



# The Impact of the Steel Industry and Climate Vulnerability in Cilegon

**WALHI**  
Wahana Lingkungan Hidup Indonesia



# Table of Contents

3	<b>Background</b>
6	<b>The Impact of Iron and Steel Industry in Cilegon</b>
7	Environmental Impact
10	Greenhouse Gases Contribution
12	Health Impact
13	Economic Impact
16	Social Impact
18	<b>The Paradox of the Steel Industry with the Right to a Clean and Healthy Environment and the Burden of Climate Vulnerability in Cilegon</b>
19	<b>Closing</b>

## Background

Cilegon is one of the cities in Banten Province, Indonesia. It is widely known as the “City of Steel” due to being home to the Southeast Asia’s largest steel industry, PT. Krakatau Steel. The industry traces its origins to the Trikora Steel Plant, which later became PT Krakatau Steel in 1962.

The iron and steel industry has continued to expand, especially during the administration of President Joko Widodo. In 2021, President Jokowi inaugurated a new steel plant located in the Cilegon Industrial Area, Banten. This new plant is Hot Strip Mill 2 owned by PT. Krakatau Steel Tbk (KRAS). Jokowi has set a target for Cilegon’s steel production to reach 10 million tons per year.<sup>1</sup> At the inauguration, Jokowi emphasized that this industry is one of the key drivers of Indonesia’s economic development.<sup>2</sup>

In addition to the facilities owned by PT Krakatau Steel Tbk (KRAS), Cilegon is also home to another major steel producer, namely PT. Krakatau Posco, a joint venture between Krakatau Steel and South Korea's largest iron and steel producer, POSCO. PT Krakatau Posco's production facilities are also expected to produce 10 million tons of steel by 2025.<sup>3</sup>

However, even though the steel industry is predicted and is expected to spur the national economy, the economic condition in Cilegon is still far from prosperous. From year to year, Cilegon has experienced an increasing trend of poverty rates. In 2019 – before the COVID-19 pandemic hit, the percentage of poor people in Cilegon City was recorded at 3.03%. This figure continued to increase throughout 2020 and 2021, namely 3.69% and 4.24% during the heavy pressure of the pandemic and economic slowdown.

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<sup>1</sup> “10 Million Tons of Steel from Cilegon,” September 23, 2021, indonesia.go.id, <https://indonesia.go.id/kategori/indonesia-dalam-angka/3255/ancang-ancang-baja-10-juta-ton-dari-cilegon?lang=1>.

<sup>2</sup> “President: Steel Industry Is an Important Pillar of Economic Growth,” September 21, 2021, presidenri.go.id, <https://www.presidentri.go.id/siaran-pers/presiden-industri-baja-pilar-penting-pertumbuhan-ekonomi/>

<sup>3</sup> Krakatau Posco Business Forum 2021, 2 December 2021, <https://www.krakatau-posco.co.id/news/krakatau-posco-business-forum-2021?lang=id>.

Although it had dropped in 2022 to 3.64%, the percentage of poverty rose again in 2023 at 3.98 percent.<sup>4</sup> This trend of poverty percentage tends to increase even when compared to the percentage before COVID-19 hit. After the pandemic subsided and industrial development became more and more massive, the poverty rate did not show a significant improvement. While industrial development is expected to improve the welfare of surrounding communities, such benefits have not yet been realized in Cilegon.

In addition, the unemployment rate in Cilegon is still quite high, even though the city has a large industrial sector that should be able to absorb the local workforce significantly. But in reality, the open unemployment rate (Tingkat Pengangguran Terbuka/ TPT) in Cilegon City in 2023 reach 7.25%. This figure is still quite high when compared to the Indonesian national average, which is around 5.45% in 2023. Cilegon City and national TPT data from 2019-2023 are as follows:<sup>5</sup>

Indicator	2019	2020	2021	2022	2023
Open Unemployment Rate (TPT) of Cilegon City	9,68	12,69	10,13	8,10	7,25
National Open Unemployment Rate (TPT)	4,98	4,94	6,26	5,83	5,45

Although Cilegon City's TPT figure fluctuates from 2019-2023, this figure is consistently above the national average. This shows that there are problems in the absorption of local labor. Although Cilegon is nicknamed the City of Steel Industry with a massive steel industry, it seems that this nickname is not in line with the lack of absorption and affirmation of the workforce and the welfare of the local community.

Not only from an economic aspect, the existence of the iron and steel industry in Cilegon also has a significant impact on the environment and public health. Air, water, and soil pollution due to emissions and waste generated during the steel production process are serious and ongoing concerns. The hazardous waste produced by this industry often contaminates the surrounding environment, which directly affecting the health of nearby residents.

Respiratory illnesses and other health complaints are frequently reported by communities living around the industrial area. According to the Central Statistics Agency of Cilegon City (BPS Kota Cilegon), in 2023 there were 41,779 reported cases of Acute Respiratory Tract Infections (ARI), making it the most prevalent disease affecting the people in Cilegon.<sup>6</sup> The

<sup>4</sup> "Statistics on the Percentage of Poor Population in Cilegon City," databoks.katadata.co.id, June 15, 2025, [https://databoks.katadata.co.id/demografi/statistik/6de9350af1b0aa1/3-75-penduduk-di-kota-cilegon-masuk-kategori-miskin?utm\\_source=chatgpt.com](https://databoks.katadata.co.id/demografi/statistik/6de9350af1b0aa1/3-75-penduduk-di-kota-cilegon-masuk-kategori-miskin?utm_source=chatgpt.com)

<sup>5</sup> "Labor Force Participation Rate, Open Unemployment Rate, and Employment Opportunity Rate in Cilegon City (Percent), 2023," cilegonkota.bps.go.id, November 11, 2024, <https://cilegonkota.bps.go.id/id/statistics-table/2/NzcjMg==/tingkat-partisipasi-angkatan-kerja--tingkat-pengangguran-terbuka-dan-tingkat-kesempatan-kerja-di-kota-cilegon.html>.

<sup>6</sup> "Number of Cases of the 10 Most Diseases in Cilegon City, 2023," June 20, 2024, <https://cilegonkota.bps.go.id/id/statistics-table/2/MTI3Izl=/jumlah-kasus-10-penyakit-terbanyak-di-kota-cilegon.html>.

Cilegon City Health Office also noted that there are 10 types of diseases that are almost found in every sub-district in the Industrial area, namely ARI, gastric ulcers, BTA pulmonary tuberculosis, dermatitis (skin disease), myalgia (muscle/ joint pain), essential hypertension, diarrhea & gastroenteritis, arthritis (inflammation of the joints), fever, and other symptoms of diseases.

The occurrence of this condition is inseparable from the high number of industries and the production of air pollutant particulates in the Cilegon steel industrial area. Scientifically, steel industry operations have been shown to negatively impact lung health. Through a study conducted by Pulmonologists, Robert Dales and his team showed that 61 participants who spent 8 hours per day near a steel mill settlement (0.9 km away) for 5 consecutive days, experienced a decrease in lung function, diffusion capacity, and oxygen saturation compared to when they were at a more distant location (4.5km).<sup>7</sup> These findings illustrate that being near the steel industry in a short period of time also has an impact on declining lung function. The impact of lung health is certainly more serious for people who live permanently around the Cilegon steel industrial area, with longer and repeated levels of exposure.

In addition to contributing to these economic and health impacts, iron and steel production is also one of the largest contributors to CO<sub>2</sub> emissions globally. The iron and steel industry is responsible for 4.9 percent of the total industrial emissions which reached the equivalent of 430 million tons of carbon dioxide in 2022, or the equivalent of 20-30 million tons of carbon dioxide per year.<sup>8</sup> By 2023, each ton of steel produced will produce 1.9 tons of CO<sub>2</sub> emissions.<sup>9</sup> Data from 2023 further shows that the iron and steel industry is the second-largest greenhouse gas (GHG) emitter in the industrial sector, following the cement industry. It contributes approximately 17% of total emissions from the Industrial Processes and Product Use (IPPU) sector.<sup>10</sup>

This significant contribution to climate change presents a growing challenge, as environmental degradation from steel production is closely intertwined with the worsening climate crisis due to high emission levels. In response to this, WALHI Jakarta considers it essential to investigate more deeply the social, environmental, and public health impacts of the steel industry in Cilegon. A comprehensive understanding of these impacts is critical to gaining a holistic picture of how the industry affects both local communities and the broader environment

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<sup>7</sup> Robert Dales, dkk., "Acute changes in lung function associated with proximity to a steel plant: A randomized study," *Environment International*, Volume 55, 2013, Pages 15-19, ISSN 0160-4120, <https://doi.org/10.1016/j.envint.2013.01.014>.

<sup>8</sup> "Decarbonizing the Iron and Steel Industry Needs a Comprehensive Roadmap," March 20, 2025, [iesr.or.id](https://iesr.or.id), <https://iesr.or.id/dekarbonisasi-industri-besi-dan-baja-butuh-peta-jalan-menyeluruh/>

<sup>9</sup> "Steel industry emission worldwide," July 7, 2025, [statista.com](https://www.statista.com), <https://www.statista.com/topics/13436/steel-industry-emissions-worldwide/#topicOverview>

<sup>10</sup> Ministry of Environment and Forestry, Greenhouse Gas (GHG) Inventory and Monitoring, Reporting, and Verification (MRV) Report 2024, p. 87

# The Impact of the Iron and Steel Industry in Cilegon



Picture 1  
Radius of research area.

WALHI Jakarta conducted in-depth observations and interviews with the community around the steel industry in Cilegon, precisely PT. Krakatau Steel and PT Krakatau Posco. There are three areas that are explored in this process, namely Kelurahan Samangraya (located approximately 1 kilometer from the residential area to the PT Krakatau Steel facility), Kelurahan Tegalratu (located approximately 1 kilometer from the residential area to the PT Krakatau POSCO), and Kelurahan Kubangsari (located approximately 1.8 km between Krakatau POSCO and the residential area). These three communities are in close proximity to the industrial sites and have been directly affected throughout all stages of industrial activity, from pre-construction to post-operation phases.

# Environmental Impact

## Air Pollution

The presence of steel industry, particularly those operated by PT. Krakatau Steel and PT. Krakatau Posco, has caused a number of environmental impacts in the surrounding area. Air pollution is one of the most felt by local residents. For example, in the Tegalratu area which is the closest area to the Krakatau Posco industry, residents frequently experience severe air quality issues, including black, smoky emissions and the deposition of black dust throughout their residential areas. Air quality testing in the area revealed PM 2.5 concentrations at **276  $\mu\text{g}/\text{m}^3$**  and PM 10 at **352  $\mu\text{g}/\text{m}^3$** . This figure is far from the standard set by the WHO, which sets safe limits at **PM 2.5 = 25  $\mu\text{g}/\text{m}^3$**  and **PM 10 = 50  $\mu\text{g}/\text{m}^3$** .



Picture 2

Results of air quality check in Tegalratu using Trotec air quality measuring device.

In the Cigading village area, the steel production activities of Krakatau Posco frequently emit thick plumes of smoke. When the wind blows in the direction of residential areas, black dust is carried into people's homes, often accompanied by a pungent and irritating odor. Similar conditions are also reported in the nearby communities of Kubangsari and Samangraya. Residents in these areas routinely face exposure to industrial dust and smoke. Additionally, loud industrial noises frequently disrupt their daily lives, especially disturbing their ability to rest at night.

Despite facing poor air quality, local communities have not been equipped with the tools or infrastructure to monitor environmental conditions. Neither the government nor the companies provide transparent, accurate, and real-time access to air quality monitoring tools or the Air Pollution Standard Index (ISPU). As a result, residents never know how bad the air quality they breathe.

"It's a factory near the sea, where does the waste go if not into the sea? Fish used to be big, now they are smaller in size. And we're not even allowed to go near the factory's jetty. So where are we supposed to fish now?"

Access to information on air quality, especially in industrial zones, is a fundamental part of the public's right to a healthy and sustainable environment. The Air Pollution Standard Index (ISPU) provides an overview of ambient air quality in a given area, based on its potential impact on human health, aesthetics, and other living things.<sup>11</sup> Even for fire-prone areas, ISPU is used as an *early warning system* for the surrounding community. If ISPU readings fall into unhealthy, very unhealthy, or hazardous categories, the government is legally obligated to disclose that information<sup>12</sup> and take pollution control measures.<sup>13</sup> Unfortunately, access to ISPU data remains limited, particularly in industrial zones.<sup>14</sup>

Even on the day of the black ash eruption, Krakatau Posco did not give a notice so that the community regretted the poor communication of Krakatau Posco to the community. When contacted, the Cilegon City Environmental Agency (Dinas Lingkungan Hidup/ DLH) refused to provide or display Krakatau Posco's Environmental Impact Assessment (AMDAL) documents and gave evasive answers when asked about environmental monitoring. The agency even claimed that the project was not within its jurisdiction.

This contradicts the legal responsibilities of the local government, which is mandated by Minister of Environment Regulation No. 12 of 2010, and further detailed in BAPEDAL Decree No. 205 of 1996 on Technical Guidelines for Controlling Air Pollution from Stationary Sources.<sup>15</sup> These regulations clearly state that local governments are required to monitor compliance by companies emitting stationary-source pollution.<sup>16</sup>



**Picture 3**  
Black dust contaminated the yards of Cigading residents.

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<sup>11</sup> Article 1 number 1 of the Minister of Environment and Forestry Number 14 of 2020 concerning the Standard Index of Air Pollutants.  
<sup>12</sup> Article 10 paragraph (2) of the Minister of Environment and Forestry Number 14 of 2020 concerning the Air Pollutant Standard Index.  
<sup>13</sup> Article 7 paragraph (5) of the Minister of Environment and Forestry Number 14 of 2020 concerning the Standard Index of Air Pollutants.  
<sup>14</sup> Location of ISPU Monitoring Station, August 4, 2025, <https://ispu.menlhk.go.id/webv5/#/stasiun>.  
<sup>15</sup> Decree of the Head of Bapedal Number KEP-205/BAPEDAL/07/1996 of 1996 concerning Technical Guidelines for the Control of Immobile Source Air Pollution.  
<sup>16</sup> Articles 12-14 of the Regulation of the Minister of Environment Number 12 of 2010 concerning the Implementation of Air Pollution Control in the Regions.

Furthermore, the results of such monitoring should be proactively published on a regular basis<sup>17</sup> as part of the public's right to environmental information, especially when it directly affects the lives and health of communities living near emission sources.

## Water and Seawater Pollution

Suspected marine pollution has occurred in the Samangraya area, which lies within the Krakatau Steel industrial complex, specifically near the Krakatau Chandra Energi building (the captive coal-fired power plant for Krakatau Steel's industrial operations). Residents have reported suspected direct disposal of semi-solid liquid waste into the sea in this area.



Based on the field research conducted by WALHI Jakarta also found a mound of dark soil-like material that resembled industrial waste behind the Krakatau Posco site, directly facing the coastline. However, by the time the team returned for verification, the waste had already been washed away by high tide.

This situation signals a potential violation of the community's right to a healthy and sustainable environment. In addition to endangering coastal ecosystems, there are growing concerns about the presence of heavy metals in the waste and marine life—raising the risk of **bioaccumulation**, which can impact human health, particularly among coastal communities whose livelihoods depend on marine resources.

**Picture 4**

Black mud waste on the coast behind the Krakatau Posco area.

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<sup>17</sup> Information on the results of monitoring and/or technical supervision in the field of environment and forestry is public information that must be provided and announced periodically, Article 4 of the Regulation of the Minister of Environment and Forestry No. P.18/MENLHK/SETJEN/KUM.1/5/2018 of 2018 concerning Public Information Services within the Ministry of Environment and Forestry.

These waste mounds may be one of the causes behind the suspected marine pollution near the Krakatau Chandra Energi facility. Notably, the area is still frequently used by locals for fishing. Nearby is **Tanjung Peni**, a traditional fishing village, where fishers live side by side with the impacts of the steel and chemical industries. Pollution of the sea and waterways has affected both the quantity and quality of their catch.

Poor water quality is also a major concern for residents. To meet daily water needs, locals are forced to purchase raw water at IDR 3,000 per gallon and drinking water at IDR 8,000 per gallon.

## Systemic Flooding



**Picture 5**  
Flooding that occurred around the Krakatau Steel area.

Kubangsari is one of the areas in Cilegon that frequently experiences flooding during the rainy season. According to local residents, over the past 10 years there have been two to three major flood events during the wet season. In 2024, a significant flood occurred, not due to heavy rainfall, but from other environmental disruptions.

Several testimonies attribute the flooding in Cilegon to **sand and stone mining activities (commonly referred to as “Galian C”)** located in the Mancak area of Serang Regency. These mining operations have reportedly damaged the natural water catchment areas that serve as the upstream source of Cilegon’s river systems.

The situation has been further exacerbated by industrial development, particularly the land reclamation and elevation activities carried out by the Krakatau Steel industrial zone. These activities have significantly reduced natural water infiltration areas, while also narrowing the drainage channels that lead to the sea. As a result, flood risks in Kubangsari have intensified and now pose threats to nearby areas such as Tegalratu and its surroundings.

## Greenhouse Gases Contribution

The impact of the steel industry in Cilegon extends beyond local environmental degradation—it also exacerbates the global climate crisis. This is primarily due to the significant greenhouse gas (GHG) emissions released from industrial operations using the Blast Furnace–Basic Oxygen Furnace (BF–BOF) method. Scientifically, BF–BOF is proven to produce significantly higher GHG emissions compared to alternative technologies such

as Direct Reduced Iron–Electric Arc Furnace (DRI–EAF), as it relies on coal or coke as the reducing agent during the production process.<sup>18</sup>

Since 2013 until now, Krakatau POSCO’s operations have been entirely based on the BF–BOF method, with a production capacity of 3 million tons per year.<sup>19</sup> As a result, the company has become the largest GHG emitter in the manufacturing sector in Cilegon. According to data from Climate TRACE, Krakatau POSCO’s annual GHG emissions have consistently been twice as high as those of Krakatau Steel, which uses the lower-emission EAF-based technology.<sup>20</sup>

<b>Time Period</b>	<b>Point Source Emissions of PT Krakatau POSCO (BF-BOF Capacity 3 million tons per year)</b>	<b>Point Source Emissions of PT Krakatau Steel Tbk (EAF capacity 4 million tons per year)</b>
January 2021 – December 2021	5.64M t CO <sub>2</sub> e 100yr	2.60M t CO <sub>2</sub> e 100yr
January 2022 – December 2022	5.88M t CO <sub>2</sub> e 100yr	2.44M t CO <sub>2</sub> e 100yr
January 2023 – December 2023	4.89M CO <sub>2</sub> e 100yr	1.88 M t CO <sub>2</sub> e 100yr
January 2024 – December 2024	5.86M Co <sub>2</sub> e 100yr	2.57 M t CO <sub>2</sub> e 100yr
January 2025 – May 2025	2.81M t CO <sub>2</sub> e 100yr	1.34M t CO <sub>2</sub> e 100yr

The consistency of emission dominance by Krakatau POSCO from year to year shows a direct relationship between the use of BF–BOF technology and the high contribution of GHG emissions.

Unfortunately, in 2018, PT Krakatau POSCO announced plans to construct an additional BF–BOF unit, each with a production capacity of 3 million tons per year, expected to commence operations between 2025 and 2026.<sup>21</sup> Unfortunately, in 2018, PT Krakatau POSCO announced plans to construct an additional BF–BOF unit, each with a production capacity of 3 million tons per year, expected to commence operations between 2025 and 2026. Furthermore, Krakatau POSCO’s operations are powered by a 200 MW captive coal-fired power plant,<sup>22</sup> which further enlarges its carbon footprint.

On the other hand, Krakatau Steel has long adopted cleaner technologies, namely Electric Arc Furnace (EAF) and Direct Reduced Iron (DRI), with EAF in operation since 1978. Krakatau Steel currently operates an EAF unit with a capacity of 4 million tons per year, and previously operated a DRI unit with a capacity of 1.35 million tons per year (mothballed). However, in a contradictory move, Krakatau Steel also built a BF unit in 2013 with a capacity of 1.2 million tons per year, which is also currently mothballed. Despite having cleaner

<sup>18</sup> Zhiyuan Fan and S. Julio Friedmann, "Low-carbon production of iron and steel: technology options, economic assessment, and policy," *Joule*, Volume 5, Issue 4, 829 - 862, <https://doi.org/10.1016/j.joule.2021.02.018>.

<sup>19</sup> Global Energy Monitor, KS POSCO Cilegon steel plant, [https://www.gem.wiki/KS\\_Posco\\_Cilegon\\_steel\\_plant](https://www.gem.wiki/KS_Posco_Cilegon_steel_plant)

<sup>20</sup>Climate TRACE,

<https://climatetrace.org/explore/#admin=PT%20Krakatau%20Posco%20:99006495:E100001010135:owner&gas=co2e&year=2021&timeframe=100&sector=manufacturing,fossil-fuel-operations&asset=>

<sup>21</sup> Global Energy Monitor, "KS POSCO Cilegon steel plant," [https://www.gem.wiki/KS\\_Posco\\_Cilegon\\_steel\\_plant](https://www.gem.wiki/KS_Posco_Cilegon_steel_plant)

<sup>22</sup> Global Energy Monitor, "KS Posco Cilegon steel plant," [https://www.gem.wiki/KS\\_Posco\\_Cilegon\\_steel\\_plant](https://www.gem.wiki/KS_Posco_Cilegon_steel_plant).

options, the company is now planning to build a new BOF unit with a capacity of 4 million tons per year, scheduled to begin operations in 2025.<sup>23</sup> This trend of expanding BF and BOF units, despite the availability of low-emission technologies, indicates that Indonesia's steel industry development remains heavily reliant on high-emission pathways. This trajectory poses serious risks of escalating GHG emissions, both locally and nationally.

A comparison between Krakatau POSCO, which operates BF–BOF at 3 million tons/year, and Krakatau Steel, which operates EAF at 4 million tons/year, but still emits twice less GHG, illustrates that technology choice has a direct and significant impact on emission levels. Therefore, the future development of Indonesia's steel industry must be urgently reassessed and redirected toward low-emission technologies to prevent worsening the climate crisis, both in Cilegon and in the broader context of Indonesia's national climate commitments and global climate targets.

## Health Impact

The poor environmental quality resulting from iron and steel industry activities has led to a range of public health problems. According to data from Ciwandan Community Health Center (Puskesmas) as cited by BPS Kota Cilegon (2023), the Tegalratu area shows a disease pattern commonly linked to or triggered by air pollution. Acute upper respiratory tract infections (4,944 cases), acute nasopharyngitis (2,235 cases), and hypertension (2,834 cases) dominate the statistics. Skin diseases such as dermatitis (1,278 cases) are also significant—aligning with residents' complaints of itchy rashes caused by black dust. These figures only reflect those who sought treatment at the local health center, suggesting that the actual number of affected individuals could be even higher.

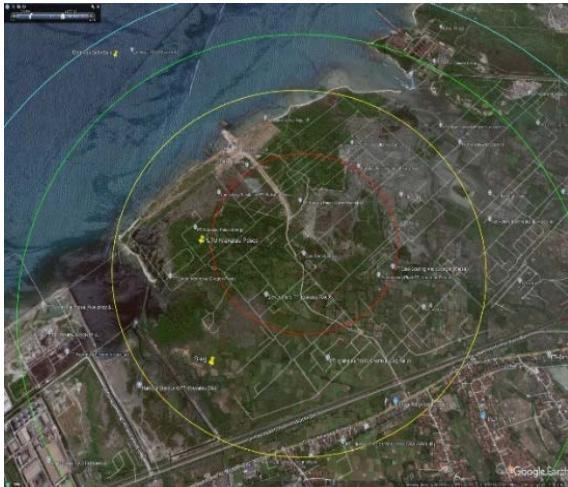
Similar conditions are reported in Kubangsari and Samangraya, where residents frequently complain of itchiness, coughing, dizziness, and mild shortness of breath. However, due to the lack of thorough medical examinations, it remains unclear whether these health issues are directly caused by industrial activities at PT Krakatau Posco.

Disease data in Citangkil District (including Samangraya) in 2023 also shows a serious trend, with ISPA as the most disease (15,311 cases). Despite this serious health condition, neither the health office nor the nearest health center has conducted serious and in-depth routine examinations to identify the cause of the high rate of ISPA in the area.

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<sup>23</sup> Global Energy Monitor, "Krakatau Steel Cilegon Plant," [https://www.gem.wiki/Krakatau\\_Steel\\_Cilegon\\_plant](https://www.gem.wiki/Krakatau_Steel_Cilegon_plant)

## Economic Impact



**Picture 6**  
Krakatau Steel Area in 2010



**Picture 7**  
Krakatau Steel Area in 2024

### 1) Destruction of Livelihoods

The existence of PT Krakatau Posco industry affects the economic development of the community. The presence of the industry is detrimental to residents because they have lost their livelihoods as farmers and fishermen, especially in the Tegalratu and Kubangsari areas. Fisherfolk who still venture out to sea have reported increasingly poor catches due to industrial waste contaminating the waters, pushing fish farther from the shore. Previously, fishermen needed only two liters of fuel to fish close to shore—now, they must burn up to five liters just to find fish.

Although this marine pollution cannot be attributed solely to the iron and steel industry, it is important to note that this sector remains one of the largest in Cilegon. The cumulative steel production of PT Krakatau Steel and PT Krakatau POSCO is enormous, placing a heavy ecological burden on the surrounding environment.

“Sometimes we just break even. Other times, we lose money. There used to be plenty of fish just 50 meters from the coast, but now they’re gone, too much industrial waste. This is supposed to be squid season, but because of the factory flaring that shines like the sun, they’re driven away. Maybe the constant loud noise every night stresses them out too, scares the fish off.”

Not only waste, fishermen also feel disadvantaged due to the damage to the mangrove ecosystem caused by industrial reclamation. The reclamation not only worsens flooding, but also damages the mangrove ecosystem. The Indonesian Fishermen's Association (HNSI) has also highlighted the loss of mangrove forests due to industrial activities. However, large companies that operate instead hold mangrove tree planting outside the Cilegon City area.<sup>24</sup>

The mangrove ecosystem itself is very important for marine life, including supporting the livelihood of fishermen. Moreover, mangrove ecosystems are also important in maintaining ecosystem balance as *a carbon sink* in the midst of the climate crisis that occurs, especially in areas with high industrial emissions.

The loss of this mangrove ecosystem not only eliminates one of the supporters of environmental quality, but also has an impact on people's livelihoods. The reason is that inadequate environmental conditions for marine life make it difficult for fishermen to get fish catches.

“The wind used to come from the east, but now it changes suddenly. Even during the rainy season, the heat is unbearable, it doesn't feel like the rainy season at all.”

Moreover, local fishers report increasing difficulty predicting the weather—an essential part of their livelihood. Amid this uncertainty, some now rely on providing boat rental services for recreational fishing or collecting trash and pumice stones to sell.

A similar fate has also affected communities who previously worked as farmers. The establishment of the iron and steel industry on what was once agricultural land or rice fields has taken away one of their primary sources of livelihood. With no effort made to build new skills or provide alternative income opportunities, older residents who are no longer physically productive are left with little choice but to work as laborers in the industrial sector after their farmland was evicted.

“I'm too old to work in a factory, and the only skill I've got is basic construction work.”

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<sup>24</sup> "Mangrove Forests in Cilegon Replaced by Industry, HNSI Regrets Company Action on This," July 26, 2025, <https://bco.co.id/hutan-mangrove-di-cilegon-tergantikan-industri-hnsi-sayangkan-aksi-perusahaan-soal-ini/>.

In addition, the land conversion process has left behind unresolved issues. There are still banners and signs displayed in the area listing the names of residents whose land has never been compensated since it was cleared by Krakatau Steel in 1973. This reflects the ongoing land ownership disputes that remain unsettled in the community to this day.

As for residents who were not hired by PT Krakatau Posco, many survive by running small businesses, selling groceries, operating food stalls from their homes, working as air conditioner repairmen, mechanics, motorcycle taxi drivers, or seeking work outside the city. Only a small portion of residents who still own land continue farming.

In these difficult conditions, women face even greater economic hardship. The competition for jobs is fierce, and the types of employment available are often not inclusive or accommodating of women's needs.

## **2) Minimal Local Employment Absorption**

In practice, PT Krakatau Posco has failed to absorb local labor in accordance with the commitments made to nearby residents. During the initial development phase of the Krakatau Posco industrial complex, the recruitment management had promised that the majority of workers hired would come from the surrounding communities. However, according to residents, that promise was never fulfilled.

This situation is further exacerbated by issues of accountability in the recruitment process. Residents are reportedly required to pay high administrative fees just to be considered for employment as laborers. A local non-governmental organization (NGO) has taken on the role of coordinating labor distribution from the community to Krakatau Posco. However, they have only been able to place residents in low-wage, short-term jobs lasting between three to six months—such as truck drivers, operators, administrative staff, drainage diggers, and other physically demanding positions paid at minimum wage.

## **3) Conflict over Corporate Social Responsibility (CSR)**

The Corporate Social Responsibility (CSR) program of PT Krakatau Posco which ideally should contribute to improving the welfare of affected communities has instead stirred conflict among local residents. CSR management, coordinated by the village government, NGOs, and the company itself, has not been carried out in a transparent manner. This lack of transparency has fueled suspicion and social jealousy within the community.

Residents of Tegalaratu and Kubangsari reported that they were largely excluded from the decision-making process. Thus far, agreements between the company and the community have been represented by NGOs and/or local government officials, rather than through direct public involvement.

## Social Impact

The economic transformation from an agricultural-based society to an industrial one has significantly influenced the behavior of local residents, bringing about changes in both cultural norms and social character in areas such as Tegalratu, Kubangsari, and Samangraya. Residents reported that the presence of the industry has led to a decline in communal religious activities, with fewer people attending prayers at the mosque. Over time, mosques have become quieter as industrial work shifts begin as early as 7 a.m. and continue until the evening. This leaves little time for communal gatherings that traditionally strengthen social bonds.

Additionally, during the early phase of transitioning from an agrarian to an industrial economy, the local population of Cilegon was unprepared, leading to the influx of workers from other regions. This shift impacted the social and cultural fabric of the area. Industrial zones, by nature, act as magnets for laborers, thus increasing the social diversity of Cilegon. The change in economic status also spurred social competition and altered people's lifestyles, as influenced by the presence of Krakatau Posco.

A visible impact of this change is the rise in consumerist lifestyles. In Tegalratu, one prominent sign of shifting social norms is the appearance of budget hotels suspected of operating as centers for prostitution. In Samangraya, the presence of foreign (Korean) workers has led to the emergence of so-called "contract marriages" with local women. These phenomena reflect the complex economic challenges faced by women in communities surrounding the industrial zone.

# The Paradox of the Steel Industry with the Right to a Clean and Healthy Environment and the Burden of Climate Vulnerability in Cilegon

The existence of large industries in the city of Cilegon such as PT Krakatau Steel and Krakatau POSCO shows the paradox that the growth of the industry is far from a positive impact on the surrounding community, resulting in a massive burden of pollution and environmental damage, which is precisely the surrounding community that is severely affected without a guarantee of protection and recovery. The application of technology by companies to maintain a good quality of life and environment is also often inadequate, resulting in an impact on the escalation of environmental impacts and risks to public health.

Air pollution, flooding, and the ongoing deterioration of seawater quality persist due to the lack of transparency in real-time air quality monitoring, as well as the lack of openness in environmental impact management and environmental supervision results. Communities are increasingly burdened by the declining quality of their environment, limited access to natural resources for livelihoods, and worsening health conditions.

This situation cannot be separated from the broader context that increasingly threatens communities: the escalating impacts of climate change. Amid the expansion of high-emission steel industries, the people of Cilegon are facing compounded burdens health, economic, and environmental impacts that heighten their vulnerability to ecological disasters such as floods, crop failures, and extreme weather events.

The lack of climate mitigation and adaptation measures in this industrial area reflects a serious problem in fulfilling the right to a healthy and sustainable environment, not only for the current generation but also for those to come.

## Closing

The presence of the iron and steel industries namely Krakatau Steel and Krakatau Posco has generated complex problems and reveals the paradox of sustainable development. The government's ambition and claims that this industry drives economic growth stand in stark contrast to the ecological crisis and the declining economic and social conditions of nearby communities. Adding to this is the fact that the iron and steel sector is also a significant contributor to greenhouse gas (GHG) emissions amid the ongoing climate crisis, further exacerbating existing vulnerabilities.

This industry has contributed to various forms of environmental degradation, including air, groundwater, and marine pollution, which have poisoned surrounding ecosystems. Systemic flooding that triggered by the loss of natural water catchment areas and land reclamation for industrial purposes has been made worse by the destruction of mangrove ecosystems, weakening ecological resilience in the face of climate change impacts such as extreme weather. The loss of mangroves is especially critical given their role as carbon sinks in an area dominated by high-emission industries like steel.

Environmental degradation is directly linked to other harmful consequences, particularly on public health. High rates of respiratory infections and skin diseases reported by the local population are a direct cost of this destruction. These issues are further aggravated by limited monitoring efforts by authorities, both in health surveillance and environmental quality control.

Beyond health impacts, the ripple effects extend to the community's economy and social fabric. The collapse of traditional livelihoods, such as farming and fishing, amid climate instability has increased unemployment and economic hardship. Fishermen, who depend heavily on predictable weather patterns, now struggle to earn a living. Meanwhile, labor absorption and transparency in corporate social responsibility (CSR) initiatives remain problematic. A lack of inclusive job opportunities and opaque CSR governance have contributed to growing social tensions. These include shifts in lifestyle, jealousy among residents, conflict, and even the rise of exploitative practices like prostitution and temporary marriages ("kawin kontrak"). Such developments disproportionately impact women, who remain the most marginalized and vulnerable to exploitation.

The absence of systematic efforts to reduce GHG emissions and strengthen community resilience against environmental and climate impacts not only neglects ecological protection, it also deepens social inequality and constitutes a violation of the rights of vulnerable communities.

Economic development and growth should not come at the expense of ecosystems, the environment, and people's well-being, especially in an era of intensifying climate impacts and growing community vulnerabilities.

