武汉市“十三五”煤炭消费总量控制方案和政策研究

The Coal Consumption Control Target and Measures for Wuhan in the “13th Five-Year Plan” Period

武汉市节能监察中心　项定先

Wuhan Energy Conservation and Supervision Centre (WHECS)

2016年11月1日

武汉 Wuhan

中国中部地区中心城市
A key city in central China

- **工业基地**
  Industrial base
- **科教基地**
  Base of science and education
- **综合交通枢纽**
  Transportation hub

面积 8569 平方公里
Total area of 8,569km²

人口 1060 万
A population of 10.6 million

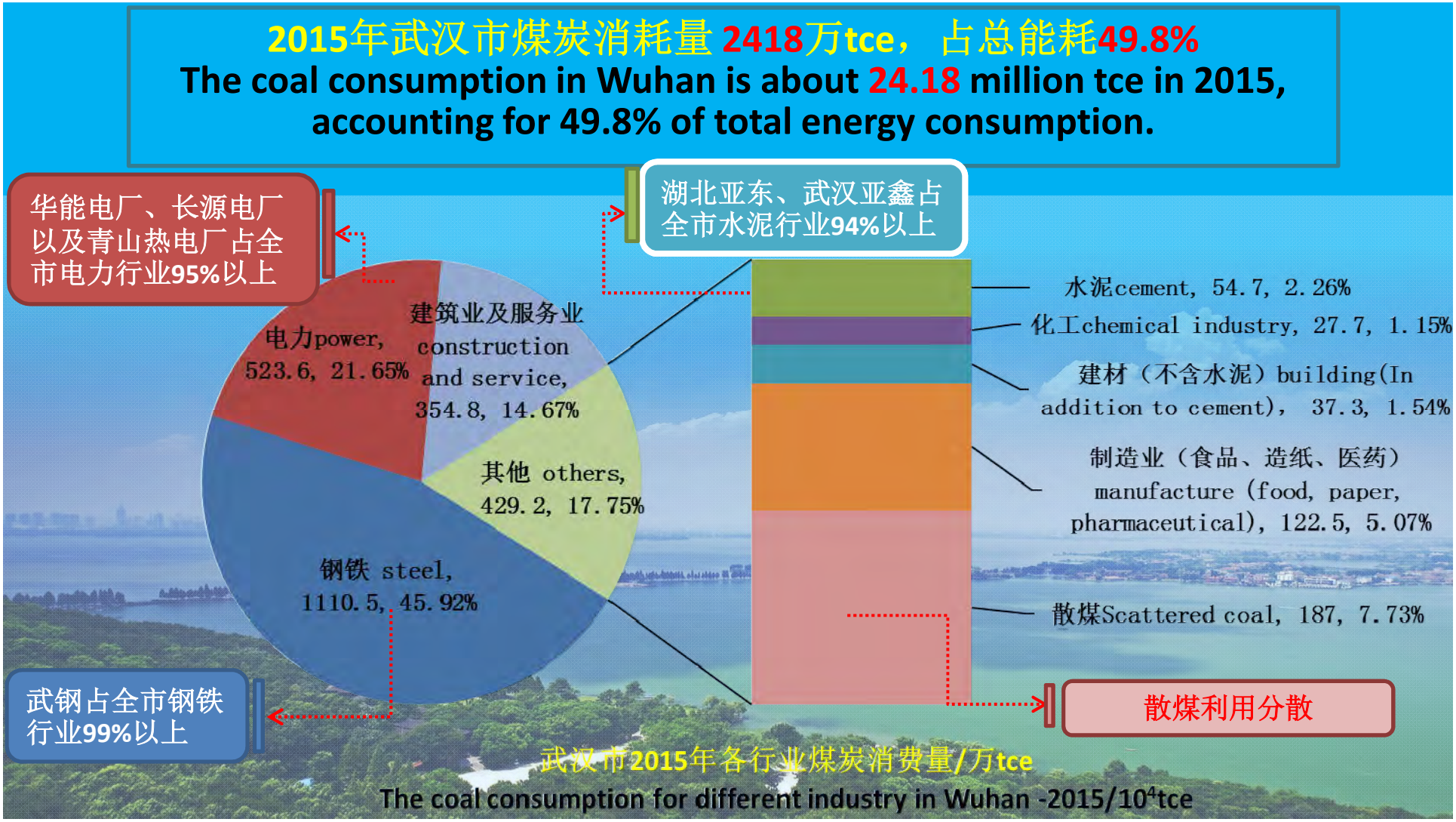
GDP 10905亿元
GDP of 1,090.5 billion yuan

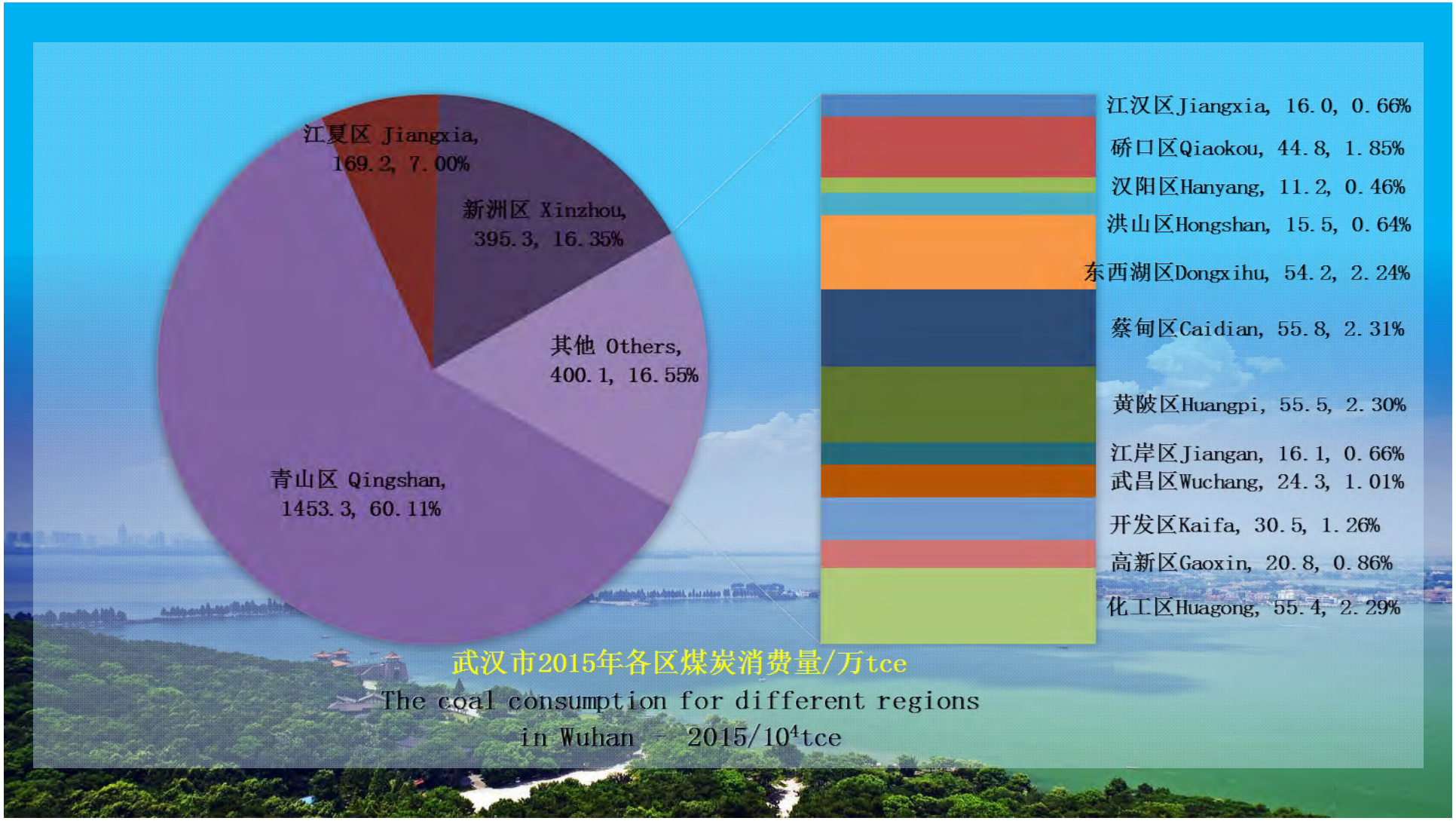
主要内容

The main content

2015年武汉市煤炭消耗量2418万tce，占总能耗49.8%

The coal consumption in Wuhan is about 24.18 million tce in 2015, accounting for 49.8% of total energy consumption.



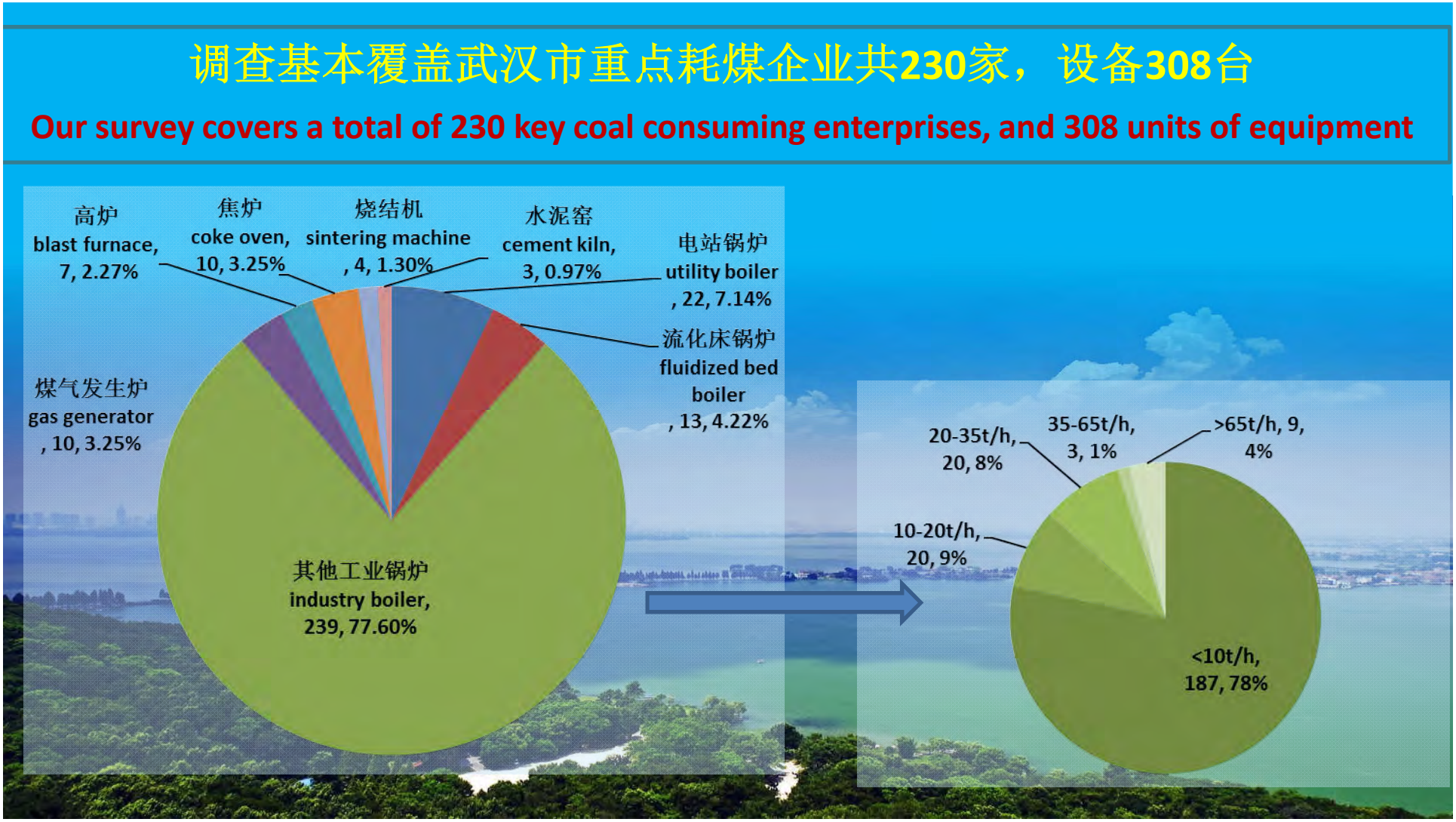


武汉市2015年各区煤炭消费量/万tce

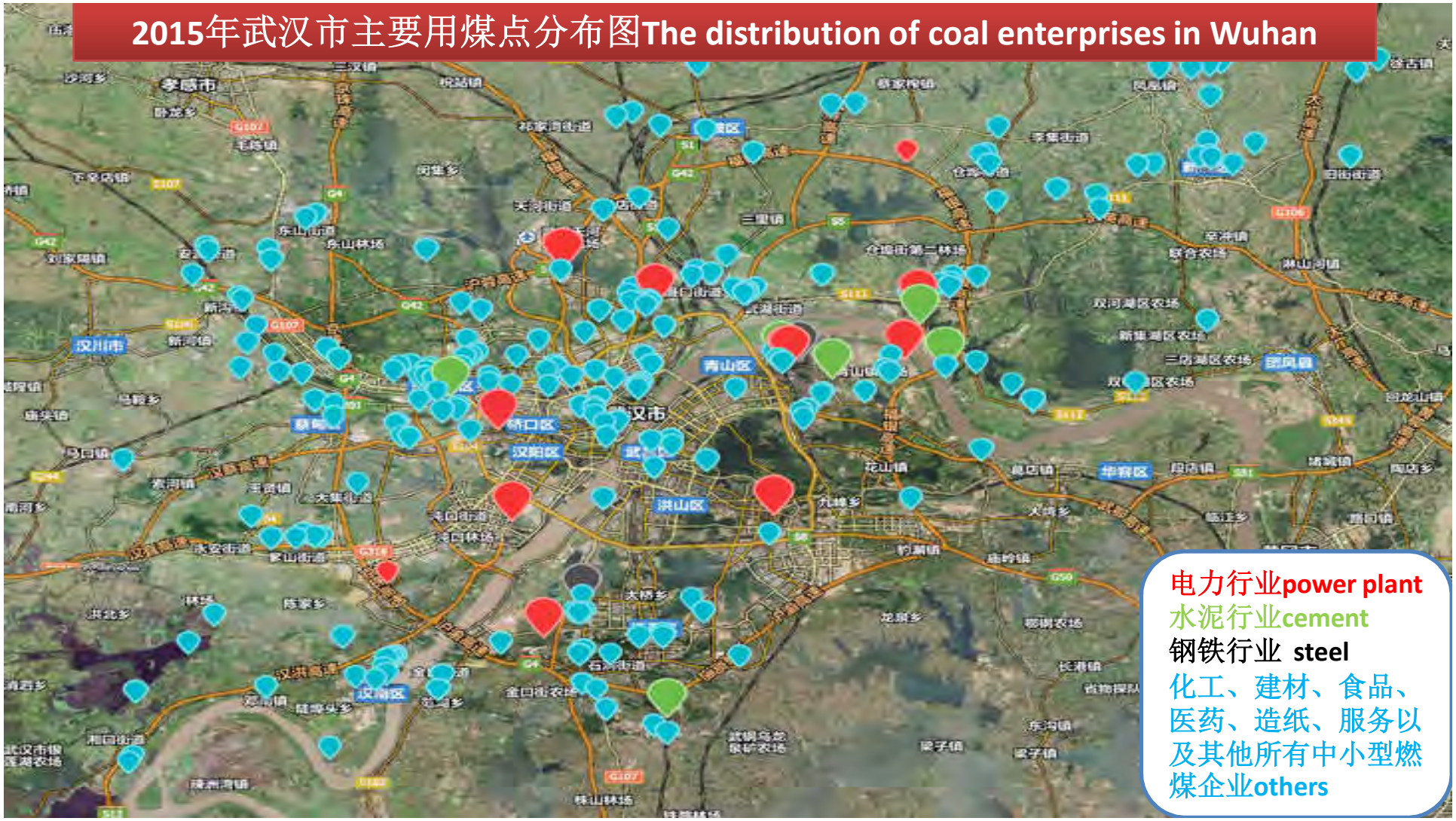
The coal consumption for different regions in Wuhan - 2015/10^4tce

调查基本覆盖武汉市重点耗煤企业共230家，设备308台

Our survey covers a total of 230 key coal consuming enterprises, and 308 units of equipment

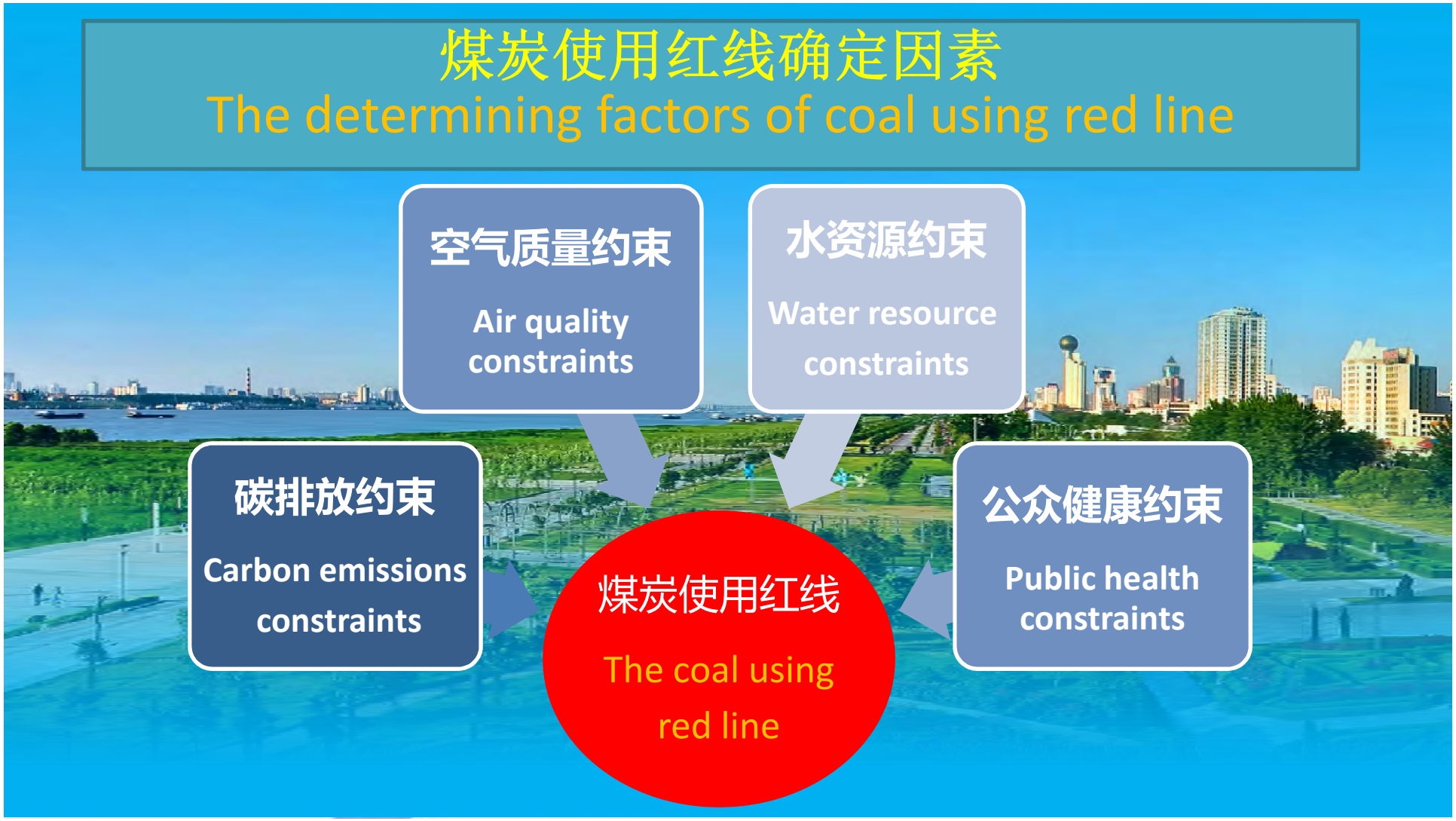


2015年武汉市主要用煤点分布图The distribution of coal enterprises in Wuhan



主要内容

The main content


煤炭使用红线确定因素
The determining factors of coal using red line
空气质量约束
Air quality constraints
水资源约束
Water resource constraints
碳排放约束
Carbon emissions constraints
煤炭使用红线
The coal using red line
公众健康约束
Public health constraints

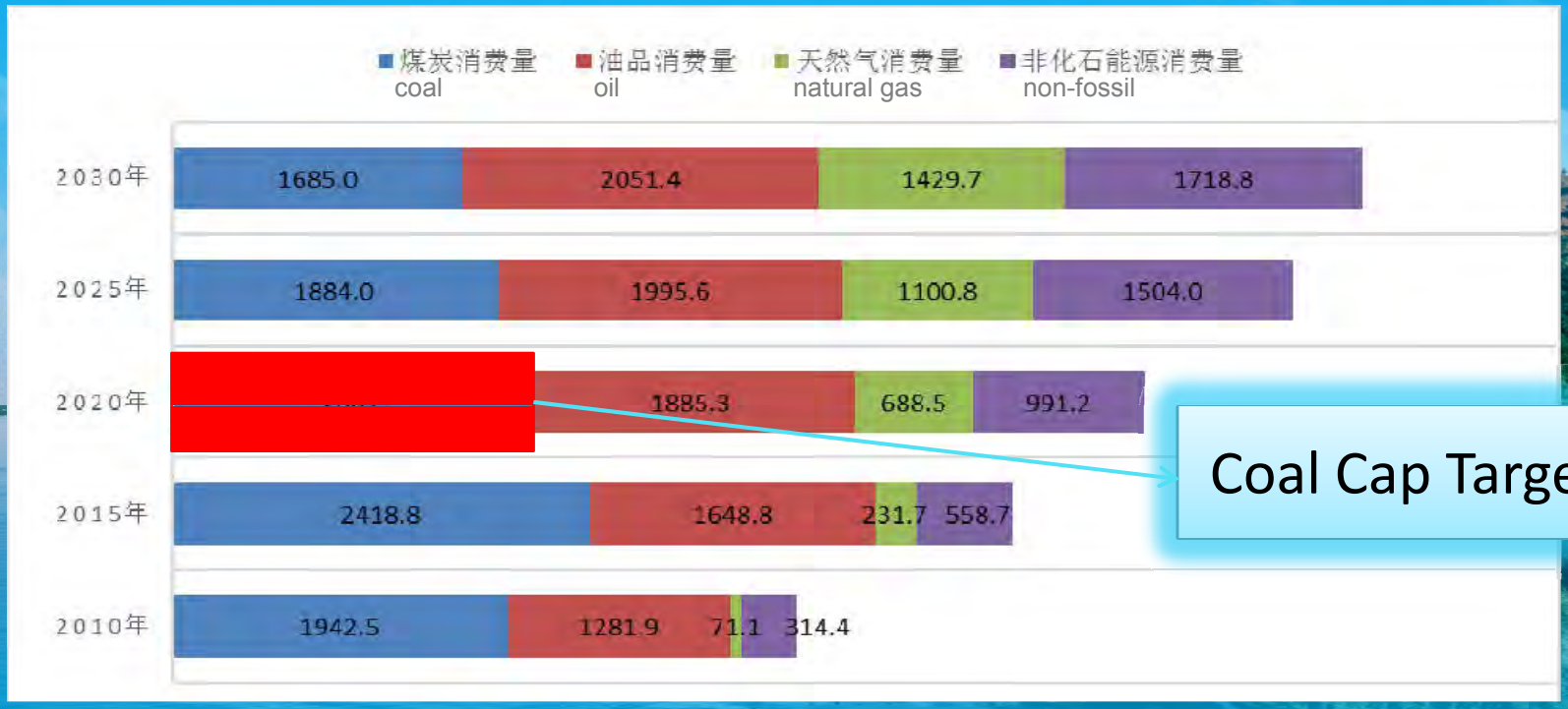
约束条件constraint		煤炭需求限制 The limitation of coal demand
碳排放 Carbon emissions	2022年武汉市碳排放达到峰值1.44亿吨 The carbon emissions reach a peak of 144 million tons in 2022	2020年煤炭****万吨以下 The coal consumption need to be controlled under 23.905 million tons in2020
空气质量 Air quality	2020年武汉空气质量达标天数达到70%以上，PM_{10}、$PM_{2.5}$年均浓度分别为73μg·m^{-3}、49μg·m^{-3} The air quality standard days reach above 70%, and the annual concentration of PM_{10}、$PM_{2.5}$ reach 73 μg·m^{-3}、49μg·m^{-3} in 2020.	2020年煤炭****万吨以下 The coal consumption need to be controlled under 20.61 million tons in2020
水资源 Water resource	2020年武汉市用水总量需控制在48.75亿m^{3}以内。The total water consumption should be controlled within 4.875 billion m^3 in 2020	煤炭需求与最严生态红线一致 The coal consumption is similar with Air quality red line
公众健康 Public health	2020年因煤污染物排放早死亡人数明显下降 The number of early deaths due to coal pollutant emissions decreased significantly in 2020.	煤炭需求与空气质量约束一致，煤控情景早死亡人数下降到4563人以下 The coal consumption is similar with Air quality red line, and the number of early deaths decreased to 4563 in Coal Consumption Scenarios

煤炭使用红线

主要内容

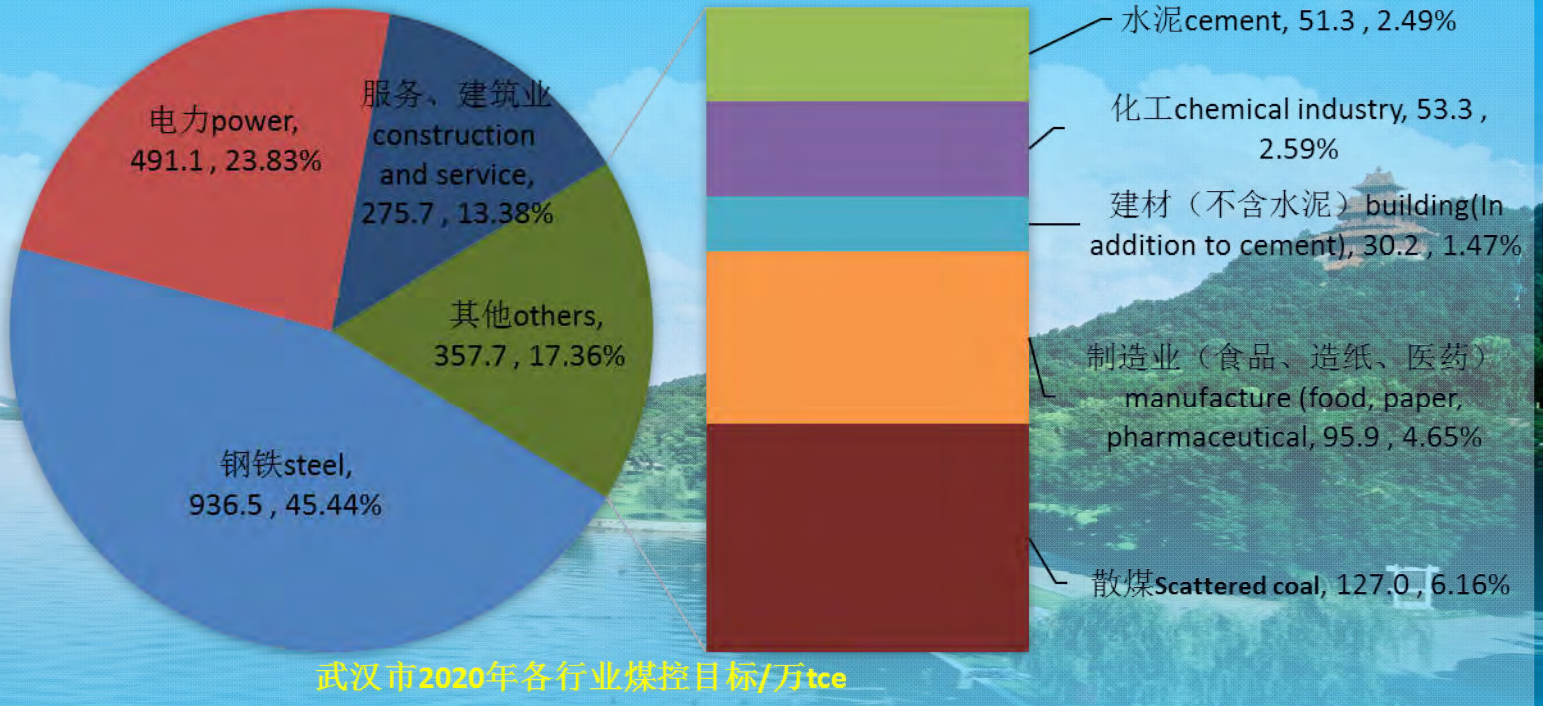
The main content

全市煤控目标Coal Cap Target



能源消费总量虽逐年增加，但煤炭消费总量逐年降低，能源结构不断优化，碳排放量也逐渐降低。**Although the total energy consumption increased year by year, the total coal consumption are decreased, and the energy structure is optimized, carbon emissions are gradually reduced.**

各行业煤控目标Coal Cap Target for different industry



武汉市2020年各行业煤控目标/万tce

结合产业结构调整、化解产能过剩、主要单位产品能耗指标达到先进水平以及各部门污染物排放量显著降低等标准，确定各行业煤控目标和减煤量。In combination with the industrial structure adjustment, the excess production capacity dissolution, the main energy consumption per unit product index reach the advanced level and various departments such as pollutant emissions significantly reduced standard, determine the coal cap target and reduction of coal.

各行业煤控目标Coal Cap Target for different industry

武汉市“十三五”期间各行业煤炭减量目标

The coal reducing target for different industry in Wuhan -“13th Five-Year Plan” Period

总减煤目标为357.1万tce The total coal reducing target are 3.571million tce

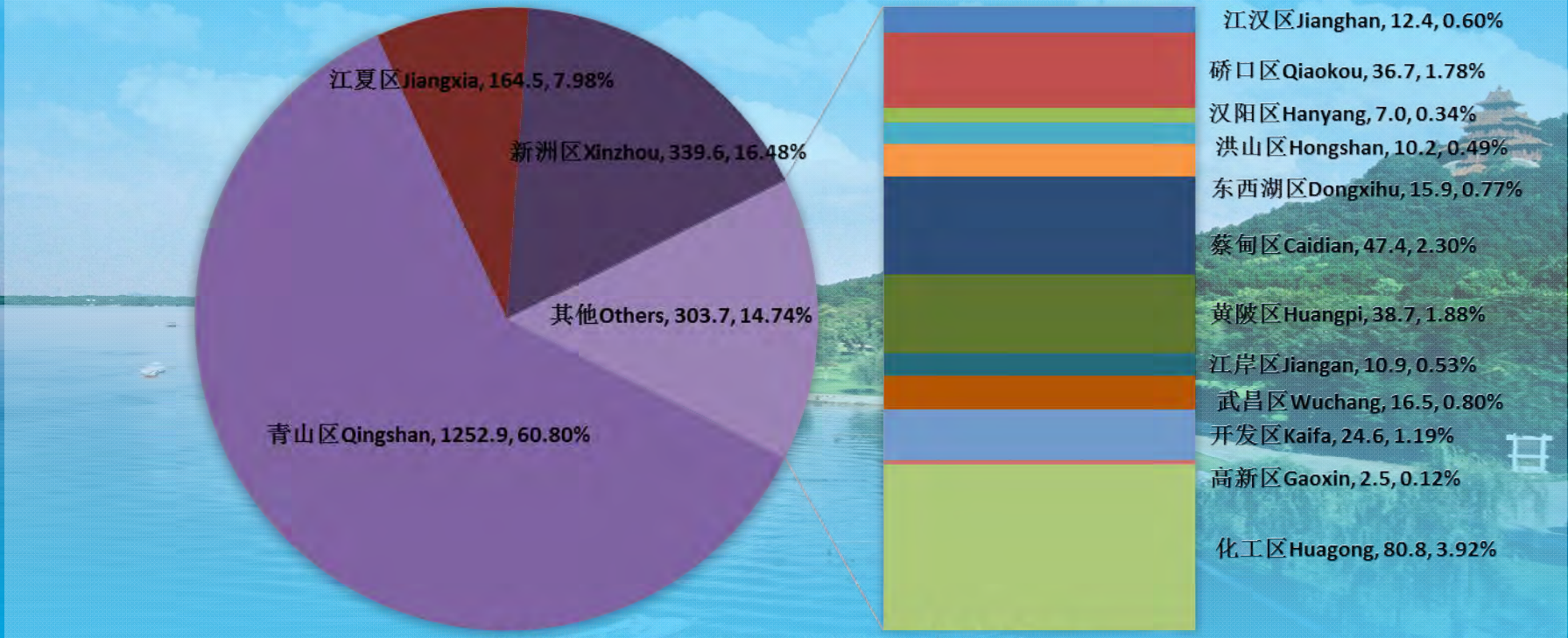
钢铁行业减煤量占比48.7% The coal reducing target of iron and steel industry accounted for 48.7%

小型燃煤锅炉减煤量占比22.1%The coal reducing target of small coal-fired boiler accounted for 22.1%

散煤使用减煤量占比16.8% The coal reducing target of scattered coal accounted for 16.8%

化工行业共将增加25.6万吨 The coal reducing target of chemical industry accounted for

各区煤控目标 Coal Cap Target for different region



武汉市2020年各区域煤控目标/万tce

The Coal Cap Target for different regions in Wuhan-2020

主要内容

The main content

武汉市煤炭消费情况
Coal Consumption situation

武汉市煤控目标确定
Coal Cap Target

武汉市煤控目标分解
Coal Cap Target decomposition

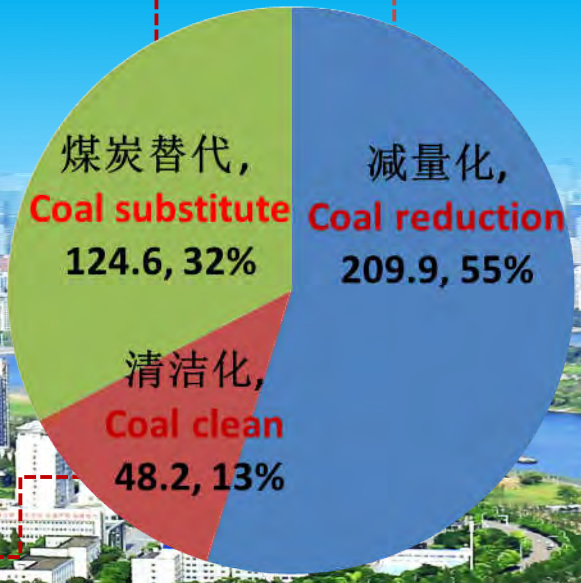
武汉市煤控实现途径
The realization approach for Coal Cap

武汉市煤控主要措施
The main measures for coal cap

实施途径The realization approach

到2020年，全市非化石能源占重提到17.6%，天然气占比提至12.3%，油品占比提至33.5%。煤炭消费占比降至36.6%。

By 2020, the city's non-fossil energy accounted for 17.6%, natural gas accounted for 12.3%, oil accounted for 33.5%. Coal consumption accounted for down to 36.6%



高效利用Efficient utilization：技改可减煤59.2万吨

调整产业结构Readjusting industrial structure：2020年服务业占比提高到60.7%

淘汰落后产能Eliminate backward production capacity：淘汰高污染燃煤设备或清洁改造

化解过剩产能Dissolve excess capacity：武钢化解产能节煤139万吨，高新热电关停减煤11.7万吨

绿色制造Green manufacturing：《武汉制造2025行动纲要》

提高煤炭质量和标准，推广使用洗煤，开发和推广洁净煤技术

Improve coal quality and standards, promote the use of coal washing, development and promotion of clean coal technology

2020年需减煤357.1万吨。由于化工行业增加25.6万吨，故实际需减煤382.7万吨

In 2020, it need to reduce 3.571 million tons of coal. As the chemical industry increased by 256,000 tons, so the actual need to reduce 3.827 million tons of coal

三大途径减煤量382.7万tce

Three approach can achieve 3.827 million tce coal reduction

主要内容

The main content

煤控措施Coal cap measures

电力行业Power
钢铁行业Steel
水泥行业Cement

- 节能技术改造

Energy-saving technology

- 化解过剩产能

Dissolve excess capacity

其他行业
other industries

- 集中供热central heating
- 煤改气 Coal to gas
- 煤改电Coal to electricity
- 煤改生物质Coal to biomass

散煤
Scattered coal

- 建管结合，宣传推动

Combining the construction and management，and publicity to promote

电力行业power industry

武汉市三大电厂煤耗总量基本占到武汉市电力行业煤耗总量的95%以上

The total coal consumption of the three power plants accounted for more than 95% of the total coal consumption of power industry in Wuhan

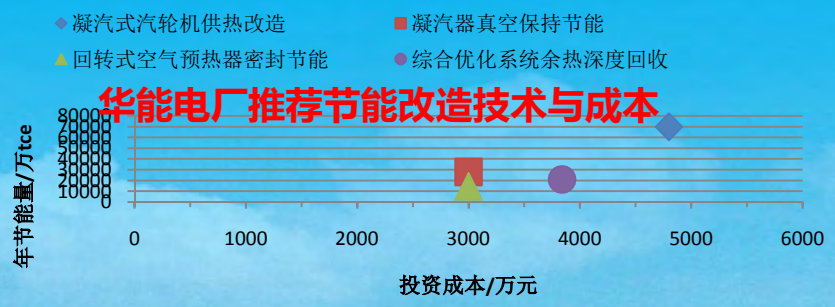
华能电厂					
机组	类型	供电量/万kWh	单位供电能耗/(gce/kWh)	限定值/(gce/kWh)	先进值/(gce/kWh)
1#	330MW亚临界	135386	325.33	331	323
2#	330MW亚临界	133014	324.97		
3#	300MW亚临界	80757	329.81		
4#	300MW亚临界	98244	328.69		
5#	640MW超临界	267252	300.89	306	302
6#	640MW超临界	215331	301.25		

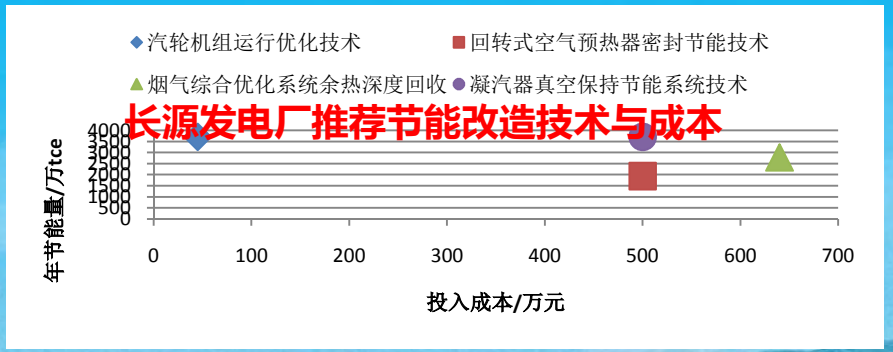
指标	青山热电厂	长源发电厂	限定值
单位供热能耗（kgce/GJ）	57.79	58.14	40
2015年供热量（GJ）	2594955	251478	—

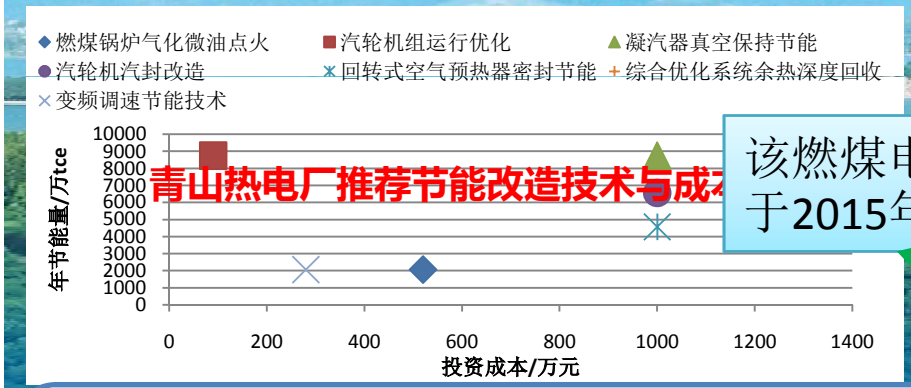
华能电厂1#-4#机组达到限定值，5#、6#达到先进值

两个热电厂供热能耗高于限定值较多

电力行业power industry







该燃煤电厂已于2015年关停

全市电力行业节能改造情况汇总

企业名称	投资成本/万元	年节煤量/万吨
华能电厂	14640	15.6
青山热电厂	5170	3.9
长源发电厂	1685	1.2
高新热电厂	0	11.7
总计	**21495**	**32.5**

通过对华能、青山、长源、高新电厂依次采用以上技术，总共可实现32.5万吨标煤的节煤量，预计需投入成本2.1亿元。Through the Huaneng, Qingshan, Changyuan, Gaoxin power plant in turn to adopt the above technology, it can be achieved a total of 325,000 tce reduction of coal, and is expected to cost 0.21 billion investment.

钢铁行业 Steel industry

武钢不同搬迁或去产能方案

The different relocation and dissolve capacity project of WUHAN IRON AND STEEL CROP

不搬迁、去产能 Don't relocate, resolve capacity	完全搬迁至外省 Completely relocated to other provinces	流程横切，部分搬迁到省外 Process cross-cutting, partly relocated to other province
• 减产能451万吨 • 实现减煤量**139**万吨标煤	• 完全搬迁至广西防城港 • 实现减煤量**1109**万吨标煤	• 仅保留后端高附加值钢材加工工序，外迁前端工序 • 实现减煤量**1109**万吨标煤

结合目前国内化解钢铁过剩产能的环境和武钢宝钢战略重组，武钢去产能势在必行。不管采用三种方案中任一种，可起码保证139万吨标准煤的减煤量。 Combined with the current domestic steel production capacity to resolve excess and Baosteel and Wuhan Iron and Steel strategic restructuring of the background, Wuhan Iron and Steel to resolve capacity is imperative. Regardless of the use of any of the three options can be at least to ensure that 1.39 million tce reduction.

钢铁行业Steel industry

武钢主要节能改造技术情况The main energy - saving technology of Wuhan Iron and Steel

技术	应用情况	年节煤量/tce	投资成本/万元
干式TRT	部分采用	5.5	37406
煤调湿技术	未采用	10.9	38723
焦化荒煤气回收	部分采用	4.7	18470
转炉煤气干法回收	未采用	8.7	35000
高炉鼓风除湿	部分采用	4.8	20000
合计		35	149599

武钢 “十三五”期间通过化解过剩产能可减煤153.9万tce，通过节能改造可减煤35万tce，即武汉市钢铁行业可实现188.9万吨tce的节煤量。Through resolve capacity can be reduced by 1.539 million tce coal, and energy saving can be reduced by 350,000 tce coal, So the Wuhan Iron and Steel industry can achieve 1.889 million tce coal reduction in the “13th Five-Year Plan” Period.

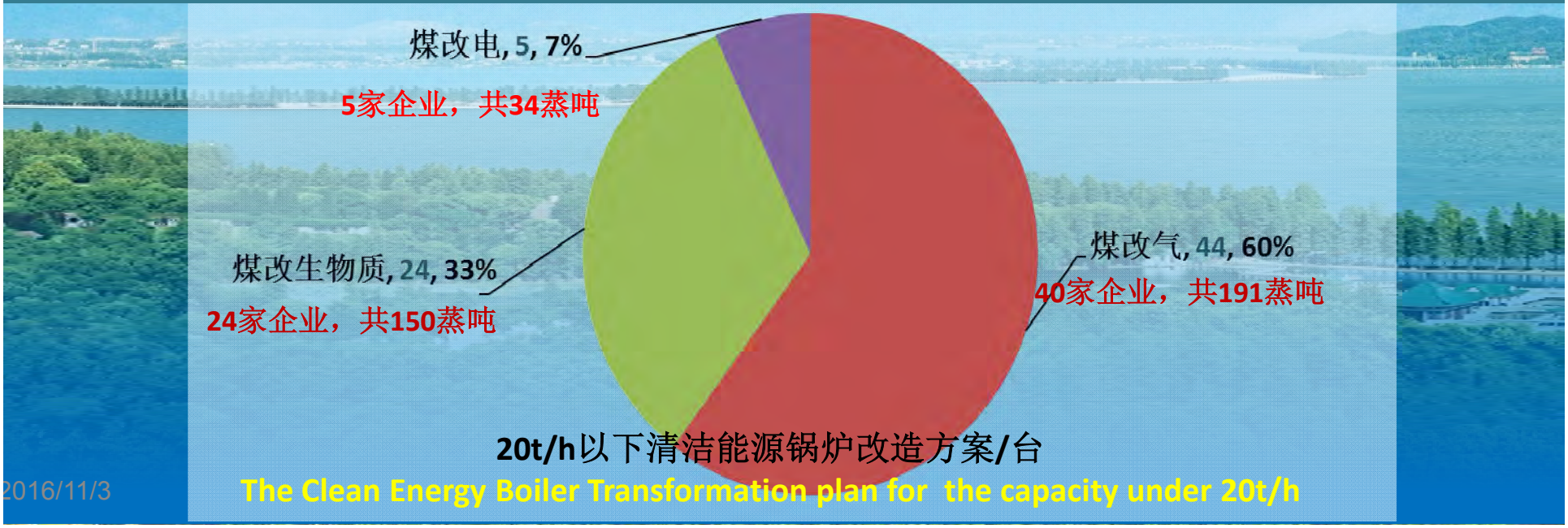
水泥行业Cement industry

企业名称	技术措施	应用潜力	节煤量（万tce/年）	节电量（万kWh/年）	投资成本（万元）	投资回收期（年）
湖北亚东	5级升六级	100%	1.48×2	—	7372	6.9
	改良的磨机	17.50%	—	897	2385	4.1
	高压辊磨机					
	冷却水热回收	100%	—	375	3750	1.5
	小计	—	3	1271	13507	5.3
武汉亚鑫	五级升六级	100%	0.4	—	1930	6.2
	燃料球磨改造	17.50%	—	111	123	1.8
	冷却水热回收	100%	—	138	138	1.7
	压缩机控制	100%	—	66	124	3.1
	小计	—	0.4	315	2315	4.6
总计		—	3.4	1586	15822	—

其他行业 other industries

全市容量在20蒸吨/小时以下的燃煤锅炉共有207台，其中具备集中供热条件的有134台，剩下的73台小型燃煤锅炉需全面拆除或清洁能源改造。预计总投资1.02亿元，可实现57.1万吨标准煤的减煤量。

According to the existing gas pipeline layout in Wuhan City, the electricity and natural gas development planning in “13th Five-Year Plan” period and the boiler clean energy transformation and other relevant provisions, the existing coal-fired enterprises alternative forms of clean energy can be initially identified , which costs 0.102billion and achieves 0.571 million tce of coal.



20t/h以下清洁能源锅炉改造方案/台

The Clean Energy Boiler Transformation plan for the capacity under 20t/h

集中供热central heating

根据燃煤企业分布集中情况，拟定在武汉市建立十一处集中供热区域来进行煤炭替代

武汉市集中供热区域规划The regional planning of central heating in Wuhan			
集中供热区域	煤炭替代量/万tce	集中供热改造企业个数	完成截止时间
阳逻新城集中供热区域	20.38	8	2020年
武昌滨江商务区集中供热区域	14.1	10	2020年
北湖集中供热区域	1.67	4	2020年
黄金口-汉阳主城区集中供热区域	1.04	13	2020年
汉口西部地区集中供热区域	47.27	33	2020年
盘龙城集中供热区域	12.15	18	2030年
横店集中供热区域	1.71	8	2030年

在“十三五”期间，通过对以上五大区域内所有燃煤企业锅炉进行集中供热改造大约可实现**67.49**万tce的减煤量。Through the central heating planning of all coal-fired boiler enterprises in this five areas, it can achieve about 674 900 tce reduction of coal in the “13th Five-Year Plan” period .

散煤Scattered coal

武汉市2015年散煤消费量为187万tce左右，占全市煤炭消费总量的7.73%。In 2015, the scattered coal consumption is about 1.87 million tce in Wuhan, accounting for 7.73% of total coal consumption.

治理思路：建管结合，宣传推动。Combining the construction and management，and publicity to promote.

建

- 加快电力设施增容新能源发展 Accelerate the power facilities capacity expansion and new energy development
- 加快燃气管网、站点布局 Accelerate the construction of gas network and site layout
- 稳步推进集中供热建设 Steadily push forward the construction of central heating
- 改善煤炭配供方式。 Improve the way of coal distribution and supply

管

- 继续推进“更换优质燃煤”、“更换高效节能炉具”等工作 Continue to promote the “replacement of high-quality coal”, “replacement of energy efficient stoves” work
- 严格禁燃区管理 Strict “Ban burning zone” management
- 建立规范散煤渠道 Establish a standardized scattered coal trading channels
- 多措并举，多管齐下，建立长效机制 Take a variety of measures to establish long-term mechanism




各区煤控措施Coal Cap Measure for different district

青山区：钢铁、电力、水泥行业比重较大，重点进行化解过剩产能和节能升级改造

Qingshan district have a large proportion of steel, power, cement industry ,so it need to focus on the elimination of excess capacity and energy-saving upgrades.

新洲区：中小型煤耗企业数量最多，重点对其进行节能改造、中小型燃煤锅炉的集中供热替代与清洁能源改造

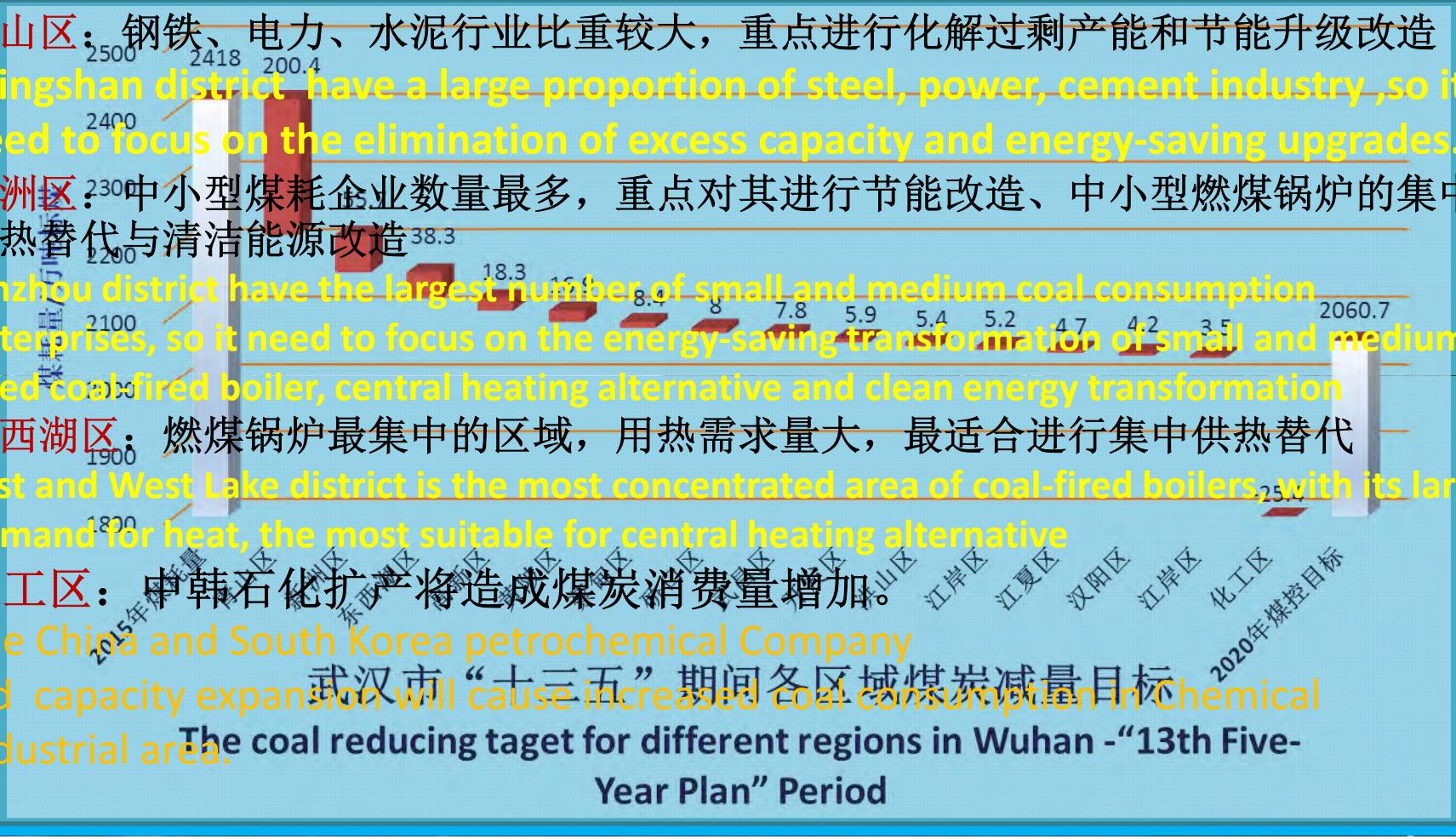
Xinzhou district have the largest number of small and medium coal consumption enterprises, so it need to focus on the energy-saving transformation of small and medium-sized coal-fired boiler, central heating alternative and clean energy transformation

东西湖区：燃煤锅炉最集中的区域，用热需求量大，最适合进行集中供热替代

East and West Lake district is the most concentrated area of coal-fired boilers, with its large demand for heat, the most suitable for central heating alternative

化工区：中韩石化扩产将造成煤炭消费量增加。

The China and South Korea petrochemical Company Ltd capacity expansion will cause increased coal consumption in chemical industrial area.



武汉市煤控总结 The summarize of coal cap

◆制定煤控总目标及分目标(set and decompose coal control overall goals) 。 在空气质量、气候变化、水资源、公众健康四大生态红线约束条件下，空气质量是武汉市最强约束。确定武汉市2020年煤炭消费总量目标为2061万tce，较2015年消减357万tce，煤炭占比由49.8%降至36.6%。并将目标分解到各区各行业。(Under the strongest constraints of air quality, Wuhan coal control target is 20.61 million tce)

◆明确煤控路径和措施(Clear control path and coal measures)。对于武汉市这样正在实行战略转型的超大城市，煤控的根本途径在于结合供给侧改革实现煤炭减量化。减量化可以实现超过55%的煤控目标，其中，充分利用宝武重组机遇，结合去产能，可以减煤48%；重点着力于调整产业结构和能源结构，2020年第三产业比例到61%，提高电力和天然气供应能力，电力和天然气比重方便提高78%和128%。同时，将从政府、企业、市场等多方面协同推动煤炭清洁利用、煤炭替代及散煤治理。 (The fundamental way of coal control is to combine the supply side reform to realize the coal reduction)

◆探索利用市场机制高效推进煤控(Explore the use of market mechanism efficiently promote coal control)。探索建立煤炭配额制度或利用现有碳交易制度加入煤炭配额实现煤炭额度交易，通过市场配置以综合最优成本实现煤炭总量的可持续控制，最大程度实现武汉经济、能源、环境的协调发展。 (To establish the coal cap-and-trade system)

谢谢大家

Thank You

武汉市节能监察中心WHECS
项定先Xiang Dingxian
手机mobil：13971497715
电话telephone：027-82757043
邮箱e-mail： 249029098@qq.com