

5/8/2024

Pacific Steel Group (PSG) appreciates the opportunity to provide comments regarding potential amendments to the Cap-and-Trade Regulation, specifically in response to the April 23rd, 2024, CARB workshop topic: *Updates to minimize emissions leakage and continue to support decarbonization and innovation in California's industrial sector and fuels sector.*

PSG has proposed to invest more than \$630 million in California to build a state-of-the-art reinforcing steel recycling mill near Mojave, California. The facility received approval of its Environmental Impact Report (EIR) by the Kern County Board of Supervisors in March 2024, and continues to advance its proposed project. This is a bold plan, considering generations of mills have closed in California and have been replaced by out of state manufacturers for the purpose of serving the west coast market, and specifically the large California market. No steel mill has been built in California in over 50 years.

CARB's focus on minimizing emissions leakage in the industrial sector is essential for the state to achieve its long-term climate goals. Any state policy that results in the shifting of production of essential materials out of state is in no way furthering the state's climate goals.

The once vibrant steel industry in California is a prime example of emissions leakage. Steel production (CARB Classification Iron and steel mill, NAICS code 331111, as opposed to processing or rolling of steel) has entirely left the state, shifting the emissions as well as the economic activity along with it. When the Cap-and-Trade program was established, there was one steel melting facility left in the state. At that time, CARB identified the steel industry as Energy Intensive and Trade Exposed (EITE), recognizing the high energy requirement necessary to melt steel along with the competitive trade pressure this specific industry faced from out of state producers, and set direct and indirect baselines, assistance factors, and cap decline factors based on its understanding of the risk of emissions leakage.

This last remaining steel mill stopped production in the state in 2019, shifting production to neighboring states. California continues to consume vast amounts of steel, including over 1,000,000 tons per year of reinforcing steel bar (rebar) for critical infrastructure, seismic stability, and climate resilience. The net climate impact of this shift in production out of state was an increase in emissions due to production under less stringent environmental regulations, with dirtier electric grids and longer shipping distances of raw scrap metal and finished materials.

California now imports 100% of its steel. Without an industry to regulate within CARB's jurisdiction, the Cap-and-Trade program is unable to apply any pressure whatsoever to drive down emissions in the steel industry that is supplying the state. The current cap decline factor and other program parameters are simply applying pressure on a vacuum.

Despite the clear recognition of EITE status in the steel industry, the industry has entirely left the state. No single factor can explain the exit of the state by an entire industry, but clearly the goal to minimize emissions leakage was not achieved. Unfortunately, 100% of the California steel industry

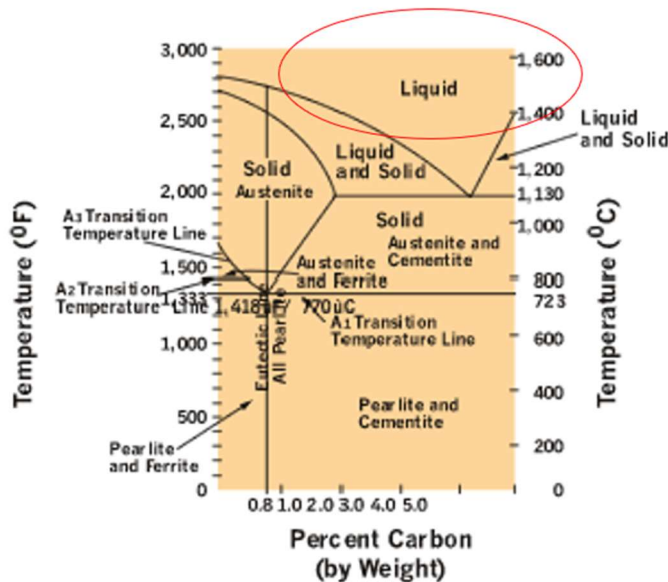
and their associated carbon emissions leaked out of state. In doing so, it is important to note that those emissions increased. Considering this outcome, we think a fresh look at direct and indirect baselines and cap decline factors is appropriate recognizing the facts that have emerged since those parameters were originally set.

Steel melting is extremely trade exposed, and any adjustments to the Cap-and-Trade program parameters should reflect the current reality, which is, California imports 100% of its demand for steel. Theoretical studies and models provide very little additional insight when the current reality is ALL steel is produced and traded from outside of the state.

Steel melting is extremely energy intense, both for direct process emissions and for indirect emissions associated with electricity, as the fundamental process involves “arcing” electricity through recycled scrap metal to over 3,000 degrees Fahrenheit.

- **Direct Process Emissions** - Direct process emissions of carbon are inherent to the chemistry of the steel making process. You cannot make steel without carbon and oxygen. Carbon is a key component of the final steel product, as it is necessary to achieve hardness and strength specifications. Carbon sources in the process include carbon embedded in the scrap metal that is charged in the furnace, plus the use of carbon electrodes that inject electricity into the furnace, and direct carbon injection to achieve the final steel product chemical properties. Oxygen is injected into the furnace to remove impurities; however, some oxygen will combine with carbon sources to create CO₂, which is also unavoidable, based on chemistry.
- **Indirect Process Emissions** – Indirect process emissions are essential to the electric arc furnace steel making process. Electricity is the primary energy source to achieve process temperatures at which steel chemical properties are achieved. Steel requires temperatures of around 3,000 degrees F (see Figure 1) to achieve the required phase change, crystalline structure, and the chemical properties of the finished product. Steel mills can run more or less efficiently to achieve the required temperatures, but this liquid steel temperature requirement is inherent to the process. Just as you can boil water on the stove or in the microwave, in either case the water must reach 212 degrees F to boil, no technology will change that fact. Perfect transfer of heat with zero losses would still require a minimum amount of electricity to make steel – and that minimum is the majority of all electricity consumed in a steel plant today.

Figure 1 – Diagram of temperatures required to achieve liquid steel phase change



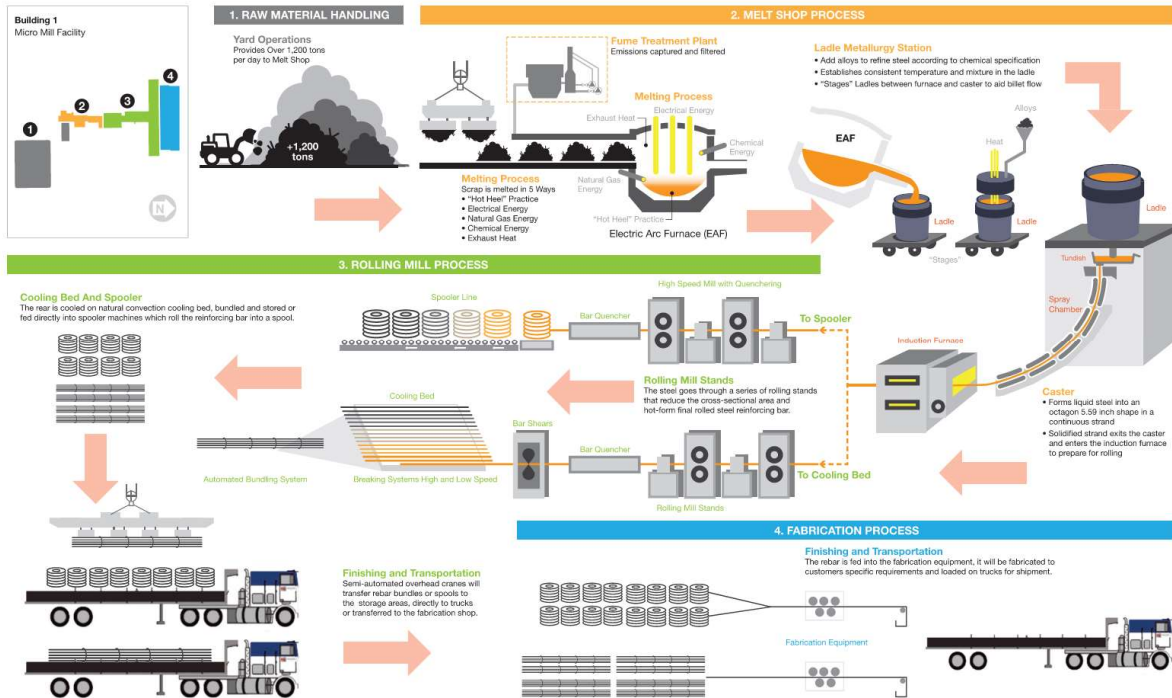
This is a critical time, and it is appropriate and necessary for adjustments to be made to the steel industry program parameters that recognize the realities faced by this industry, like the fierce trade exposure, and the industry’s need for energy at extremely high levels of intensity. New parameters must be established at levels that recognize that the previous parameters were not sufficient to prevent emissions and economic leakage in the steel industry. Parameters must be established at levels that encourage a return of world class steel production to California, and that stimulate investment in efficient and innovative emissions control technology.

The PSG proposed steel mill is state-of-the-art, with substantially reduced emissions per ton of steel when compared to the current industry importing steel into California. This project is strategically located in Kern County, providing the community with local job opportunities and economic growth. The site is in close proximity to existing scrap and raw materials, and close to customer project sites resulting in a reduction in transportation emissions. See Figure 2 for process overview.



Figure 2

Micro Mill Factory Process Flow Chart



The proposed PSG mill would use the most efficient steel making technologies currently available, including raw material scrap pre-heating, it incorporates the efficient Danieli Micro-Mill technology that eliminates semi-finished billet reheating, and employs on-site renewable energy. Further, PSG has designed its proposed mill to eliminate the use of natural gas, by electrifying key processes eliminating the need for fossil fuel. The result of adopting these world class technologies is a 59% reduction in carbon emissions compared to the U.S. electric arc furnace (EAF) average (see Figure 2). The remaining emissions are inherent to the steel melting process and cannot be avoided.

Figure 3

Sources Of Emissions (kg CO ₂ e per MT of steel)	U.S. EAF Average	Baseline MicroMills	PSG MicroMill
EAF Carbon in Metallic Charge + Carbon Injection	190.0	80.5	67.5
EAF Natural Gas		5.5	0.0
EAF electrodes and other additives		6.0	6.0
LF electrodes and additives		4.0	4.0
Rolling Mill Reheating Furnace			
Preheaters (ladle and tundish)		3.0	0.0
Other GHGs		1.8	0.8
Subtotal	190.0	100.8	78.3
Process CO₂e Reduction (%)			59%

PSG is working to equip its steel mill to use a first of its kind carbon capture system that has never been put to use in combination with electric arc furnace steelmaking. The carbon gas stream that would be captured will be liquified and purified to a food grade quality to service the beverage industry. The substantial investment, operational risk, and performance risk associated with such an innovative approach to decarbonize the production of critical materials should be encouraged through the Cap-and-Trade program.

PSG recommends that CARB make adjustments to the existing program to encourage substantial investment to decarbonize critical industries:

- Establish new baselines for Iron and steel mills to reflect the current reality that no California industry exists today. Consider an updated direct emissions baseline of the average delivered emissions per ton including transportation of imported steel to California. Consider an updated indirect emissions baseline of the average delivered electricity intensity per ton of imported steel to California.
- Recognize the extreme high trade exposure and energy intensity inherent to the process and chemical requirements of steel production and adopt at a maximum, a 1% cap decline factor for Iron and steel mills for both direct and indirect baselines from a new updated baseline.
- Establish special allowance set asides for investments in innovative technologies such as electrification of industrial processes or carbon capture in novel applications, across industries that reduce emissions by more than 25% from prior best industry performance.

PSG appreciates the opportunity to provide comments and would be happy to explore these ideas in further detail with CARB staff.

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