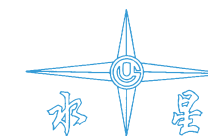




共建清洁低碳生活
行稳致远·匠心超越

Building A Clean and Low-Carbon Life Together
Achieve long-term development with prudent operation and surpass
through ingenuity



华光环能燃气锅炉

| 技术与产品 |

WHEE Gas Boiler Technology & Product Brochure

无锡华光环保能源集团股份有限公司
WUXI HUAGUANG ENVIRONMENT & ENERGY GROUP CO., LTD.



燃气轮机余热锅炉
HRSG



垃圾焚烧锅炉
WTE Boiler



燃气锅炉
Gas Boiler



生物质锅炉
Biomass Boiler



循环流化床锅炉
CFB Boiler



污泥炉 / 污泥干化机
Sludge Boiler/Sludge Dryer



煤粉锅炉
PC Boiler



工程总包 (传统项目)
EPC project(traditional energy)



工程总包 (光伏)
EPC project (photovoltaic)



技术咨询
Technical

顾全斌 (总工程师)
电话: 13812002423
Mr. Gu Quanbin (Chief Engineer)
Tel: 13812002423



电站装备
Power plante equipment

邹涵 (市场负责人)
电话: 13338102881
李艳松 (市场负责人)
电话: 13951502076
Mr. Zouhan (VP Sales)
Tel:13338102881
Mr. Li Yansong (VP Sales)
Tel:13951502076



工程总包
EPC

联系人 /Contacts: 陆伟
电话: 13914252810
LU WEI(PR)
Mob:13914252810



燃气炉技术负责人
Gas Boiler Technical Manager

薛金彪 (设计处长)
电话: 13814223386
Xue Jinbiao (Design Director)
Tel: 13814223386



华光环能成立于 1958 年，前身为无锡锅炉厂，2000 年完成股份制改造，2003 年在上海证券交易所挂牌上市（股票代码 600475），2017 年完成重大资产重组。2020 年更名为“无锡华光环能能源集团股份有限公司”。

华光是江苏省首家既完成资产重组又实现员工持股和股权激励的大型国有控股上市公司。形成了“能源与环保领域的产业投资运营平台”的功

能定位，以“共建清洁低碳生活”为企业使命，以“诚信、责任、专业、超越”为公司核心价值观，确立了成为“中国领先的环保能源综合服务商”的发展愿景。

公司是中国机械五百强、中国机械工业百强、中国分布式能源企业百强、中国工业行业排头兵企业。装备板块主营新能源类和传统能源类锅炉装备及总包：

- ◆ **传统能源类锅炉：**节能环保型燃煤锅炉（CFB+PC）。
- ◆ **新能源类锅炉：**零碳生物质发电锅炉、减碳固废发电锅炉。
- ◆ **清洁能源类锅炉：**低碳燃气—蒸汽联合循环余热锅炉（HRSG）。

截至目前累计研制投运环保发电装备达到近五千台套，分布国内各省，以及海外 38 个国家和地区。

WHEE (formerly Wuxi Huaguang Boiler Co., Ltd. 2000-2020) was known as Wuxi Boiler Works when established in 1958. We completed our shareholding reform in 2000, listed on Shanghai Stock Exchange in 2003 (SH. 600475), and completed major asset restructuring in 2017. We altered our name to "Wuxi Huaguang Environment & Energy Group Co., Ltd." in 2020.

WHEE is the first large state-owned listed company in Jiangsu Province to complete asset restructuring and realize employee stock ownership and equity incentive. We have formed the functional orientation of "industrial investment and operation platform in the field of energy and environmental protection". With "jointly building a clean and low-carbon life" as the corporate mission and "integrity, responsibility, professionalism and transcendence" as the company's core values, we establishes the development vision of becoming "China's leading comprehensive environmental protection and energy service provider".

WHEE have been awarded the titles of one of China's top 500 machinery enterprises, China's top 100 machinery industry enterprises, China's top 100 distributed energy enterprises and the leading enterprise of Chinese industry. Our equipment business sector is mainly engaged in design, manufacture supply and EPC of the boiler products in term of both new energy and traditional energy:

- ◆ **Traditional energy boilers:** energy-saving and environment-friendly coal-fired boilers (CFB + PC).
- ◆ **New energy boilers:** Zero Carbon biomass power generation boiler, carbon reduction solid waste power generation boiler.
- ◆ **Clean energy boiler:** low carbon gas steam combined cycle HRSG.

Up to now, nearly 5000 sets of environmental protection power equipment have been developed and put into operation, which are distributed in all provinces in China and 38 countries and regions overseas.

01

华光环能产品简介

WHEE Product Introduction

公司拥有全球领先的特种锅炉生产、检测、探伤设备仪器累计 2200 余台套，具备年产 3 万蒸吨产能，年产汽包数量全球第一。

WHEE owns the world's leading manufacturing, testing, flaw detection equipment and instruments of totaling 2,200 sets, with an annual production capacity of 30,000 t/h and the world's largest in the number of drums produced annually.

| | |
|---|--|
| <div>一、燃气轮机联合循环余热锅炉</div> <div>Heat Recovery Steam Generator</div> | <div>同时拥有 B-H，卧式、立式 HRSG 技术，与 JC 业绩共享。</div> <div>承担北京 5 个煤改气项目中的 4 个。</div> <div>提供定制化的设备和服务，在世界范围内有近 700 台燃机余热锅炉业绩。</div> <div>WHEE owns B-H, horizontal and vertical HRSG technology, sharing its performance with JC.</div> <div>Undertook 4 out of 5 coal-to-gas projects in Beijing.</div> <div>Provide customized design and services. Nearly 700 gas turbine waste heat boilers manufactured by WHEE are running worldwide.</div> |
| <div>二、循环流化床锅炉</div> <div>Circulating Fluidized Bed Boiler</div> | <div>35t/h(6MW)~480t/h(150MW) 循环流化床锅炉系列。</div> <div>480t/h(150MW)~745t/h(220MW) 超高压再热循环流化床锅炉系列。</div> <div>745t/h(220MW)~1142t/h(325MW) 亚临界再热循环流化床锅炉系列。</div> <div>35t/h (6MW) - 480t/h (150MW) circulating fluidized bed boiler.</div> <div>480t/h (150MW) - 745t/h (220MW) ultra-high pressure reheat circulating fluidized bed boiler.</div> <div>745t/h (220MW) - 1142t/h (325MW) subcritical reheat circulating fluidized bed boiler.</div> |
| <div>三、煤粉锅炉</div> <div>Pulverized Coal Boiler</div> | <div>75t/h(12MW)~1217t/h(350MW) 中压、高压、超高压、亚临界煤粉锅炉系列。</div> <div>75t/h (12MW) - 1217t/h (350MW) medium pressure, high pressure, ultra-high pressure and subcritical pulverized coal boiler.</div> |
| <div>四、生物质能发电锅炉</div> <div>Biomass Energy Power Generation Boiler</div> | <div>开发了多种容量，不同参数的生物质能锅炉，燃料包括农作物秸秆、木本植物、稻壳、废木柴、建筑木板、废弃家具、锯木粉、砂光粉、糠醛渣、药渣、咖啡渣、甘蔗渣、棕榈壳、空果串、生物质造粒等。35t/h(6MW) ~ 150t/h(35MW) 中压、次高压、高压、超高压再热生物质能锅炉。</div> <div>Biomass boilers with various capacities and parameters have been developed, burning natural fuels including crop straw, woody plants, rice husk, waste firewood, construction plank, waste furniture, sawdust, sanding powder, furfural residue, drug residue, coffee residue, bagasse, palm shell, empty fruit string, biomass granulation, etc.</div> <div>35t/h (6MW) - 150t/h (35mW) medium pressure, sub-high pressure, high pressure and ultra-high pressure reheat biomass boiler.</div> |

| | |
|--|---|
| 五、垃圾焚烧发电锅炉 Waste Incineration Power Generation Boiler | <p>形成了引进日立造船 L 型全系列、自主研发华光炉排全系列顺推式往复炉排和循环流化床等垃圾焚烧发电锅炉产品。</p> <p>100t/d ~ 1000t/d 垃圾焚烧锅炉系列。</p> <p>Different types of waste incineration boiler products have been formed, including the licenced Hitachi Shipbuilding L-type, independent developed smooth-push type reciprocating grate and CFB type with IP rights.</p> <p>100t/d ~ 1000t/d waste incineration boiler series.</p> |
| 六、燃气锅炉 Gas Fired Boiler | <p>燃用各类可燃气体，如天然气、高炉煤气、焦炉煤气、兰炭尾气、丙烷气及各类化工尾气等；油类燃料，如轻油、重油等。</p> <p>容量范围：10t/h-670t/h</p> <p>压力参数：1.3MPa-18.7MPa</p> <p>Capable of applying various types of combustible gases, such as natural gas, blast furnace gas, coke oven gas, semi-coke flue gas, propane gas and various types of chemical tail gas, etc.; oil fuels, such as light oil, heavy oil, etc.</p> <p>Capacity range: 10t/h-670t/h</p> <p>Pressure parameter: 1.3MPa-18.7MPa</p> |



02 华光环能燃气锅炉产品概况 WHEE Gas Boiler Overview

华光环能从 90 年代初期为客户提供各种参数的油气炉，目标客户群为钢铁行业、化工行业、造纸行业、煤化工行业、供热发电行业等。华光环能具备成熟的 π 型、D 型、角管式燃油气锅炉技术，结构简单，技术可靠。

- ◆ **容量范围：**10t/h-670t/h
- ◆ **压力参数：**1.3MPa-18.7MPa
- ◆ **燃料：**各类可燃气体，如天然气、高炉煤气、焦炉煤气、兰炭尾气、丙烷气及各类化工尾气等；油类燃料，如轻油、重油等。
- ◆ **燃料热值：**500kcal/Nm³-22000kcal/Nm³

WHEE has provided customers with oil and gas boilers with various parameters since the early 1990s. Our target customer group includes steel industry, chemical industry, paper industry, coal chemical industry, heating and power generation industry etc. WHEE is equipped with mature technologies on π -type, D-type, and corner-tube oil/gas boilers, characterized with simple structure and reliable technology.

- ◆ **Capacity Range:** 10t/h-670t/h
- ◆ **Pressure Parameters:** 1.3MPa-18.7MPa
- ◆ **Fuel:** Varied combustible gas, such as natural gas, blast furnace gas, coke oven gas, semi-coke flue gas, propane gas and various chemical tail gas, etc.; oil fuel, such as light oil, heavy oil, etc.
- ◆ **Fuel calorific value:** 500kcal/Nm³-22000kcal/Nm³



03 燃气锅炉技术优势

Gas Boiler Technical Advantages

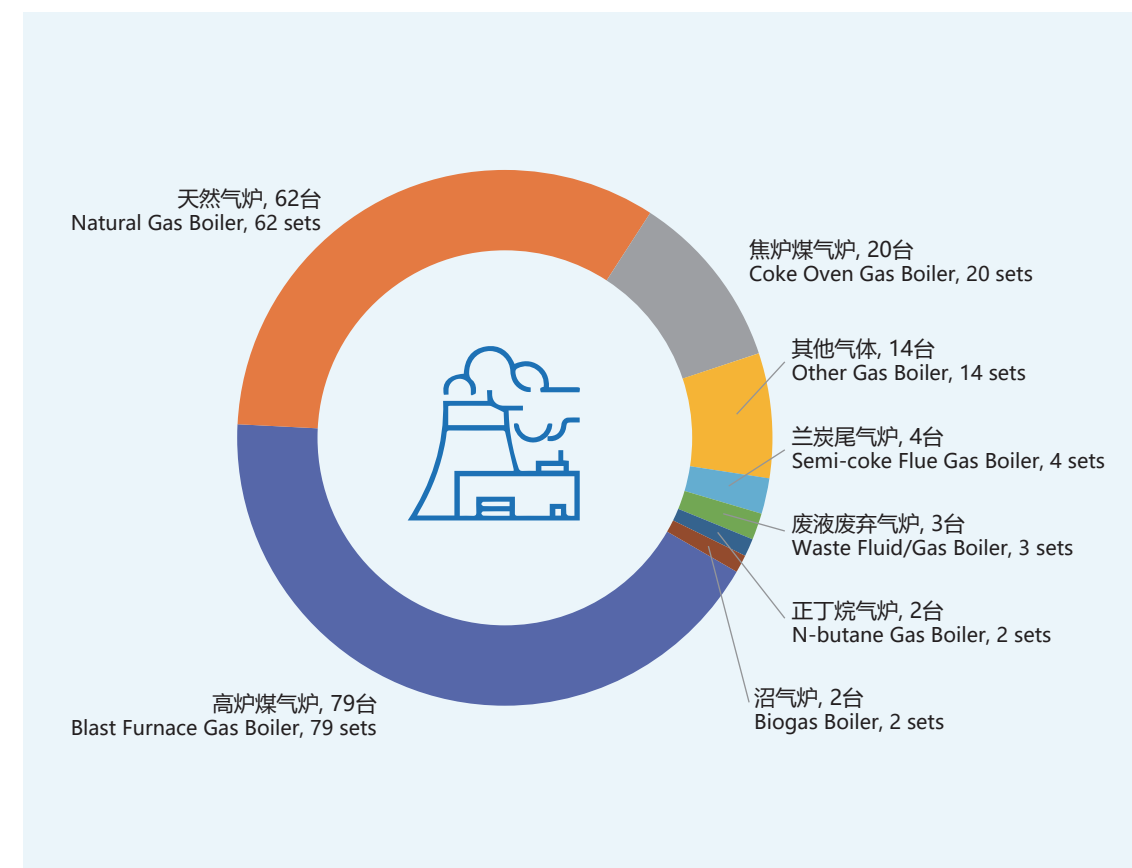


04 燃气锅炉种类及业绩

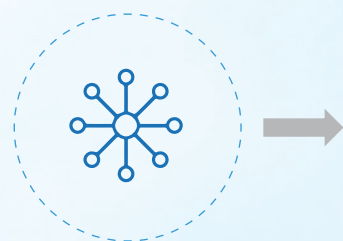
Types and Performances of gas boilers

截止 2022 年 9 月，华光环能共计销售燃气锅炉 186 台套。

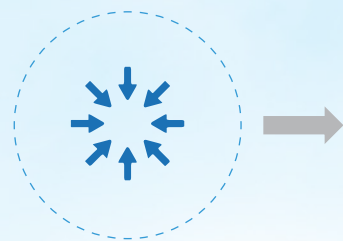
Till September 2022, WHEE has achieved sales performance of 186 sets of gas boilers.



05 华光环能燃气锅炉技术特点 Technical Features of WHEE Gas Boiler



- ◆ 技术点 1: 灵活多样的燃烧器布置——前、后墙布置、四角布置、底部（顶部）布置。
- Feature 1: Flexible burner arrangement. Front and rear wall arrangement, four-corner arrangement, or bottom (top) arrangement.



- ◆ 技术点 2: 锅炉整体布置紧凑，结构多样，满足用户不同需求。
- Feature 2: The overall layout of the boiler is compact and the structure can be diversified to meet different needs from users.



- ◆ 技术点 3: 自主低氮燃烧技术和进口低氮燃烧器（可选）。
- Feature 3: Independent developed low-nitrogen combustion technology and imported low-nitrogen burner (optional).



06 华光环能燃气锅炉性能指标 WHEE Gas Boiler Performance Index

◎ 不同燃料下的锅炉排放 Emissions of Boiler Applying Different Fuels

- | | |
|--|--|
| ◆ 天然气 $\leq 30\text{mg}/\text{Nm}^3$ | ◆ Natural gas $\leq 30\text{mg}/\text{Nm}^3$ |
| ◆ 高炉煤气 $\leq 50\text{mg}/\text{Nm}^3$ | ◆ Blast furnace gas $\leq 50\text{mg}/\text{Nm}^3$ |
| ◆ 兰炭尾气 $\leq 450\text{mg}/\text{Nm}^3$ | ◆ Semi-coke flue gas $\leq 450\text{mg}/\text{Nm}^3$ |

◎ 不同燃料下的锅炉效率 Boiler Efficiency Applying Different Fuels

- | | |
|------------------|------------------------------------|
| ◆ 天然气: 94%-97% | ◆ Natural gas: 94%-97% |
| ◆ 低热值燃气: 88%-91% | ◆ Low calorific value gas: 88%-91% |



07 华光环能燃气锅炉典型项目 Typical Project of WHEE Gas Boiler

◎ 河北普阳钢铁有限公司 220t/h 高压高炉煤气锅炉

220t/h high-pressure blast furnace gas boiler for Hebei Puyang Iron and Steel Co., Ltd.

◆ 锅炉参数 (BMCR)

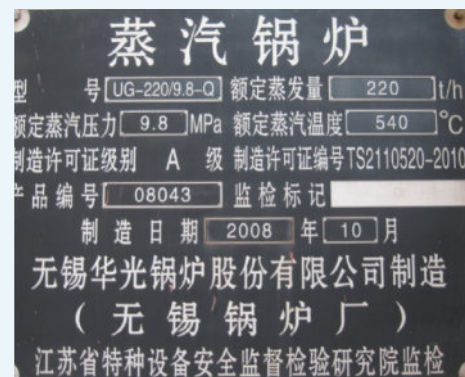
- 额定蒸发量 220 t/h
- 额定蒸汽压力 9.8 Mpa(g)
- 额定蒸汽温度 540 °C
- 给水温度 215 °C

◆ 燃料: 高炉煤气

◆ Boiler Parameters (BMCR)

- Rated Evaporation 220 t/h
- Rated Steam Pressure 9.8 Mpa(g)
- Rated Steam Temperature 540 °C
- Feedwater Temperature 215 °C

◆ Fuel: Blast Furnace Gas



◎ 烟台万华 220t/h 高温高压燃气锅炉

Yantai Wanhua 220t/h High-temperature & High-pressure Gas Boiler



◆ 锅炉参数 (BMCR)

- 额定蒸发量 220 t/h
- 额定蒸汽压力 10.3Mpa(g)
- 额定蒸汽温度 540°C
- 给水温度 215°C

◆ 燃料: 天然气、丙烷气、甲烷氢等燃料气

◆ Boiler Parameters (BMCR)

- Rated Evaporation 220 t/h
- Rated Steam Pressure 10.3Mpa(g)
- Rated Steam Temperature 540°C
- Feedwater Temperature 215°C

◆ Fuel: Natural Gas, Propane Gas, Methane Hydrogen and Other Fuel Gases

◎ 新疆塔里木 150t/h 中温中压燃气锅炉

Xinjiang Tarim 150t/h Medium-temperature & Medium-pressure Gas Boiler

◆ 锅炉参数 (BMCR)

- 额定蒸发量 150 t/h
- 额定蒸汽压力 4.2Mpa(g)
- 额定蒸汽温度 450°C
- 给水温度 120°C

◆ 燃料: 天然气

◆ Boiler Parameters (BMCR)

- Rated Evaporation 150 t/h
- Rated Steam Pressure 4.2Mpa(g)
- Rated Steam Temperature 450°C
- Feed Water Temperature 120°C

◆ Fuel: Natural Gas



◎ 新疆哈密 265t/h 高温次高压燃兰炭尾气项目

Xinjiang Hami 265t/h High-temperature & Sub-high Pressure semi-coke flue gas project



◆ 锅炉参数 (BMCR)

- 额定蒸发量 265t/h
- 汽包抽汽 37.3t/h
- 额定蒸汽压力 6.75Mpa(g)
- 额定蒸汽温度 540°C
- 给水温度 158°C

◆ 燃料: 兰炭尾气

◆ 技术特点

- 燃高水分兰炭尾气;
- 采用立式蒸发器;
- 低氮燃烧器脱硝一体化布置。

◆ Boiler Parameters (BMCR)

- Rated Evaporation 265t/h
- Drum Extraction 37.3t/h
- Rated Steam Pressure 6.75Mpa(g)
- Rated Steam Temperature 540°C
- Feed Water Temperature 158°C

◆ Fuel: Semi-coke flue gas

◆ Technical Feature

- Burning high-moisture semi-coke flue gas;
- adopts vertical evaporator;
- low-nitrogen burner with integrated de-nitrification device.

◎ 印度 JSW ISPAT 204t/h 超高压煤气炉

JSW ISPAT 204t/h Ultra High Pressure Gas Furnace in India

◆ 锅炉参数 (BMCR)

- 额定蒸发量 204t/h
- 额定蒸汽压力 11.4 MPa(g)
- 额定蒸汽温度 540℃
- 给水温度 233 °C

◆ 燃料: 高炉煤气

◆ Boiler Parameters (BMCR)

- Rated Evaporation 204t/h
- Rated Steam Pressure 11.4 MPa(g)
- Rated Steam Temperature 540 °C
- Feed Water Temperature 233 °C

◆ Fuel: Blast Furnace Gas



◎ 委内瑞拉中央电厂 3×50t/h 低压、微正压油气炉

Venezuela Central Power Plant 3×50t/h Low-pressure, Micro-positive-pressure Oil & Gas Boiler



◆ 锅炉参数 (BMCR)

- 额定蒸发量 50 t/h
- 额定蒸汽压力 1.4 Mpa(g)
- 额定蒸汽温度 350℃
- 给水温度 104℃

◆ 燃料: 轻油、天然气

◆ Boiler Parameters (BMCR)

- Rated Evaporation 50 t/h
- Rated Steam Pressure 1.4 Mpa(g)
- Rated Steam Temperature 350℃
- Feed Water Temperature 104℃

◆ Fuel: Light oil, natural gas

◎ 新疆宣东 280t/h 高温高压燃兰炭尾气项目

Xinjiang Xuandong 280t/h High-temperature & High-pressure Semi-coke flue gas Project

◆ 锅炉参数 (BMCR)

- 额定蒸发量 280t/h
- 额定蒸汽压力 9.8Mpa(g)
- 额定蒸汽温度 540°C
- 给水温度 215°C

◆ 燃料: 兰炭尾气

◆ 技术特点

- 燃高水分兰炭尾气锅炉采用靠背紧凑结构、低氮燃烧器脱硝一体化布置

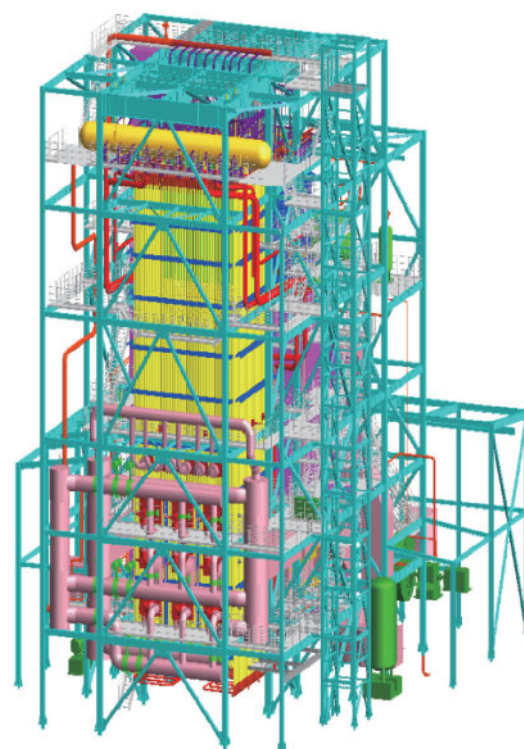
◆ Boiler Parameters (BMCR)

- Rated Evaporation 280t/h
- Rated Steam Pressure 9.8Mpa(g)
- Rated Steam Temperature 540°C
- Feed Water Temperature 215°C

◆ Fuel: Semi-coke flue gas

◆ Technical Features

- Boiler burning high-moisture semi-coke flue gas adopts backrest compact structure and an integrated arrangement of low-nitrogen burners and de-nitrification device.



(2022 年签订项目执行中)
 (This project signed in 2022 is under implementation)

◎ 南京汽轮陕西创源煤电化工 140t/h 超高温超高压兰炭煤气锅炉

140t/h Ultra HT and Ultra HP Semi-coke Combusted Boiler for Nanjing Steam Turbine Shanxi Chuangyuan Coal Chemical Power Plant

◆ 锅炉参数 (BMCR)

- 额定蒸发量 140t/h
- 额定蒸汽压力 13.7Mpa(g)
- 额定蒸汽温度 571°C
- 给水温度 239.38°C
- 锅炉设计效率 91.4%

◆ 燃料: 兰炭尾气

◆ 技术特点

- 锅炉包含八种再热蒸汽工况, 燃气成分复杂, 且兰炭尾气中携带灰分、水分、焦油等其他杂质。

◆ Boiler Parameters (BMCR)

- Rated Evaporation 140t/h
- Rated Steam Pressure 13.7Mpa(g)
- Rated Steam Temperature 571°C
- Feed Water Temperature 239.38°C
- Boiler designed efficiency 91.4%

◆ Fuel: Semi-coke flue gas

◆ Technical Features

- Boiler is designed with eight different reheat steam working conditions. The gas composition applied is quite complicated, and the semi-coke flue gas carries ash, moisture, tar and other impurities.



项目规划图
 Project Planning Drawing

09 华光环能燃气锅炉相关专利
Gas Boiler Relevant Patents of WHEE

◎ 华光环能拥有燃气锅炉相关授权专利 7 件，其中发明 4 件

WHEE owns 7 authorized patents on gas boilers, including 4 invention patents



| 序号 Serial No. | 专利号 Patent No. | 专利名称 Patent Name | 专利权人 Patentee | 专利类型 Patent Type |
|------------------|-------------------|--|--|------------------------------|
| 1 | ZL201110060607.5 | 沼气锅炉 Biogas boiler | 无锡华光环保能源集团股份有限公司 Wuxi Huaguang Environment Energy Group Co., Ltd. | 发明专利 Invention patent |
| 2 | ZL201310009663.5 | 燃用低热值煤气锅炉的炉膛布置结构 Furnace layout of low calorific value gas boiler | 无锡华光环保能源集团股份有限公司 Wuxi Huaguang Environment Energy Group Co., Ltd. | 发明专利 Invention patent |
| 3 | ZL201510724527.3 | 一种煤气燃烧器结构 One kind of burner structure of gas boiler | 无锡华光环保能源集团股份有限公司 Wuxi Huaguang Environment Energy Group Co., Ltd. | 发明专利 Invention patent |
| 4 | ZL201610551098.9 | 一种燃气锅炉 One kind of gas boiler | 无锡华光环保能源集团股份有限公司 Wuxi Huaguang Environment Energy Group Co., Ltd. | 发明专利 Invention patent |
| 5 | ZL201220382011.7 | 一种高炉煤气锅炉受热面的布置结构 Heating surface layout structure of one kind of blast furnace gas boiler | 无锡华光环保能源集团股份有限公司 Wuxi Huaguang Environment Energy Group Co., Ltd. | 实用新型 Utility model patent |
| 6 | ZL201620043722.X | 燃烧器烟气再循环锅炉结构 Economizer layout structure | 无锡华光环保能源集团股份有限公司 Wuxi Huaguang Environment Energy Group Co., Ltd. | 实用新型 Utility model patent |
| 7 | ZL201920998984.5 | 省煤器布置结构 Economizer layout structure | 无锡华光环保能源集团股份有限公司 Wuxi Huaguang Environment Energy Group Co., Ltd. | 实用新型 Utility model patent |

□ 燃气锅炉专利 | Gas Boiler Patents



10 企业战略及文化

Corporate Strategy & Culture

品牌定位 Brand Positioning

为全球提供绿色动能
Provide green energy for the world

企业使命 Corporate Mission

共建清洁低碳生活
Building a clean and low-carbon life together

发展愿景 Development Vision

全球领先的环保能源领域系统解决方案服务商
Becoming world's leading comprehensive service provider in the field of environmental protection and energy utilization

核心价值观 Core Values

诚信·责任·专业·超越
Integrity, responsibility, professionalism and transcendence

企业精神 Enterprise Spirit

务实创新·团结拼搏
Pragmatic innovation, unity and hard-working

经营理念 Business Philosophy

产品服务让用户满意，企业发展让股东满意，工作氛围让员工满意，公共责任让社会满意。
Products and services to customers' satisfaction, enterprise development to shareholders' satisfaction, working atmosphere to staff satisfaction, and public responsibilities to society's satisfaction.

11 研发制造能力篇 R & D and Manufacturing Capabilities

□ 研发 & 制造能力 | R&D and manufacture capacity



200+ 名
 拥有性能, 标准, 受热面, 钢结构, 工艺等专业的 200 多名工程师。
200+ Engineers
 specialized in performance, standard, heating surface design, steel structure design, processing technology, etc.





+90%
 采用参数化定制设计, 设计出图效率提升 90%, 可视化模拟安装现场, 保障安装可靠性。
+90%
 Design efficiency Tailor designed for client, the design efficiency increased by 90%, Visual simulation of erection procedure to ensure the reliability of Erection.



10000m²
 10000 平米的厂房, 专为余热锅炉模块组装新建。
10000 m²
 workshop Specially built for the assembly of HRSG modules.

□ 研发 & 制造能力 | R&D and manufacture capacity



9 大体系 9 Systems



| | |
|--------------|---|
| ◆ ASME 体系 | · ASME |
| ◆ 质量管理体系 | · Quality management system |
| ◆ 环境管理体系 | · Environmental management system |
| ◆ 职业健康安全管理体系 | · Occupational health and safety management system |
| ◆ 知识产权管理体系 | · Intellectual property management system |
| ◆ 两化融合管理体系 | · Information and industrialization integration management system |
| ◆ 测量管理体系 | · Measurement management system |
| ◆ 研发管理体系 | · R & D management system standardized management |
| ◆ 党建标准化管理体系 | · System of Party Building |