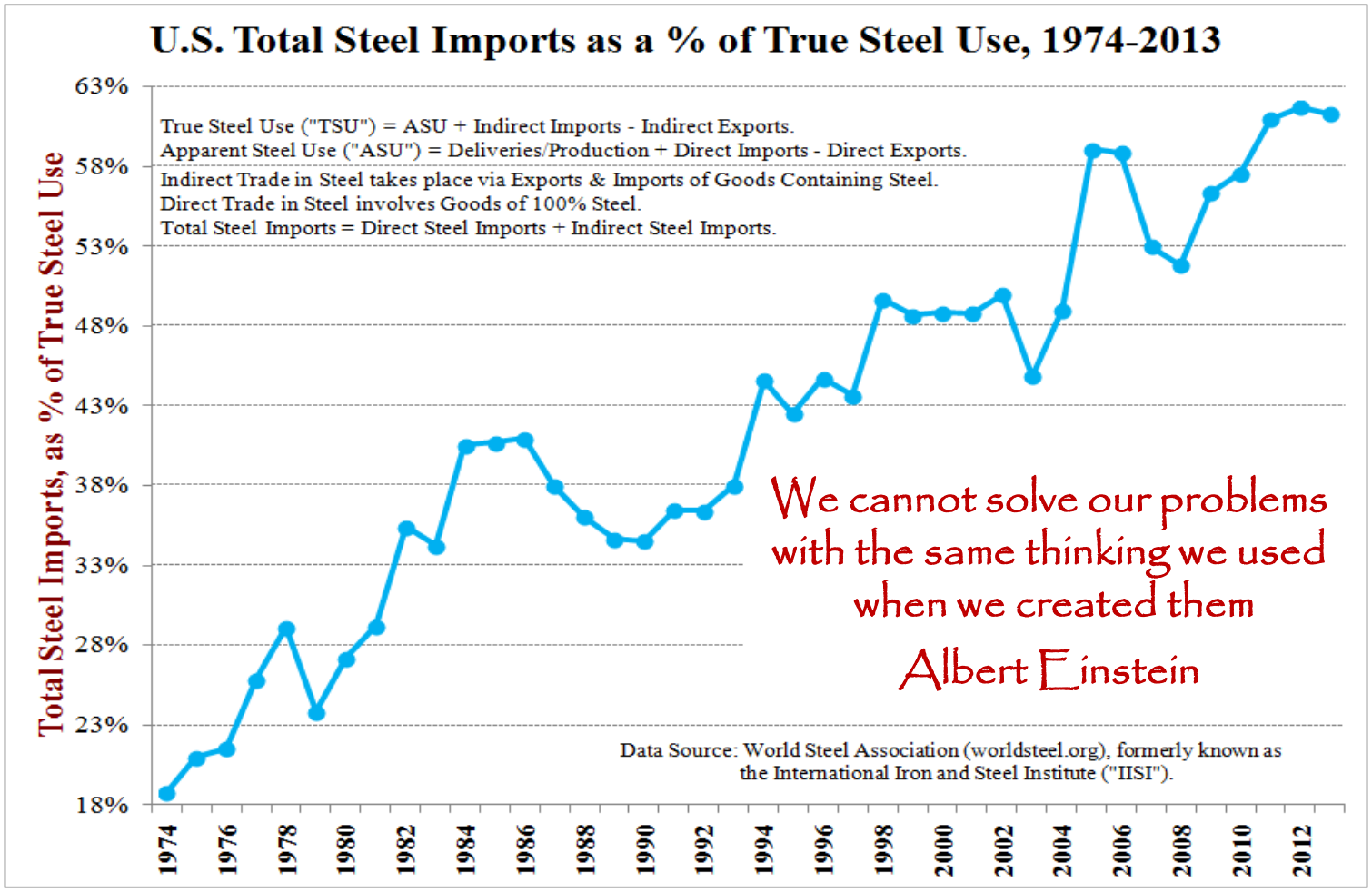
IPS - Iron Power Steel

A Cleaner and More Efficient Way To Use Coal

Presented by John Schultes
New Steel International

National Coal Council 2016 Spring Meeting - April 20, 2016

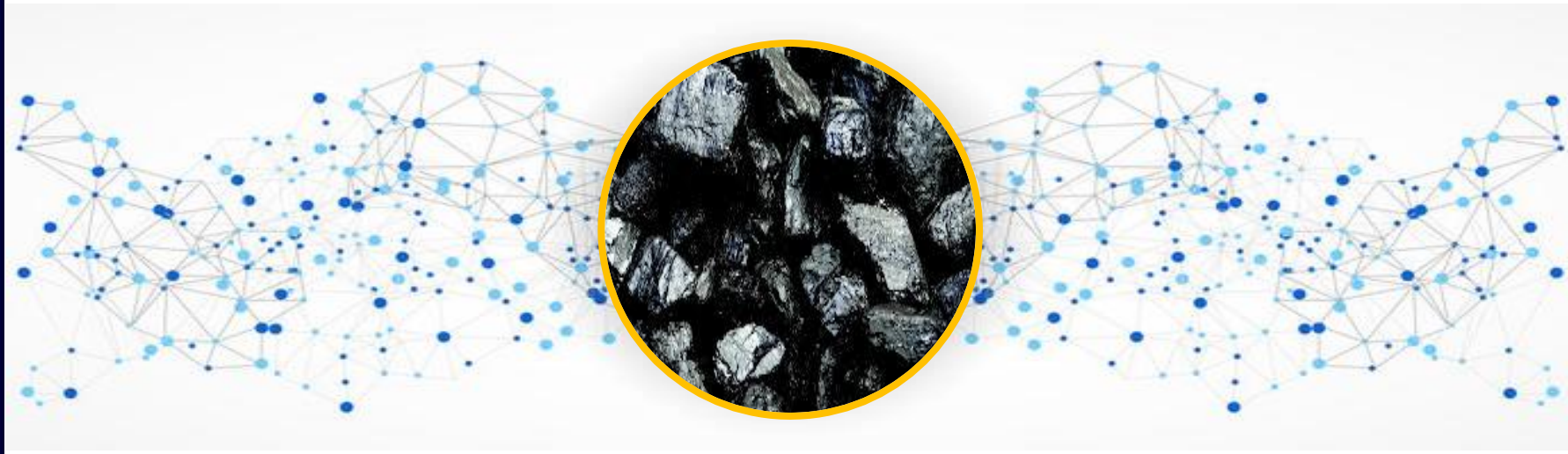
Lack of Better Steel Undermines the U.S. Economy



Bethlehem Steel's Burns Harbor Plant Was the Last World Class Integrated Steel Plant Built in the U.S. – in the Mid 1960's

Connecting The Dots That Others Don't See . . .

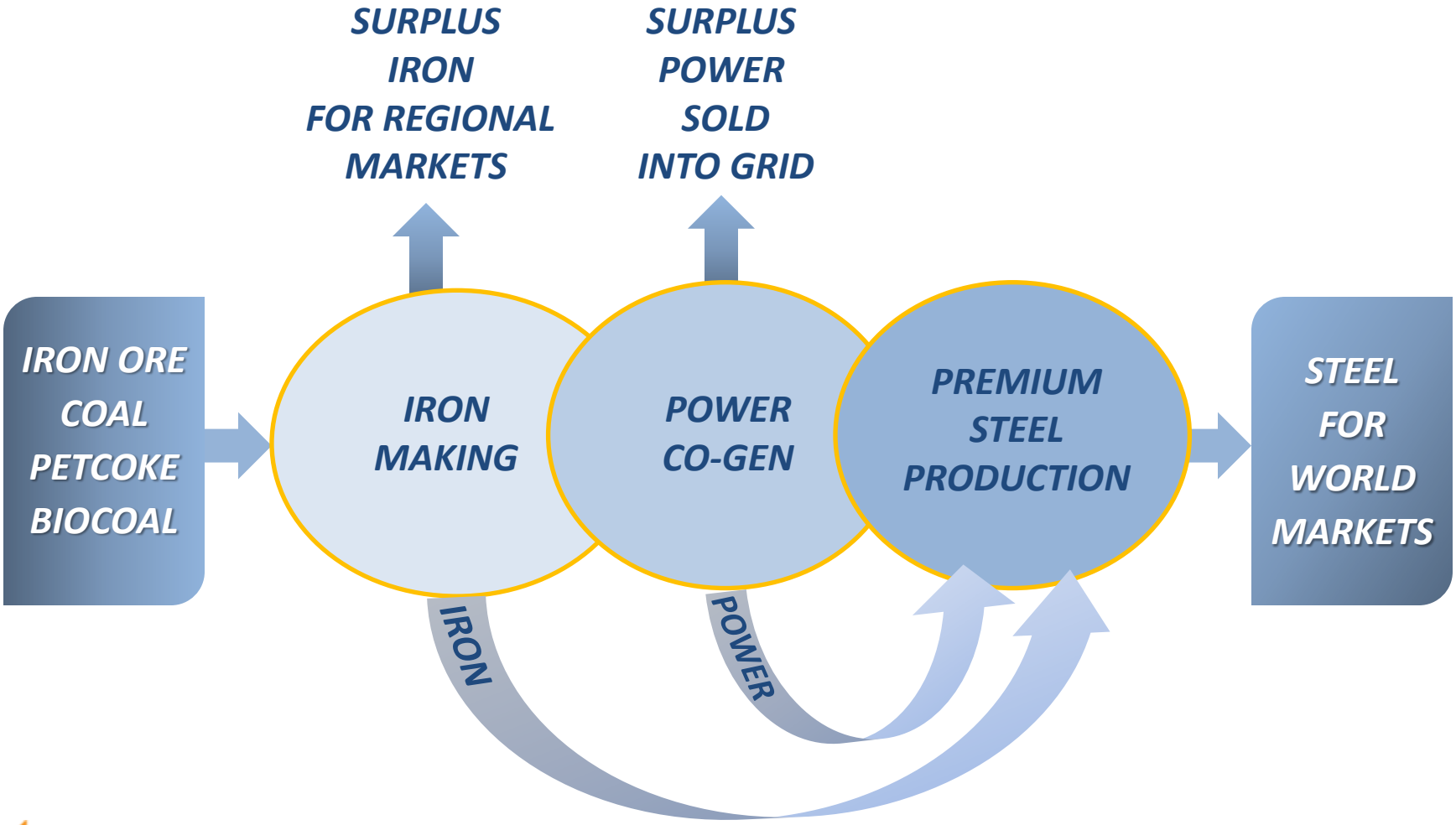
TAKING STEEL AND COAL TO THE NEXT LEVEL



- ***Using COAL Twice – Wasting Nothing***
- ***Producing Vital Materials & Strategic Products***
- ***Generating Clean Electricity***
- ***Restoring Critical Supply Chains***

IPS = Iron + Power + Steel

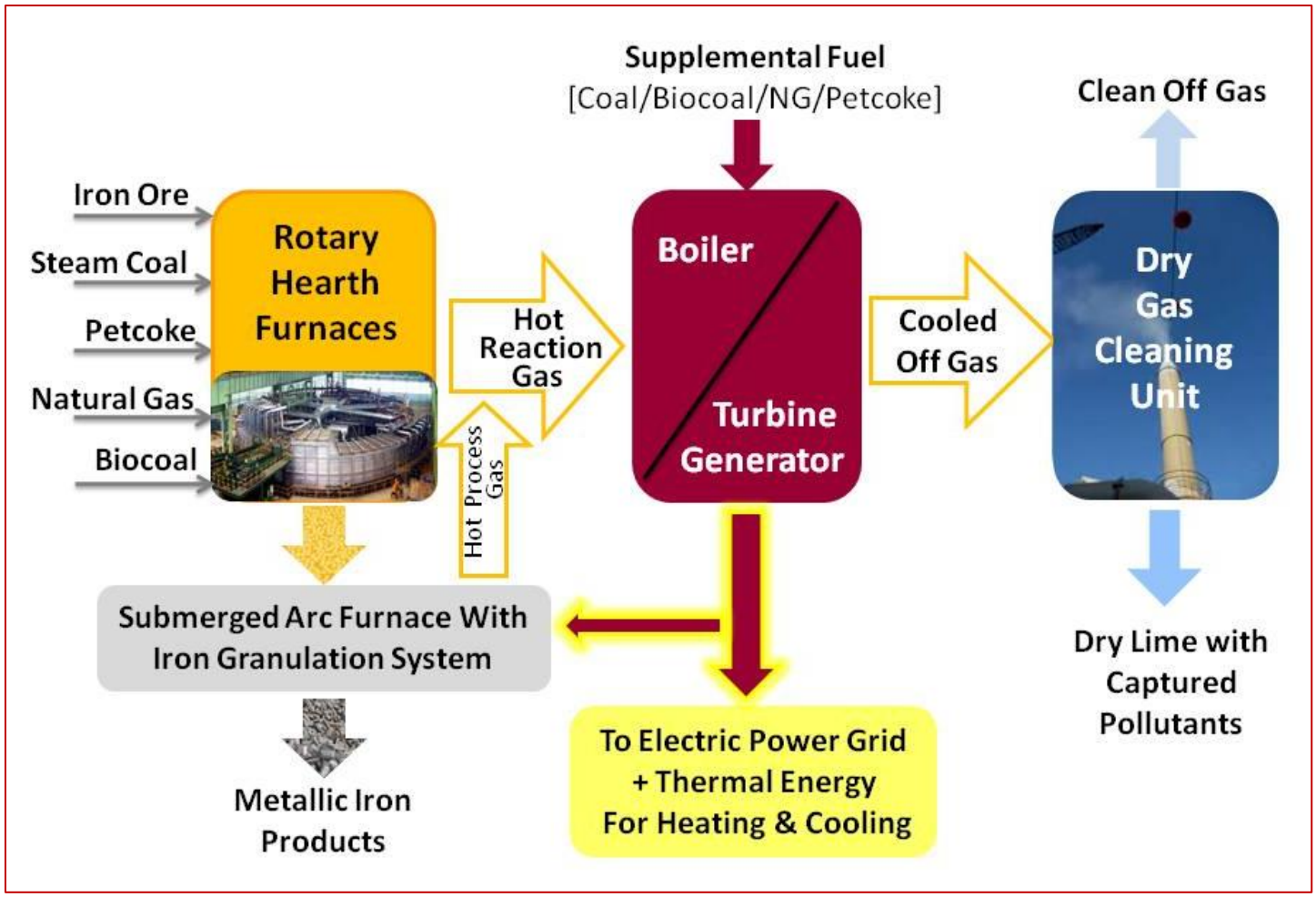
A Unique Combination of Proven & Clean Technologies



Iron Making Cogeneration Plant – "IMCP"

Lowest Cost Production of TWO Critical Products

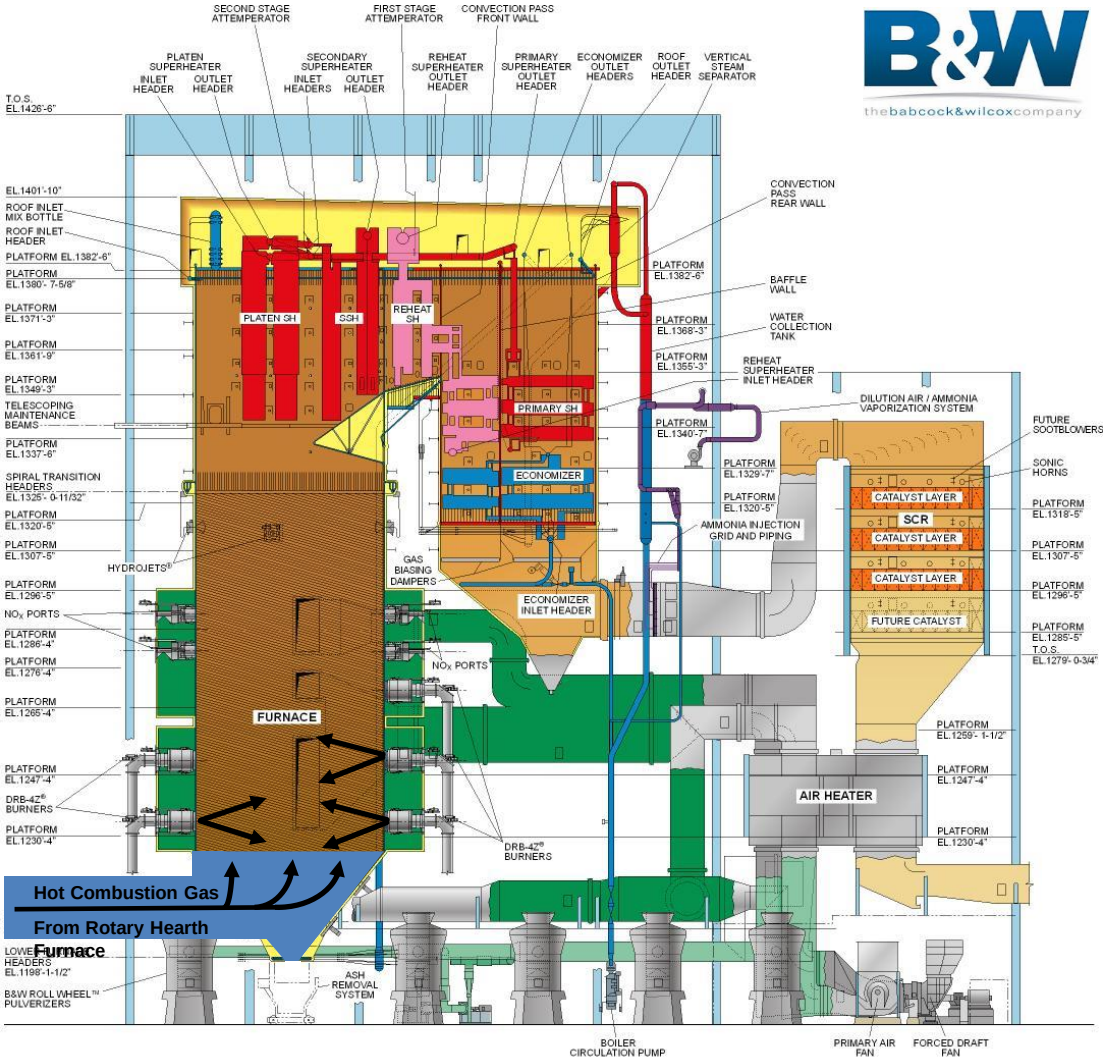
Alternative Iron Units . . . AND . . . Clean Electricity



B&W - 500 MW PC-Fired Supercritical Boiler

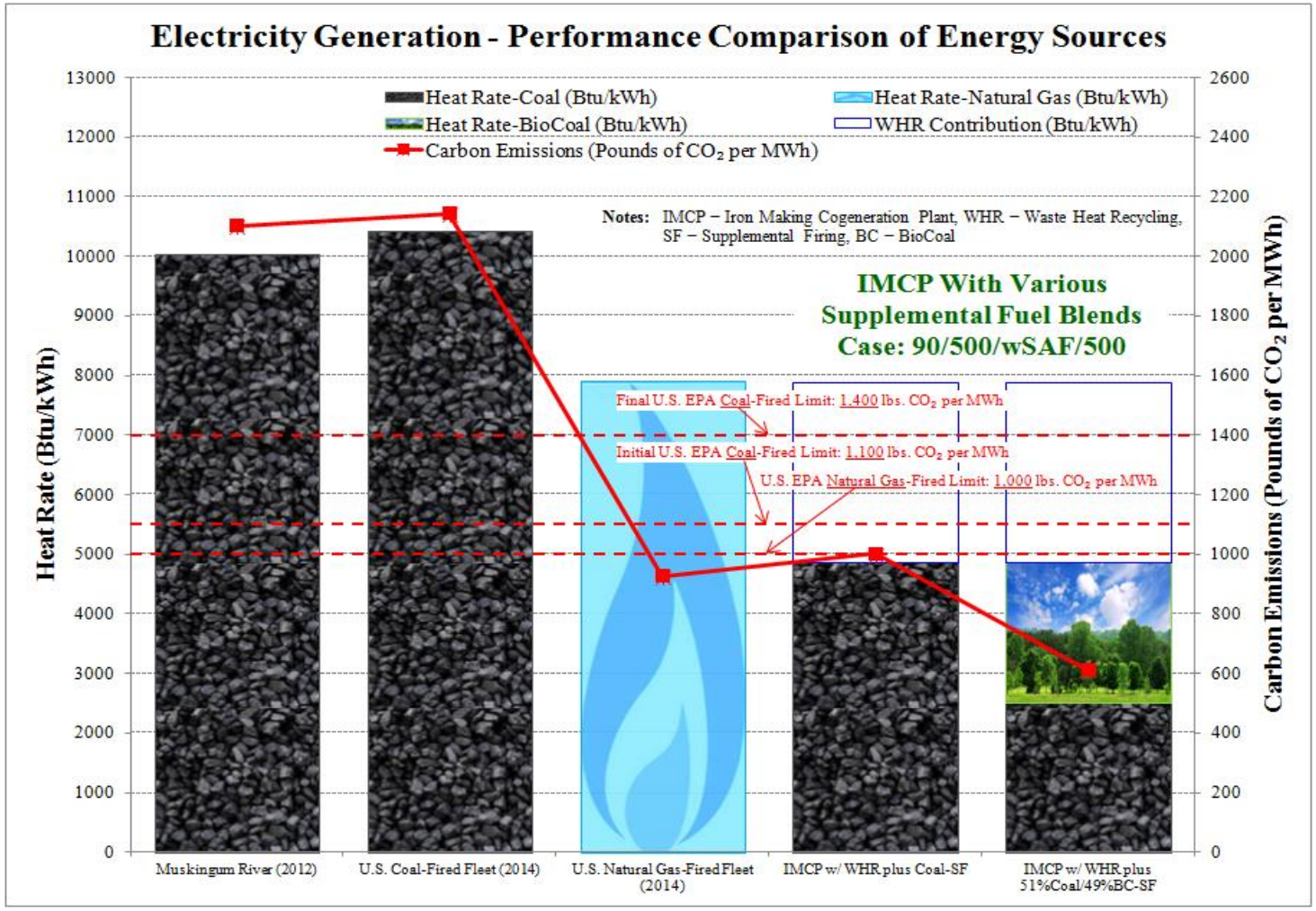
Base Case Operating Conditions:

- *40% of Total Heat Input is from Rotary Hearth Furnace Process Heat*
- *The Boiler is Capable of Full Load Operation w/o Waste Heat from Iron Making Units*
- *Updated Design for 800+MW And Ultra-Supercritical Conditions is Available*

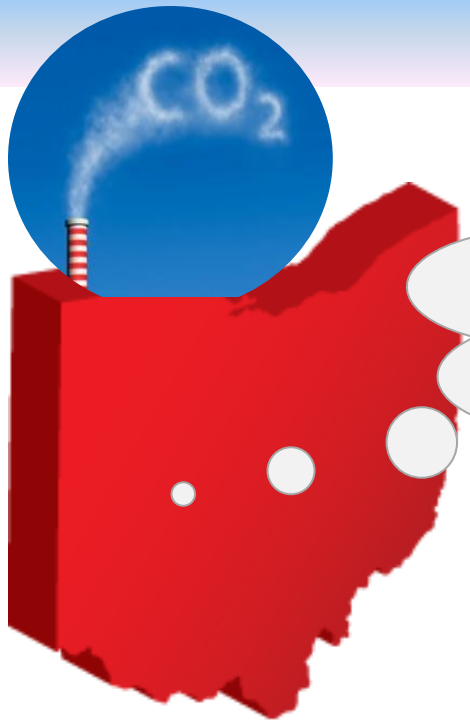


IMCP Performance at 500MW$_g$

Comparison with AEP Muskingum River Plant in Ohio



The Power of Cogeneration



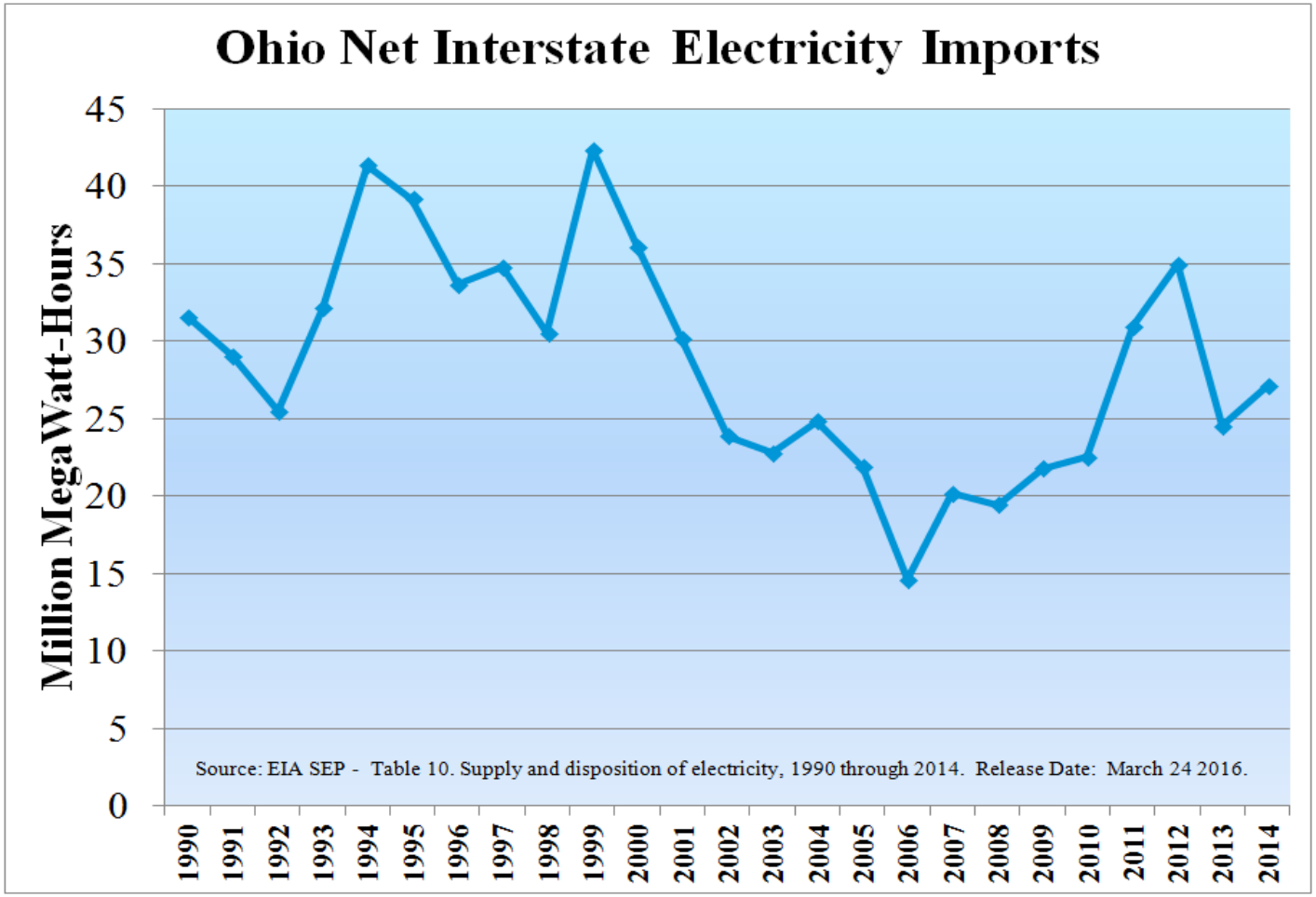
In 2014
Ohio Coal Fired Power Plants Emitted
A Total of
87 Million Metric Tons of CO_2

ONE Iron + Power + Steel Plant
as Planned by New Steel International
Can Avoid the Emission of
55 Million Metric Tons of CO_2 per Year . . . by . . .

- *Producing Breakthrough Products for the Automotive Industry*
- *Maximizing Cogeneration Benefits*
- *Avoiding the Need for Costly Carbon Capture and Sequestration*
- *Complying with Ohio Renewable Energy Standards*
- *AND Creating Thousands of High Paying & Permanent U.S. Jobs*

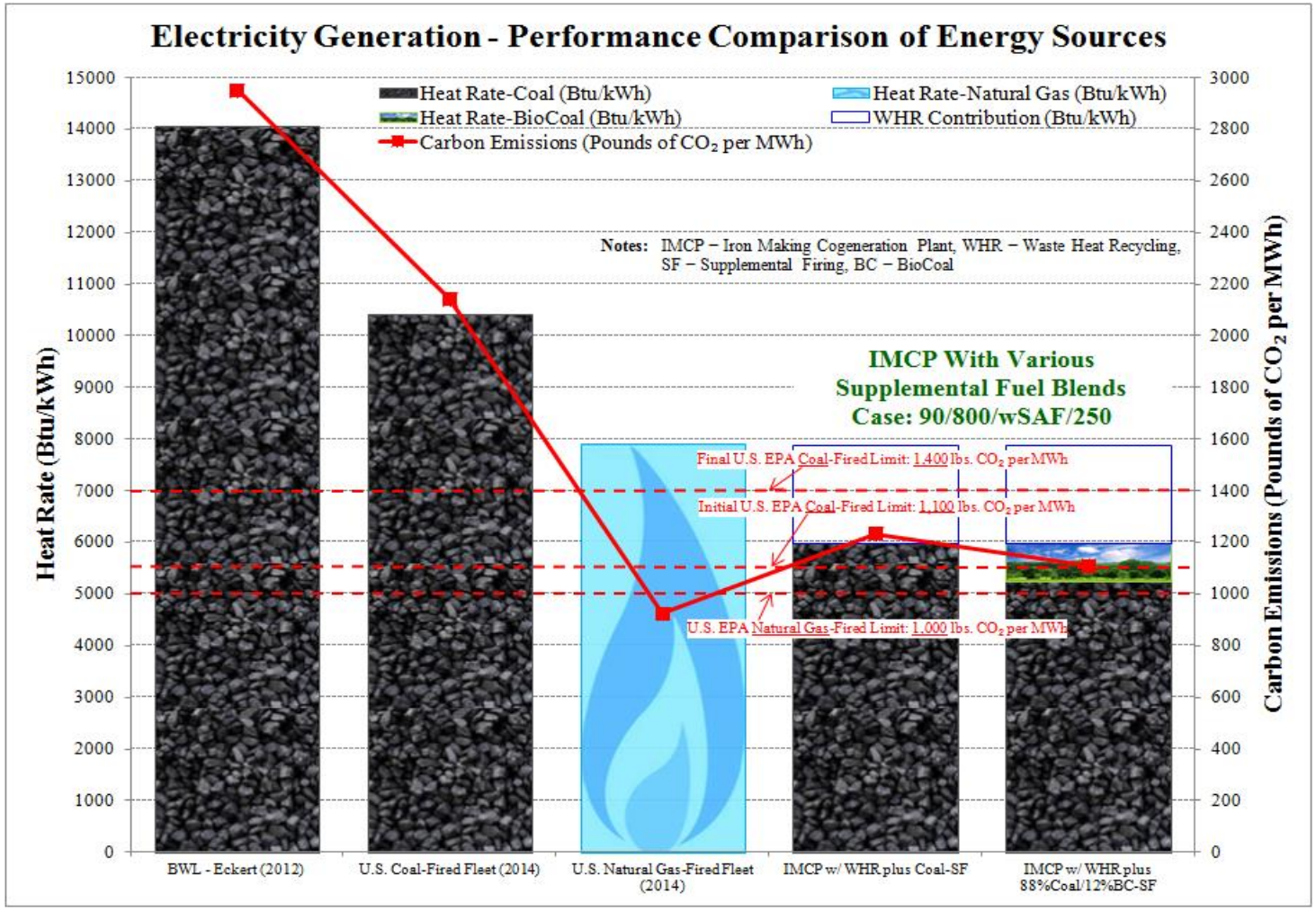
Ohio Needs New Generation Capacity

As Multiple Coal Fired Plants Are Shutting Down

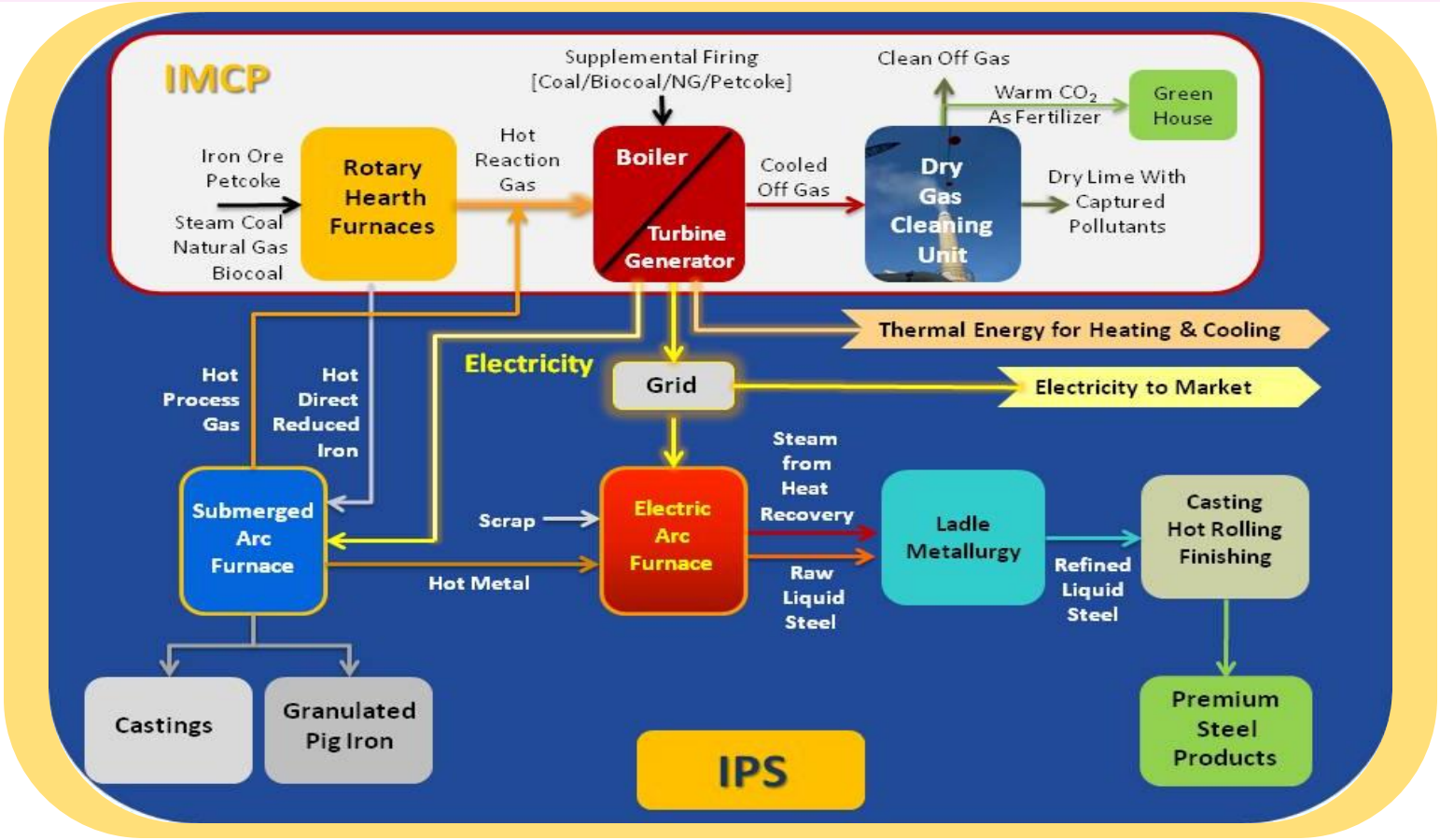


IMCP Performance at 800MW$_g$

Comparison with BWL Eckert Plant – Lansing, Michigan

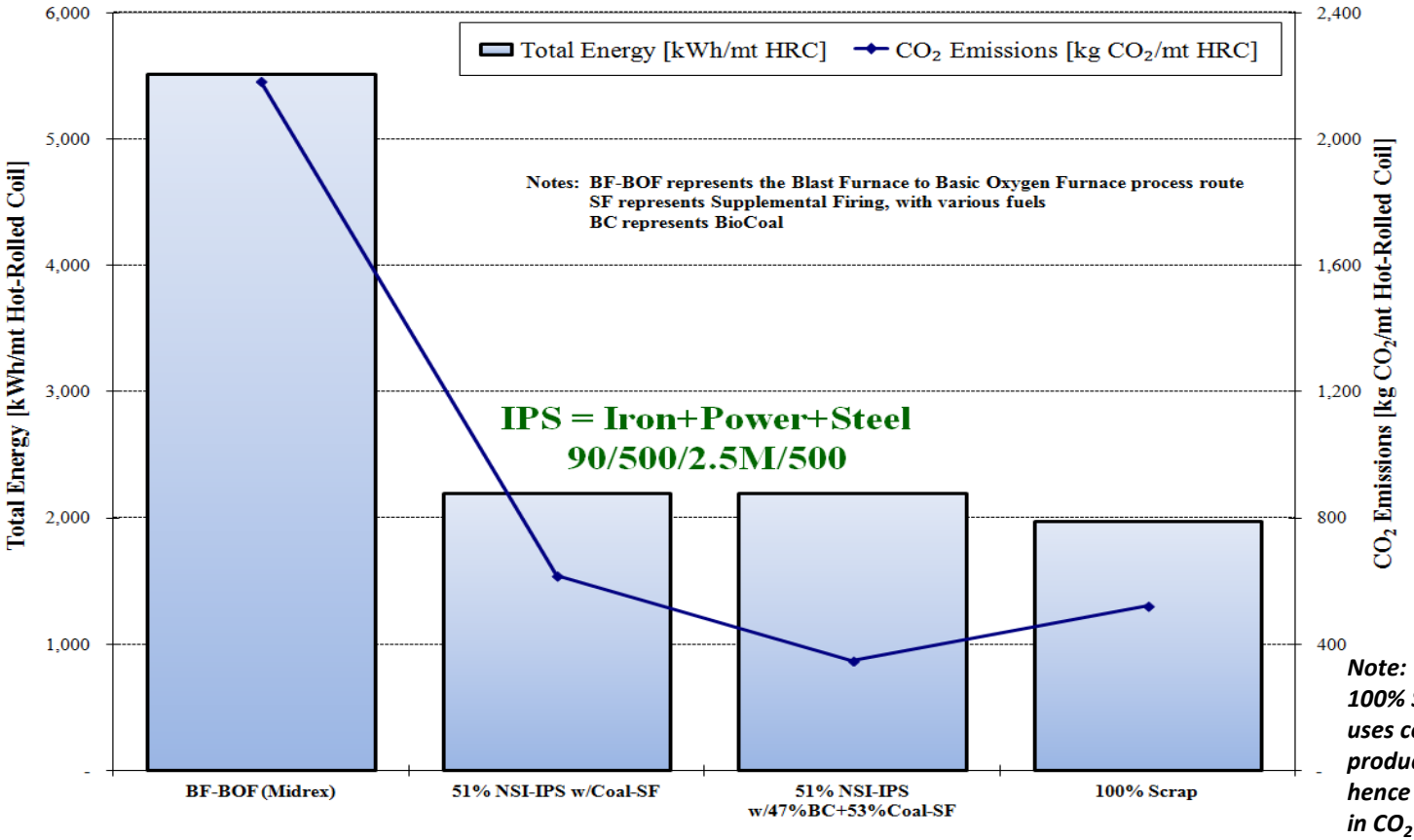


IPS - Iron Making + Power Cogeneration + Steel Making



- *Utilizing IMCP Products - Electricity and Molten Iron Metal*
- *PLUS Advanced Steel Making Technologies*
- *Reduces CO_2 Emissions by Approx. 80% from Current Industry Levels*
- *Producing Premium Quality, World Leading Steel Products*

Rolled Steel . . . Energy & Emissions Comparison



Note:
100% Scrap case uses conventionally produced electricity, hence the increase in CO_2 emissions

Basis for NSI Cases: EAF Production of 2.5M mtpa of Liquid Steel fed by ~1 Unit of NSI's IMCP [2 RHF's producing 0.72M mtpa HB-DRI each], IPS includes 500MW Gross Supercritical Power.
Sources: U.S. Dept. of Energy, Midrex "FUTURE GREEN STEELMAKING TECHNOLOGIES" study, EIA, Andritz, B&W, iWoodFuels, Siemens, SMS group, NSI+Hatch.

The Use of Advanced and Renewable Energy from the IMCP Significantly Improves the Environmental Impact of the Steel Making Operation

The Paris Pledge . . .

PARIS2015 UN CLIMATE CHANGE CONFERENCE COP21·CMP11

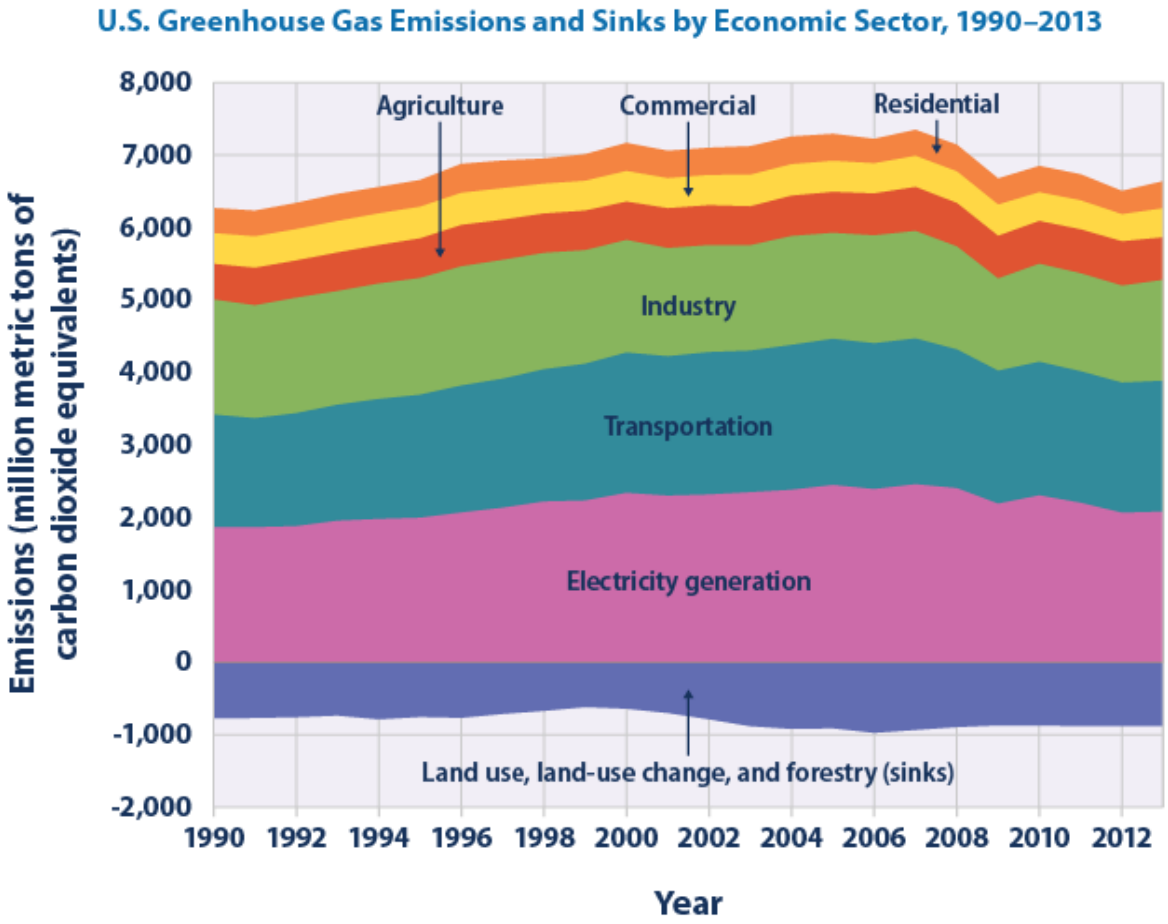
Meeting the Paris Pledge Will Require Additional Action:

Reducing emissions 26-28% below the 2005 levels by 2025 will not be possible through current and planned policies alone. Even under the most effective policy implementation and optimistic technology and forest sink scenarios, we expect US emissions to be 23% below 2005 levels that year - leaving a ***220-350 million metric ton gap****. While the US still has nearly a decade to put additional policy in place, it will need to do so relatively quickly for the impact to be felt by the time the 2025 pledge comes due . . .*

Source: Taking Stock: Progress Toward Meeting US Climate Goals; The Rhodium Group; Jan 2016

. . . Investment in a Series of IMCP & IPS Plants Plus Related CCS Investments Will Greatly Help to Close This Gap . . .

IPS Impacts Multiple Emissions Sources . . .



Data source: U.S. EPA (U.S. Environmental Protection Agency). 2015. Inventory of U.S. greenhouse gas emissions and sinks: 1990–2013. EPA 430-R-15-004. www.epa.gov/climatechange/ghgemissions/usinventoryreport.html.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climatechange/indicators.

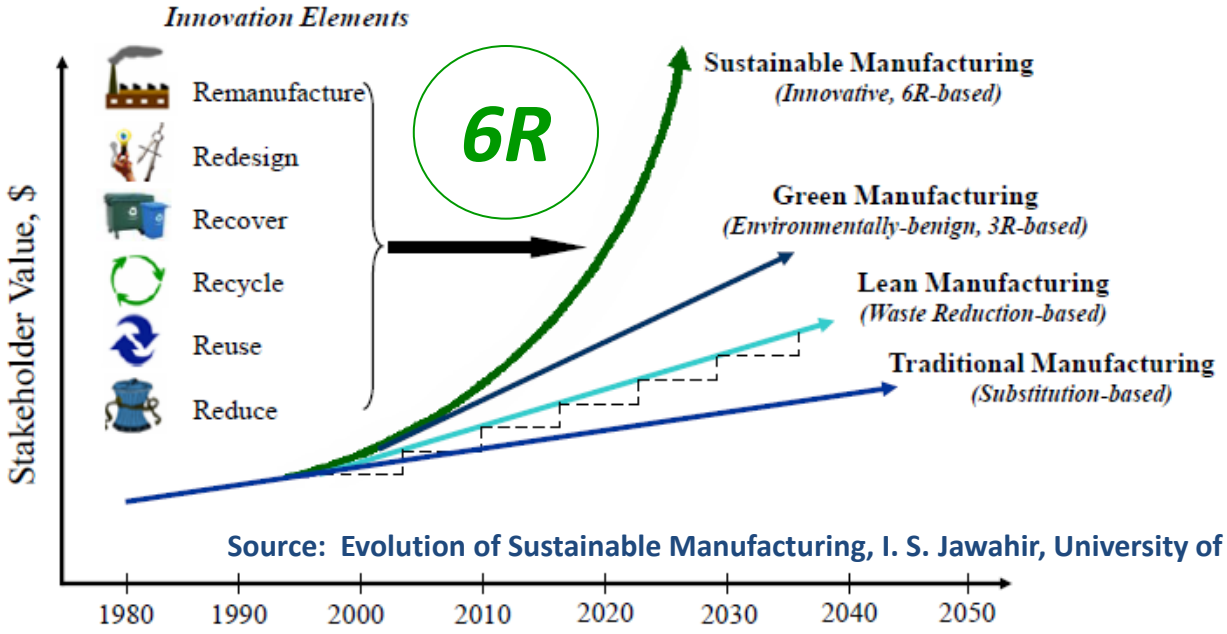
Through . . .

- *Use of Biomass & Biocoal*
- *Energy & Resource Efficiency*
- *Light Weighting & Fuel Efficiency*
- *Heat Recovery, CHP & Emissions Reduction*
- *CO_2 as Fertilizer in Greenhouses*

Plus Significant Benefits from Distributed Generation and Demand Response Capabilities

IPS is Setting New Standards by . . .

. . . Enabling 6R Based Sustainable Manufacturing



Source: Evolution of Sustainable Manufacturing, I. S. Jawahir, University of Kentucky

***R**educing Emissions In Every Production Step*

***R**ecycling Materials*

***R**ecovering Energy*

***R**eusing By-Products*

*Enabling the **R**edesign and **R**emanufacture of Products*

Thank you!

Questions / Comments: Please Contact
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