worldsteel ASSOCIATION

ENERGY USE IN THE STEEL INDUSTRY

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Overview

- Global Steel Industry Overview
- Energy use in the steel industry

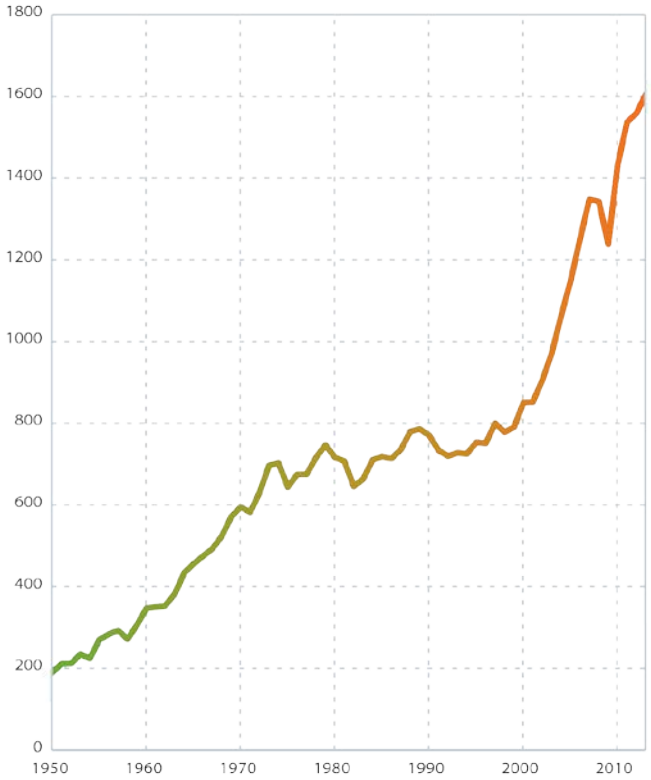
  - aims, goals & status

  - methodology & web based tool

  - analysis results

The iron and steel industry – *where are we*

- Total world crude steel production in 2013: 1 606 Mt
- Energy costs represent around 20 to 25 % of the total input of steel producers and is one of the most important items to manage by steel producers
- Coking coal accounts for more than 65% of primary source of energy



Average Energy Intensity: BF-BOF 18.68 GJ / $t_{CS,}$

Average CO_2 Intensity: 1.77 t CO_2 / t_{CS}

Operational production proportion

BF / BOF: 69.6% EAF: 29.3 %

OHF: 1.1%

Energy use in the steel industry

Project objectives and background

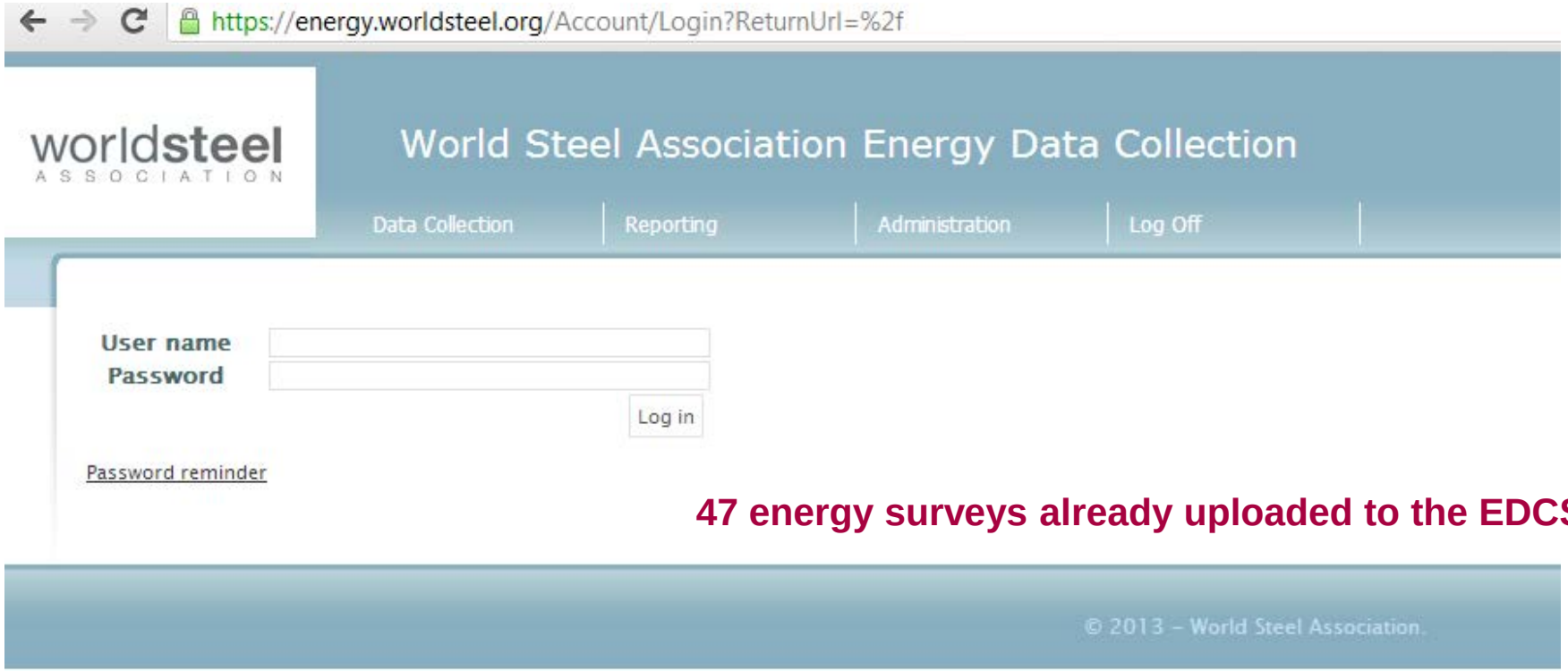
- Enable steel producers to:
  - Make a fair comparison of their own energy consumption with a standard reference plant and with their peers on a site and facility basis
  - Identify the performance gap between their own performance, the reference and peers on a site and facility level
  - Monitor their trend of improvement of their energy performance taking into account all key factors, e.g. process production level, raw material selection, technologies etc.
  - Provide a online web based tool for the worldsteel members to measure their performance on an annual or ad-hoc basis.
  - Evaluate technologies and forecast potential improvements based on practical performance levels.

The study covers these facilities or plant types

- Sintering
- Pelletizing
- Direct Reduced Iron
- Coking
- Iron making (BF)
- BOF
- EAF
- Continuous Casting
- Hot Rolling Mill
- Air Separation Unit
- Power Plant
- Flares

GJ / t of Crude Steel / Cast Steel or process Product
or / and
GJ / t of HR Coil

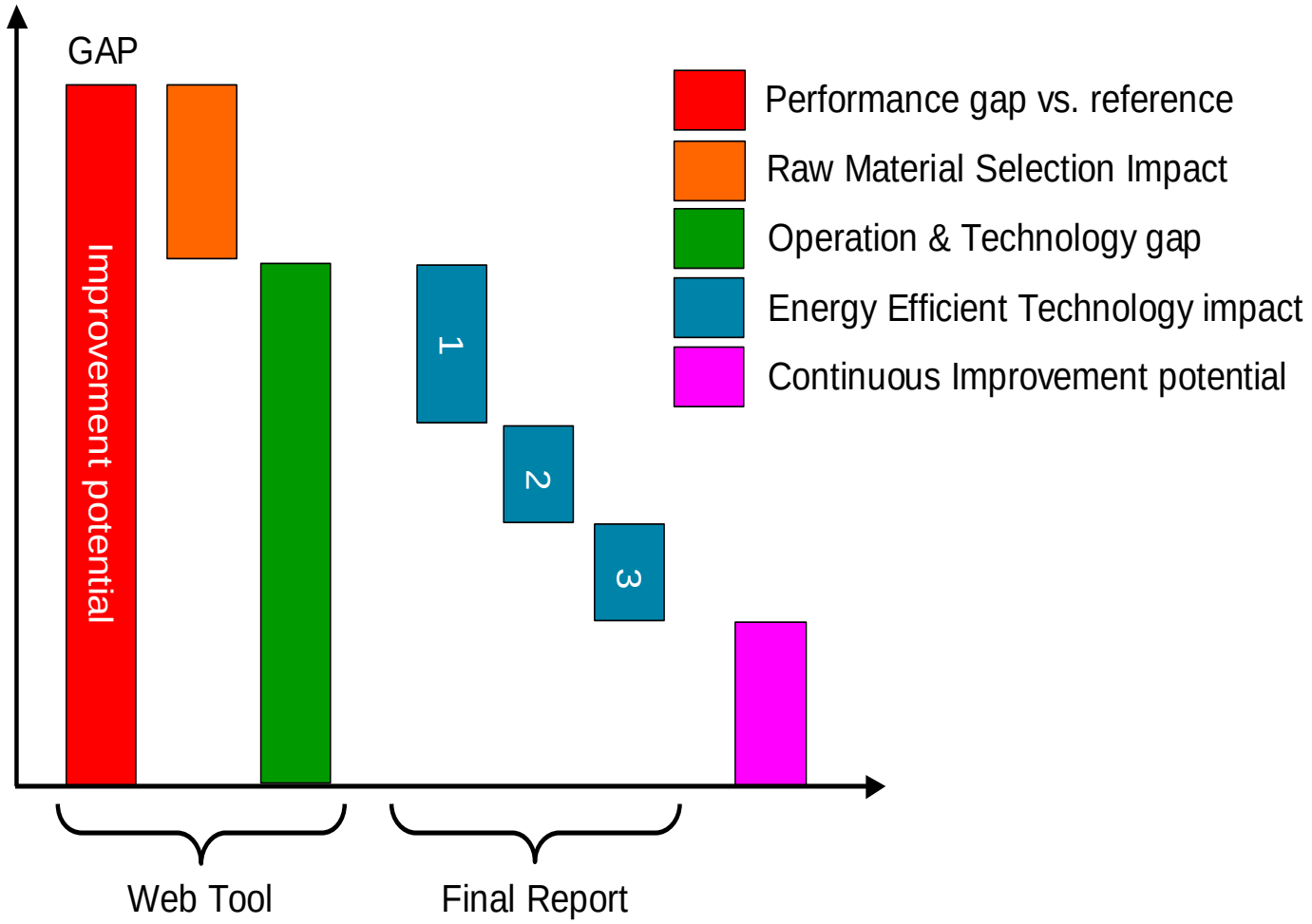
Energy Data Collection System (V2)



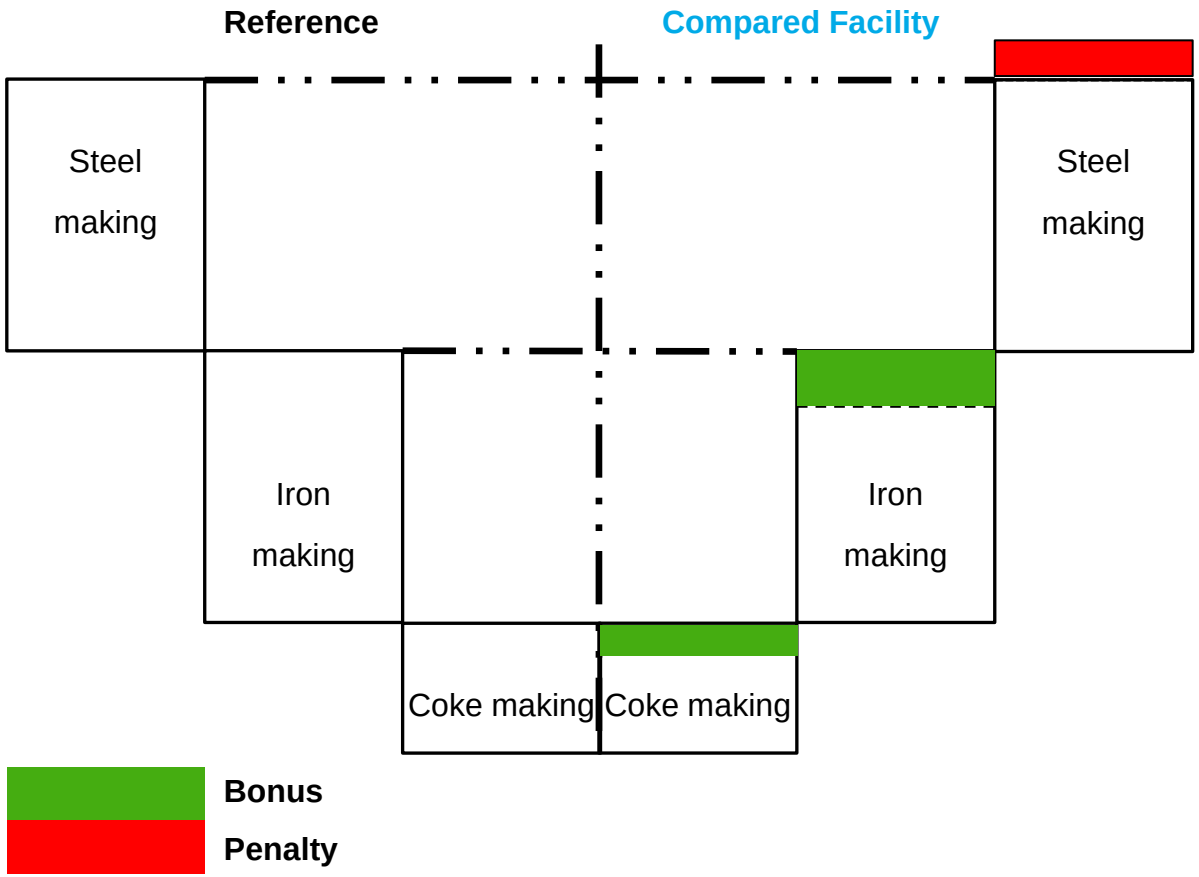
47 energy surveys already uploaded to the EDCS

- Database developed in 4 languages
- Standard safety data store
- Multilevel data entry (administrator and user entry)
- 1 system used for 4 worldsteel projects *(Safety, Energy, CO_2 data collection and Maintenance & Reliability)*
- Allow to entry for more users at the same time

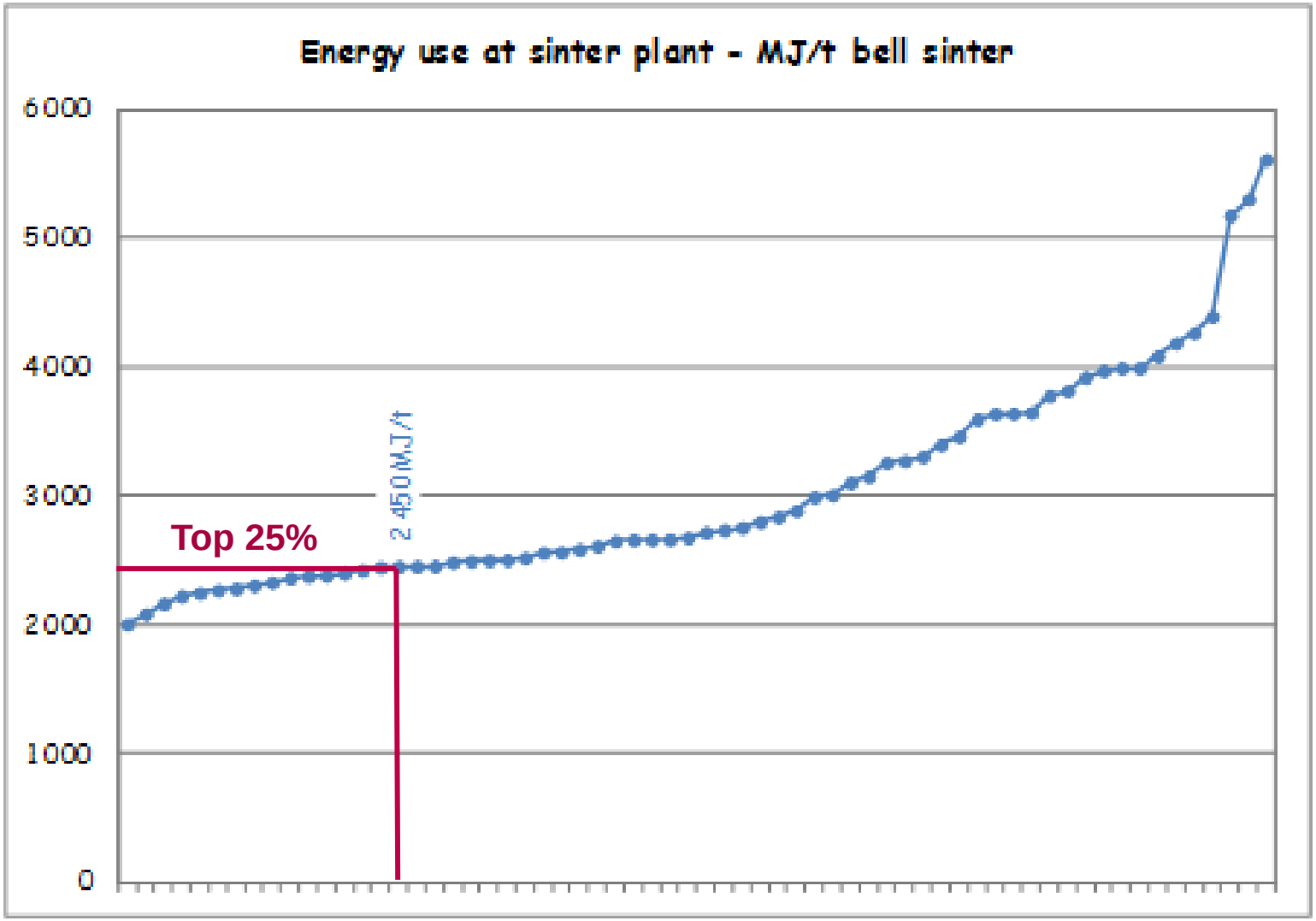
Gap analysis within the energy use project



Principle of performance assessment for multi-step production routes



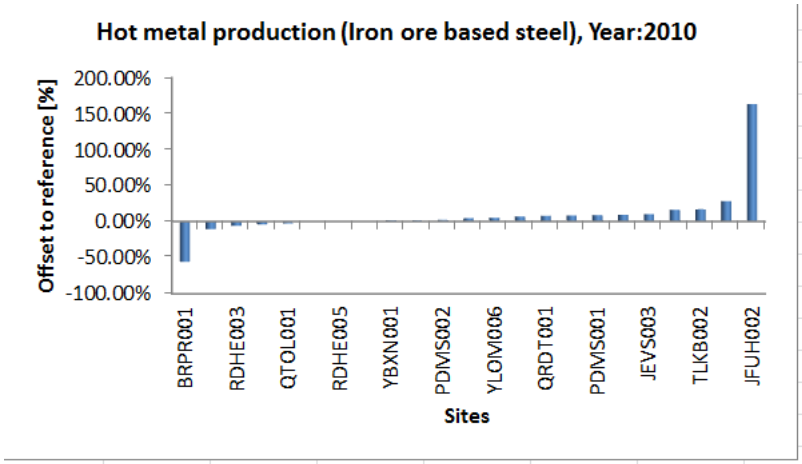
Example of an energy intensity analysis for a sinter plant

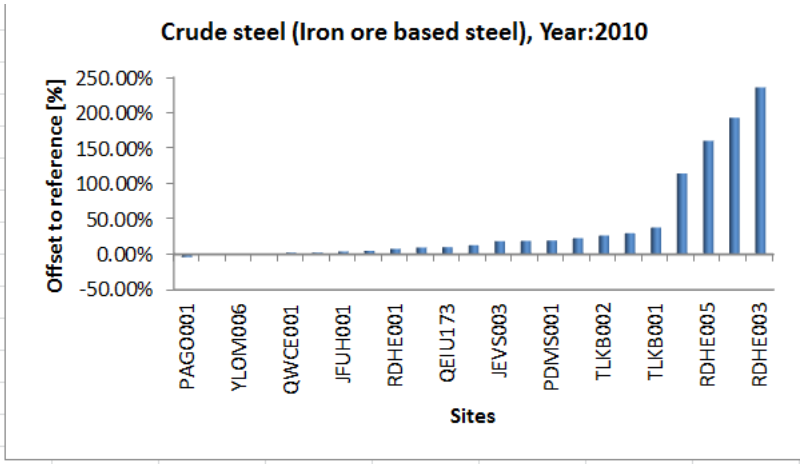


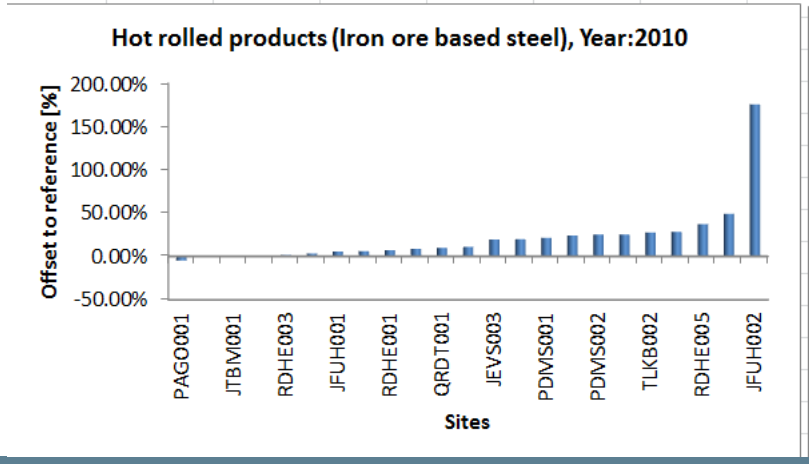
The project team decided to set the reference at the top 25% of performance of the plants.

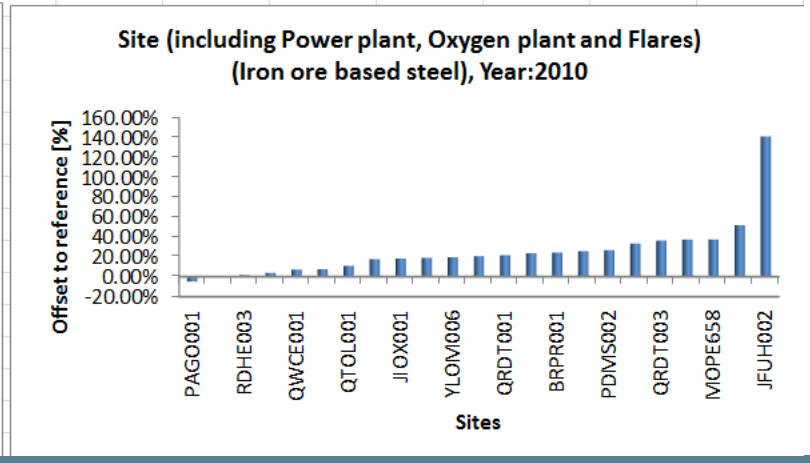
Roll up Methodology of energy intensity assessment

1	Roll-up Primary Metal level	Sinter Plant + Coke Oven Plant + ….. + BF Plant
2	Roll-up Crude Steel level	(1 + Steel Shop)
3	Roll-up Hot Rolled level	(2 + Hot Rolling Mill)
4	Roll-up site level	(3 + Power Plant + ASU + Flares)

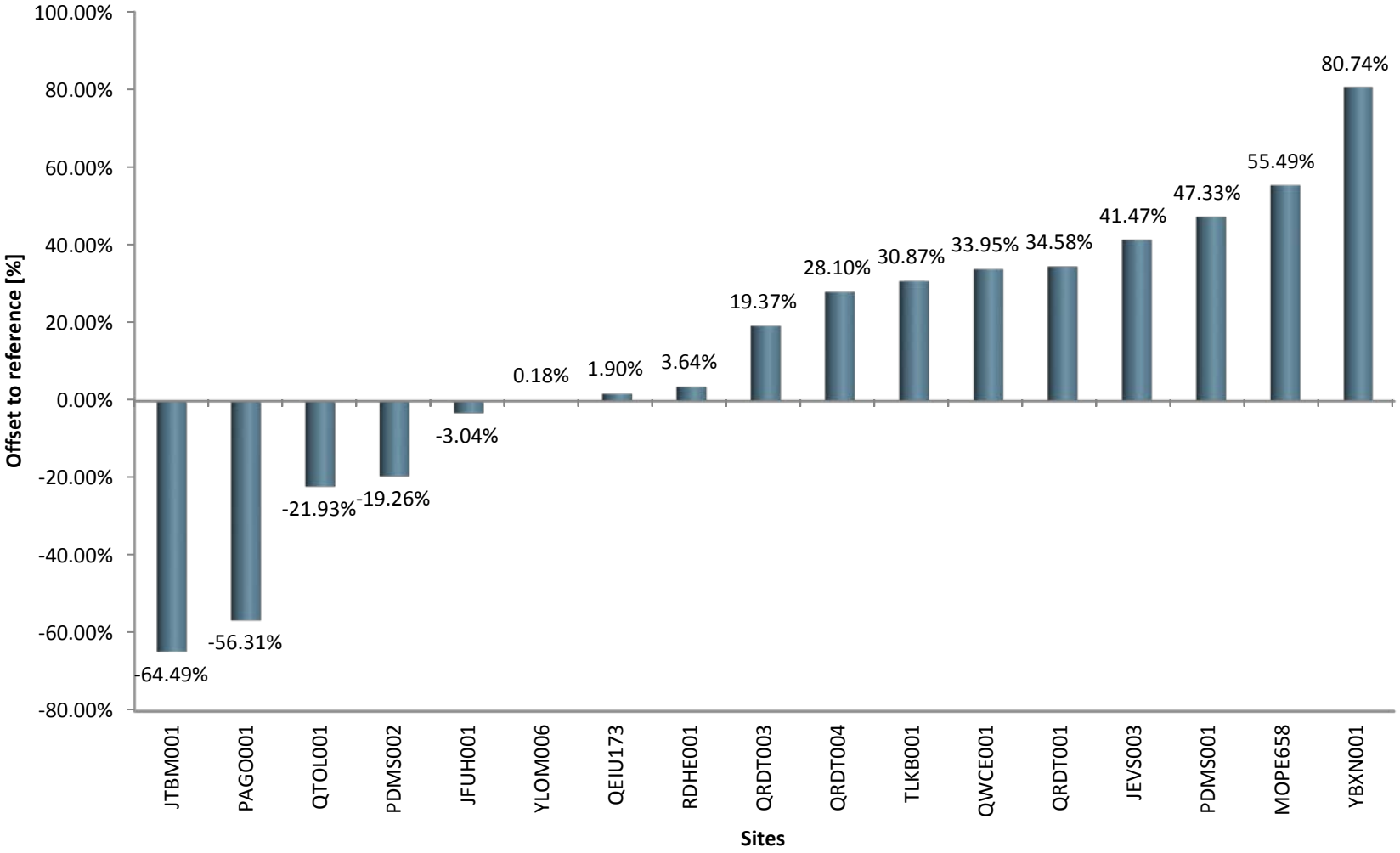




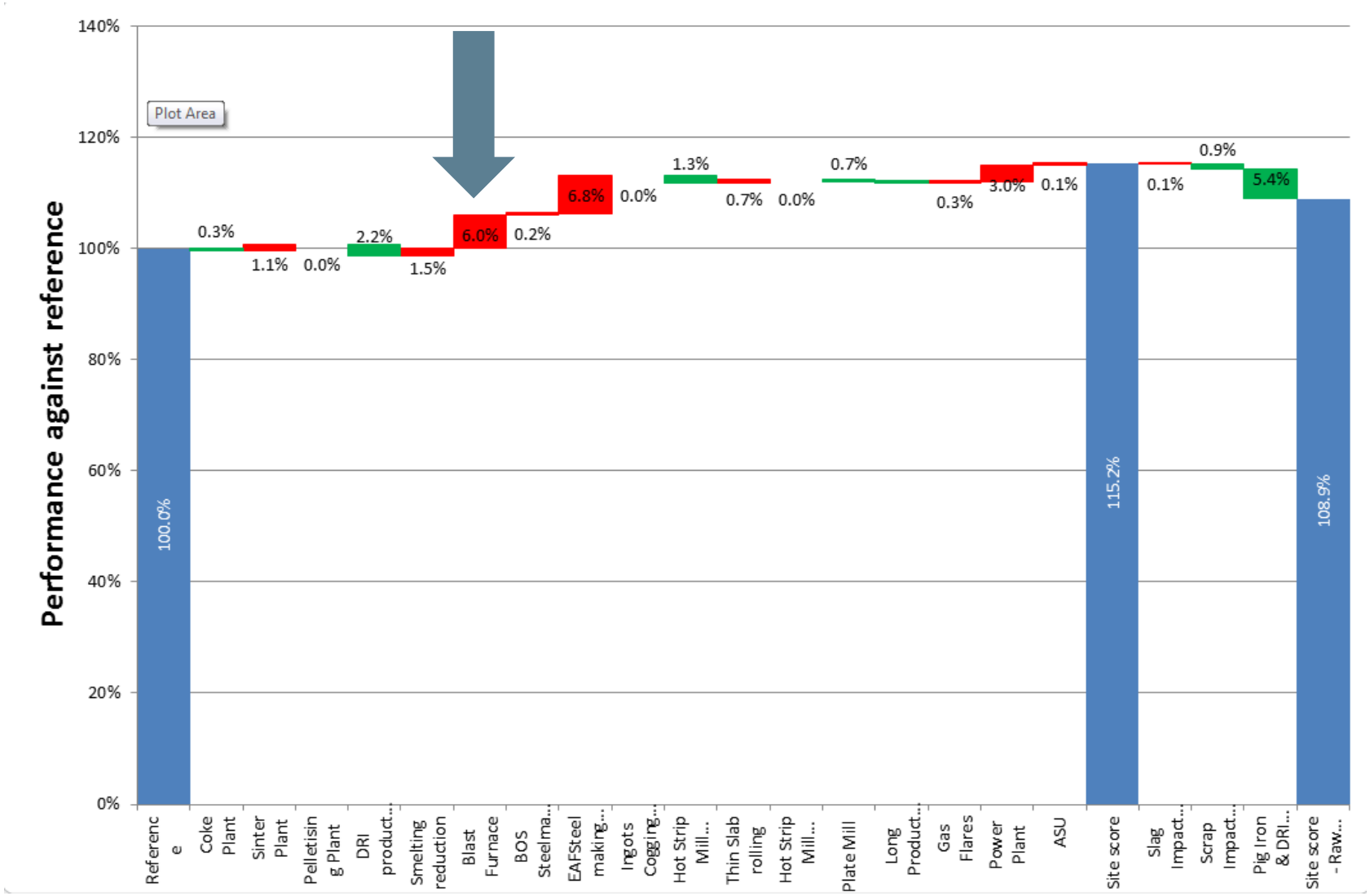




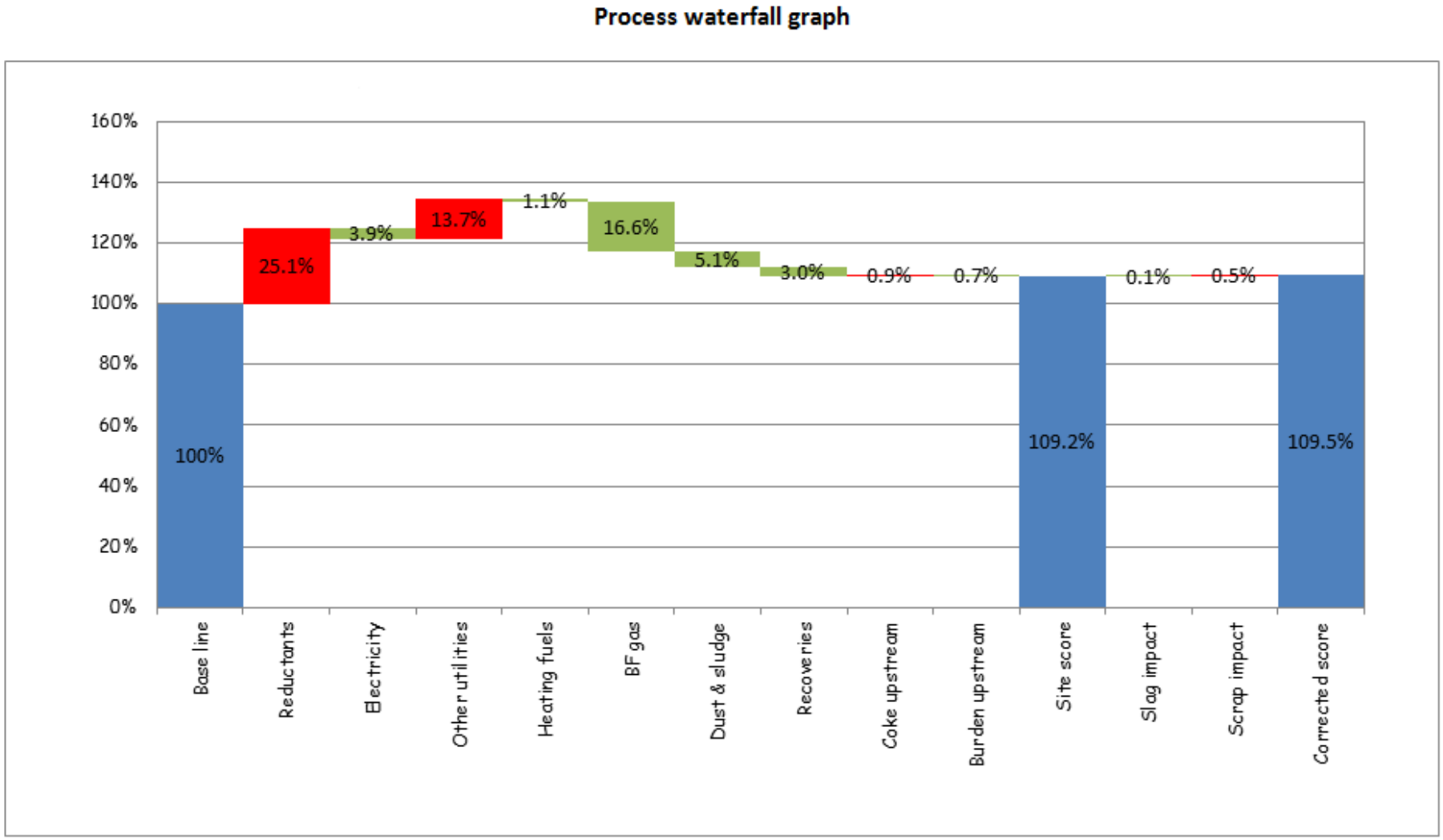
Coke oven plants energy intensity comparison with worldsteel reference



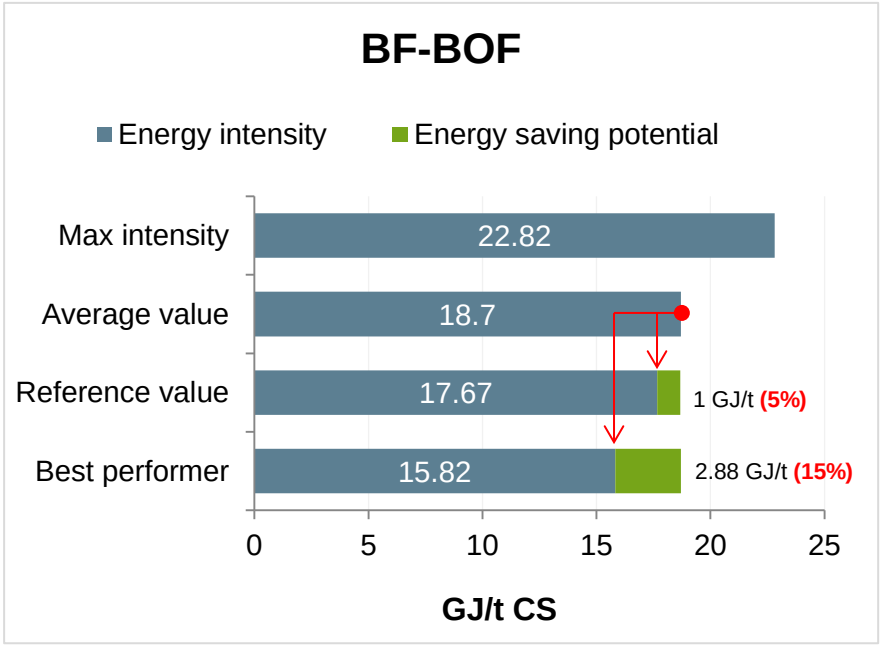
Analyzed site waterfall graph

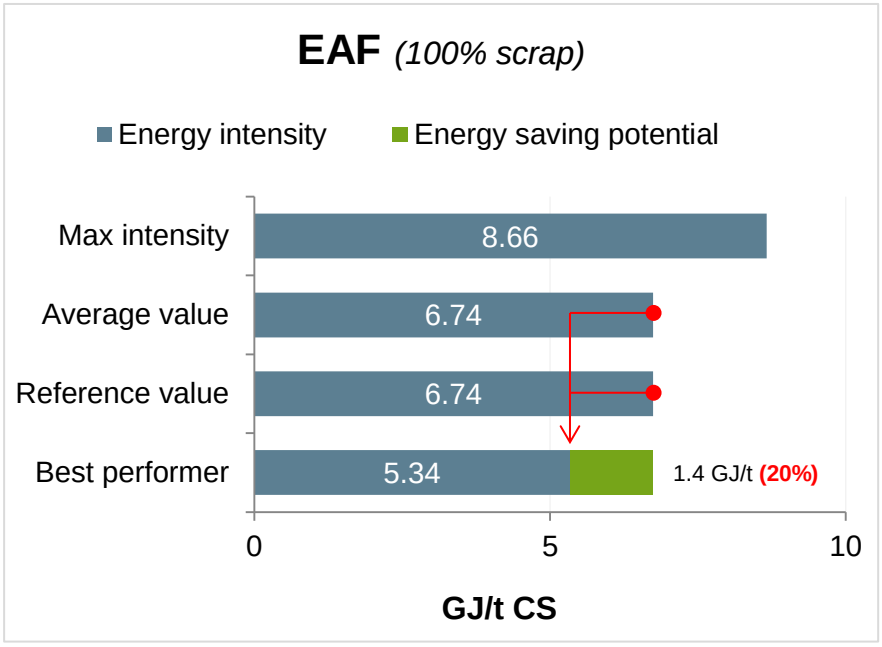


BF plant – process waterfall graph



Energy intensity saving potential from participating plants





Thank you for your attention, Questions????.

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