Steel sectoral approach

Chunxia ZHANG

China Iron & Steel Research Institute

Brussels, 17 & 18 September 2008

1. The purpose of sectoral approaches

- **The purpose of sectoral approach is to promote the technology transfer and improve the energy efficiency of industrial sectors to address climate change.**

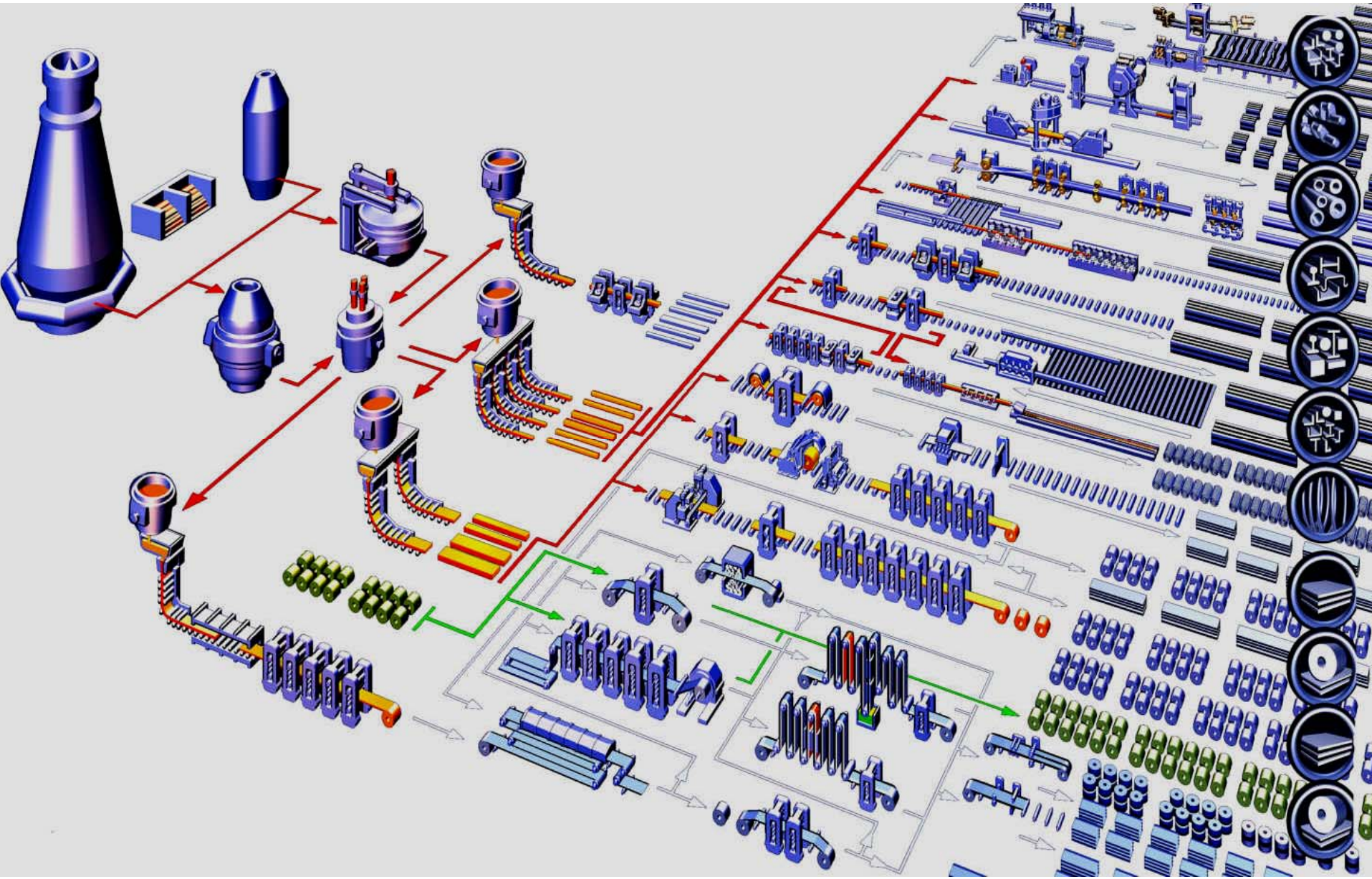
- **Sectoral approach may be the supplementary for general national emission cap for developed countries and also the efficient way for developing countries.**

2. Indicators of benchmarking for steel industry

Steel is still the material of choice in the future. World steel production was 1.3 billion tons in 2007. Future growth is about 3-5%.

Benchmarking would be the useful tool for implementing sectoral approach.

What indicators would be set and implemented for steel industry.

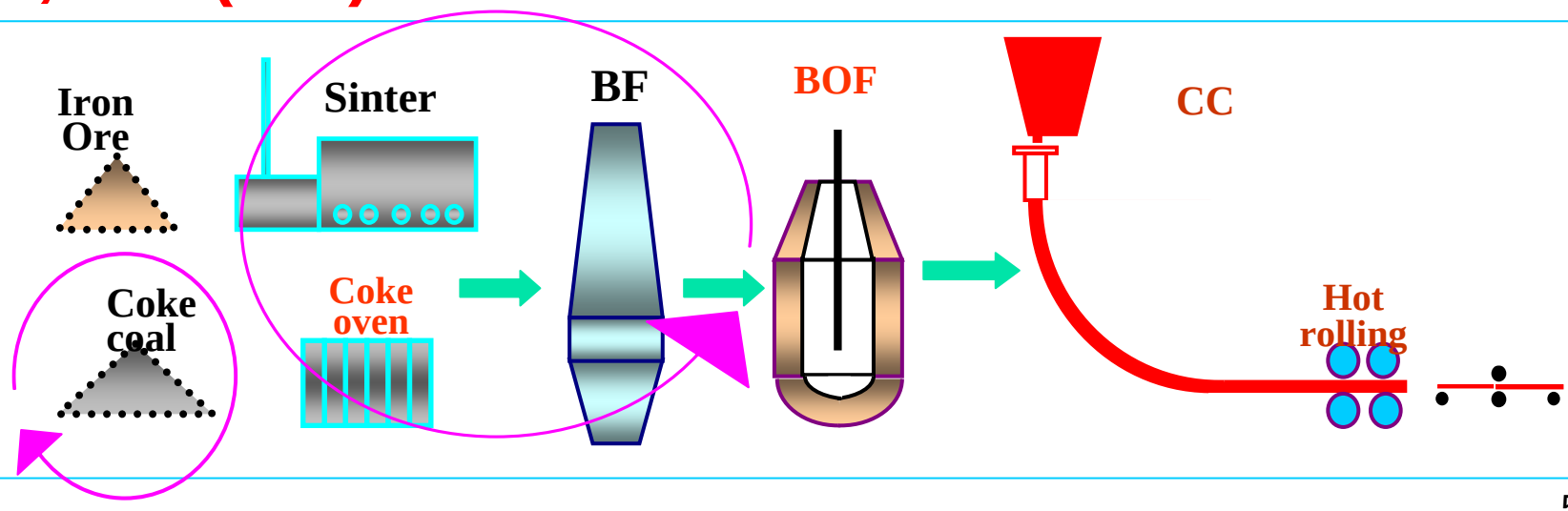


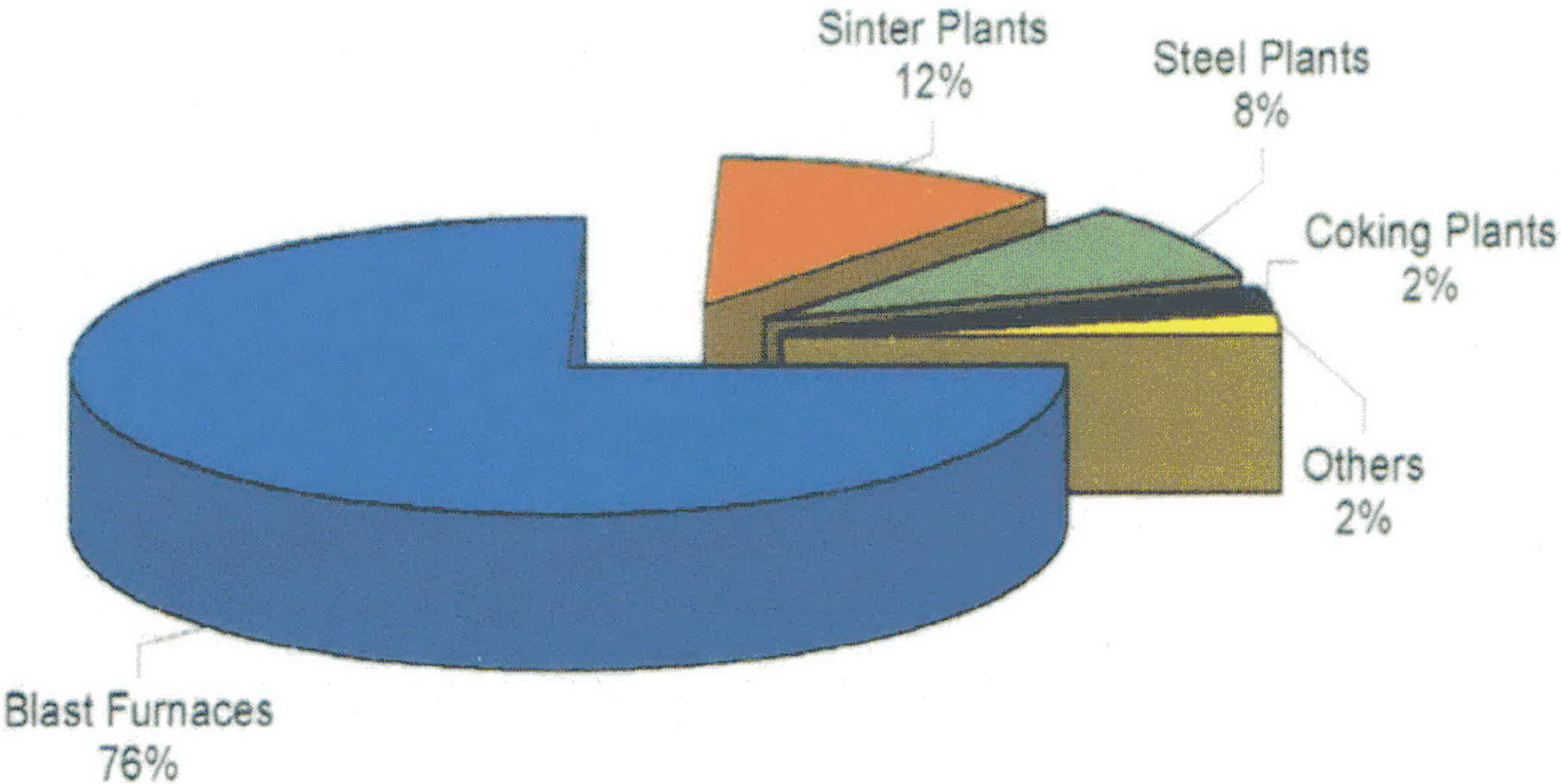
Steel production process is more complicated than other process industry.

2.1 Energy consumption per unit product of major procedures

The CO_2 emission from fossil fuel shares more than 95% of total CO_2 emission of steel plant. So, energy consumption is the key issue for CO_2 reduction addressing climate change.

Energy consumption per unit product of sinter, coke, BF, BOF (EAF) should be set as main indicators.





CO_2 emission distribution from different procedures in the traditional BF-BOF process

The boundary of the Energy consumption of major procedures should be same.

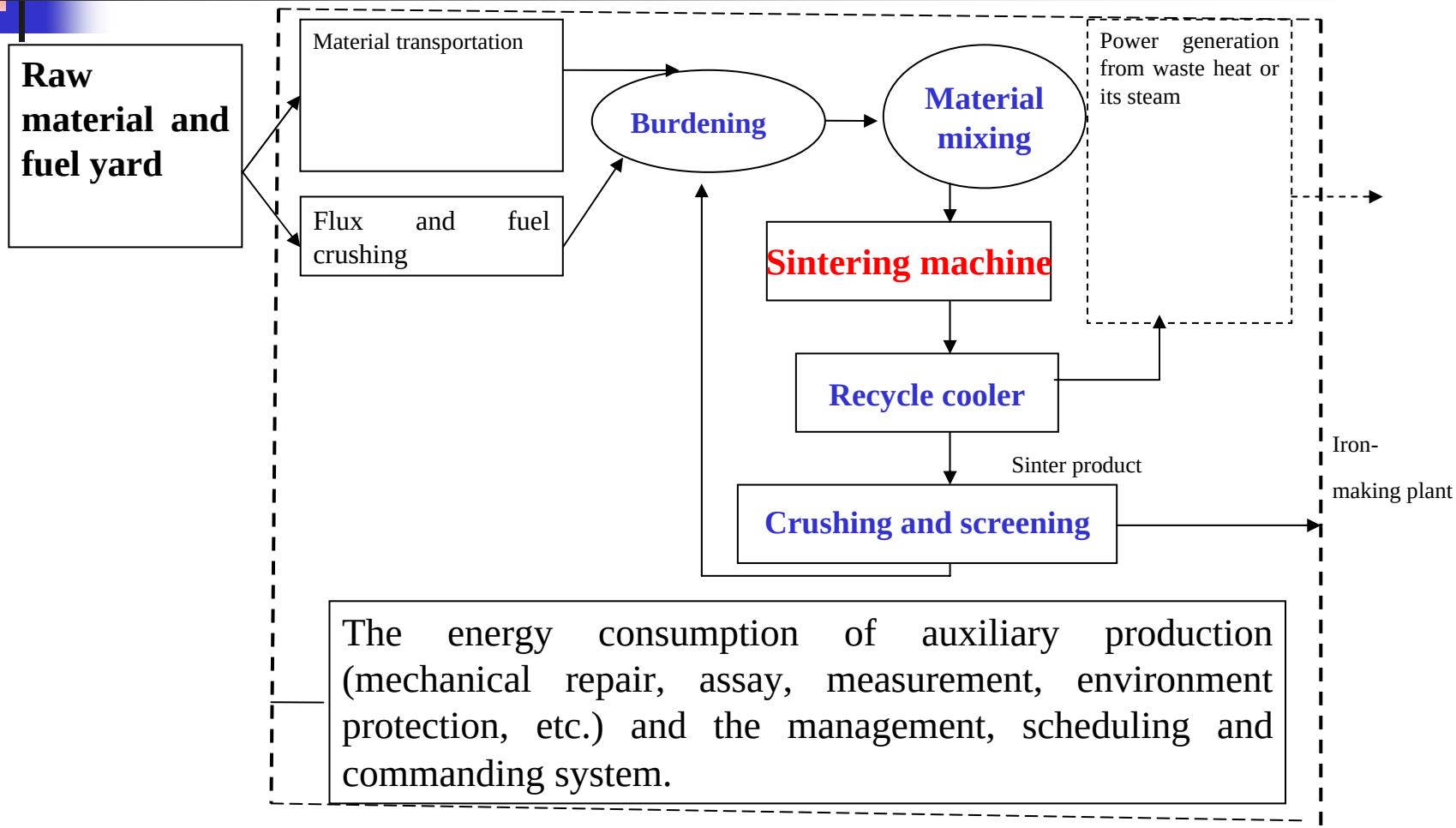


Fig. 1 Boundary of the energy consumption of sintering procedure

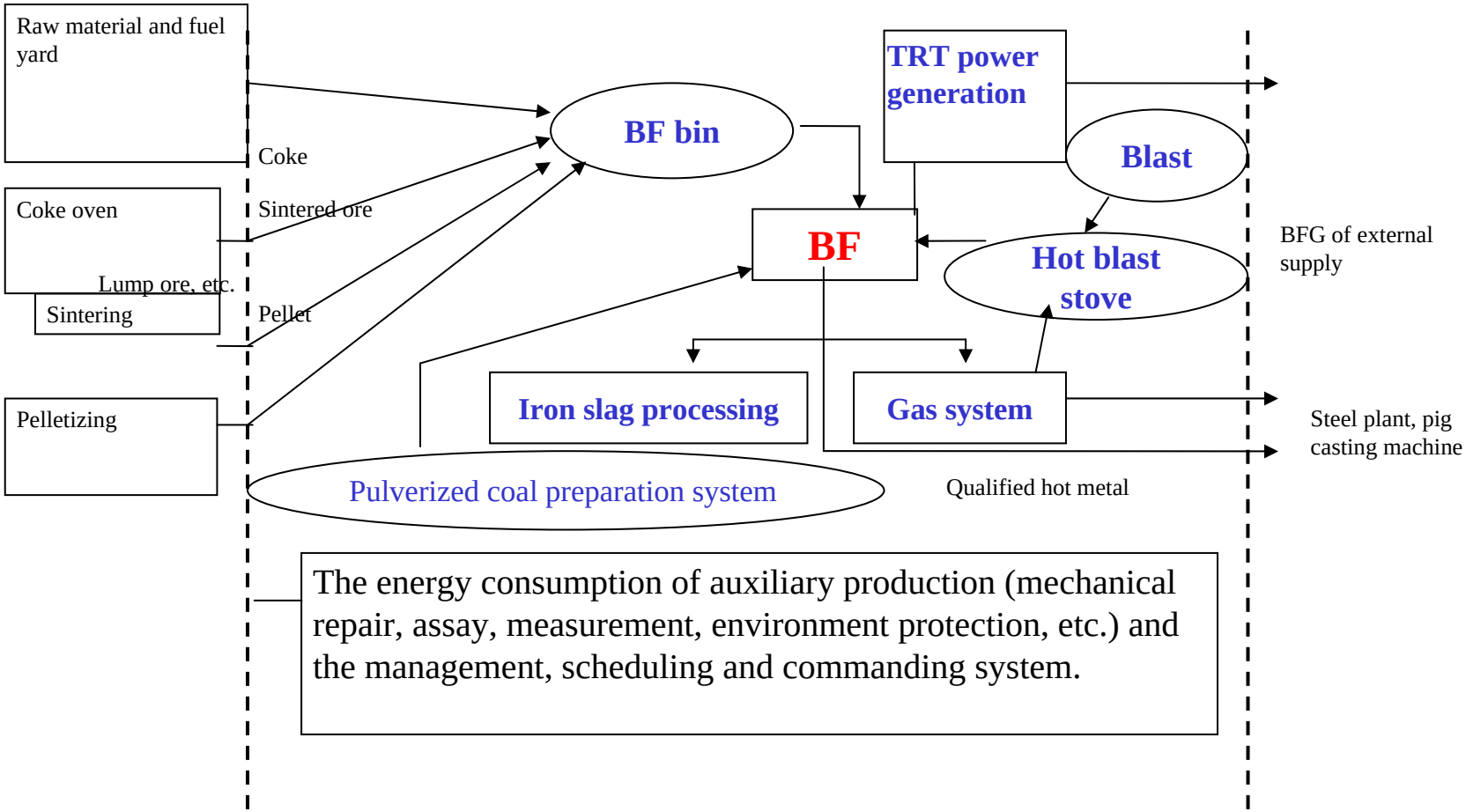


Fig.2 The statistic boundary of the energy consumption of BF procedure

- **Energy conversion factors should be same when benchmarking.**

2.2 Specific CO_2 emission per ton steel

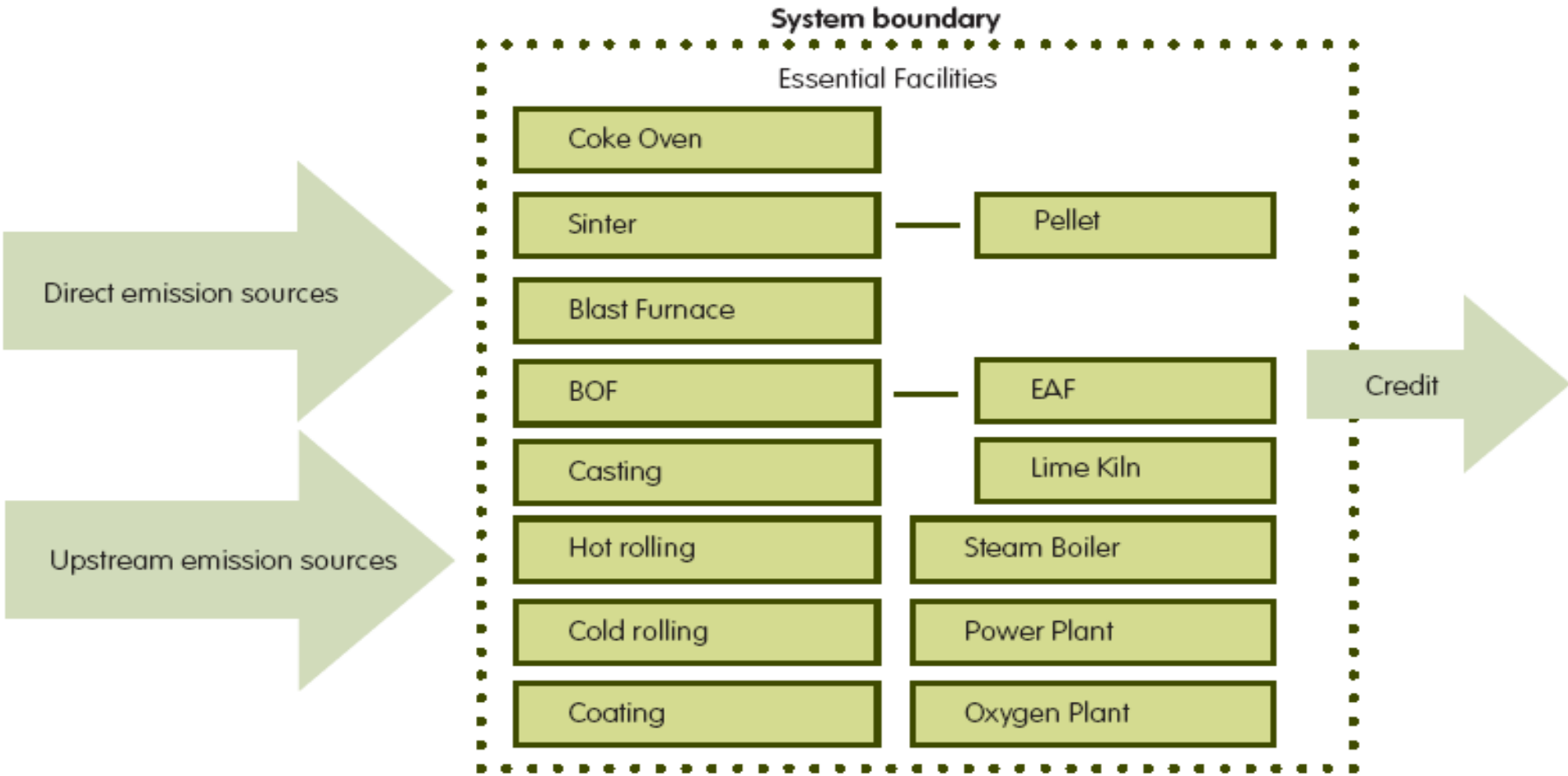
Based on the new methodology of IISI,"World Steel CO_2 Emissions".

Definition for CO_2 emission:

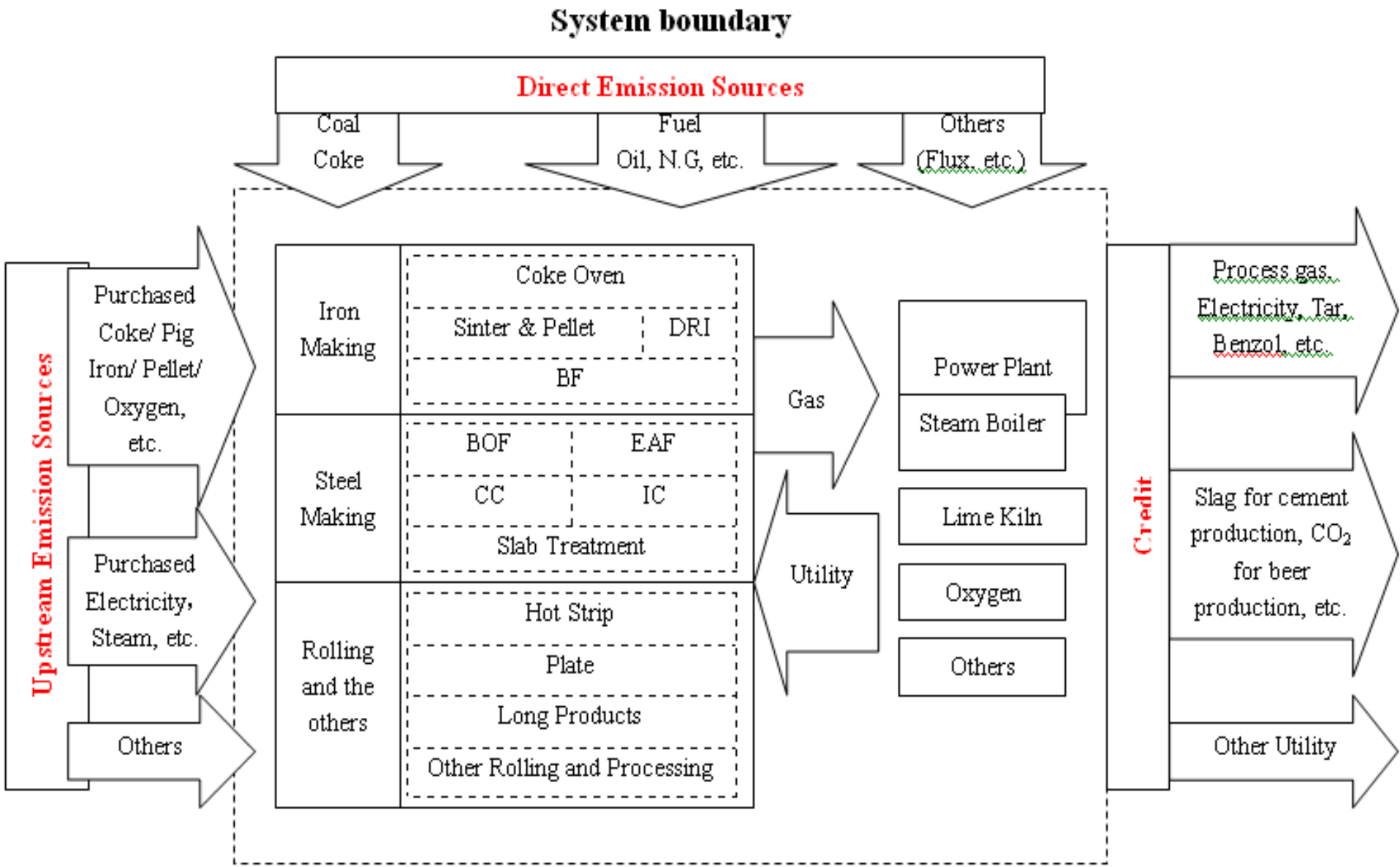
CO_2 emissions = Direct + Indirect – Credit (tonne)

CO_2 intensity = CO_2 emissions (tonne)/ **crude steel (tonne)**

System boundary in very important (Fig.).



System boundary for calculating CO_2 emission for steel plant



Detail system boundary for calculating CO_2 emission for steel plant

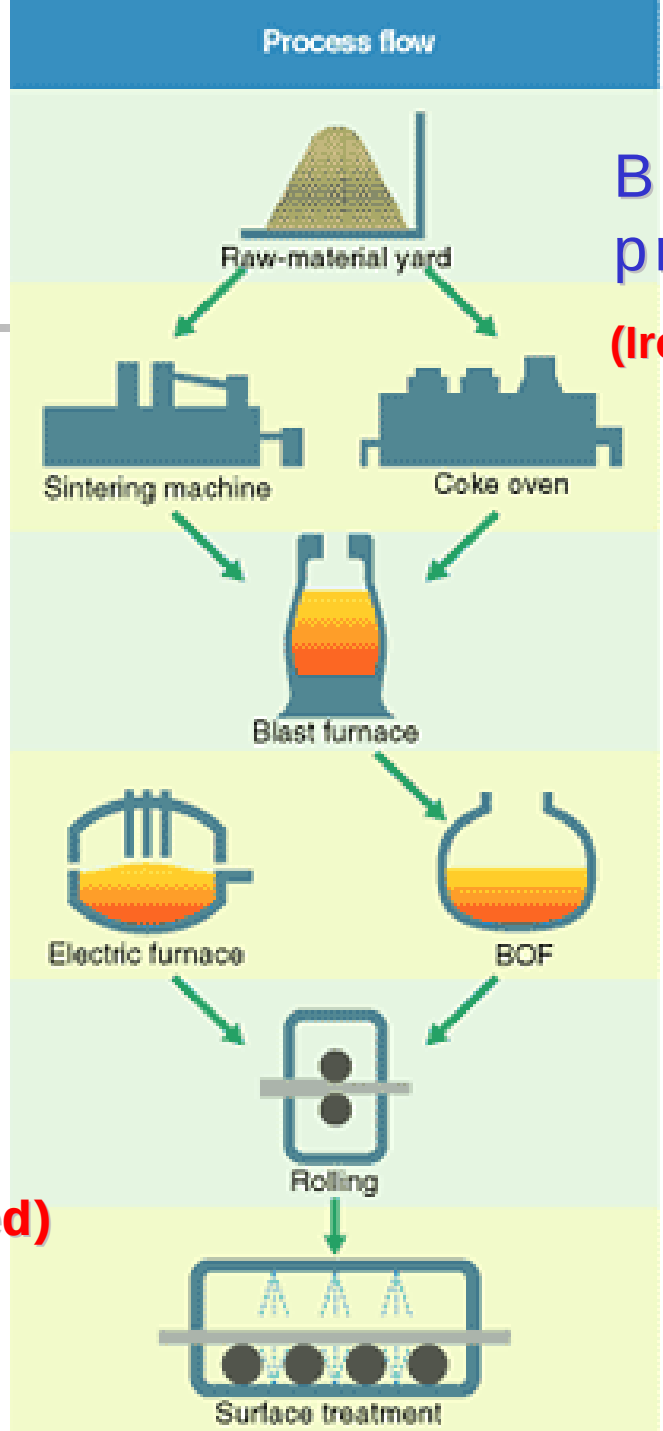
2.2 Specific CO_2 emission per ton steel

But anyway, above methodology is still not comparable. For benchmarking, this indicator should be improved further, following factors would be fairly considered:

- **Different steel pant have different content in above boundary, there should be same procedures;**
- **Degree of steel product processing?**
- **Scrap ratio?**
- **CO_2 emission factors;**
- **Different steel routes in a plant, mixed process**
- **Different energy structure in different countries?**
- **Different quality of raw material and energy?**

2.3 CO_2 emission for process

There are two typical steel process, iron ore based and scrap based.(Fig.)



BF-BOF process

(Iron ore based)

EAF process

(Scrap based)

But data collection for this is more difficult. It depends on the level of morning and statistic system.

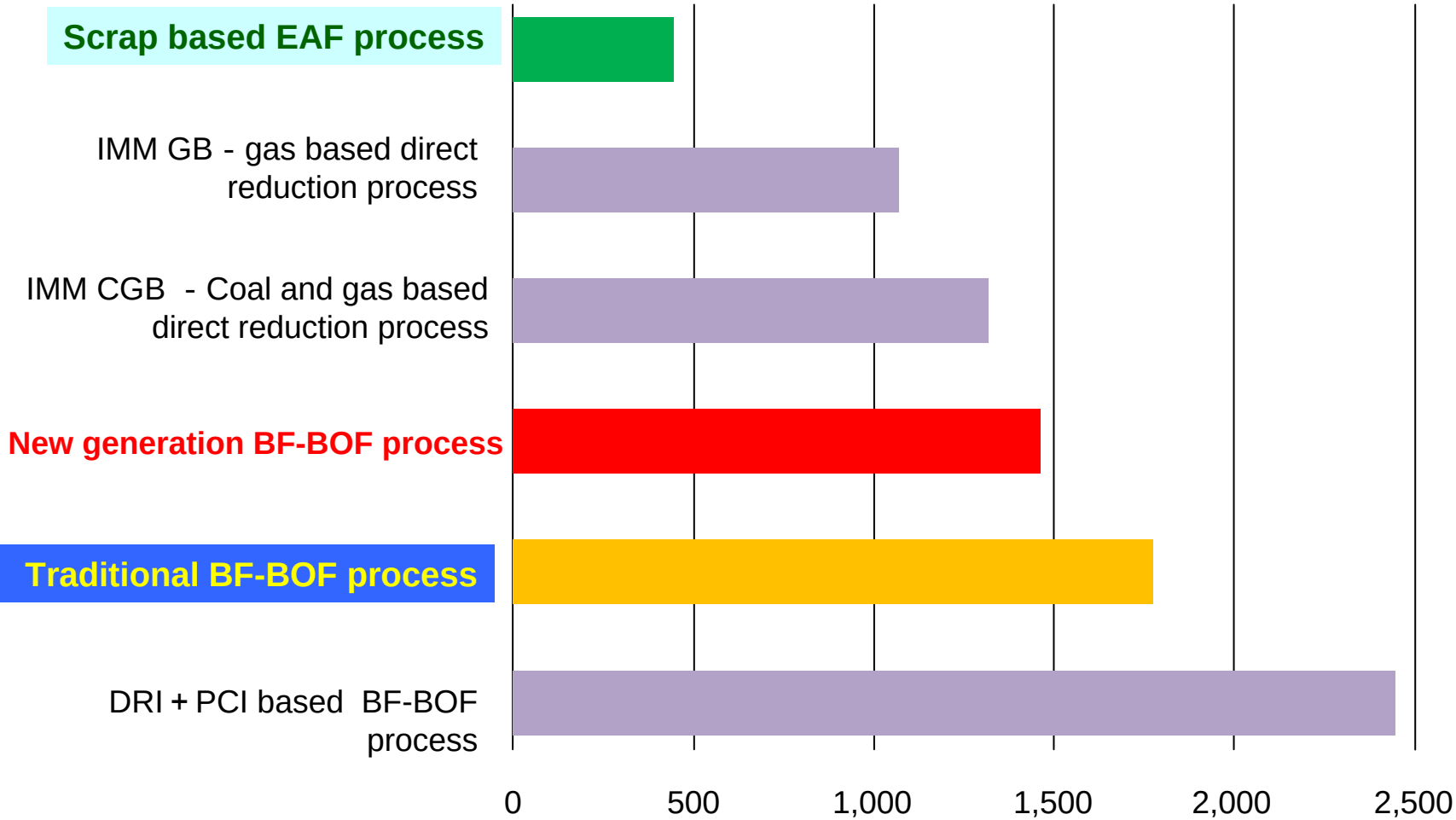


Fig. CO_2 intensity for different process, CO_2 t/t-s

(Theoretical results)

3. Difficulties and solutions for sectoral approaches in steel industry

3.1 Difficulties

- **Consistency of data definition and the boundary of indicators in the whole steel industry (not only IISI member).**
- **Benchmark: what kind of benchmark should be set or selected? For existing and new facilities? For different process? For different steel product?…… How to get it?**
- **Availability and reliability of data. data collection is hard.**
- **Monitoring of data. （Espesiailly in developing countries）**
- **Reporting and verification rule are poor.**
- **Contradiction transparent←→confidential?**

3.2 Possible solutions

- **Consistency: further improvement of methodology; set same, clear and simple boundary**
- **Benchmark: set typical benchmark for most steel process and including major and common procedures.**
- **Availability and reliability of data: gradually improving the energy management and statistic system.**
- **Monitoring of data: improving standard of energy measurement, need more training and related help for developing countries**
- **Reporting and verification: basic rule and qualified and recognized technical group.**
- **Contradiction: secrecy agreement?**

3.2 Possible solutions

- **Pilot plant first, not whole industry implement at the same time.**
- **Different target of indicators for different country and different steel plant (process).**
- **Technology transfer and technology roadmap**
- **Detailed benchmarking method (not only principle, but also concrete operation roadmap).**

4. Some suggestions for international scheme of implementing sectoral approaches

1) The framework must be flexible and diverse, taking into consideration the real circumstance of each country (each steel plant).

2) Concrete and efficient mechanism should be built to provide real incentive to do sectoral approaches for developing countries. --Financial support and technology transfer?

3) The way for improving energy efficiency would be different in different countries.

(Sweden, Canada, no TRT, CDQ)

Some experts think the only way for reducing CO_2 emission is technology. It may not right in most developing countries. Some "soft" factors may have more influences on it.

- **Energy management**
- **Restructure adjustment of industry**
- **And related social problems**

are also the important issues. (China case)

5) Reinforcement of support of developing countries

— capacity building

— energy management training

6) The framework must achieve compatibility between environmental protection and economic growth by utilizing energy conservation and other technologies.

5. Countermeasures for CO_2 reduction

For Chinese steel industry:

- **eliminating backward**
- **further energy-saving**
- **constraining steel product export and encouraging utilization of scrap.**
- **Promote building Eco-industry chain with other industries.**
- **Some new idea or theory are needed (Three functions).**
- **CCS in the future.**

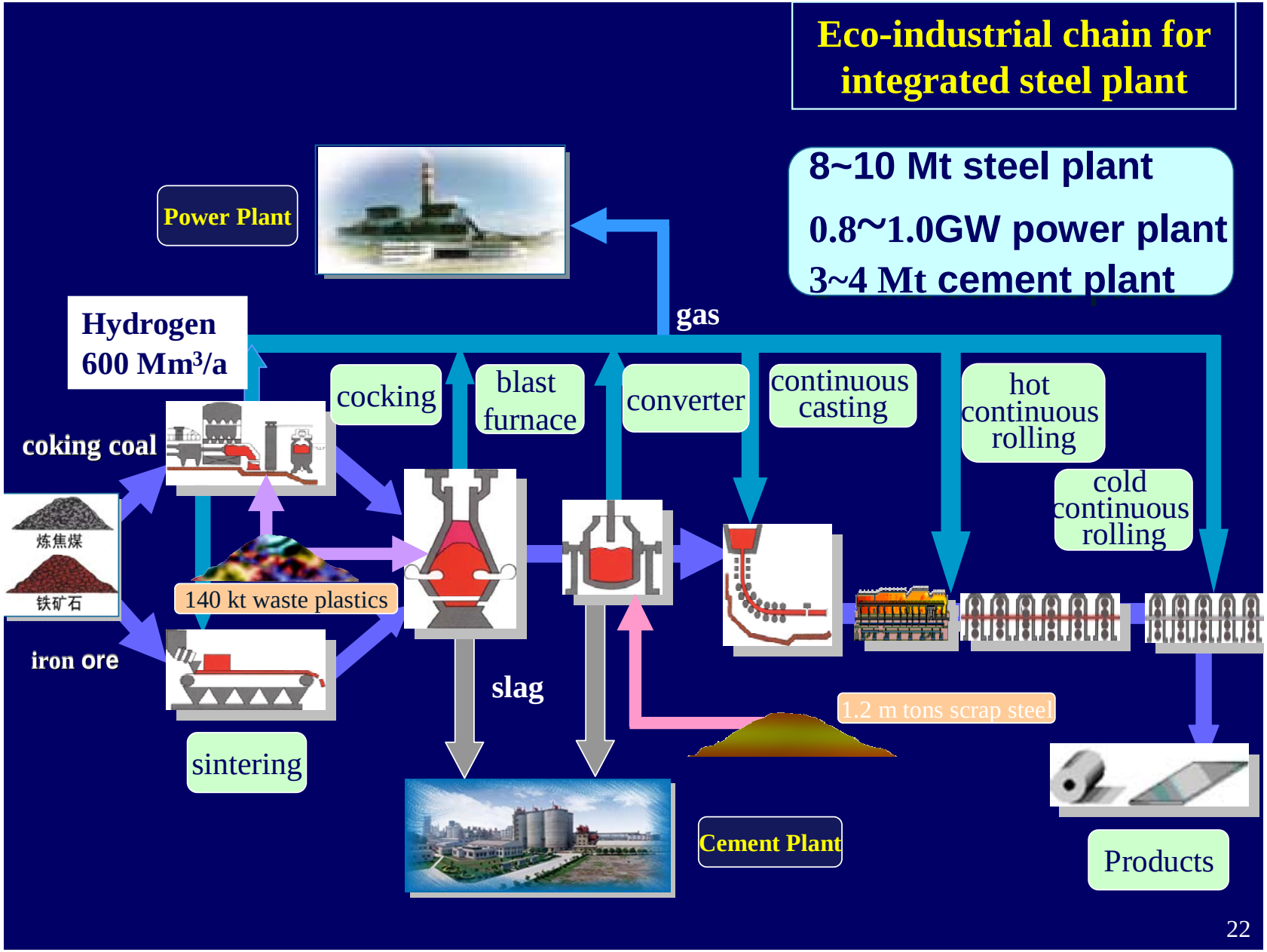
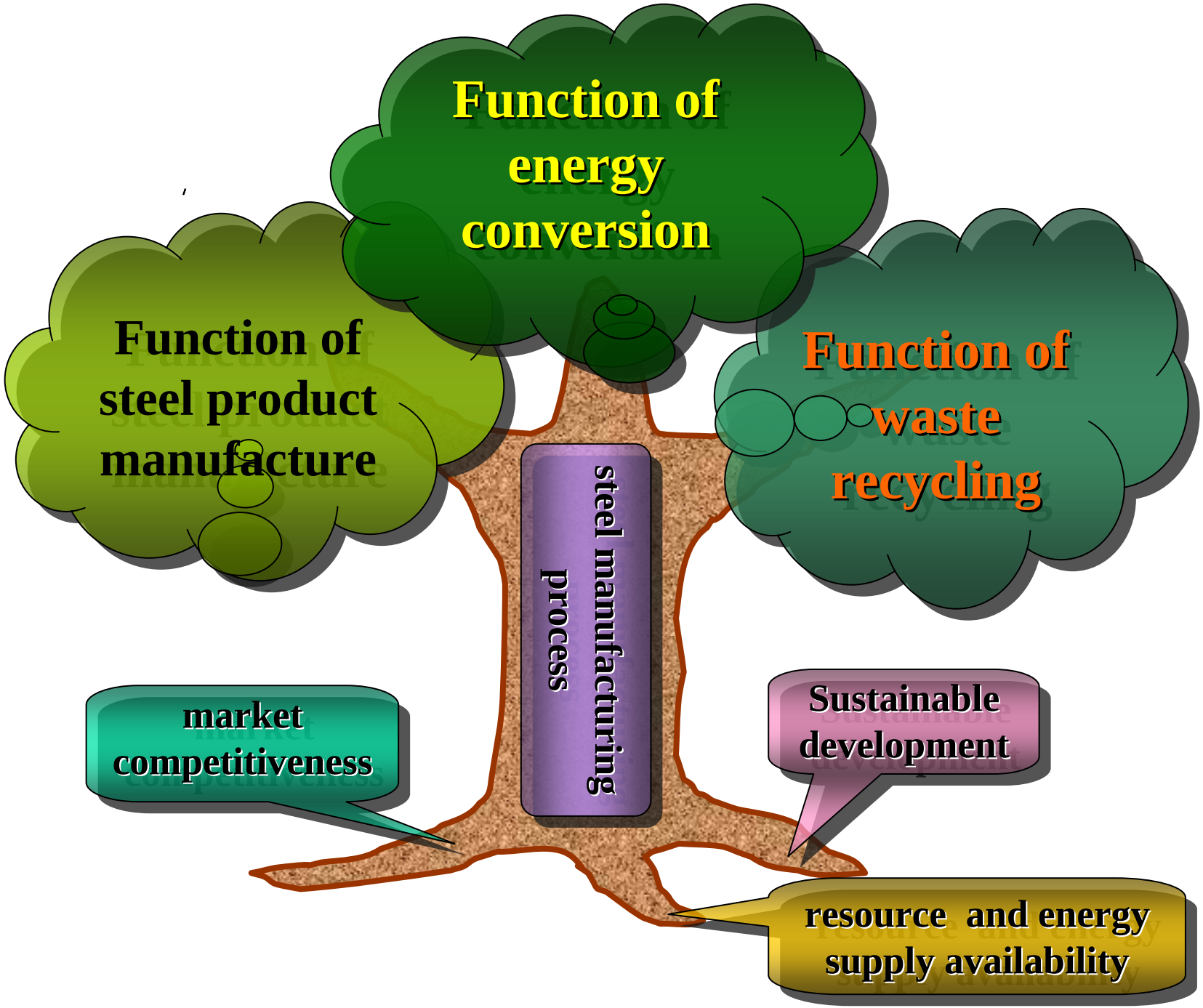


Fig. Eco-industry chain with new generation steel plant as the core

In the future, steel plant would have three functions:

- **the function of steel product manufacture**
- **the function of energy conversion**
- **the function of waste treatment and recycling.**


Function of energy conversion
Function of steel product manufacture
Function of waste recycling
steel manufacturing process
market competitiveness
Sustainable development
resource and energy supply availability

Thanks for your attention!

Dr. ZHANG Chunxia

China Iron & Steel Research Institute

Email: hellenzster@gmail.com