Case Study: Steel Mill Waste Heat to Electricity

Primary Energy Recycling- North Lake

Industry: Steel

Other Potential Applications: Carbon Black, Petroleum refining, Chemical

Project: North Lake Energy, LLC

Developer, Owner, Operator: Primary Energy Recycling Corp (Primary Energy)

Customer: ArcelorMittal

Location: East Chicago, Indiana

Capacity: 90 MW

Waste Heat Source: 1500 °F exhaust heat from blast furnace gas recovery boilers

Use of Electrical Energy: On-site consumption

Major Equipment: One ABB 90 MW steam turbine; one Brush 90 MVA, 13.8 kVturbine generator; one 5 cell cooling tower

Commercial Operation: May 1996

The project captures and recycles heat from ArcelorMittal's principle blast furnace, producing up to 90 MW of electricity, providing more than 20% of ArcelorMittal's electricity requirements, increasing reliability of the plant electric supply, substantially reducing energy costs compared to purchased power alternatives, and producing 215,000 fewer tons of carbon dioxide when compared to other plants using separate heat and power sources.

The Heat is Power Association (HiP) is the trade association for the waste heat to power (WHP) industry. WHP uses waste heat from industrial processes to generate electricity with no additional fuel, no combustion, and no incremental emissions. HiP educates decision makers about clean energy from waste heat and lobbies for policies that provide parity for WHP with other sources of emission-free power like wind, solar and geothermal. For more information visit heatispower.org

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Project Description

ArcelorMittal, an integrated steel producer, has partnered with Primary Energy on several projects at its Northwest Indiana operations to capture and use waste heat and by product fuels. Primary Energy worked with ArcelorMittal to identify an opportunity to more efficiently utilize byproduct fuel from ArcelorMittal's principle blast furnace (No. 7), and use it to produce up to 90 MW of emission-free electricity. Primary Energy built and owns the project, which uses steam delivered from ArcelorMittal's existing blast furnace gas recovery boilers.

The North Lake Energy project is capable of supplying more than 20% of ArcelorMittal's electricity requirements using an onsite waste fuel that had principally been flared. This facility has substantially reduced energy costs compared to purchased power alternatives while increasing reliability of the electric energy supply for ArcelorMittal's plant operations. The plant produces ~215,000 fewer tons of carbon dioxide when compared to other plants using separate heat and power sources and has been recognized by the United States Environmental Protection Agency for its environmental performance and efficiency.

Operational Benefits

- Increased reliability of the electric energy supply for ArcelorMittal's plant operations
- Uses an onsite waste fuel that had principally been flared

Economic Benefits

- Supplies more than 20% of ArcelorMittal's electricity requirements
- Substantially reduced energy costs compared to purchased power alternatives

Environmental Benefits

- Produces up to 90 MW of emission-free electricity
- Produces 215,000 fewer tons of carbon dioxide when compared to other plants using separate heat and power sources.
- The United States Environmental Protection Agency recognized North Lake Energy's 2007 operations for environmental performance and efficiency