Sustainable BF process

Tata Steel Netherlands

ICGSI 2024 Jamshedpur – Mark Hattink

Together we make the difference

Agenda

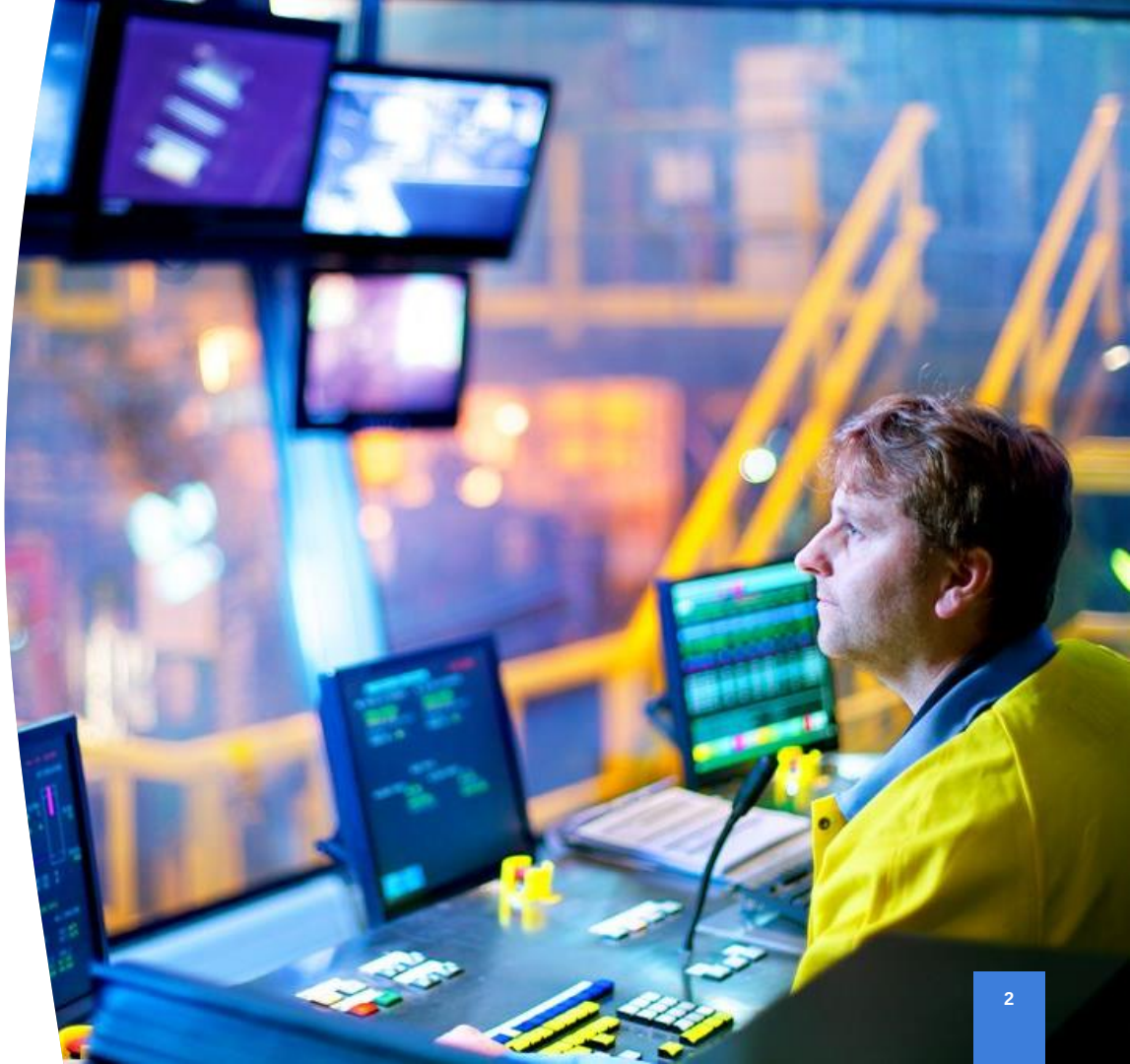
Sustainability mission

Decarbonisation route TSN 2030

Green ironmaking today

- Examples

Final remarks



TATA STEEL

TATA

Clean

Green

Circular

Leadership principles

Connect

Change

Care

Themes

People & Society

Environment & Community

Decarbonisation & Sustainability

Customers & Value

Purpose

Why we are on the journey

Improving how people around the world work, live and move, through sustainable steel

Mission

The route we follow

To continue to play a meaningful role for all our stakeholders as a clean, green, circular steel company that creates value, is an employer of choice, and maintains an ongoing dialogue with our neighbours

Vision

What we expect to find when we arrive

A clean, green and circular steel company that is sustainable in every sense

Clean, green and circular

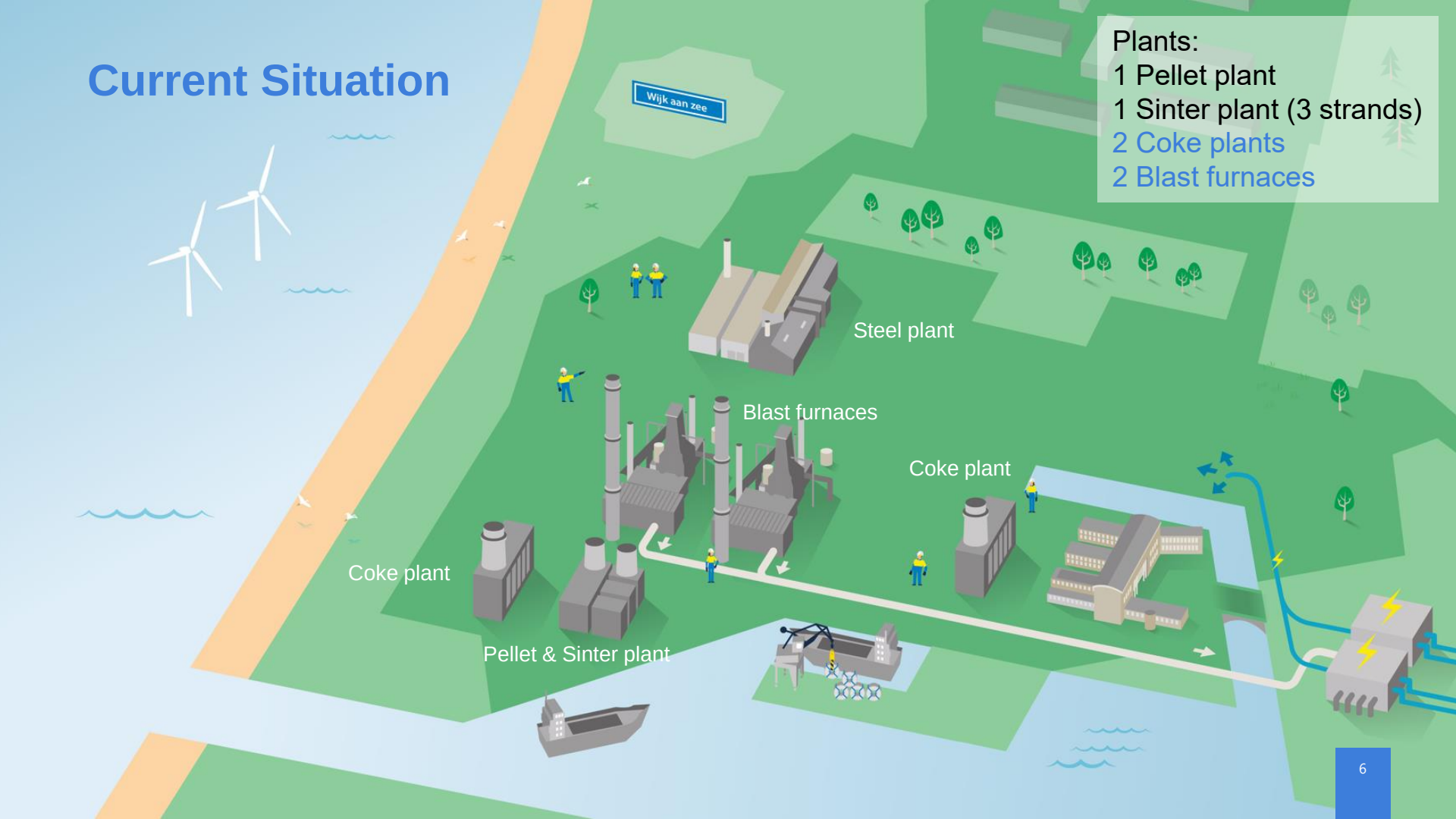
What does this mean effectively?

- **Clean:** the reduction of fine dust emissions by roofing a large part of our raw materials required for green steel.
- **Green:** 40% less CO_2 emissions by 2030 = CO_2 footprint of 385.000 Dutch citizens a year. CO_2 neutral in 2045
- **Circular:** The use of scrap will be increased from 17% to 30% from 2030 onwards

Green iron & steelmaking

- Reduction of CO_2 emissions
- In EU: Emission Trading System (ETS)
  - Reducing free allowances in future years
  - Increasing trading prices in last years
- Encourages CO_2 reduction measures
- TSN top 3 in CO_2 benchmark (Worldsteel benchmark 2021)
  - Includes scope 1,2,3 emissions
  - Combination of process improvements and route choices of all plants on integrated site, incl. BF ironmaking

Current Situation



Plants:
1 Pellet plant
1 Sinter plant (3 strands)
2 Coke plants
2 Blast furnaces

Decarbonisation 1st phase 2030

Plants:
1 Pellet plant
1 Sinter plant
1 Coke plant
1 Blast furnace
1 DRI plant
1 Electric furnace

Sustainable Blast Furnace ironmaking

“Short term” sustainability:

- Currently (up to 2030):
  - 2 Blast Furnaces
- After 2030 (up to 2nd phase):
  - 1 Blast Furnace

- Besides step change in 2030: continuous focus on CO_2 reduction in BF route

- Limited investments in BF route
  - Capex required “long term” decarbonisation
- ETS: CO_2 large contributor in steel production costs

Blast Furnace CO_2 reduction:

- Improve efficiency: Less carbon input

- Reduce coke rate: Overall less coal requirement

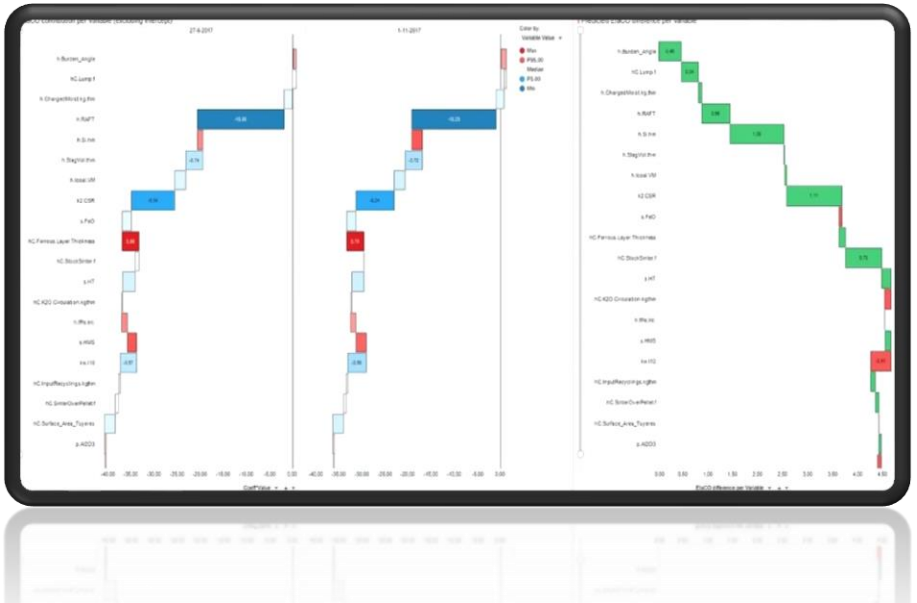
- Optimise productivity

- Increase scrap input

BF efficiency improvements

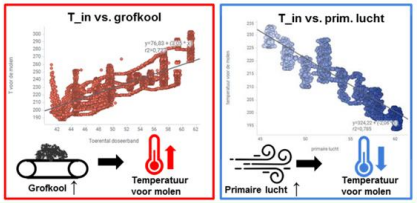
- Using Advanced Analytics models to better understand the impact of input materials and process settings
  - AA model Top Gas Utilisation
  - AA model Furnace Resistance

- Increase Hot Blast temperature (stove optimisation)
- Improve burden distribution
- Optimise process settings
- Maximise own agglomerates
- Etc.

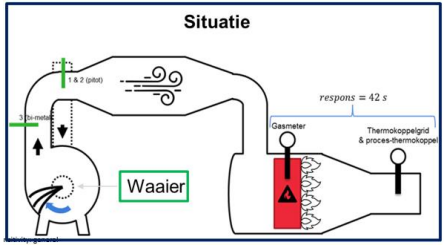


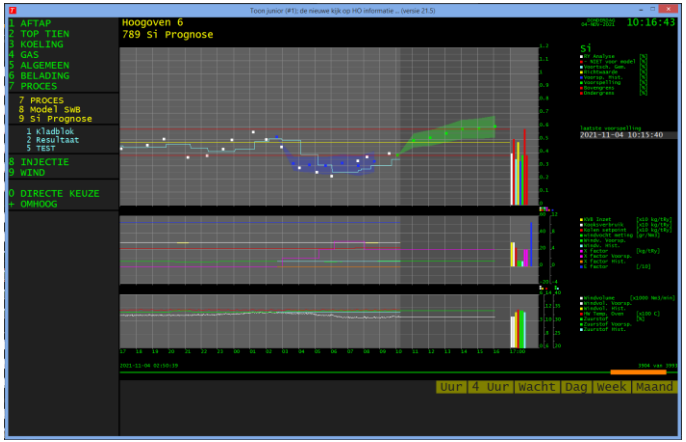
Coke rate reduction

- Increase coal injection (enabler for increasing coal):
  - Debottleneck coal grinding
    - Less moisture in raw coal
    - Less stops / reliability (e.g. better control of screening)
    - Increase throughput (temperature control, increase drying air flow, automation)
  - Improve [Si] (thermal) control (enabler for reducing coke rate):
    - AA model in control room
  - Continuous improvement in process stability
    - Process settings
    - Raw material quality
    - Slag properties



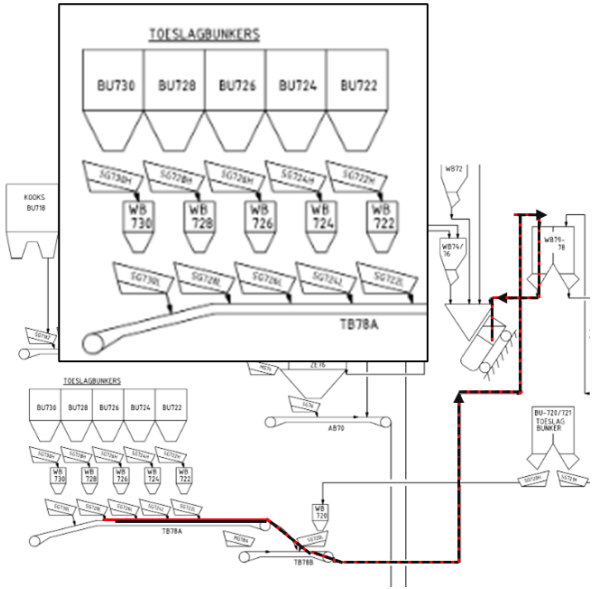
Per 1000 Nm³/h beschikbare primaire lucht extra kan de grofkool doorvoer worden verhoogd met 0,66 ton/h.





BF trial scrap charging (1)

- Material selection and evaluation suitable for current installation (conveyor belts, stockhouse, skip and BF top)
- Trial done with 200 tonnes shredded scrap (size 15-100 mm)



BF trial scrap charging (2)

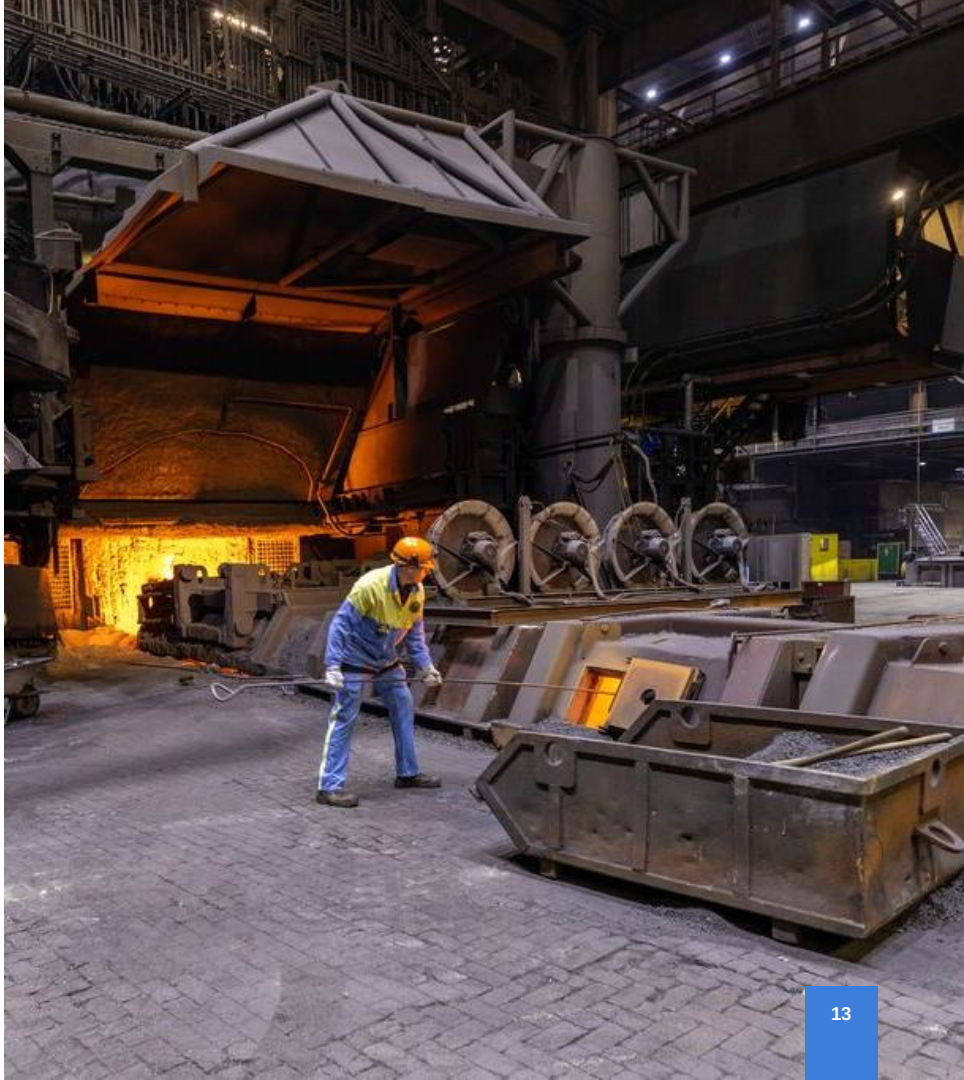
- Trial successful
- Points of attention for further trials:
  - Potential damages on belts
  - Spark formation
  - Blockages due to larger pieces (see picture)
  - Noise (also focus by authorities)
  - HM quality at higher scrap rates

- However, first priority maximising scrap usage in steel plant
  - E.g. increase HM temperature by improved torpedo insulation and logistics

Final remark

- Just some examples of “sustainable” ironmaking
- Numerous other projects within the current route
  - E.g. Biomass, emission reduction, dust control, etc.

- Maintain focus on continous improvements in stability and efficiency



Thank you!