

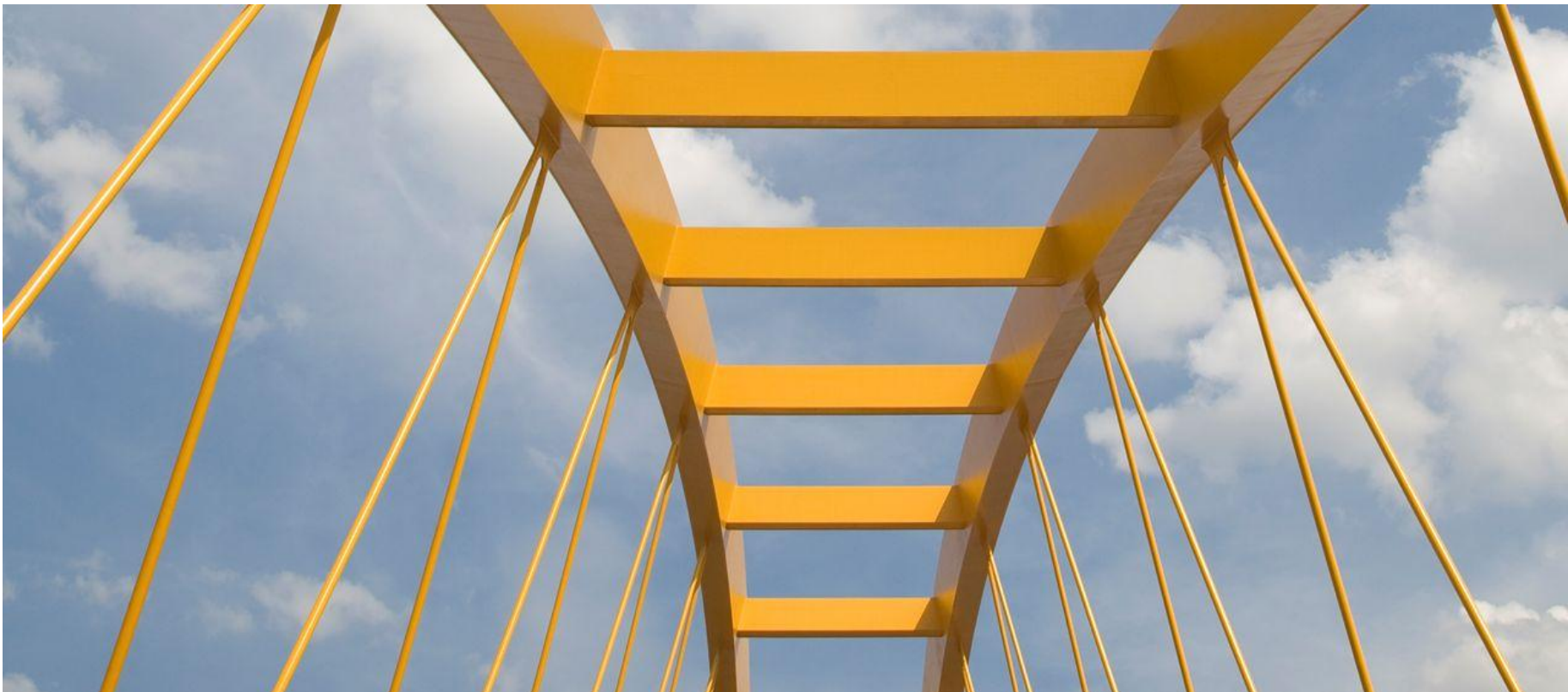
worldsteel Climate Change Initiatives

- Present status of CO₂ emissions Data Collection and future task -

Parallel Session 1, International workshop on International Standards to promote Energy Efficiency and Reduce Carbon Emissions

17th March 2009

Climate Change, World Steel Association



about World Steel Association

On Monday, 6th October 2008 the International Iron and Steel Institute (IISI) changed its name to World Steel Association.

- The World Steel Association (worldsteel) is one of the largest and most dynamic industry associations in the world.
- worldsteel represents approximately 180 steel producers (including 18 of the world's 20 largest steel companies), national and regional steel industry associations, and steel research institutes.
- worldsteel members produce around 85% of the world's steel.

worldsteel Climate Change Initiatives

Four major building blocks for worldsteel Climate Change Initiatives

(at the annual board meeting on October 2008 in Washington D.C.)

- Commit to reducing our CO₂ emissions by ***performance improvements based on actually collected data.***
- Promoting best practice operation and technology globally
- Engaged in major research and development of breakthrough technology
- More CO₂ efficient applications of steel by working with our customers
 - Most efficient steel applications in terms of energy over the products complete life-cycle

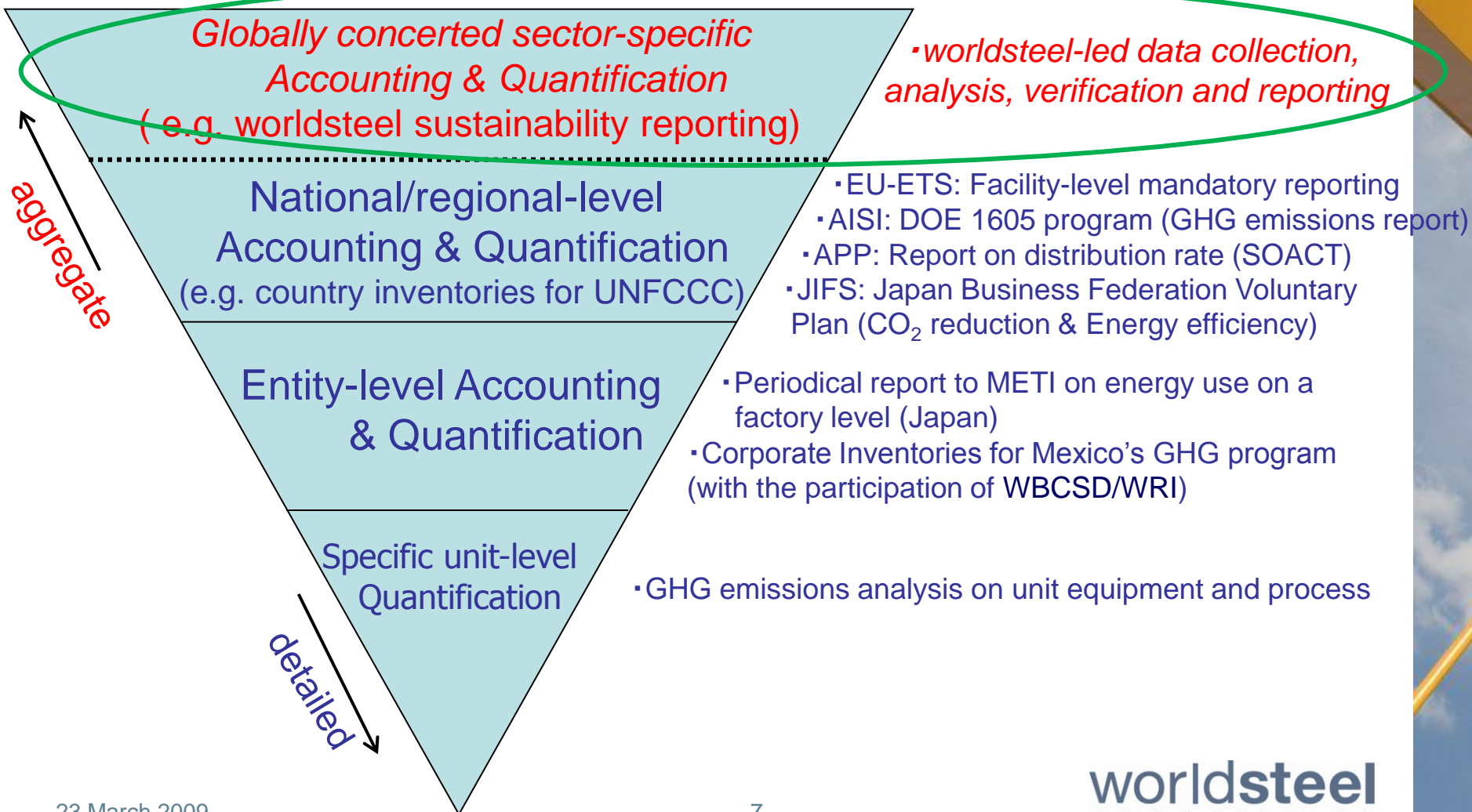
Data Collection

- **Objectives:**
 - Capacity building for CO₂ emissions measurement, reporting and performance guideline setting
 - Tracking and reporting performance improvement year-by-year
 - No intention of ranking: data are to be used by organisations to manage internal improvements and negotiate with their governments.
- **Indicators: technology-based**
 - principal measure: CO₂ intensity (ton-CO₂ /ton-crude steel)
 - sub-measure : Energy intensity (GJ /ton-crude steel)
- **Prerequisites for CO₂ emissions measurement:**
 - Liquid steel production site-basis
 - Classification of sites into three types of steel production processes: ***ore-based***, ***scrap-based*** and ***unconventional***
 - Boundary and conversion factors have been determined by industry-wide experts

Basic concept & methodology

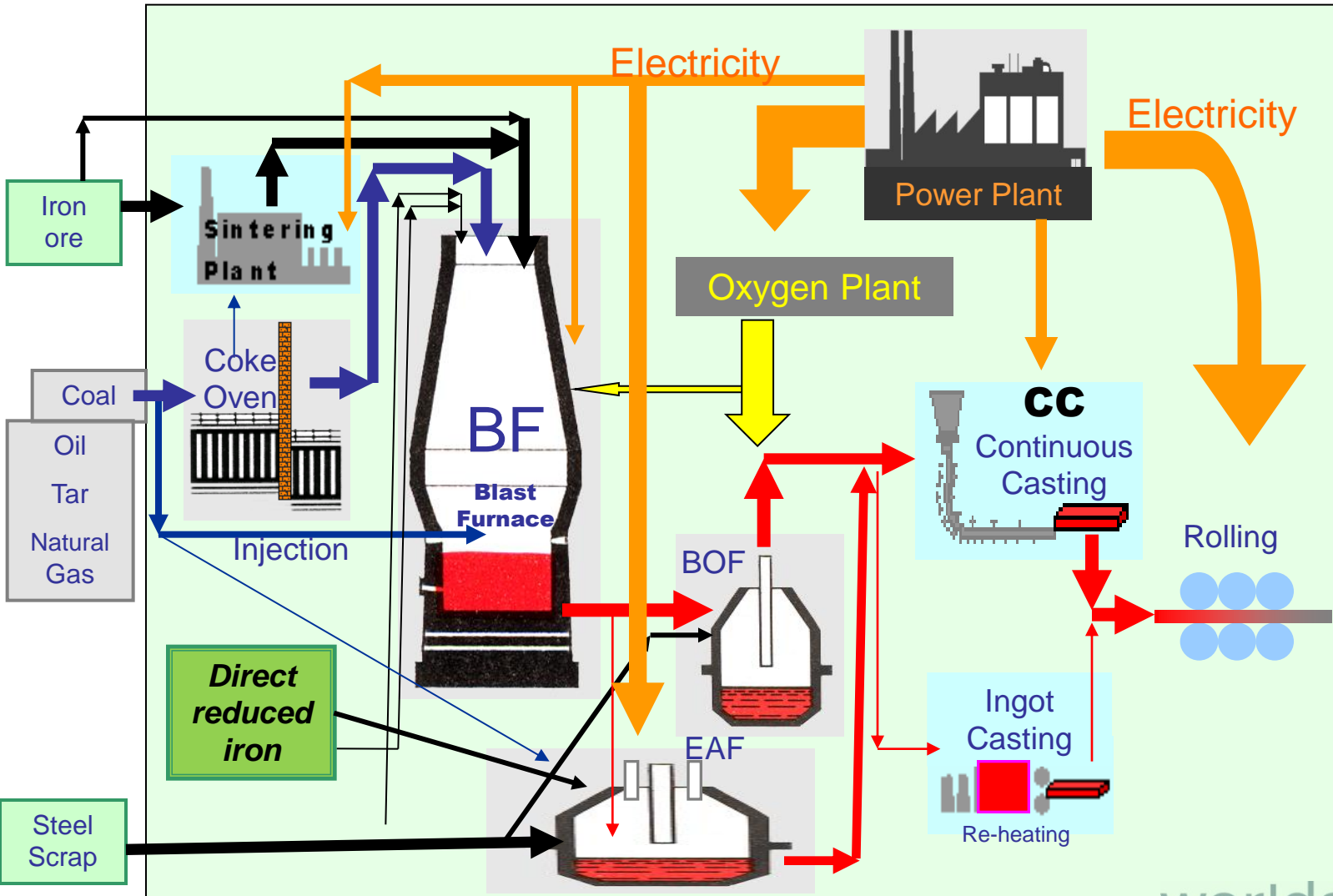
Basic concept: Multi-levels of Accounting & Quantification

Measurability, Reportability and Verifiability must be sought



Process of Steel making

[Material Flow In the Steelmaking Site]

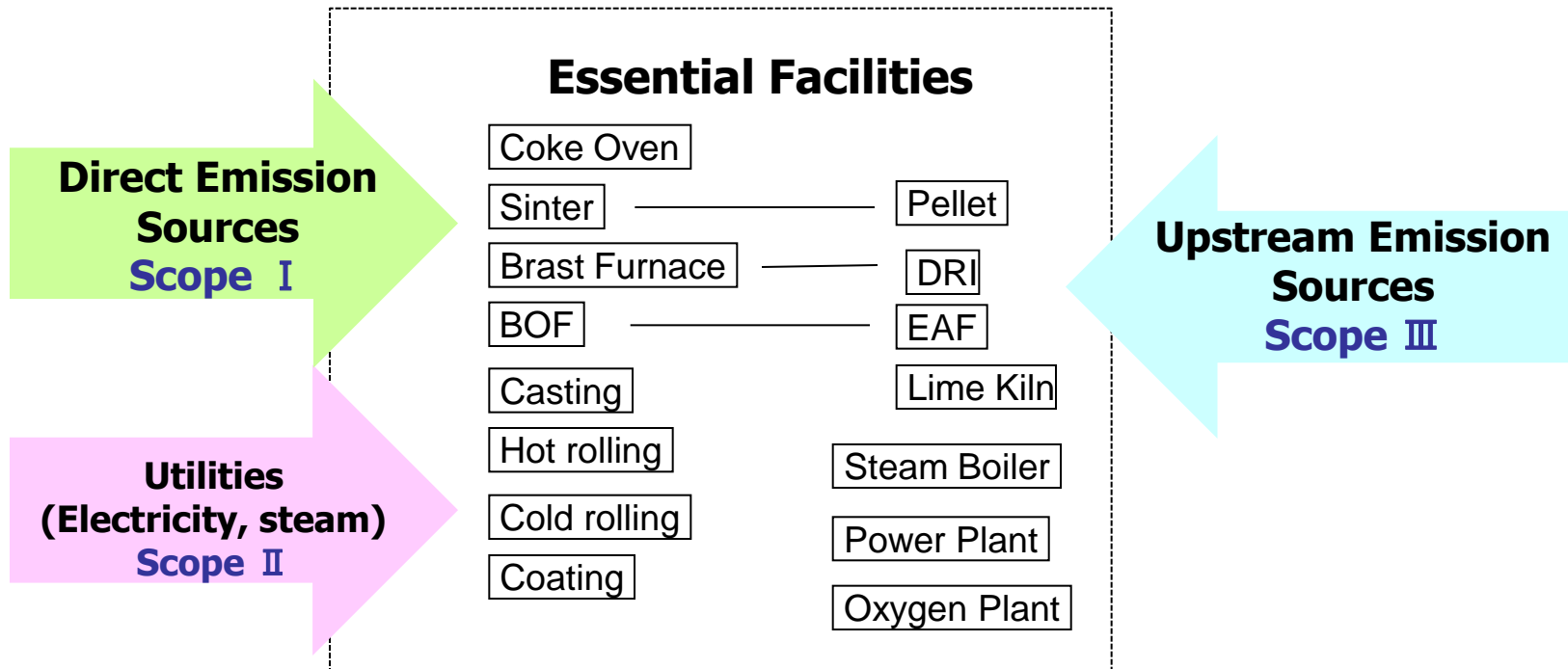


- Steel Products**
- Hot Rolled
 - Plate
 - Cold Rolled
 - Galvanized
 - Coating
 - Shape
 - Section
 - Wire
 - Rod
 - Tube
 - Rail
 - etc.

System boundary for calculation of CO₂ emissions

Comparability of data must be sought

System Boundary



$$\text{CO}_2 \text{ emissions} = \text{Scope I} + \text{Scope II} + \text{Scope III}$$
$$\text{CO}_2 \text{ intensity} = \text{CO}_2 \text{ emissions (tonne)} / \text{crude steel (tonne)}$$

worldsteel CO₂ Data Collection Sheet

CO₂ reporting for worldsteel Sectoral approach

Site:	
Company:	
Country:	
Report period:	

Carbon steel Site structure (number of operated units)

Coke batt.		BF > 1000 m ³		Open hearth		Cold rolling	
Sinter plant		100<BF<1000		Hot rolling		HDG lines	
Pellet plant		BF < 100 m ³		Lime kilns		EG lines	
Gas DRI		BOF shops		Oxygen plant		Tining lines	
Coal DRI		EAF units		Power plant		Smelting Red.	

General information

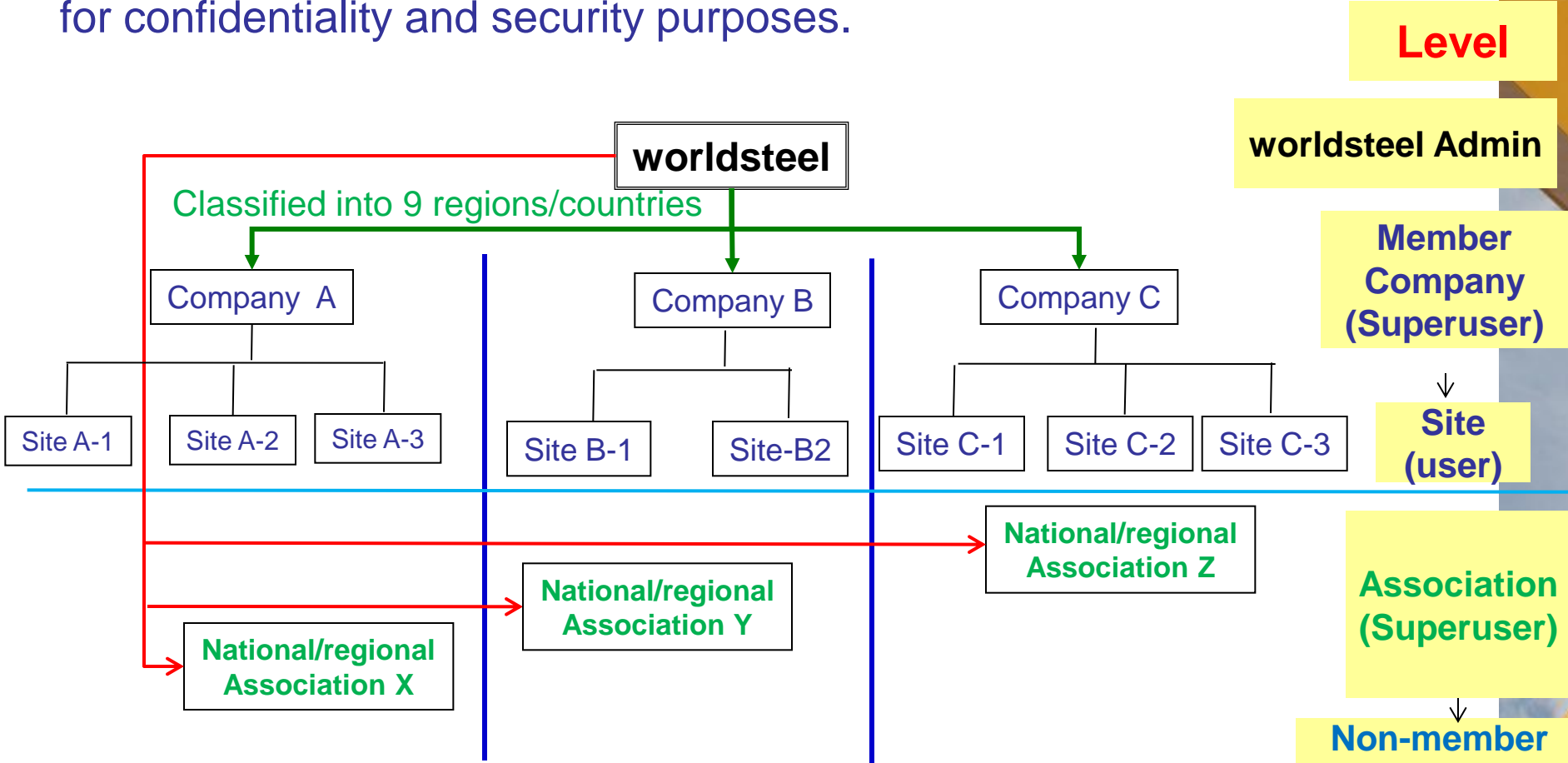
Total coke production (dry t)	
Sinter production (t)	
Hot metal production (t)	
DRI production (t)	
BOF crude steel production (t)	
OH crude steel production (t)	
EAF crude steel production (t)	
Carbon crude steel production (t)	0
Granulated slag production (t)	
Purchased carbon steel scraps (t)	
Purchased stainless steel scraps (t)	
Data verified by external body	

	Unit	Site data				Conversion factors		Calculation results			
		Purchased Procured	Sold Delivered	C content Site measurement t C/unit	Energy Equiv. GJ/unit	Emission Factor t CO ₂ /unit	Upstream CO ₂ value t CO ₂ /unit	Scope 1 Direct emissions t CO ₂	Scope 2 emissions t CO ₂	Scope 3 emissions t CO ₂	Total Energy TJ
Coking coal	dry t										
BF injection coal	dry t										
Sinter/BOF coal	dry t										
Steam coal	dry t										
EAF coal	dry t										
SR/DRI coal	dry t										
Coke	dry t										
Charcoal	dry t										
Heavy oil	m ³										
Light oil	m ³										
Kerosene	m ³										
LPG	t										
Natural gas	k.m ³ N										
Limestone	dry t										
Burnt lime	t										
Crude dolomite	dry t										
Burnt dolomite	t										
Pellets	t										
EAF electrodes	t										
Pig Iron	t										
Gas based DRI	t										
Coal based DRI	t										
Ferro-Nickel	t										
Nickel oxides	t										
Nickel metal	t										
Ferro-Chromium	t										
Molybdenum oxides	t										
Ferro-Molybdenium	t										
Electricity	MWh										
Steam	t										
Oxygen	k.m ³ N										
Nitrogen	k.m ³ N										
Argon	k.m ³ N										
Coke Oven gas	k.m ³ N										
Blast furnace gas	k.m ³ N										
BOF gas	k.m ³ N										
Coal tar	t										
Benzol	t										
BF slag to cement	t										
BOF slag to cement	t										
CO₂ to external use	t										
Total											
Total CO₂ emission Intensity											

worldsteel CO₂ calculation web design & update

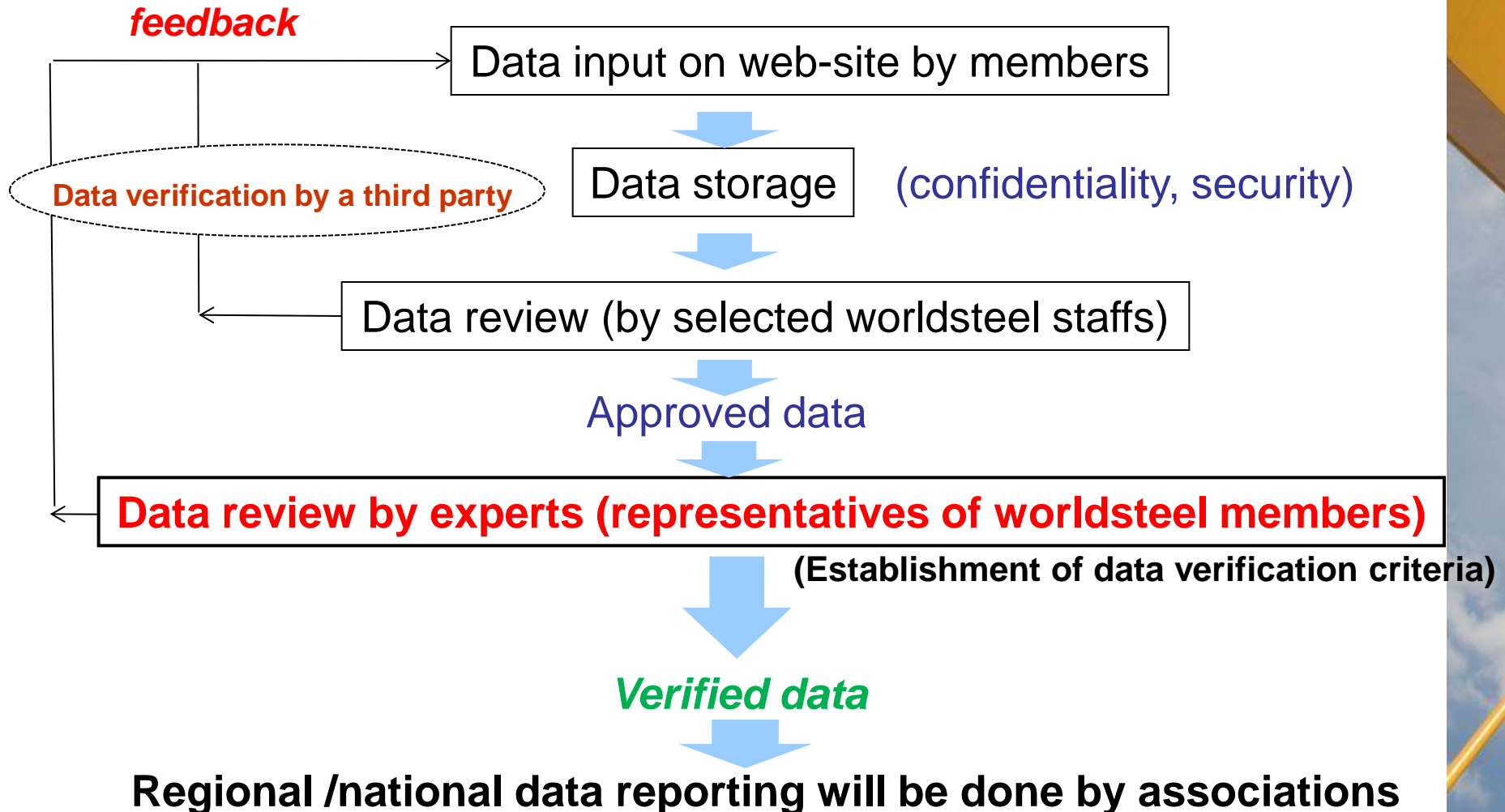
Basic Data collection scheme

There are three levels of basic structure of data collection scheme for confidentiality and security purposes.



- It is not possible to look “up” nor to look across the tree to other branches
- A scheme for getting data from non-member companies is incorporated in the worldsteel data collection system and working well.

Basic scheme of CO₂ data collection, verification and reporting



Progress to data

■ April 2008:

- Basic web-based data collection scheme was completed and web-hosting site was transfer to an ISO-certified external company
- Official start of Data Collection

■ June 2008~

- Incorporation of energy intensity calculation

■ September 2008~

- Threat assessment of the worldsteel CO₂ web site by an external expert company
- Intensification of security and confidentiality of collected data
- An expert group comprising of regional industry authorities on energy management was organized and established criteria for data verification

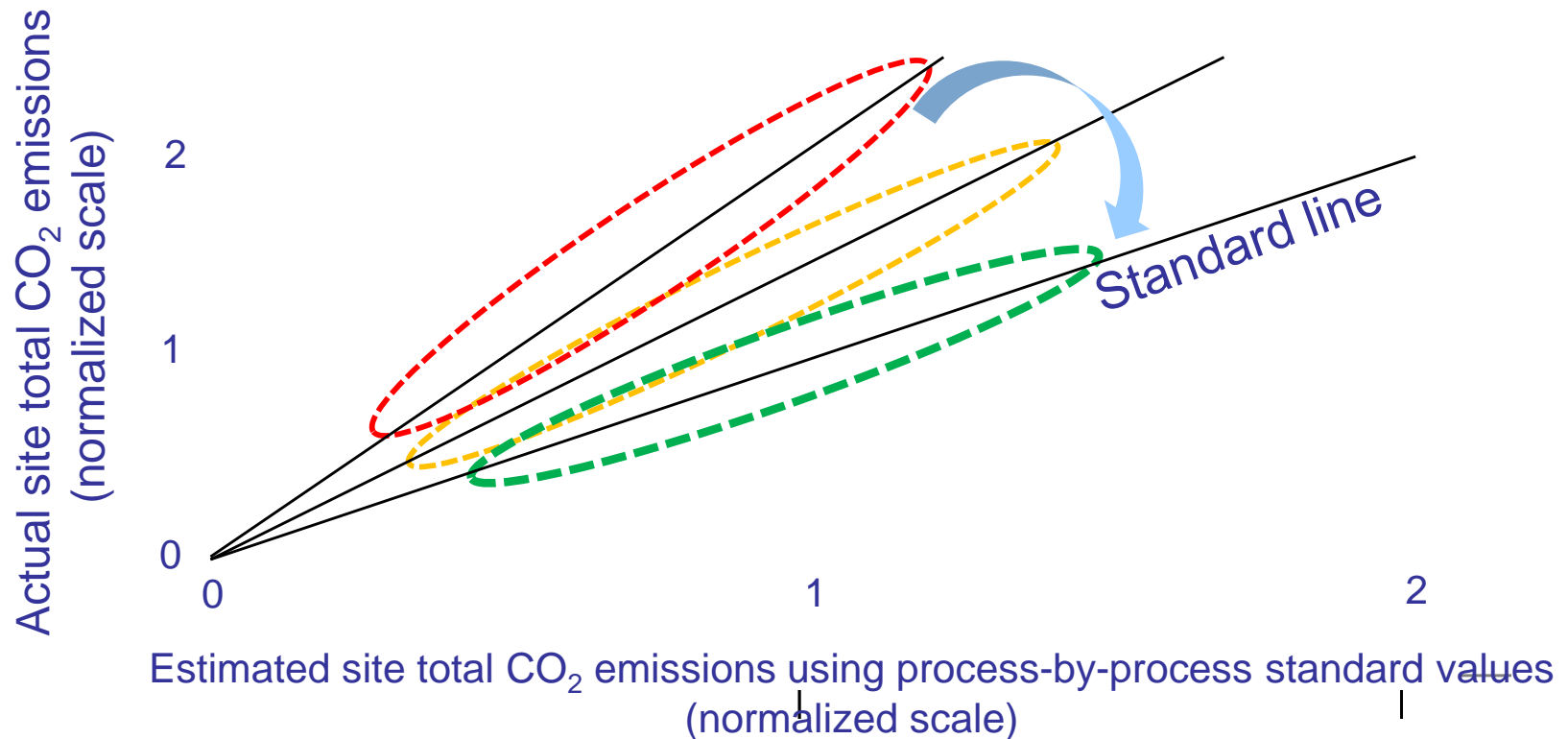
Future tasks in relation to methodology standardization

Future Tasks

- **Expand participants and help them to build capacity for collecting credible data and analyzing them based on a common global steel industry-specific CO₂ emissions calculation methodology**
 - **Performance guideline establishment**
 - Bottom-up: sum-up of process-by-process performance benchmarking
 - Top-down: performance categorization on a site wide basis and technological clarification of differentiations among them
 - **Sharing best available operating practices & technologies**
 - **External check and review on our methodology for making it recognized as globally acceptable CO₂ emissions evaluation tool**
 - **Standardization of our methodology**

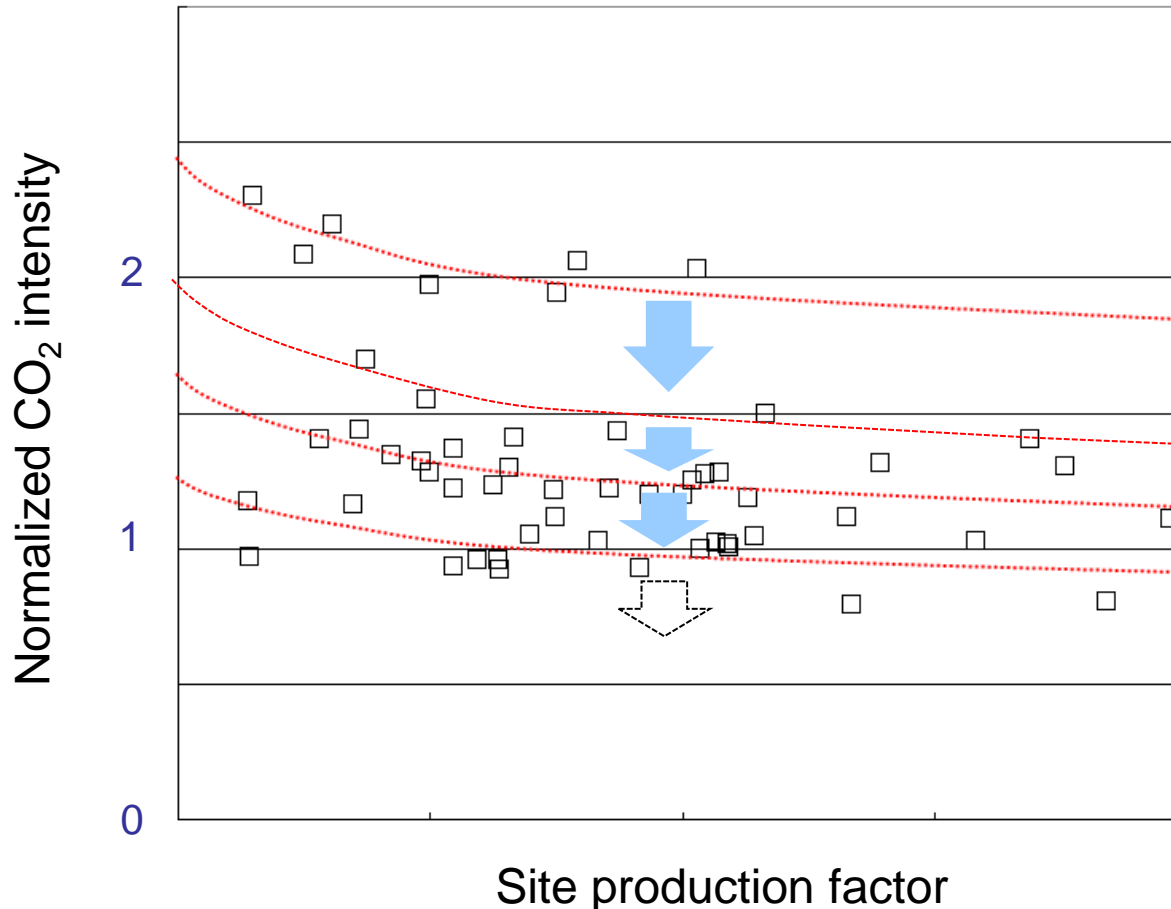
(Example)

Bottom-up analysis on performance determining factors - BF-BOF process -



(Example)

Concept of top-down performance improvement -BF-BOF process -



Recognize present performance status

Plan on improving performance on a step-by-step basis (to a one-rank higher status)

Define key technologies to achieve it

worldsteel

A S S O C I A T I O N