

Tang Jin, KE2, Sinocarbon (10 min)

- short introduction to the Chinese MRG and an overview of the main elements relevant for the reporting entities (10 minutes)
- 国家钢铁的MR
- 编号

钢铁行业企业碳排放核算报告指南

Chinese MRG for Steel Industry

管理机构

Authority

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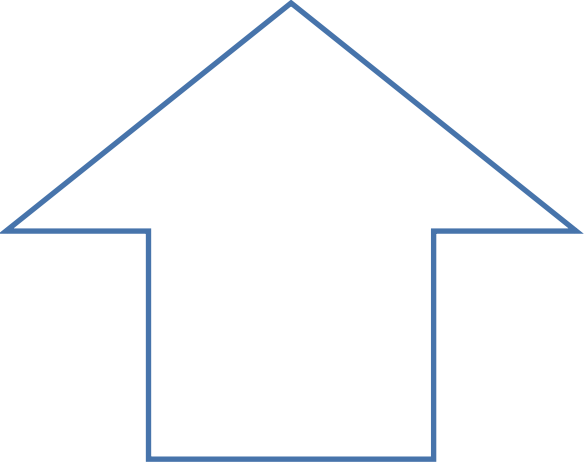
Purpose

- 构建企业温室气体排放报告制度
- Establishment of the GHG emission reporting system

钢铁行业企业碳排放核算报告指南

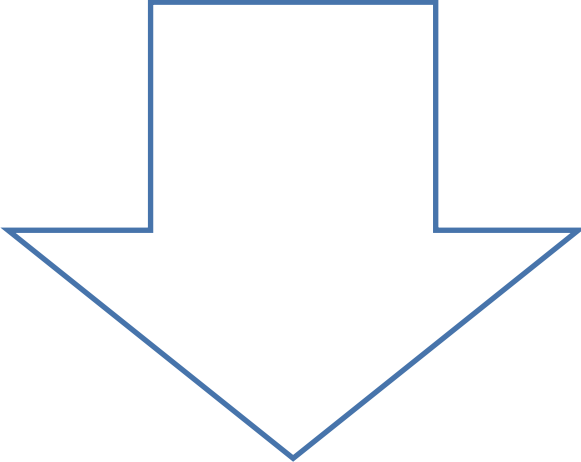
Chinese MRG for Steel Industry

特点 Characters



涵盖与生产经营活动有关全部排放
(直接排放和间接排放)

Accounting emissions associated to
steel company operation (including
direct emission and indirect emission)



核算方法应简便易行，有较强的可
操作性

Easy for companies to practice

钢铁行业企业碳排放核算报告指南

Chinese MRG for Steel Industry

✚ 基本要素 Main Elements

适用范围
Application

- 钢铁生产企业 Steel production companies

排放类型
Emission

- 燃料燃烧排放 Fossil fuel combustion、工业过程排放 Industrial process、固碳产品隐含的排放 carbon sequestration、及外购电力、热力的排放 Emission of purchased power and heat.

核算的温室气体
Type of GHG

- CO₂

核算方法学
Methodology

- 基于计算 Calculation method

Li Peng, NKE, Sinocarbon (10 min)

- explain to what extent other problems, i.e. the use of varying qualities of coal, play a major role in the MR issues that require further discussion
- outline which and how practical solutions can be agreed upon, and where the technical specifications/solutions in the European MRR might provide solutions.
- 指南中存在的问题（例子）
- 企业应用时遇到的问题（例子）
- 欧盟针对以上问题的解决方案（欧盟的规定）

钢铁行业企业碳排放核算报告指南应用中的问题

Issues of practicing MRG of Steel Industry

“外购生铁等含碳原料产生的排放”只列出了生铁、铁合金、直接还原铁等，是否还有其他的原料输入？如铁矿石等

The MRG only list a few types of material input. Other possible material are not mentioned

产品除了粗钢和甲醇外，是否还有其他产品，是否需要给出缺省的含碳量？

The MRG only list methanol and raw steel as products. How about Other possible products?

煤炭燃烧的消耗量也是钢铁行业的主要排放源，重要数据如含碳量氧化率是否需要实测？

The coal combustion makes main part of emission. Whether parameters like oxidation factors should be measured?

钢铁行业企业碳排放核算报告指南应用中的问题 Issues of practicing MRG of Steel Industry

✚ 欧盟针对这些问题的解决办法 Solution in European MRR

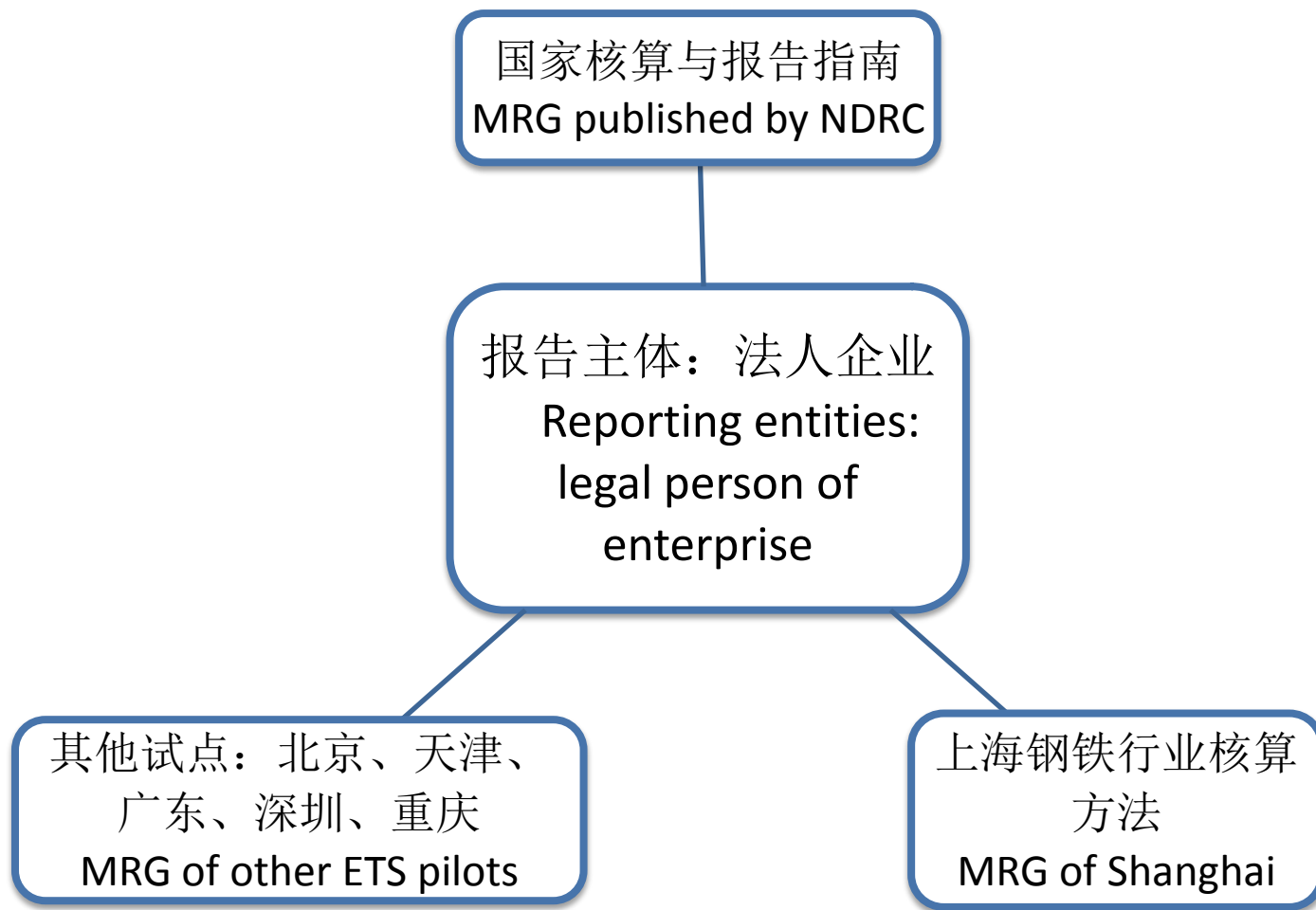
- 排放者可自行申报监测方法，确定频次 The operator shall submit and apply the minimum frequencies for analyses
- 排放者应用物料平衡计算时，根据实际生产对输入输出物质进行全面分析 Calculation by means of a suitable mass balance shall take into account all significant parameters on the input side as well as on the output side

Li Peng, NKE, Sinocarbon (10 min)

- Explanation of the Chinese situation of reporting entities
- explain in global terms the difference with EU ETS, but also the similarities in view of the concept of source streams within a facility/ the emission sources and source streams
- how to define boundaries of Chinese reporting entities to ensure completeness of monitoring. *This may include example/ case study of reporting entity/ facility boundaries*

钢铁行业企业碳排放核算与报告主体

Reporting Entity in MRG of Steel Industry



钢铁行业企业碳排放核算与报告主体

Reporting Entity in MRG of Steel Industry

报告主体：具有温室气体排放行为并应定期核算和报告的法人企业或视同法人的独立单位。

Reporting entity : legal person or independent entity regard as legal person

核算边界：以企业法人为边界，核算边界内所有生产设施产生的温室气体排放。

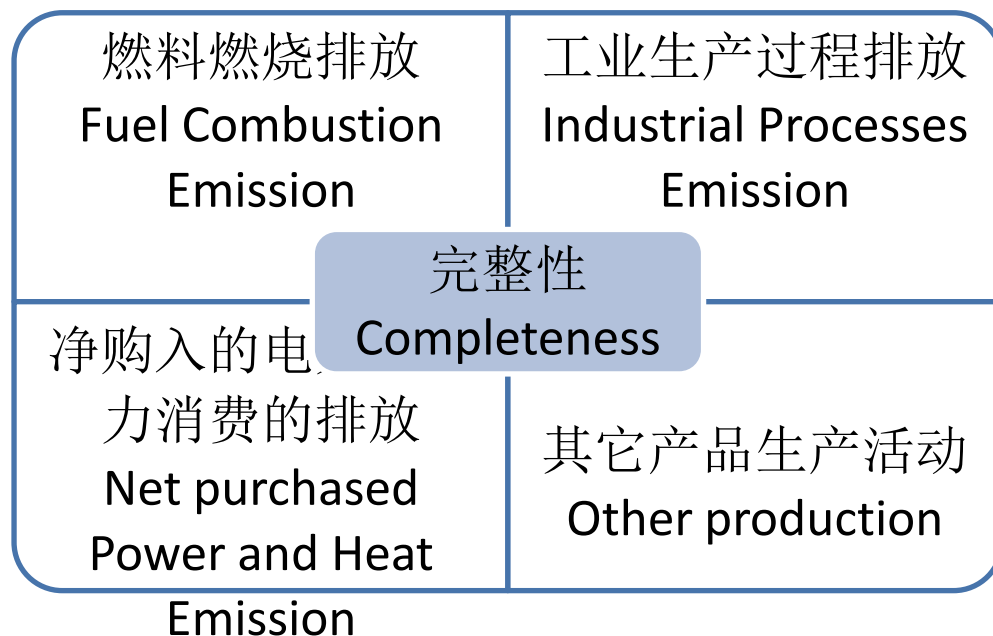
Accounting Boundary: all the emission relates to the production activities within legal person

钢铁行业企业碳排放核算与报告主体

Reporting Entity in MRG of Steel Industry

报告边界Boundary

- 区分排放类型并列出生产生排放的设备或过程Categories of facilities and process
- 结合化石燃料和原料消耗统计审核Fuels and materials



钢铁行业企业碳排放核算与报告主体

Reporting Entity in MRG of Steel Industry

✚ 各试点间区别 Differences of boundaries between pilots and national MRG

	国家 National	北京 Beijing	广东 Guangdong	上海 Shanghai
化石燃料燃烧固定源排放 Stationary combustion	✓	✓	✓	✓
化石燃料燃烧移动源排放 Mobile combustion	✓			✓
电极 Carbon electrodes	✓			✓
净购入热力 Heat purchased	✓			✓

钢铁行业企业碳排放核算与报告主体

Reporting Entity in MRG of Steel Industry

	欧盟 EU ETS	国家核算指南 National MRG
报告主体 Reporting entity	设施 Installation	最低一级法人 Lowest level of legal person
排放源 Emission sources	直接排放 Direct emission	直接排放与间接排放 Direct and indirect emission,
极小排放源流 Source streams	对极小源流的计算可用保守估算替代层级方法 Operator may use conservative estimation instead of tiers for de-minimis stream	

中国与欧盟的比较

Comparison Between China & EU

中国与欧盟的比较

相同点：Similarity:

排放源、排放类型
Emission Sources、
emission types

不同点：Differences:

中国以企业法人为核算边界，
欧盟以设施为核算边界
China: corporate enterprises
EU: facilities

中国与欧盟的比较

Comparison Between China & EU

如何定义核算边界 Accounting Boundary Definition

中国企业温室气体排放的核算，在核算边界内与能源统计体系保持一致，考虑地域属性。

GHGs emission accounting of Chinese enterprises should be in accordance with energy accounting system and take into consideration of regional factors

Li Peng, NKE, Sinocarbon (10 min)

- Presenting current MRG requirements on establishing an MP within the reporting entity 国家的核算对监测计划的要求，对比其他试点分行业的要求
- Advantages and disadvantages of mandatory or voluntary MP
- Exploring what the minimum requirements should be for national, obligatory monitoring plan（国家/上海）最低要求，包括的内容

钢铁行业企业碳排放核算与报告监测要求

MP Requirements in MRG of Steel Industry

国家核算指南中没有对监测计划中的细节问题没有明确的要求

No detail requirements of Monitoring Plan in the National Accounting Guideline

质量保证和文件存档

QA/QC & Documentation

- 建立健全的企业温室气体排放参数的监测计划。具备条件的企业，对企业温室气体排放量影响较大的参数，如化石燃料和替代燃料的低位发热量，应定期监测，原则上每批燃料进企业，都应监测低位发热量。
- To establish the monitoring plan of enterprises GHGs emission parameters

钢铁行业企业碳排放核算与报告监测要求

MP Requirements in MRG of Steel Industry

《碳排放权交易管理暂行办法》

Interim Measures for Carbon Emissions Trading Management

- 重点排放单位应制定排放监测计划并报所在省、自治区、直辖市的省级碳交易主管部门备案；
- Covered entity should make MP and report to the authority department in related provinces
- 重点排放单位应严格按照经备案的监测计划实施监测活动。监测计划发生重大变更的，应及时向所在省、自治区、直辖市的省级碳交易主管部门提交变更申请。
- Covered entity should strictly follow the MP

钢铁行业企业碳排放核算与报告监测要求

MP Requirements in MRG of Steel Industry

	国家 National	北京 Beijing	广东 Guangdong	上海 Shanghai
单独的监测指南MP guideline		✓		
在核算指南中提出监测要求 Requirement in MRG on MP and practice	✓		✓	
提供监测计划模版MP Templates		✓	✓	✓
第三方审核Third Party Verification		✓		
提交备案Reporting		✓		✓

钢铁行业企业碳排放核算与报告监测要求

MP Requirements in MRG of Steel Industry

强制监测计划的优缺点 Pros and cons of mandatory monitoring plan

- 优点 Pros
 - 便于企业执行监测
Facilitate entity's monitoring
 - 便于核查机构核查
enhance verifiers' efficiency
- 缺点 Cons
 - 高行政成本
High administrative cost
 - 增加企业负担
Increase entity's burden

自愿监测计划的优缺点 Pros and cons of voluntary monitoring plan

- 优点 Pros
 - 监测计划制定有弹性
Flexible to draft
 - 低行政成本
Low administrative cost
- 缺点 Cons
 - 低执行率
Limited execution
 - 不利于核算的合规性
Hinder normative accounting of GHG

钢铁行业企业碳排放核算与报告监测要求

MP Requirements in MRG of Steel Industry

- 1. 排放主体的基本信息 Basic information of Reporting entity
- 2. 排放主体的边界 Accounting boundary
- 3. 核算方法的选择和相关说明 Methodology & Explanation
- 4. 活动水平获取方法及说明 Activity data and collecting

Li Peng, NKE, Sinocarbon (10 min)

- To outline how what monitoring methodologies apply in the Chinese MRG
- What alternative options would be possible under MRG
- How should the data quality be assessed and improved
- How should the reporting entities deal with uncertainty of measurements
- How to incorporate these items in the Monitoring Plan
- 监测计划的实施：根据指南数据获取要求，描述精度等方法为主
- 数据质量管理和不确定性

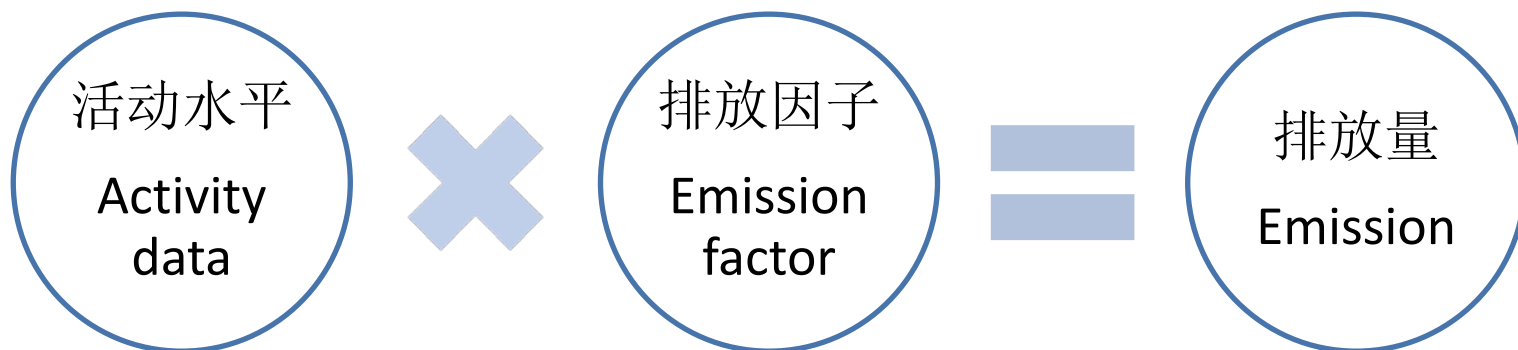
钢铁行业企业碳排放核算与报告监测要求

Monitoring Methodology in MRG of Steel Industry

✚ 计算的方法 Calculation-based methodologies

$$E = E_{\text{燃烧}} + E_{\text{过程}} + E_{\text{电和热}} - R_{\text{固碳}}$$

combustion Industrial process Electricity & heat Carbon sequestration



钢铁行业企业碳排放核算与报告监测要求

Monitoring Methodology in MRG of Steel Industry

$$E_{\text{燃烧}} = \sum_{i=1}^n (AD_i \times EF_i)$$

➤ 活动水平数据获取

Activity data collecting

$$AD_i = NCV_i \times FC_i$$

- NCV_i 是核算和报告年度内第*i*种燃料的平均低位发热量，采用指南推荐值

- FC_i 是核算和报告年度内第*i*种燃料的净消耗量，采用企业计量数据

➤ 排放因子数据获取

Emission factor collecting

$$EF_i = CC_i \times OF_i \times \frac{44}{12}$$

CC_i 为第*i*种燃料的单位热值含碳量，采用指南推荐值

OF_i 为第*i*种化石燃料的碳氧化率，采用指南推荐值

钢铁行业企业碳排放核算与报告监测要求

Monitoring Methodology in MRG of Steel Industry

$$E_{\text{过程}} = E_{\text{熔剂}} + E_{\text{电极}} + E_{\text{原料}}$$

Industrial process flux Carbon electrodes Raw material

$$E_{\text{熔剂}} = \sum (P_i \times EF_i)$$

- ✚ 活动水平数据获取 Activity data collecting
 - P_i : 第*i*种熔剂的净消耗量，单位为吨 (t)
- ✚ 排放因子数据获取 Emission factor collecting
 - EF : 第*i*种熔剂的CO₂排放因子，单位为tCO₂/t熔剂

钢铁行业企业碳排放核算与报告监测要求

Monitoring Methodology in MRG of Steel Industry

$$E_{\text{熔剂}} = P_{\text{电极}} \times EF_{\text{电极}}$$

✚ 活动水平数据获取 Activity data collecting

■ $P_{\text{电极}}$: 电炉炼钢及精炼炉等消耗的电极量，单位为吨（t）

✚ 排放因子数据获取 Emission factor collecting

■ EF: 电炉炼钢及精炼炉等所消耗电极的CO₂排放因子，单位为tCO₂/t电极。

钢铁行业企业碳排放核算与报告监测要求

Monitoring Methodology in MRG of Steel Industry

$$E_{\text{原料}} = \sum (M_i \times EF_i)$$

- ✚ 活动水平数据获取 Activity data collecting
 - M_i : 含碳原料的购入量, 单位为吨 (t)
- ✚ 排放因子数据获取 Emission factor collecting
 - EF: 含碳原料的CO₂排放因子, 单位为tCO₂/t原料;

钢铁行业企业碳排放核算与报告监测要求

Monitoring Methodology in MRG of Steel Industry

$$E_{\text{电和热}} = AD_{\text{电力}} \times EF_{\text{电力}} + AD_{\text{热力}} \times EF_{\text{热力}}$$

✚ 活动水平数据获取 Activity data collecting

- 净购入的电量AD电力（热量AD热力）= 购入量-外销量
- 依据：电力（或热力）供应商、报告主体存档的购售结算凭证以及企业能源平衡表

✚ 排放因子数据获取 Emission factor collecting

- 国家主管部门最近年份公布的相应区域电网排放因子
- 热力消费的排放因子暂按0.11 tCO₂/GJ计，未来更新

钢铁行业企业碳排放核算与报告监测要求

Monitoring Methodology in MRG of Steel Industry

$$R_{\text{固碳}} = \sum (AD_{\text{固碳}} \times EF_{\text{固碳}})$$

✚ 活动水平数据获取 Activity data collecting

■ $AD_{\text{固碳}}$: 固碳产品的产量, 单位为吨 (t)

✚ 排放因子数据获取 Emission factor collecting

■ $EF_{\text{固碳}}$: 固碳产品的CO₂排放因子, 单位为tCO₂/t;

钢铁行业企业碳排放核算与报告监测要求

Monitoring Methodology in MRG of Steel Industry

- 数据质量的要求QA/QC requirement
 - 数据复查与验证Data checking
 - 仪器校准与调整Instruments calibration
- 相应的监测要求Monitoring requirement
 - 数据原始凭证Original data evidence
 - 测量仪器证明文件Instruments evidence
 - 验证计算内容Checking process

钢铁行业企业碳排放核算与报告监测要求

Monitoring Methodology in MRG of Steel Industry

- 不确定性要求
Uncertainty requirement
 - 不确定性因素识别
Uncertainty sources
 - 不确定性计算Uncertainty estimation
 - 两个或多个变量的不确定性可使用加减运算的误差传递公式和乘除运算的误差传递公式。
Use error transfer formula for no less than 2 parameters
- 相应的监测要求
Monitoring requirement
 - 不确定性因素说明
Statement of uncertainty sources
 - 降低不确定性的措施说明
Improvement of uncertainty
 - 验证计算内容Checking process

Li Peng, NKE, Sinocarbon (10 min)

- To outline the sampling and sample analyses in the MRG of the national ETS
- which improvements and lessons from EU ETS might be useful
- 钢铁的取样方法

钢铁行业企业碳排放核算与报告取样与分析要求

Sampling and Sample analyses Requirements in MRG of Steel Industry

国家排放指南取样与测量要求 Sampling and sample analyses requirement

采用已有测量标准 Analyses standards

- GB 17167-2006 《用能单位能源计量器具配备和管理通则》
- GB/T 213-2008 《煤的发热量测定方法》
- DL/T 567.8-95 《燃油发热量的测定》
- GB/T 11062-1998 《天然气发热量、密度、相对密度和沃泊指数的计算方法》
- GB/T 476-2008 《煤中碳和氢的测定方法》
- GB/T 212-2001 《煤的工业分析方法》

钢铁行业企业碳排放核算与报告取样与分析要求

Sampling and Sample analyses Requirements in MRG of Steel Industry

上海排放指南取样与测量要求 Sampling and sample analyses requirement

参数Parameters	取样要求Sampling Requirements
热值NCV	每批次入厂燃料至少1次 $\geq 1/\text{batch}$
含碳量Carbon contents	同一燃料品种每年不少于6次 $\geq 6/\text{fuel type}/\text{year}$
含铁物质含碳量Carbon contents of iron material	同种物质每年不少于1次 $\geq 6/\text{material type}/\text{year}$
废气及烟尘含碳量Carbon contents of waste gas and dust	每年至少抽样3个完整生产循环或3小时 ≥ 3 cycle or hrs/year
炉渣含碳量Carbon contents of cinder	每年检测不少于6次 $\geq 6/\text{year}$
石灰石、白云石Limestone and dolomite	同种物质每年不少于3次 $\geq 6/\text{material type}/\text{year}$
氧化率Oxidation rate	每年至少1次 $\geq 1/\text{year}$

钢铁行业企业碳排放核算与报告取样与分析要求

Sampling and Sample analyses Requirements in MRG of Steel Industry

✚ 欧盟的经验与教训Improvements and lessons from EU ETS

- 制订取样计划Sampling plan
- 采用通用的分析方法和标准Analytical methods and relevant standards

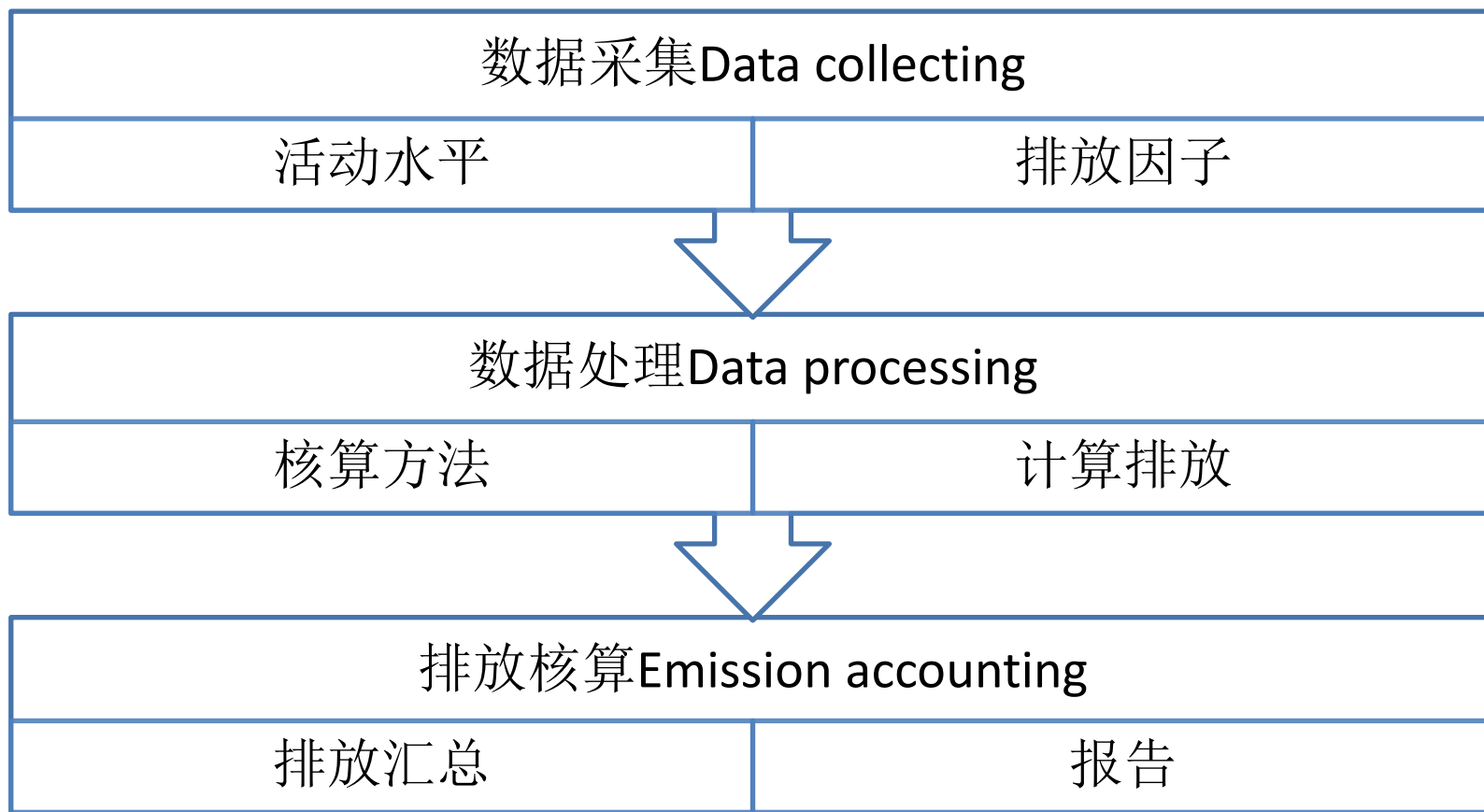
Li Peng, NKE, Sinocarbon (10 min)

- MRG requirements on data flow and QA/ QC procedures
- 从原始的数据到最后的结果
- 加国家指南的QA要求
- to what extent may experience with EU ETS be useful for China and showing an example how this might work
- 欧盟的QA要求 和中国的区别

钢铁行业企业碳排放核算与报告数据质量要求

Data Flow and QA/QC Procedure in MRG of Steel Industry

数据流 Data flow



钢铁行业企业碳排放核算与报告数据质量要求

Data Flow and QA/QC Procedure in MRG of Steel Industry

✚ 数据管理要求QA/QC Procedure

- 建立企业温室气体排放核算和报告的规章制度GHG emission accounting and reporting regulation
- 建立企业温室气体排放源一览表GHG emission source list
- 建立健全的温室气体排放和能源消耗的台账记录GHG emission and energy consumption records
- 建立健全的企业温室气体排放参数的监测计划Relevant monitoring plan
- 建立企业温室气体排放报告内部审核制度Internal GHG emission reporting audit system

钢铁行业企业碳排放核算与报告数据质量要求

Data Flow and QA/QC Procedure in MRG of Steel Industry

	国家 National	北京 Beijing	广东 Guangdong	上海 Shanghai
管理人员Staff	✓	✓	✓	
管理体系Accounting management system	✓	✓		
工作计划Work plan	✓	✓		✓
数据管理Data management		✓	✓	✓
文件存档Documents	✓	✓	✓	✓
仪器检定Equipment calibration		✓	✓	✓
内部审计Internal check	✓			✓
不确定性Uncertainty		✓	✓	✓

钢铁行业企业碳排放核算与报告数据质量要求

Data Flow and QA/QC Procedure in MRG of Steel Industry

欧盟的经验 Experience from EU ETS

- 数据的内部审核和验证 Internal data review and verify
 - 过去几年内获得、监测和报告的数据进行比较 Compare monitored data from last several years
 - 对通过不同运行数据采集系统获取的数据和数值进行比较 Compare data from different source
- 外包流程（如计量设备的委托检测等） Data outsourcing
 - 检查外包数据流活动和控制活动的质量 check the data from outsourcing and guarantee its quality
- 数据缺失的处理 Data missing
 - 采用适当的估算方法确定相应时期和缺失参数的保守替代数据 appropriate estimation method to replace the missing data and make sure it is conservative

Li Peng, NKE, Sinocarbon (10 min)

- To outline how an MP template could work for Chinese MRG implementation
- 内容总结
- which elements might be useful to include in the MRG

钢铁行业企业碳排放核算与报告监测计划

MP template in MRG of Steel Industry

+ 监测：获取与温室气体排放相关的数据

Monitoring: data collection guideline

■ 监测计划的制定Monitoring plan

- 实用性Useful for data collection

- 简捷性Easy to practice

■ 监测计划的实施Monitoring practice

- 提供计划模板Template of monitoring plan

- 第三方审核The third party verification

钢铁行业企业碳排放核算与报告监测计划 MP template in MRG of Steel Industry

✚ 主要内容举例 Contents for example

- 1 排放主体基本信息 General Information of Reporting Entity
- 2 基本排放情况说明 Description on Emission Status
- 3 活动水平数据获取方式 Acquisition of activity data
- 4 化石燃料相关参数获取方式说明 Monitoring procedure for fossil fuel net calorific value
- 5 熔剂碳酸盐排放因子获取方式说明 Monitoring procedure for emission factor of carbonate
- 6 不确定性说明 Uncertainty

钢铁行业企业碳排放核算与报告监测计划

MP template in MRG of Steel Industry

北京 Beijing	上海 Shanghai
排放主体基本信息 General information	排放主体基本信息 General information
排放主体的边界 Boundary of reporting entity	基本排放情况 Boundary and total emission
核算方法的选择和相关说明 Choice of accounting method and detail	化石燃料实物消耗量监测计划 Monitoring plan for fossil fuel consumption
监测体系 Monitoring position and personnel	化石燃料低位热值监测计划 Monitoring plan for NCV, CPE, OX and other specification of fossil fuel
	直接测量法监测计划 Plan for Measurement-based method
	不确定性说明 Uncertainty analysis

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方便企业进行监测的要素 Possible useful elements in the MRG

- 较完整的排放分类与排放源总结 Complete summary of the emission type and sources
- 数据统计指导 Guideline for data collection

Li Peng, NKE, Sinocarbon (10 min)

- Presenting the Chinese AER template based on AER requirements in the MRG
- 报告模版

钢铁行业企业碳排放核算与报告指南报告模板

AER template in MRG of Steel Industry

主要内容Contents

- 一、企业基本情况Information of Reporting Companies
- 二、温室气体排放GHG Emission
- 三、活动水平数据及来源说明Activity Data and Statement
- 四、排放因子数据及来源说明Emission Factor and Statement

钢铁行业企业碳排放核算与报告指南报告模板

AER template in MRG of Steel Industry

试点模板——上海 Templates of Shanghai

- 分工序情况说明 Statement of industrial progress
- 分工序排放 Emission of industrial progress

表 C-5 分工序情况说明

工序名称	生产线地理位置	涉及的主要生产设备	设备规格 ×数量	使用的主要原料、燃料	产出的主要产品、废弃物

表 C-6 温室气体排放汇总（单位：t CO₂）

工序	直接排放量	间接排放量

钢铁行业企业碳排放核算与报告指南报告模板

AER template in MRG of Steel Industry

- 国家模板：template for national MRG
- 附表一：报告主体二氧化碳排放量报告

Annex I : Annual CO₂ Emission

企业二氧化碳排放总量 (tCO ₂) Total CO ₂ emission	
化石燃料燃烧排放量 (tCO ₂) Emission of fossil fuel combustion	
工业生产过程排放量 (tCO ₂) Emission of industrial process	
净购入使用的电力、热力产生的排放量 (tCO ₂) Emission of purchased power and heat	
固碳产品隐含的排放量 (tCO ₂) Emission of carbon sequestration	

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附表二：报告主体活动水平数据

Annex II : Activity Data

	净消耗量Consumption (t, 10 ⁴ m ³)	NCV (GJ/t, GJ/10 ⁴ m ³)
Fossil fuel		
	数据Data	单位Unit
Industrial process		
	数据Data	单位Unit
Purchased power and heat		
	数据Data	单位Unit
Carbon sequestration		

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AER template in MRG of Steel Industry

附表三：排放因子和计算系数

Annex III: Emission Factors and Calculation Factors

	含碳量Carbon Content (tC/GJ)	氧化率Oxidation Rate (%)
Fossil fuel		
	数据Data	单位Unit
Industrial process		
	数据Data	单位Unit
Purchased power and heat		
	数据Data	单位Unit
Carbon sequestration		