



# 节能减排中的中国水泥工业

## China Cement Industry in Energy Saving and Emission Reduction

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### I. Present situation and achievements

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# 一、现状与成就

## I. Present situation and achievements

### (一) 产量与结构 (I) Output and structure

2010年，中国水泥产量18.8亿吨，新型干法水泥熟料产量比重达81%以上。In 2010, the output of China cement achieved 1.88 billion ton, of which the cement clinker applying new dry-process accounting for over 81%.

新型干法水泥生产线：近1300条，熟料产能12.5亿吨左右。New dry-process cement production line: nearly 1,300 lines, clinker capacity was about 1.25 billion ton.



## 2001~2010年中国水泥产量及新型干法水泥产量占比

Output of China cement and proportion of new dry-process  
cement in 2001-2010



年份 Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
亿吨 10 <sup>8</sup> ton	6.61	7.25	8.62	9.67	10.69	12.36	13.60	14.00	16.48	18.80
占比 Proportion	14	16	21	32	39	46	51	61	72	81

# 一、现状与成就

## I. Present situation and achievements

### (二) 技术与装备

### (II) Technology and equipment

目前中国的水泥装备已由国际市场份额40%左右,到2010年时,采用我国水泥技术和装备累计建成投产、正在实施和已签合同的水泥成套生产线140多条,已经建成的生产线120多条,建设规模基本都是日产2000吨至日产10000吨新型干法水泥生产线。

At present, China cement equipment has already owned a share of about 40% in the international market. By the end of 2010, having been applying China cement technology and equipment, 140 sets of cement production lines had been put into operation, under implementation or already contracted, and about 20 production lines had been completed, all of which were basically new dry-process cement production lines yielding an output of 2,000 t/d to 10,000 t/d.

# 一、现状与成就

## I. Present situation and achievements

### (三) 淘汰落后

## (III) Eliminating backward production capacity

2006—2010年，累计淘汰落后水泥产能3.4亿吨

In 2006-2010, a total of 340 million ton backward cement capacity was eliminated.



# 一、现状与成就

## I. Present situation and achievements

### (四) 集中度 (IV) Concentration

ratio 2010年中国水泥行业前10家企业产量4.7亿吨，占全国水泥产量的25%，较2005年提高9.6个百分点。In 2010, the output of top 10 China cement industry enterprises amounted 470 million ton, accounting for 25% of the national cement output, up by 9.6% in comparison with 2005.



# 一、现状与成就

## I. Present situation and achievements

### (五) 能耗与品种 (V) Energy consumption and category

2009年水泥行业能源消耗1.53亿吨标准煤，比2005年增加30.8%。In 2009, the energy consumption of standard coal in cement industry reached 153 million ton, up by 30.8% in comparison with 2005.

煤炭和电力是水泥工业的主要能源，占总量的97.71%，其中煤炭消耗占水泥工业能耗总量的86.86%。Coal and electric power are main energy sources for cement industry, accounting for 97.71% of the total amount, while coal consumption accounts for 86.86% of the total energy consumption in cement industry.





## 2005-2009年中国水泥工业能源消耗及增长情况Energy consumption and growth of China cement industry in 2005-2009

单位：万吨标准煤  
Unit: 10<sup>4</sup> ton standard coal

年份Year	能源消耗量 Energy consumption	增长率% Growth rate %
2005	11730	7.22%
2006	13102	11.70%
2007	14191	8.31%
2008	14323	0.93%
2009	15347	7.15%



# 一、现状与成就

## I. Present situation and achievements

### (六) 余热利用(VI) Waste-heat

utilization 到2010年年底，累计约有700条生产线建成余热发电站，

总装机容量达到4800兆瓦。年发电368亿度，相当于年节约标

准煤900多万吨。 By the end of 2010, a total of about 700 production lines had been built into waste-heat power station, the gross installed capacity reaching 4,800 Mw. The annual generating capacity amounted 36.8 billion kilowatt-hour, which was equivalent to saving more than 9 million ton of standard coal annually.



# 一、现状与成就

## I. Present situation and achievements

### (七) 单位产品能耗水平

#### (VII) Energy consumption of unit product

随着日产4000吨及以上生产线成为主流窑型，中国新型干法水泥熟料单位煤耗接近国际先进水平。With the production lines of and over 4,000 t/d becoming the main type of kiln, the unit coal consumption of cement clinker applying China new dry-process approaches the international advanced level.

与国际先进水平的差距，主要体现在落后产能上。The gap with international advanced level finds its expression in backward production capacity.



# 中国一家现有水泥企业单位产品能耗

## Energy consumption of unit product of one existing cement enterprise in China

分类Classification	可比熟料 综合煤耗kgce/t Comparable comprehensive coal consumption of clinker kgce/t	可比熟料 综合电耗 <sup>a</sup> kWh/t Comparable comprehensive power consumption <sup>a</sup> of clinker kWh/t	可比水泥 综合电耗 <sup>b</sup> kWh/t Comparable comprehensive power consumption <sup>b</sup> of cement kWh/t	可比熟料 综合能耗 kgce/t Comparable comprehensive energy consumption of clinker kgce/t	可比水泥 综合能耗 kgce/t Comparable comprehensive energy consumption of cement kgce/t
4000t/d以上 (含4000t/d ) Above 4000t/d(including 4000t/d)	≤120	≤68	≤45	≤128	≤105
2008	98.31	62.16	37.06	106.54	90.84
2009	90.14	57.38	34.29	97.74	84.8
2010	90.20	57.14	38.07	97.82	86.63

# 一、现状与成就

## I. Present situation and achievements

### (八) 单位产品能耗下降

(VIII) Energy consumption reduction of unit product  
与2005年相比, 2009年度水泥综合能耗下降约25%左右; 水泥熟料单位产品能耗下降约20%左右。 Compared with 2005, the comprehensive energy consumption of cement in 2009 reduced by about 25%; the energy consumption of unit cement clinker in 2009 reduced by about 20%.

主要原因分析: Analysis on main reasons:

- 1、工艺结构的提升: 新型干法能耗比立窑低20% 1. The improvement of process structure: the energy consumption of new dry-process is 20% lower than that of vertical kiln.
- 2、规模结构的提升: 生产线大型化 2. The improvement of scale structure: the expansion of production lines.





# 一、现状与成就

## I. Present situation and achievements

### （九）企业加强节能减排管理

(IX) Enhanced management of energy saving and emission reduction by enterprises

- 中国某水泥企业的节能减排重点措施The key measures on energy saving and emission reduction of one cement enterprise in China:
  - 1、在新建项目和改造中，配套完善环境保护设施。1. In new projects and reconstruction, provide perfect environmental protection facilities.
  - 2、使用环保新装备、新技术，窑尾电收尘改袋式收尘，降低污染物的排放，确保排放指标优于国家标准。2. Use new environmental equipment and new technologies, replace kiln inlet electric precipitation is with bag-type precipitation, reduce pollutants emission, and ensure the emission index to be better than national standard.
  - 3、进一步完善企业环保管理体系和管理制度，加强环保设备设施的运行和环保日常管理工作，将环保设备视同主机设备，要求其同步运转率达到100%，并严格按照管理制度的规定予以考核。3. Further perfect management system and mechanism of environmental protection within enterprises, strengthen the operation of environmental equipment & facilities and daily management of environmental protection. Take the environmental equipment as the main process equipment, synchronous running rate being required to reach 100%, and check strictly according to the regulations of management mechanism.



# 一、现状与成就

## I. Present situation and achievements

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- 4、严格按照ISO14001的规定做好环境保护工作，在进行公司内部审核的同时，由认证中心专家定期进行审核，根据专家的意见和建议，对出现的问题予以持续改进。 4. Conduct environmental protection strictly according to the regulations of ISO 14001. Verification should also be undertaken by experts at the same time of enterprise internal examination, according to which promote continuous improvement regarding occurring issues.
- 5、加强余热发电项目运行管理，提高发电效率。 5. Strengthen the operation management on power generation projects of waste-heat, and improve generating efficiency.
- 6、广泛采取变频节电技术，继续采用低能耗设备，进一步降低电能消耗。 6. Extensively adopt power-saving technology of frequency conversion, continuously adopt low energy-consumption equipment, and further reduce power consumption.
- 7、实施照明改造工程，使用高效节能灯，降低电耗和成本。 7. Implement lighting modification project, use high efficiency energy-saving lamp, reduce power consumption and cost.
- 8、使用好劣质燃料的燃烧技术及装备技术，最大限度地发挥燃料的使用效率。 8. Properly use the combustion technology and equipment technology of low grade fuel, and maximize the utilization efficiency thereof.





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## I. Present situation and achievements

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(IX) Enhanced management of energy saving and emission reduction by enterprises

- 9、继续开展降低熟料煤耗QC活动，煤碳占能耗比例80%以上。使用清洁生产技术，提高工业废弃物的利用率，如磷石膏、炉渣等。 9. Continuously carry out QC activity on reducing coal consumption of clinker, while coal consumption accounts for more than 80% of energy consumption. Adopt clean production technology, and improve the utilization ratio of industrial waste such as phosphogypsum and slag.
- 10、加强节能减排工作的宣传和培训工作，纳入企业培训体系。 10. Strengthen the publicity and training on energy saving and emission reduction, incorporate which into the enterprise training system.
- 11、加强混合材水份控制，提高水泥磨台产，降低水泥综合电耗。 11. Strengthen the moisture control of composite materials, improve cement mill yield, and reduce the comprehensive power consumption of cement.
- 12、拓展污泥处置业务，研究污泥干化技术，降低污泥处置过程中的能耗。 12. Expand sludge disposal business, study sludge drying technology, and reduce energy consumption during sludge disposal.





# 一、现状与成就

## I. Present situation and achievements

### （九）企业加强节能减排管理

(IX) Enhanced management of energy saving and emission reduction by enterprises

- 13、现场扬尘治理工程，对生产流程中各个扬尘点，采用增设收尘器、厂房封闭、增设防雨棚等方式，控制粉尘排放。 13. In terms of on-site dust control project, regarding each dust emission point in production process, adopt such approaches as increasing dust collectors, closing plant building, increasing all-weather canopies to control dust emission.
- 14、持续开展对标管理，瞄准行业最好水平，对比差距，持续改进，不断降低能耗水平。 14. Continuously carry out benchmarking management, aim at the best level within industry, compare the difference, continuously improve, and constantly reduce energy consumption.
- 15、加大考核与竞赛力度，实施严格的节能降耗考核，加大奖罚力度，进一步促进资源的节约。 15. Strengthen the efforts of assessment and competition, implement strict energy saving verification, intensify reward and punishment, and further promote resource saving.
- 16、开展5S管理，搞好厂区绿化、交通、规范文明工厂建设。 16. Carry out 5S management, properly conduct the construction of plant area greening, transportation and civilization.

## 二、未来与发展

## II. Future and development

### (一) 发展目标 (I) Development goals

- 1、总量：2015年国内水泥需求量22亿吨左右。1. Total : the domestic demand of cement in 2015 will be about 2.2 billion ton.
- 2、技术进步：到2015年，新型干法水泥技术要超越与引领世界水泥工业的发展，达到世界领先水平。2. Technical progress: by 2015, new dry-process cement technology is supposed to lead and surpass the development of world cement industry, and reach the leading level.
- 3、结构调整：3. Structural adjustment:
  - (1) 技术结构调整：新型干法熟料比重，由2010年的81%，提高到2015年的95%以上。Technical structure adjustment: the proportion of cement clinker applying new dry-process is supposed to increase from 81% in 2010 to more than 95% in 2015.
  - (2) 组织结构调整：前10家水泥企业生产集中度，由2010年的25%，提高到2015年的35%。Organizational structure adjustment: the production concentration ratio of the top 10 cement enterprises is supposed to increase from 25% in 2010 to 35% in 2015.
  - (3) 淘汰落后：累计淘汰落后水泥2.5亿吨。Eliminate backward production capacity: a total of 250 million ton backward cement capacity is supposed to be eliminated.

## 二、未来与发展

### II. Future and development

#### (二) 发展重点 (II) Development focuses

- 1、产品发展的重点 1. Product development
- 2、节能减排技术推广的重点 2. Promotion of energy saving and emission reduction technology
- 3、技术改造的重点 3. Technical reconstruction
- 4、标准制修订的重点 4. Development and revision of standards



## 二、未来与发展

### II. Future and development

#### (三) 重点工程 (III) Major projects

- 1、节能改造工程 1. Project of energy saving reformation
- 2、淘汰落后工程 2. Project of backward capacity elimination
- 3、环保产业工程 3. Project of environmental protection industry

介绍结束，谢谢！  
The end, thanks!

