## Simplified 2009 UK Iron and Steel Industry Energy Flows

### Energy Vector Label Magnitude Category in DUKES

<table>
<thead>
<tr>
<th>Energy Vector</th>
<th>Label</th>
<th>Magnitude</th>
<th>Category in DUKES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>1</td>
<td>4.9 Mt</td>
<td>Coke manufacture</td>
</tr>
<tr>
<td>Coal</td>
<td>2</td>
<td>0.9 Mt</td>
<td>Blast furnaces</td>
</tr>
<tr>
<td>CO Gas</td>
<td>3</td>
<td>8.0 TWh</td>
<td>Production</td>
</tr>
<tr>
<td>CO Gas</td>
<td>4</td>
<td>3.9 TWh</td>
<td>Coke manufacture</td>
</tr>
<tr>
<td>CO Gas</td>
<td>5</td>
<td>0.6 TWh</td>
<td>Blast furnaces</td>
</tr>
<tr>
<td>CO Gas</td>
<td>6</td>
<td>3.5 TWh</td>
<td>Auto-generators, heat generation, iron and steel</td>
</tr>
<tr>
<td>CO Gas</td>
<td>7</td>
<td>0.11 TWh</td>
<td>Losses</td>
</tr>
<tr>
<td>CO Gas</td>
<td>8</td>
<td>3.0 TWh</td>
<td>Auto-generators, heat generation</td>
</tr>
<tr>
<td>CO Gas</td>
<td>9</td>
<td>0.5 TWh</td>
<td>Iron and steel</td>
</tr>
<tr>
<td>CO Gas</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO Gas</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BF Gas</td>
<td>12</td>
<td>11.4 TWh</td>
<td>Production</td>
</tr>
<tr>
<td>BF Gas</td>
<td>13</td>
<td>3.2 TWh</td>
<td>Blast furnaces</td>
</tr>
<tr>
<td>BF Gas</td>
<td>14</td>
<td>0.4 TWh</td>
<td>Iron and steel</td>
</tr>
<tr>
<td>BF Gas</td>
<td>15</td>
<td>0.5 TWh</td>
<td>Auto-generators, heat generation</td>
</tr>
<tr>
<td>BF Gas</td>
<td>16</td>
<td>0.5 TWh</td>
<td>Coke manufacture</td>
</tr>
<tr>
<td>BF Gas</td>
<td>17</td>
<td>0.7 TWh</td>
<td>Losses</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>18</td>
<td>5.0 TWh</td>
<td>Iron and steel</td>
</tr>
<tr>
<td>Electricity</td>
<td>19</td>
<td>3.6 TWh</td>
<td>Iron and steel</td>
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</tbody>
</table>

*Purchased electricity is utilised at numerous facilities and adds to the self-generated supply. 21.
Introducing Tata Steel in Europe

Together we make the difference
Tata Group
One of the world’s fastest-growing and most reputable corporations

- Spans 7 major industry sectors
- Operations in more than 80 countries and 450,000 employees
- Total revenues $100 billion (58% from outside India)
- Ranked world’s 11th most reputable and 17th most innovative company
- Tata Sons 66% owned by philanthropic trusts
- £170 million invested in community projects last year
The materials sector contributes 28% of Tata Group revenues
Tata Steel Group
One of the world’s most geographically-diversified steel producers

Tata Steel Group
- Top 12 global steel producer
- Annual crude steel capacity of more than 29 million tonnes
- Around 80,000 employees
- Manufacturing operations in 26 countries across 4 continents
- Present in both mature and developing markets
- Turnover in 2012-13: £24.82 billion
- Fortune 500 company
Tata Steel Group
A global network serving demanding markets worldwide
Tata Steel in Europe

Tata Steel’s European assets

- 4 steelmaking sites
- 31 downstream manufacturing locations including electrical, plated and pre finished steels, tubes
- 33 distribution and service centres and 3 joint venture operations
- 15 countries with sales office presence
- 6 businesses manufacturing products for building systems
An integrated, customer-centric steel supplier
Our market sector-focused approach

Our customers

Market sector teams and distribution network
- Automotive
- Construction
- Lifting & excavating
- Packaging
- Energy & power
- Rail
- Industry strip & long

Integrated supply chain

Manufacturing operations
- Strip Mainland Europe
- Strip UK
- Long EU
- Downstream
Long Products

Together we make the difference
Long Products

Overview

- Producer of steel for global markets
- Manufacturing sites in the UK and France
- Capacity to produce around five million tonnes of product per year
- Approximately 5,500 employees
- A proud and strong heritage

Carbon steels

- Slabs, blooms, billets
- Channels, joists, beams, angles
- Plates
- Wire rod
- Bar
- Rail
- Special profiles
Long Products manufacturing sites

<table>
<thead>
<tr>
<th>Facility</th>
<th>Description</th>
<th>Indicative operating capacity (kt/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scunthorpe</td>
<td>Steelmaking, plates, sections, wire rod, billets, rail</td>
<td>4500</td>
</tr>
<tr>
<td></td>
<td>Scunthorpe Rail and Section Mill Areas 1 and 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scunthorpe Rail and Section Mill Area 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Functional departments / others</td>
<td></td>
</tr>
<tr>
<td>Teesside</td>
<td>Beam Mill</td>
<td>720</td>
</tr>
<tr>
<td>Dalzell / CB</td>
<td>Plate Mill/Q&amp;T facility</td>
<td>250</td>
</tr>
<tr>
<td>Skinningrove</td>
<td>Special Profiles Mill</td>
<td>250</td>
</tr>
<tr>
<td>Hayange</td>
<td>Rail Mill</td>
<td>300</td>
</tr>
</tbody>
</table>

Other locations include: Immingham, Darlington, Workington, Warrington, St Germain, Manchester, Birmingham
Scunthorpe Operations

Coke ovens
Coke
Coal

Fine ore
Sinter plant
Sinter

Lump ore & pellets

Limestone

Blast Furnace

Hot metal

BOS converter
3x300t LAF
3.8Mtpa capacity

Scrap steel

Secondary steelmaking
2xRH degassers
2.5Mtpa capacity

Pretreat

Continuous casting
4 BFs with capacity of 4.1Mtpa.
3x300t converters
4.5Mtpa capacity

Rolling processes for sections, plates & rods
2 bloom casters
1 billet caster
1 slab caster
4.5Mtpa capacity

Steel scrap

Hot metal

BOS converter

Pretreat

Secondary steelmaking

3x 300t LAF
3.8Mtpa capacity

3x 300t LAF
3.8Mtpa capacity

4.5Mtpa capacity

3x 300t converters
4.5Mtpa capacity

2xRH degassers
2.5Mtpa capacity
Strip Products UK

Together we make the difference
Strip Products UK overview

- Producer of strip steel for UK and European markets
- Manufacturing sites in Port Talbot and Newport South Wales
- Capacity to produce 4.8 million tonnes of product per year
- Approximately 4,900 employees
- Annual turnover of £1.7 billion
- Iron and steel production, hot rolling, cold rolling and galvanising facilities
A brief history

- 1837 Port Talbot opened – named after Principal Sponsor of the dock, Christopher Talbot of Margam
- 1923 First expansion completed – known as “Margam Works”
- 1967 British Steel formation – Nationalisation of 14 steel companies (peaked at 250,000 employees)
- 1988 Privatisation
- 1999 Merger of British Steel and Koninklijke Hoogovens to form Corus
- 2005 Cultural Change Programme – The Journey - begins
- 2007 Tata acquires Corus
- 2008 Worldwide economic crisis leads to Llanwern Hot Mill and Blast Furnace 4 mothballing
- 2009 Blast Furnace 4 and Hot Mill re-start
- 2010 £185M investment to rebuild Blast Furnace 4 announced (2012)
- 2010 Corus changes to Tata Steel
- 2013 BF4 rebuild complete and fully commissioned
## Major facilities – Port Talbot

<table>
<thead>
<tr>
<th>Facilities</th>
<th>Equipment</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Handling</td>
<td>Deep water harbour</td>
<td>3 grab loaders / 160kt max vessel capacity</td>
</tr>
<tr>
<td>Iron making</td>
<td>• Coke ovens</td>
<td>• 1 battery containing 84 ovens</td>
</tr>
<tr>
<td></td>
<td>• Sinter plant</td>
<td>• 1 Lurgi, 344m² strand</td>
</tr>
<tr>
<td></td>
<td>• Blast Furnaces</td>
<td>• 2 (No’s 4&amp;5) 10.8m hearth diameter (4.7Mt)</td>
</tr>
<tr>
<td>Steel making</td>
<td>• Steel converters</td>
<td>• 2 Basic Oxygen Convertors (330t each)</td>
</tr>
<tr>
<td></td>
<td>• Secondary metallurgy units</td>
<td>• 2 vacuum degassers, 2 secondary steelmaking</td>
</tr>
<tr>
<td></td>
<td>• Slab casters</td>
<td>• 2 double strand and 1 split mould twin casters</td>
</tr>
<tr>
<td>Rolling</td>
<td>• Hot Strip Mill</td>
<td>• 2 walking beam furnaces, 1 reversing rougher and 7 finishing stands (3500kt)</td>
</tr>
<tr>
<td></td>
<td>• Cold Mill</td>
<td>• 1 continuous pickle line linked to a 5-stand cold reduction mill</td>
</tr>
<tr>
<td></td>
<td>• CAPL</td>
<td>• 1 continuous annealing processing line</td>
</tr>
</tbody>
</table>
Heat Sources
11 Bar Steam Layout

Centralised Heat Recovery Investment Strategy

- Coke Ovens
- Steel & Slab
- Briquetting
- BLAST FURNACE
- Service Boilers
- New Steam Turbine
- Cooling Tower
- Condenser
- CAPL
- Cold Mill
- Hot Mill
- HRP
- Sinter Plant Waste Heat
- Stoves Waste Heat
- Waste Heat Stoves
- Centralised Heat Recovery Investment Strategy
- Any Extra??
- Main Powerplant

INPUT
- 60 TPH – 40-60tph BOS Plant
- 20 TPH – Service Boilers

OUTPUT
- 20tph = 2.5 MWe
- 40tph = 6.0 MWe
- 60tph = 10.4 MWe
- 100tph = 18.7 MWe

Extra 20tph
Will be reassessed as the 'new powerplant' scheme is developed
11 Bar Steam Layout

- Coke Ovens
- Steel & Slab
- Cold Mill
- Hot Mill
- Service Boilers
- New Steam Turbine
- Blasting Furnace
- Main Powerplant
- CAPL
- Offices
- Bay Heating
- Low Grade Waste Heat

INPUT
- 60 TPH – 40-60tph BOS Plant
- 20 TPH – Service Boilers

OUTPUT
- 20tph = 2.5 MWe
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Extra 20tph will be reassessed as the 'new powerplant' scheme is developed.
Tata Steel in IJmuiden

Together we make the difference
Tata Steel in IJmuiden
Tata Steel in IJmuiden (I)

Our strength

Top steel producer in Europe

- Approx. 9,300 employees, including 250 researchers
- Capacity: 7.5 million tons of steel, production 2011-2012: 6.9, expectation 2012-2013: 7.2
- Fully integrated production process

Tradition of innovation and continuous improvement

- Processes: 8% energy saving between 2011 - 2015
- Production means: approximately €800/900 million invested in state-of-the-art processes (BB22, KW22, DVL3, Fabric Filters Sinter Plant)
- Products: lighter, stronger, higher quality (examples: car industry, building industry, packaging)

Lots of attention for the surroundings

- Environment, investments, employment and knowledge
- Spending of more than € 0.5 billion in the region (environment, employment)
Tata Steel in IJmuiden (II)

Our strength

- Excellent in logistics based on location
  - Deep-sea port, railway, road and inland waterways
  - The industrial estate is 750 hectares and lies next to the North Sea
  - Excellent export position and home market with high-value markets

- Strength through knowledge
  - M2i of strategic importance for knowledge development in the field of materials
  - Own RD&T in IJmuiden, access to worldwide network (UK and India)
  - Close co-operation with (international) knowledge institutes
  - Own training centre in Velsen-Noord
  - Co-operation with ROCs (regional training centres) and universities of applied sciences (InHolland and HU University of Applied Sciences Utrecht)
Tata Steel in IJmuiden: high-quality processes

TS IJmuiden produces high-quality hot-rolled, cold-rolled and coated steel

Raw materials - Pig iron - Steelmaking - Casting - Rolling - Coating
Tata Steel in IJmuiden: sustainability (I)
Innovative processes as an answer to the climate problem

- Long-term agreement with the government to improve energy efficiency further:
  - Objective: from the base year of 2005 up to and including 2030, an annual efficiency improvement of 2% (total 50%)!
  - Energy Efficiency program: the IJmuiden project to achieve this objective

- Research into electricity generation with CO$_2$ recovery & storage
  - Tata Steel is involved in the Dutch CATO-2 research

- Energy supply of the future: construction of a thermal power station (TRUST)

- Contribution to industrial research for the future (ULCOS) to achieve a 50% reduction of CO$_2$ emissions per ton of steel in 2050
  - HISARNA demonstration project in IJmuiden
Tata Steel in IJmuiden: sustainability (II)
HISARNA – Process innovation

- A new process that allows the direct use of powdered raw material. No more coke oven or ore processing required
- Iron ore is melted in the cyclone reactor
- Fine coal is injected directly into the smelter
- By using pure oxygen, we get gases without nitrogen
- This makes the combination with CO₂ recovery & storage (CCS) easier to realise

HISARNA technology will produce 20% less CO₂ emission in the future with CCS 80%