i < r^g} \quad \textit{... equation 2}$$

Or we can add va as an additional value,

$$\boldsymbol{r^g - r^i = va;\ va > 0} \quad \textit{... equation 2a}$$

In simple terms, the loan interest cost (ri) should be less than the closing cost discount (r^g). The difference between closing cost discounts minus interest costs is the added value (profit) for the government (va). The greater the added value, the more feasible this financing model is. Conversely, the smaller the added value, the less feasible it is. If the added value is equal to or even smaller than 0, then this financing model is not feasible.

Example:

The government will close a CPP and provide profit compensation paid in advance to investors at an interest rate discount (rg) of 8% per year. The government obtained a domestic commercial loan to finance the project. To be feasible, the commercial loan interest rate (ri) must be below 8%, for example 6%. The difference between the interest rate discount minus the loan interest rate ($rg - ri$) is the added value of the loan (va) for the government. If the loan interest rate is 8% or more then the loan is not feasible because the added value = 0 or even negative. This means that if the government takes the loan, the government will not get any benefits, in fact it will lose.

2.2.4 *Financing with International Currencies*

The financing for the early retirement of a CPP is in foreign currency, usually if it was from foreign loans. We need to include the interest rate difference (premium). It is the difference between the national currency's interest rate and the foreign currencies.

For developing countries, national currency interest rates are generally higher than foreign/international currency interest rates. The reasons are a smaller market, higher depreciation, and a higher risk mix. This interest rate difference is called premium (p).

In developing countries, the difference between domestic and foreign interest rates is generally quite significant. The greater the risk in the country, the greater the premium difference.

If we enter the premium difference factor (p), then the standard equation of interest rate feasibility for loans in international currency will be as below:

$$\boldsymbol{r^g - (r^i + p) = va;\ va > 0} \quad \textit{... equation 3}$$

This means that a foreign capital loan (in nominal international currency) for early closure costs for a CPP will only be feasible if the foreign loan interest rate (r^i) plus the

premium difference (p) is smaller than the government interest rate or discount (rg).

> *Example*:
>
> As seen in the previous example, the government is closing a CPP. It will pay investors profit compensation at a discount rate (rg) of 8% per year. The government obtained foreign commercial loans in US dollars to finance the project. We assume the difference between the rupiah and US dollar interest rates (premium) is 2%. So, the interest rate on commercial foreign loans (ri) must be below 6% (8% - 2%) making it feasible, for example 4%. If the interest on the US dollar loan is 6% per year, then the foreign loan does not provide added value for the government.

2.3 Valuation Standard

2.3.1 Aset Value

In finance, there are two ways to calculate the price (valuation) of assets, namely (1) book value and (2) market value. Book value is the price of an asset based on the accounting (*historical*) records of the asset. Meanwhile, market value is the price of assets based on the law of supply and demand or based on market prices.

Market value is generally divided into two types. The first is market price based on the physical value of the asset or scrap price. The second is market price based on *future profits or cash flow*.

The use of these two methods (market value) follows the condition of the asset to be valued. If it does not function in the future, then generally an asset will be calculated based on the physical value of used goods or *salvage value*. For example, a non-functioning machine will be assessed as scrap and calculated based on the value of the raw materials.

On the other hand, if it is still functioning, the asset will be assessed based on its benefits (function) in the future. For example, used machines that are still functioning normally will be valued based on their future benefits (function), not based on the value of the raw materials.

Generally, people take the highest value from the two types of asset prices above. If the price of scrap is more expensive than the price of benefits, then people will use the junk

price. Conversely, if the price of benefits is higher than the price of junk, then people will use the price of benefits.

In the context of early closure of a CPP, the value of the CPP's assets will be calculated using the two methods above, and the highest value will be taken (between the value of the scrap and the value of the lost benefits).

2.3.2 *Present Value dan Future Cash Flow*

In Finance, the future benefits of an asset are calculated based on potential income (cash) in the future, as long as the asset is functioning. Potential net income is called *future cash flow*. Then this future income is valued at current prices, or *present value*. So, asset value is the total potential future (net) income valued at current prices, or the *present value of future cash flow* (PVFC). Simply put, PVFC is the total (expected) amount of future net income calculated based on today's value (*discounted or present value*).

The PVFC mathematical equation is:

$$\boldsymbol{PVFC} = \frac{\boldsymbol{Cash\ Flow}}{(\boldsymbol{1}+\boldsymbol{r})} \quad \ldots \textit{ equation 4}$$

Where, r = interest rate (yield) or internal return; n = number of years. Several things need to be considered to determine the most feasible r:

1. Project or investment risk. The higher the risk of uncertainty in future ca sh flows, the higher the interest rate used. This is because risk can reduce the future value of an investment, so it needs to be balanced with greater interest. CPP investments are subject to risks from fluctuations in coal prices, environmental policies, energy transition, etc.
2. Industry rate of return. Each industry generally has a varying rate of return on capital (r). We can use the average rate of return in the power generation industry or something similar to determine the r value.
3. Inflation rate expectations. If expected inflation is high, it is necessary to use a higher r to compensate for the decline in the value of money.
4. Market consensus. We can also use the market consensus of major players as a benchmark.

Example:

A new coal-fired power plant provides net profits to investors of IDR 100 billion per year for 25 years. In the 5th year, the CPP will be closed early. So investors will lose potential profits throughout the last 20 years. The government will provide profit compensation to investors. Assuming an interest discount rate (r) of 8% per year, we can calculate the replacement value of the CPP assets using the PVFC model:

$$PVFC = \frac{100\ billion}{(1+0{,}08)^1} + \frac{100\ billion}{(1+0{,}08)^2} + \cdots + \frac{100\ billion}{(1+0{,}08)^{20}}$$

$$PVFC \approx\ Rp\ 716{,}9\ billion$$

Thus, the compensation value for investors for the loss of potential profits for 20 years is **716.9 billion rupiah**, which is paid up front, or when the CPP is shut down.

2.3.3 Cash Flow Based on Contracts and Actual

There are at least two ways to calculate future cash flow for CPP assets that will be closed. The first is to use cash flow from the contract. The second is to use expectations from actual cash flow.

First, cash flow based on contracts

In principle, CPP is a business whose margins are already measured. The government or PLN already has a profit margin benchmark for IPPs (for example, Minister of Energy and Mineral Resources Regulation Number 26 of 2016). During the auction, IPPs usually submit bids to PLN in the range of the benchmark margin. IPPs generally also include cash flow documents to support their offers. This cash flow is the basis of the contract between IPP and PLN. We call this "cash flow based on contract".

In valuing CPP assets that will be closed, we can use cash flow,

based on this contract as an expectation of future cash flow for CPP assets.

Pros :

Using cash flow based on a contract is easier to do. Because the cash flow is available and has been evaluated previously. No further assessment is required.

Cons :

Cash flow based on the contract is an expectation. Actual CPP operations may differ from these expectations. If CPP operations are better or worse than expected, then the

contract's cash flow does not reflect actual CPP operations.

When power plants are oversupplied, as in the case of Indonesia, many CPPs have low-capacity factors. Based on PLN statistics (Sekretariat PLN, 2023), there are many CPPs whose capacity factor is below 50%. A low-capacity factor causes low cash flow too. Thus, the use of cash flow based on contracts can increase the valuation compared to the actual.

Second, actual cash flow

Actual CPP operations determine *actual cash flow*. Actual cash flow can be different from expectations, it can be better or worse. This can be due to several factors. For example, the capacity factor (CF) is smaller than expectations (below 60%), resulting in fewer electricity sales to the PLN network. Another factor is the increase in operational costs beyond expectations, thereby reducing operational net profit. On the contrary, actual cash flow can be better than expectations, for example, when the factor capacity that is bigger than expectations (above 60%) or operational costs that are smaller than expectations, creating a larger net profit.

Cash flow expectations for CPPs that will be retired can be calculated based on past actual cash flows. If the actual cash flow is worse than the contract's expected cash flow, then the next cash flow is lower. Vice versa, if the actual cash flow is higher than the contract's expected cash flow, then the next cash flow is higher.

In principle, cash flow expectations from contracts and from actual cash flow are both expectations. The difference is, expectations based on actual cash flow are adjusted according to the CPP's actual operations. While cash flow expectations are based on the contract, there are no adjustments, regardless of the CPP's actual operations.

2.3.4 Operational Cost Problems

In accounting and finance, the issue of operational costs is not black and white. IPP management can control some of the CPP's operational costs which can have implications for financial performance as well as the quality of public services and the environment. For example, management can reduce operational costs to increase net profit (improve financial performance). If the costs reduction is not related to service quality, safety, the environment, and other important qualities, then this will increase the company's efficiency without sacrificing other qualities. But if cost reduction is related to important quality, then such efficiency will have a negative impact on the public. For example, management may lower environmental standards to improve the company's

financial performance. This will have an increasing pollution and harm the general public. This kind of efficiency will improve the company's financial performance but at the expense of public and environmental interests.

This creates gaps of cash flow value between the expectation and actual. To increase the value of cash flow in the future (and also increase asset valuation), management can reduce costs that cause a decrease in the quality of safety, products and the environment. CPP owners will face a conflict of interest in increasing the valuation of CPP assets at the expense of the public interest.

The problem lies here. The calculation of CPP's expected cash flow based on actual cash flow is able to provide description of CPP situation. However, this model also opens up opportunities for managers to increase (marked-up) CPP valuation, falsely increasing the value, at the expense of public interests. This is a detrimental loophole for the public.

2.3.5 Recommendation for Eliminating Potential Mark up.

For CPPs that sell their electricity to state companies such as PLN in Indonesia, we recommend a contract-based cash flow expectation model. This will eliminate the valuation mark-up gap. In principle, the CPP business is a business whose profits have been measured, with parameters already in place. Therefore, the use of parameters as valuation benchmark values, will return investors' profits to the initial parameters, regardless of their actual performance and operations. And this is quite relevant and fair for both investors and the public.

As for CPPs that operate independently, the only option available is expected cash flow based on actual cash flow. To avoid mark ups, supervision, auditing and assessment from independent and credible parties is needed.

2.3.6 Discount from CPP owner

Based on the principle of role fairness, "the party that emits more will bear more costs". CPP owners are among the economic entities that emit the most emissions. Therefore, based on the principle of justice, CPP owners should bear more of the burden than other economic entities.

Charging part of the closure costs to CPP owners can be in the form of discounts or reductions in replacement costs. The amount of the discount depends on the agreement between the CPP owner and the government. By calculating the discount, the

replacement value equation is as follows:

$$\boldsymbol{NP = PVFC - D} \text{ ... equation 5}$$

NP : Replacement value or basic cost of early retirement of the CPP

$PVFC$: *Present value of future cash flow*

D : Discount from CPP owner

Example:

We continue the previous example. The PVFC value of CPP assets which will be closed 20 years earlier is 716.9 billion rupiah. Then, as a form of environmental responsibility, the CPP owner agreed to provide a 15% discount on the PVFC, or around 107.5 billion rupiah. So, the replacement value that needs to be paid by the government to the CPP owner is 716.9 billion rupiah - 107.5 billion rupiah = **609.4 billion rupiah.**

2.3.7 Replacement cost < Construction cost of new CPP

To encourage CPP owners not to build new CPPs with funds from profits, the total replacement value (NP) must be less than the cost of building a new CPP (replacement cost - RC) with the same capacity.

We symbolize NP as the replacement value and RC as the cost of building a new CPP with the same capacity, then we can write this standard in the equation:

$$\boldsymbol{NP < RC} \text{... equation 6}$$

Example:

Continuation from the previous example; the replacement value (NP) after deducting discounts from CPP owners is 609.4 billion rupiah. Meanwhile, there was a decrease in the cost of building CPP due to the decline in demand for building new CPPs. As a result of this price reduction, the cost of building a CPP with the same capacity (RC) is only 500 billion rupiah. By this standard, then the replacement value, this must be lower than the cost of building a new CPP, which is under 500 billion rupiah.

2.4 Coherency Standard – No New CPP Construction

A policy or activity is coherent when it supports others without interference. For example, the activities of draining and cleaning a pool are coherent activities because they support each other. Then the activities of draining the pool and cleaning the garden are still considered coherent because they do not interfere with each other and do not cancel each other out. Meanwhile, the activity of draining and filling pool water at the same time is an incoherent activity because it cancels each other out.

In the energy transition, one extreme incoherent policy is the early retirement of old CPPs and the building of new ones. These two policies are contradictory and have mutually cancelling effects. All emissions reduction effects of early CPP closure will be lost when a new CPP of the same capacity is built.

The CPP early closure program will only be effective if there are no new CPPs being or will be built throughout Indonesia, in all industries. If there are still new CPPs to be built then the early closure program will be in vain.

This is the same as draining the pool water while putting new water into the pool. All energy and effort will be wasted.

Other examples of incoherent policies are the early retirement of CPPs and the provision of fossil fuel subsidies. The early closure of the CPP aims to reduce emissions. Meanwhile, providing subsidies for fossil fuels or fossil fuel vehicles actually encourages the use of fossil fuels and increases emissions.

The Ballad of Indonesian CPP sector, closing one, yet constructing another

Many industries are energy-intensive. Examples include metal smelting, cement, and petrochemicals. They use coal-fired power plants to meet their own energy needs. This CPP is called a Captive Power Plant.

According to CREA records, the number of Captive Power Plant increased 8-fold from 1.3 GW in 2013 to 10.8 GW in 2023. Of this amount, 76% (8.2 GW MW) are for metals (7.3 GW for nickel smelters and the rest is aluminum). This number only counts CPP with a capacity of 50MW or more. Since many industries in Indonesia operate those under 50 MW, the actual number of Captive Power Plant is larger, and continue to increase, especially in the mineral downstream sector.

In the CIPP document, captive power plants are not or have not been included in the emission-free plan. This means that while the government plans to close several CPPs, but the industry continues to build new one.

Nature does not differentiate between emissions coming out of industrial Captive Power Plant or the PLN's Coal Power Plant. Both produce the same emissions and in the same ecosystem. Early retirement of PLN's CPP network will reduce emissions output while the construction of new CPP within the industrial sector adds new emissions. These two activities cancel each other, just like draining and filling pool water at the same time.

The lack of policy coordination causes us to make incoherent and irrational policies. They waste energy and resources and have no impact.waste energy and resources and have no impact.

3 GENERAL STANDARD

3.1 General Information Disclosuore Standasrds

Transparency is key. It ensures that all involved parties fully understand the CPP closure process. This includes its objectives, stages, impacts, and obligation. Transparent information enables governments, companies, communities and other stakeholders to collaborate effectively in planning, implementing and monitoring CPP closure projects.

Information disclosure also helps to encourage accountability and justice. It reduces the risk of conflict. Information disclosure would build public trust and collect support for decisions and actions taken during the process.

3.1.1 General Information Disclosure

Disclosure means making sure all information about the CPP early retirement process is open. This includes the reasons, schedule, social and environmental impacts, and recovery plan. It should be available to the public, stakeholders, and other interested parties.

3.1.2 Disclosure on Impact and Affected Parties

The closure of the CPP has consequences that need to be studied thoroughly. This impact is not only limited to one party, but spreads to various sectors and individuals. Therefore, it is important to transparently disclose information regarding all affected parties, both directly and indirectly.

The parties affected by the CPP closure include :

1. The CPP workers
   Closing CPP could cost workers their jobs, both those directly employed and those in related fields like coal mining and transportation.
2. Communities around the CPP location
   Closing CPP can impact the local economy. This is especially true for people who depend on economic activities around the CPP for their livelihoods.
3. Government
   Closing CPP could have an impact on state revenues from taxes and coal royalties, as well as on national energy security.
4. Industries that depend on CPP
   Industries that require large electricity supplies, such as smelters and factories,

may experience production problems if the electricity supply is disrupted.

The various impact that needs to be disclosed include the following things.

1. Economic Impact
   a. Estimated number of layoffs for CPP workers and related sectors
   b. Analysis of potential impacts on regional and national income
   c. Planned reskilling and upskilling programs for affected workers
   d. Economic development strategy around CPP locations that retire early
2. Social Impact
   a. Analysis of potential impacts on energy security and the risk of power outage
   b. Study of the impact on access and affordability of electricity for the community
   c. Plans for social security programs and help for affected communities
   d. Mapping the potential for social conflict due to the closure of the CPP
3. Environmental Impact
   a. Asessment on reduction of greenhouse gas emissions and air pollution
   b. Strategy for handling waste and CPP infrastructure after closure
   c. Spatial planning and environmental revitalization plans around the CPP location
4. Impact towards Energy Resiliency
   a. Estimated need for additional renewable energy generation and supporting infrastructure.
   b. Analysis on imported energy dependency risk and price fluctuations after CPP early retirement
   c. Strategy for developing energy storage systems and energy efficiency.

In general, information that must be published openly are :

1. Information on impacts; all impacts, both direct and indirect, must be informed to the public.
2. Information on affected parties; all affected parties, both directly and indirectly, must be informed to the public.
3. Informasi on Impact towards the affected parties; information about impacts must reach all affected parties.

3.1.3 Supervision and Reporting

A monitoring and reporting plan also needs to be created to monitor the implementation of CPP's early retirement, including monitoring the various impacts, along with other potential problems. Reports on the monitoring results need to be submitted to related

parties and the public periodically.

3.1.4 All parties collaboration

Encourage cooperation and open dialogue between central and regional governments. Conduct this also with CPP managers and employees. Engage with related industries on the upstream and downstream sides, local communities, and other stakeholders.

3.2 Standar Prosedural

A just and transparant procedural standards ensure CPP closure involves all parties' interest: government, company, community or the environment. Preliminary study is crucial. It is the first step in designing appropriate procedural standards. It needs to identify the social, economic and environmental impacts that may occur during and after the CPP closure.

In addition, public discussion is an integral part of this process. The participation of the public and other stakeholders allows various perspectives and concerns to be heard and considered.

The importance of providing compensation funds for community and environment affected is crucial. This compensation fund can be used to support the economic recovery of affected communities, as well as to carry out environmental rehabilitation that may be affected by the CPP closure process.

CPP closure process can run more smoothly and provide a sustainable positive impact for all parties involved by implementing fair procedural standards, conducting comprehensive and transparent initial research, facilitating public discussions, and providing adequate compensation funds.

3.2.1 Energy Availability and Reliability

We recommend the construction of National Energy Availability Map. It would show the energy transition strategy in Indonesia. It would include the following:

1. Energy availability analysis: the proportion of available energy compared to per capita energy needs in an area.
2. Energy source analysis: energy sources currently available and renewable energy potential production of each area in the future.
3. Energy provider analysis: mapping of all energy supply companies categorized

into energy source, power plant age, power plant capacity, and power plant owner.

4. If the total power generation capacity in the area does not exceed a reasonable margin capacity (the capacity is not excessive), then before the CPP is closed, there must be a Renewable energy generator to replace it, an energy that is clean and reliable.
5. If the total electricity generation capacity in the area exceeds a reasonable margin capacity (excessive capacity), and the closure of the CPP does not cause a capacity shortage, then a replacement Renewable generator is not needed.
6. It is recommended that the National Energy Availability Map document be openly accessible to all parties and updated regularly following developments in the energy transition.

3.2.2 Social and Environment Impact Evaluation

A comprehensive evaluation regarding economic, social and environmental impacts needs to be carried out when selecting CPP that will be funded for early retirement. Mitigation steps for all impacts also need to be planned from the start. Details of the things that must be evaluated are as illustrated in point 3.1.2. Another study is needed to discuss the purpose of land use after the CPP closure. Environmental and social impact mitigation activities will be adjusted according to the new land function.

It is necessary to ensure the financial readiness to mitigate negative social and environmental impacts during and after the CPP closure. One can source funds from schemes like the Natural Resources Profit Sharing Fund (Dana Bagi Hasil Sumber Daya Alam / DBH SDA) from the Director General of Fiscal Balance and Loss and Damage funds. Some fund expenditure items include: employment termination compensation as regulated in Law no. 13 Yrs. 2003 article 156; job training for laid-off employees; land remediation; disposal and recycling of CPP closure waste; etc.

3.2.3 Categori for Prioritization of CPPs' early retirement

Due to the lack of experience in conducting equitable early retirement of CPPs in Indonesia, it would be a good idea for stakeholders to carry out several pilot projects at lower costs first. This pilot project aims to identify best practices for a just energy transition that suit the conditions in Indonesia and can be implemented in larger scale projects.

For the purpose of pilot project, It is prioritze to select CPPs base on below categorization :

1. CPPs located in energy surplus areas or in areas that have replacement Renewable generators. Energy surplus areas are areas with a reserve margin of ≧35%. The order of priority for early retirement falls on CPPs in areas with the highest to lowest reserve margin values.
2. The age of the CPP is in the range of 25-28 years to save on compensation costs. CPP has never extended its IUPTLU.
3. To improve public health conditions, it is prioritized to retire CPPs in high-pollution areas early. It is known that the combustion process in CPP causes an increase in the number of respiratory organ diseases in a population. For every additional 1 kW of coal capacity per person in a country, the relative risk of lung cancer increases by 59% (Lin, et al., 2019). The Air Quality Index (AQI) unit is used to assess the level of air pollution in an area. The main priority for early retirement falls on CPPs located in areas with AQI ≧151. The next priority is given to CPPs located in areas with AQI between 101 - 150.
4. To ensure the availability of water for the environment and surrounding communities, it is prioritized to retire CPPs located in water scarce areas early. CPP has a very large need for water to produce energy. Research from *Sandia National Laboratories* estimates that a CPP with a capacity of 500 MW requires 1,140 million liters of water every day for the cooling process (Crane-Murdoch, 2010). For each unit of electricity output, CPP with a wet tower cooling system takes 8.4% of fresh water reserves and CPP with a water tower cooling system takes 38% of fresh water reserves (Wu, Ji, Li, Xia, & Chen, 2019).

Water scarcity is assessed using the water stress index. This index explains the ratio of water use at certain location to total renewable water resources available as ground water, surface water and moisture stored in the soil layer. A place is categorized as water scarce when the water stress index is below 1700m^3 per kapita per year (Ding & Ghosh, 2017). The priority for early retirement falls on CPPs located in areas with the lowest *water stress index.*

Priority categories 1, 3, and 4 would help choose the next coal plant to retire early. Category number 2 only applies to initial pilot projects.

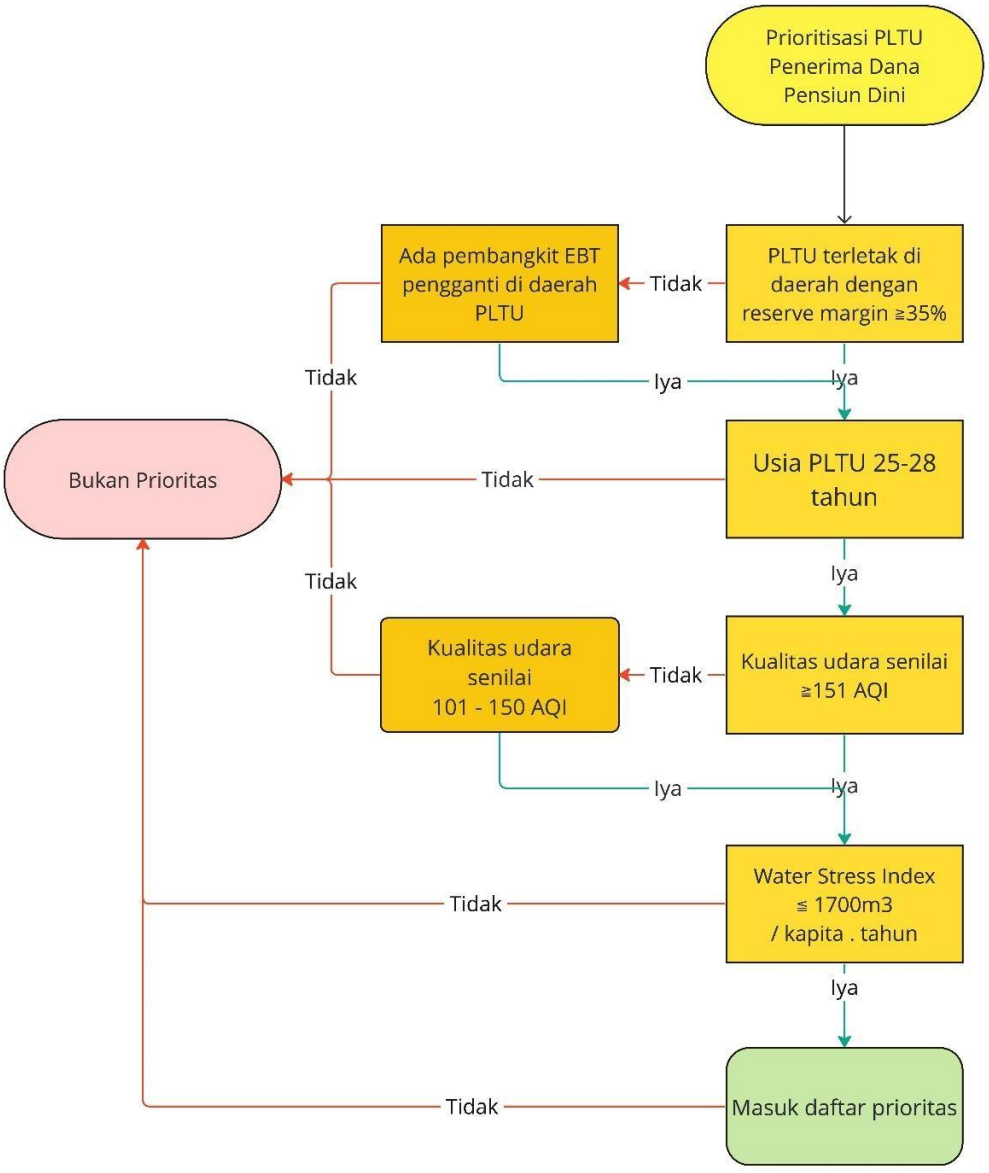

Figure 2 Decision Tree for CPP Prioritization as Recipients of Early Retirement Funds

3.2.4 *Appointment of Implementer for Coal Power Plant Early Retirement Project*[2]

After a long evaluation, many CPPs coal will be the top candidate. They will receive funds for early retirement. If the financing comes from the state budget (APBN), then the process needs a supervisory body. The supervisory body will select recipients of funds who meet the requirements below:

1. Demonstrate *good corporate governance*
2. Having a stakeholder mapping along with a comprehensive communication strategy
3. The stakeholder mapping document must at least include the points stated in section **3.1.2.** The communication strategy section includes a third party who does not have a conflict of interest who is appointed to resolve disputes.
4. Having a monitoring system design
5. The monitoring procedures document must include this information: type of data and information to be reported, determination of units of measurement, data collection sources and methodology, data collection and reporting intervals, *quality assurance / quality control (QA/QC)* design, project organizational structure along with required qualifications. As well as, information management system to store the information.

3.2.5 *Process Flow for Early Closure of Coal Power Plant*[3]

All stakeholders must be involved according to their capacity throughout the CPP early retirement process. The following are things that must be considered at each phase of early retirement:

1. Annoucment of CPP closure

   The owner or manager must announce the closure of the coal CPP and a commitment not to build another coal CPP. Managers began notifying employees of layoffs and providing training services for new jobs.

2. *Decommisioning* CPP

   Parts of the Generator components must be disposed properly so that they are not used in the construction of new CPPs and/or extending the life of existing CPPs.

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[2] Overall the standard was obtained from (1) *Verified Carbon Standar's Methodology for earlyretirement of coal-fired power plants using a just transition* dan (2) *US EPA's Coal Plant Decommissioning guide*

[3] Ibid

Ex-employees must receive compensation rights upon termination of employment as regulated in Law no. 13 Yrs. 2003 article 156.

3. Environmental Remediation

The environmental remediation process is adjusted to prepare for further land use. At minimum, environmental remediation includes these activities:

a. Cleaning the area of dangerous chemical compounds such as asbestos and polychlorinated biphenyls (PCBs).
b. Testing and cleaning surface soils for mercury, spills and leaks.
c. Air contaminant testing and removal.
d. Covering the coal ash disposal area with a layer of soil.
e. Removal of fuel tanks and contaminated soil.
f. Testing for PCBs content in concrete pads and soil around old transformers and hydraulic equipment. Dispose of according to standard as required.

4 REKOMENDATION

Our current actual condition is far from ideal. It is not ideal in terms of economic and justice standards. First, currently, most of the financing for CPPs early retirement will be borne by the government or the public. There are lack of grants and the willingness from third parties to pay these costs; leaving the government with little choices. Based on the principle of justice, financing through public funds should have been the least priority. Second, the government is still giving permits to industry (especially the downstream metal smelting sector) to build new CPPs for their own use. This policy is incoherent with the zero emissions target and would make the effort toward CPP early retirement becomes pointless, when new ones continues to be build.

We recommend the following :

1. The government and all interested parties need to make harder and more systematic efforts to optimize the most ideal funding, such as grants, from governments and agencies in industrialized countries as well as economic entities that emit a lot of emissions. Those from upstream to downstream, such as oil and gas companies, coal mines, fossil power plants, car factories, smelters, chemical industries, cement factories and other massive fossil energy-consuming industries. The search for funds can also be based on regulations such as carbon taxes and to collect funds from these polluters.
2. It is necessary to reorganize the downstream industry (and other industries that are still permitted to operate and build new CPPs) to have them in line with Indonesia's big plan to be emission free by 2060. This reorganization is important because misalignment of policies can thwart the big emission-free plan and waste resources. As we have said repeatedly, CPPs early retirement will only be effective if no new CPPs are built.
3. Having a just and economic standards makes the early closure of CPP (and other energy transition programs) effective. They would minimize costs, based on the principles of justice. Governments and others can use these standards. They can boost the effectiveness and efficiency of energy transition programs.
4. Early retirement of CPPs is something new in Indonesia. We are still in the early learning curve. To find best practice, the government needs to create a pilot project right away. They should start by closing small CPPs that have a short time left before closing. This way, the closure costs will be small.

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