



Improving Industrial Efficiency: Primary Metal Manufacturing

Primary metal manufacturing is done in iron and steel mills; alumina and aluminum production facilities; non-ferrous metal production facilities, such as those that make copper; and foundries. Many of these facilities use the same energy intensive processes, such as those that require grinding and heating to homogenize and then process the raw material into a finished product. Energy conservation measures related to these types of processes are also similar across sectors.

Make the most of heat

- Improve the efficiency of electric arc furnaces by covering arc and melt surfaces with foamy slag to reduce heat losses.
- Use gas injection technology to improve heat transfer to the melt.
- Install engineered refractories to reduce slag formation, which decreases heat transfer.

Replace and upgrade equipment

- Replace continuous casting with strip casting, which has lower energy and operations and maintenance requirements.
- Install variable frequency drives (VFDs) on coke oven gas compressors, saving electricity.
- Upgrade old fans, motors, and pumps with VFDs and controls.
Save up to 50% of electricity usage.

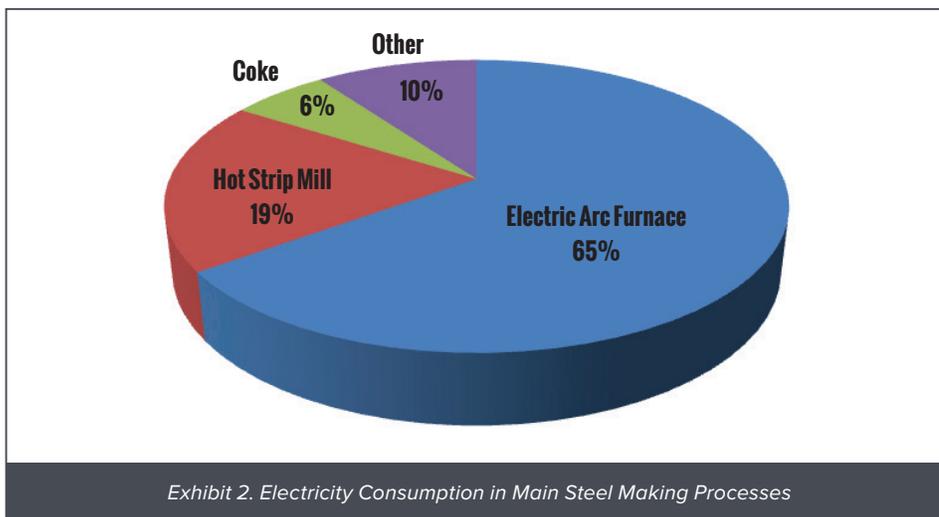
Streamline aluminum reduction

- Optimize chemical composition of cryolite solution to reduce the current required.
- Install alumina point feed systems to maintain constant alumina concentration and efficient reactions.



The largest energy consumption in iron and steel manufacturing arises from the use of electric arc furnaces, which are used to melt down raw materials. Casting and rolling using a hot strip mill is second, with a combination of other processes comprising third place, and cokemaking rounding out the top four.

Aluminum manufacturing is an inherently electricity-intensive process, as it uses direct current to reduce raw materials into elemental aluminum. A 2007 Department of Energy (DOE) assessment estimated that this process accounts for approximately 82% of electricity usage, making it a key target for energy efficiency improvement. Machine drives for grinding of the raw material and rolling and shaping of the finished product compose most of the rest of the electricity usage.



References

Ernst Worrel et al. (2010) Energy Efficiency Improvement and Cost Saving Opportunities for the US Iron and Steel Industry: An ENERGY STAR Guide for Energy and Plant Managers. Ernest Orlando Lawrence Berkeley National Laboratory.

BCS. (2007) U.S. Energy Requirements for Aluminum Production: Historical Perspective, Theoretical Limits, and Current Practice. Report to the DOE Industrial Technologies Program. February, 2007.

Get started

Visit nyserdera.ny.gov or call **1-866-NYSERDA** to learn more about how NYSERDA can help you significantly reduce electricity usage and achieve measurable savings throughout your primary metals manufacturing process.

