

China Industrial Wastewater Policy Overview and Opportunities for EU SMEs in Qingdao and Chengdu



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1. Introduction

1.1. The China Market

This report provides an overview of industrial wastewater policy in China, specifically analysing opportunities for EU SMEs in two of the key regions in China, namely Shandong province and Sichuan province.

Promoted by the national subsidy policy mentioned in [2.2 Provincial Policies](#), investment in the Chinese environmental protection industry is undergoing rapid growth, such as “black-odorous water” treatment and “sponge city” construction. Besides, the development of ZLD, introduced in [4.4 Zero Emissions](#), is another trend that demonstrates the size, diversity, and evolving nature of the market for wastewater treatment in China.

As introduced in [2.3 Policies Related to Public Private Partnership Projects](#) and [3.2 Local Public Private Partnership Project or Build-operate-transfer Project Operational Bodies](#), the Public-Private Partnership (PPP) model is highly recommended and encouraged by the Chinese government that developed it accordingly. EU SMEs have the chance to get involved in the construction and operation of infrastructure projects related to wastewater treatment, with the precondition that they co-operate with reliable Chinese partners.

1.2. International Investment in China

The investment environments in China and Europe differ significantly. As an example of this, it is essential to be vigilant about intellectual property (“IP”) in China, although its protection has been strengthened a lot by the Chinese government in recent years.

- Details about construction and operation of wastewater treatment plants, manufacturing of equipment for water pollution control, and other technologies and equipment manufacturing that are related to water supply and treatment are all listed in the [Catalogue of Industries for Encouraging Foreign Investment \(2019 Version\)](#) (*鼓励外商投资产业目录 (2019 年版)*).¹
- Further opening up to foreign investment, such as that detailed in the [Notice of the State Council on Certain Measures for Actively and Effectively Utilizing Foreign Investment to Promote Quality Economic Development](#) (*国务院关于积极有效利用外资推动经济高质量发展若干措施的通知*), provides EU SMEs easier access from a political perspective.²

1.3. Key Market Access Barriers and Potential Limitations

No policy barriers are preventing EU SMEs from entering the Chinese wastewater treatment market. However, the establishment of a joint venture (“JV”) with Chinese distributors, or of a wholly foreign-owned enterprise (“WFOE”), must follow several procedures and policies, which are more time-consuming and comprehensive in scope to adhere to than is establishing a Chinese company.

Like all international companies, EU SMEs should have patience and resources when adapting to Chinese culture, laws, and political situation.

The PPP model has developed over many years in China; nevertheless, it is not yet mature, and EU SMEs need to prepare comprehensive risk management strategies that cover, amongst others, legal and governmental issues before entering the Chinese PPP market.

¹ <http://www.gov.cn/xinwen/2019-06/30/5404701/files/9d2dde75fa054d249dfa16267af42277.pdf>

² http://www.gov.cn/zhengce/content/2018-06/15/content_5298972.htm

The difference between the quality of technology and management seen in Chinese companies and in EU SMEs is shrinking. In the past, these were areas where EU SMEs held advantages in the China market, yet that is now becoming less common. Considering this, the competitive advantages of EU SMEs are reducing.

A certain amount of investment is required for EU SMEs to penetrate the market in China, and this will directly affect their development strategies. EU SME decision-makers need to decide whether they are willing, and whether it is affordable, to make this investment, and how much support they will receive from employees and other stakeholders.

EU SMEs, not being familiar with the Chinese competitive tender process and other business activities, will find it very difficult to get involved in Chinese projects through the normal competitive tender process without reliable Chinese partners.

1.4. Practical Advice and Further Opportunities

Some policies will be introduced in [2. Policies](#); however, it is advisable to regularly check them because they are constantly changing and being updated. EU SMEs are recommended to attend policy-related activities such as roundtables, and to contact delegations of businesspeople and officials from China, so as to remain up-to-date regarding the latest policies.

Marketing plays an important role in building brand awareness and establishing a business in the China market. EU SMEs should work with reliable partners, conduct meaningful market research, decide on appropriate exhibitions to attend when they have limited resources and investment, and choose a suitable marketing strategy.

EU SMEs are advised to build a prototype project to present to the market in order to show the advantages of their specific technology or product. The successful test of AMBC in the Guodian Hanchuan Power Plant introduced in [5. Case Studies](#) is a useful demonstration of how Modern Water entered the market in industrial wastewater treatment.

EU SMEs should identify, build, and maintain good relationships with the stakeholders introduced in [3. Key Stakeholders](#), such as governments, industrial parks, design institutes, and project owners, as well as with reliable Chinese partners, including agents, retailers, and factories. In May 2015, Chinese state planners launched another initiative to promote and support the development of advanced industries and technologies. It is clear that this latest attempt is not to be achieved through measures that will establish a market economy. Instead, government officials have tasked themselves with steering development and have handpicked the industries that they believe will drive China's economy in the future.

Titled [Made in China 2025](#) ([中国制造 2025](#)), the plan sets ambitious goals for accelerating the development in several industries. Regarding the water sector, the plan establishes that by 2025 the water consumption per unit of industrial value added should be 41% lower than in 2015, causing a rise in the demand for industrial wastewater treatment and recycling systems.³

The potential for ZLD and high-end decentralised sewage treatment gives EU SMEs the chance to sell their products to single industries or property developers in China. This instance would be beneficial in a situation where it is challenging to build relationships with relatively large companies and government bodies.

If an EU SME is a supplier to any of the large European companies that have already entered the China market, especially in water supply or wastewater treatment, it will have more opportunities to continue and expand cooperation or supply chains with these European companies, such as VEOLIA.

³ http://www.gov.cn/zhengce/content/2015-05/19/content_9784.htm

EU SMEs can seek the opportunity to research and develop new technologies or products together with Chinese companies, rather than acting unilaterally. Through this kind of cooperation, EU SMEs may develop their technologies so that they meet a higher standard and stay competitive globally.

The *[“Belt and Road Initiative” Cooperation Plan for Ecological and Environmental Protection](#)* (*“一带一路”生态环境保护合作规划*) promotes the investment and building of wastewater treatment projects in industrial parks along the route of the Belt and Road Initiative (“BRI”).⁴ EU SMEs from countries on the BRI route can capitalise on this by connecting with Chinese investors in their home countries.

⁴ <http://www.mee.gov.cn/gkml/hbb/bwj/201705/W020170516330272025970.pdf>

2. Policies

2.1. National Industrial Water Policies and Standards

The following section will introduce the national discharge standards, as opposed to industrial and provincial standards, due to the relative abundance and complexity of different regions and industries. Moreover, it will introduce two different kinds of standard which are applied to industrial water.

The main national policies related to industrial wastewater discharge, which govern both Chengdu and Qingdao, are :

- [*Law of the People's Republic of China on Prevention and Control of Water Pollution*](#) (*中华人民共和国水污染防治法*),⁵ issued by the [*Standing Committee of the National People's Congress*](#) (*全国人民代表大会常务委员会*, “SCONPC”),⁶ and revised in 2017;
- [*Marine Environment Protection Law of the People's Republic of China*](#) (*中华人民共和国海洋环境保护法*), issued by the SCONPC, and revised in 2017;⁷
- [*Action Plan for Prevention and Control of Water Pollution*](#) (*水污染防治行动计划*, “*Action Plan*”),⁸ issued by the [*State Council*](#) (*国务院*)⁹ in 2015.

The *Action Plan* is the latest and most detailed regulation for wastewater treatment, and directly addresses the prevention and control of industrial pollution.

It calls for water pollution in concentrated industrial areas to be treated on a centralised basis, and to strengthen pollution control in industrial agglomeration areas, including economic and technological development zones, high-tech industrial development zones, and export processing zones. Industrial wastewater from these areas must be pre-treated in order to meet centralised treatment processing requirements and it can then be discharged into centralised sewage processing facilities. Newly-built and upgraded industrial agglomeration areas should be equipped with the planning and the construction of pollution control facilities, such as centralised sewage and waste treatment.

Based on the progress of the *Action Plan*'s implementation, the Ministry of Ecology and Environment (*中华人民共和国生态环境部*, “MEE”)¹⁰ issued the [*Notice on Speeding up the Work of Water Pollution Treatment in Industrial Agglomeration Areas and Cleaner Transformation of Key Industries*](#) (*关于加快推进工业集聚区水污染治理和重点行业清洁化改造工作的通知*)¹¹ in 2017. This notice states that the MEE will cooperate with other relevant departments to suspend the examination and approval of new construction projects in those industrial parks which failed to complete water treatment task on time and to revoke the parks' qualifications. The notice also states that in the case of any falsification, omission, or concealment of information, relevant units and personnel will be strictly investigated for their responsibilities, in accordance with relevant provisions.

The standards related to industrial wastewater discharge can be divided into national discharge standards, local discharge standards, and industrial standards. National discharge standards are formulated by the national

⁵ <http://www.npc.gov.cn/npc/c30834/201706/689960d6e5f34d1c8512c024d27d0de5.shtml>

⁶ <http://www.npc.gov.cn/englishnpc/c2847/column2.shtml>

⁷ <http://www.npc.gov.cn/npc/c30834/201711/0804dfba200b4c8cb7f7fcb6f46b1ccc.shtml>

⁸ http://www.gov.cn/zhengce/content/2015-04/16/content_9613.htm

⁹ <http://english.www.gov.cn/>

¹⁰ <http://english.mee.gov.cn/>

¹¹ http://www.gov.cn/xinwen/2017-08/10/content_5217040.htm

administrative department of environmental protection, the MEE, and are applied nationwide or to specific regions. Local discharge standards are approved and promulgated by the governments of provinces, autonomous regions, and municipalities, and are applicable in specific administrative regions. The [*Integrated Wastewater Discharge Standard GB8978-1996*](#) (*污水综合排放标准*, “GB8978”) issued by the MEE states that 12 different industrial sectors in China are allowed to follow their corresponding industry sector standards instead of adhering to GB8978.¹² These sectors are:

- Paper making;
- Meat processing;
- Weapons making;
- Shipbuilding;
- Steel;
- Phosphate fertiliser;
- Offshore oil development;
- Synthetic ammonia;
- Caustic soda;
- Textile dyeing and finishing;
- Aerospace propellant;
- Polyvinyl chloride.

As for the different kinds of standard applied to industrial water, their choice depends on the disposal method of the water used in the industrial process. There are three options:

- Without treatment or only after simple treatment, the water can be reused in the process where the water was originally used to form a recycling system, or with other processes to form a sequential system;
- After carrying out necessary pre-treatment inside the plant area where the products are made, to meet the relevant requirements, the water can be disposed of via a sewage pipe or combined pipe;
- After conducting treatment in the plant to meet specific requirements, the water can be discharged directly into bodies of water, connected to urban rainwater pipelines, or used to irrigate farmland.

These three water disposal methods are governed by different standards, which will be discussed in [*2.1.1 Raw Water Emission Standards*](#). At present, industrial wastewater in China is predominantly discharged from factories and facilities in industrial parks and industrial agglomeration areas into sewage pipes which are connected to centralised wastewater treatment plants, especially in the developed and planned areas. However, due to the current trends of cleaner production, zero emissions, and sustainable development, incentive policies from different levels of government, and wider corporate social responsibility pressures, as well as operational costs, several industries have begun to focus on treating their wastewater in the plant area where the products are made, so as to use it in a recycling or sequential system.

2.1.1. Raw Water Emission Standards

Industrial units need to follow the national discharge standard GB8978 to discharge wastewater.

¹² http://www.mee.gov.cn/home/ztbd/rdzl/yjcz/bzgf/201106/t20110601_211492.shtml

The GB8978 standard provides the maximum allowable discharge concentrations of 69 different water pollutants and the maximum allowable discharge capacities for certain industries, according to the flow direction of the wastewater. Work units constructed before and after 1st January 1998 should adhere to two different levels of standards. As an example, ten different pollutants and indicators have been selected to provide an insight into pollutant control in China, and are displayed in Table 1.

Table 1: Maximum Allowable Discharge Concentrations for 10 Pollutants and Indicators (Work Units Constructed after 1st January 1998)

	Parameters	Units	Application Scope	Class I	Class II	Class III
1	pH	-	All discharging work units	6-9	6-9	6-9
2	Colour (dilution ratio)	-	All discharging work units	50	80	-
3	Suspended solids ("SS")	mg/L	Mining, ore dressing, and coal dressing industries	70	300	-
			Gold-bearing vein dressing	70	400	-
			Alluvial gold dressing in outlying districts	70	800	-
			Municipal secondary wastewater treatment plants	20	30	-
			Other discharging industries	70	150	400
4	Biochemical oxygen demand ("BOD ₅ ")	mg/L	Beet sugar processing, ramie degumming, wet method fibre board, dyes, and fur treating industries	20	60	600
			Cane sugar processing, alcohol, MSG, leather, and chemical fibre starch industries	20	100	600
			Municipal secondary wastewater treatment plants	20	30	-
			Other discharging industries	100	150	300
5	Chemical oxygen demand ("COD")	mg/L	Beet sugar processing, synthetic fatty acid, wet method fibre board, dyes, fur treating, and organophosphorus pesticide industries	100	200	1,000
			MSG, alcohol, pharmaceuticals and pharmaceutical raw materials, biological pharmaceuticals, ramie degumming, leather, and chemical fibre starch industries	100	300	1,000
			Petrochemical industry (including refining)	60	120	500
			Municipal secondary wastewater treatment plants	60	120	-
			Other discharging industries	100	150	500
6	Petroleum hydrocarbons	mg/L	All discharging work units	5	10	20
7	Vegetable and animal oils	mg/L	All discharging work units	10	15	100
8	Volatile phenols	mg/L	All discharging work units	0.5	0.5	2.0
9	Total cyanides	mg/L	All discharging work units	0.5	0.5	1.0

10	Sulphides ("S")	mg/L	All discharging work units	1.0	1.0	1.0
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Table 1 shows that the standards have been divided into three classes, and each of them represents a different discharge direction of the water areas. The water areas in China are classified into [Environmental Quality Standards for Surface Water GB3838-2002](#) (地表水环境质量标准, "GB3838")¹³ and [Sea Water Quality Standard GB3097-1997](#) (海水水质标准, "GB3097"),¹⁴ both issued by the MEE.

Referring to GB3838, surface water is divided into five classes based on its purpose for use and protection target:

- Class I: mainly for source of water and national nature protection areas;
- Class II: mainly for Class I protection areas, related to categories such as centralised potable water sources, protection areas for rare fish, and spawning grounds for fish and shrimps;
- Class III: mainly for Class II protection areas for centralised potable water sources, protection areas for general fish, and swimming areas;
- Class IV: mainly for general industrial water areas and scenic water areas not in direct contact with humans;
- Class V: mainly for farmland water areas and water areas for general landscape requirement.

Referring to GB3097, the water quality of seawater can be divided into four categories based on the different functions and protection objectives of the sea area:

- Class I: marine fishery waters, marine nature reserves, and rare and endangered marine biological reserves;
- Class II: aquaculture areas, sea bathing areas, marine sports and entertainment areas where the human body is in direct contact with sea water, and industrial water areas directly related to human consumption;
- Class III: general industrial water use areas and coastal scenic tourist areas;
- Class IV: marine port waters and marine development operation areas.

The three classes of discharging standards are classified in GB8978 as:

- Wastewater that is discharged into a GB3838 Class III water area (excluding designated protected areas and scenic areas) and wastewater that is discharged into a GB3097 Class II marine area must follow GB8978 Class I standards;
- Wastewater that is discharged into a GB3838 Class IV or V area and wastewater that is discharged into a GB3097 Class III marine area must follow GB8978 Class II standards;
- Wastewater that is discharged into city and town sewage systems that have a secondary wastewater treatment plant must follow GB8978 Class III standards;
- Wastewater that is discharged into city and town sewage systems which do not have a secondary wastewater treatment plant should refer to Class I, II, and III standards of GB8978, with a judgement based on the functional requirements of the water area which receives effluent from the sewage system.

Having a direct connection to bodies of water, GB8978 Class I standards contain stricter requirements; however, the majority of industries in industrial agglomeration areas only need to meet Class III standards. GB8978 also provides some standards for municipal secondary wastewater treatment plants, but the standards for municipal

¹³ http://www.mee.gov.cn/ywgz/fgbz/bz/bzwb/shjbh/shjzlbz/200206/t20020601_66497.htm

¹⁴ http://www.mee.gov.cn/ywgz/fgbz/bz/bzwb/shjbh/shjzlbz/199807/t19980701_66499.shtml

secondary wastewater treatment plants have been updated (see Table 2) and will be introduced in 2.1.2 *Municipal Wastewater Plant Standards*.

When industrial units discharge wastewater into bodies of water directly, they need to apply for a Permit of Pollutant Discharge (排污许可证), issued by local Bureaus of Ecology and Environment (地方生态环境局, “BEE”).

[Wastewater Quality Standards for Discharging to Municipal Sewers GB/T31962-2015](#) (污水排入城镇下水道水质标准, “GB/T31962”)¹⁵ need to be applied/is applied when wastewater is discharged into city and town sewage system, according to the requirements from local BEEs. This standard was proposed by the [Ministry of Housing and Urban-Rural Development of China](#) (住房和城乡建设部, “MOHURD”).¹⁶ In addition, industrial units need to follow this standard to get a Permit for Sewage to Discharge into the Drainage Network (污水排入排水管网许可证, “PSDDN”), which is issued by local [Bureaus of Housing and Urban-Rural Development](#) (住房和城乡建设局, “BOHURD”). Industrial units that have been listed in the [Management Catalogue for Discharge Permit Classification of Fixed Pollution Sources](#) (固定污染源排污许可分类管理名录)¹⁷ need to apply for a Permit of Pollutant Discharge, in addition to a PSDDN.

GB/T31962 offers three classes of standards, based on the treatment technology and ability of municipal wastewater plants connected to the municipal sewers: reclamation treatment, primary treatment, and secondary treatment.

2.1.2. Municipal Wastewater Plant Standards

When the wastewater is discharged into sewage pipes from industrial facilities, it is then directed into a municipal wastewater treatment plant to wait for further treatment. Treatment at these plants should adhere to the [Discharge Standard of Pollutants for Municipal Wastewater Treatment Plants GB18918-2002](#) (城镇污水处理厂污染物排放标准, “GB18918”) issued by the MEE, which is also a national standard.¹⁸

According to their respective sources and properties, pollutants can be divided into two types: basic control items and selective control items. Basic control items mainly include 12 regular pollutants which affect the water environment and can be removed using the regular municipal wastewater treatment process, as well as seven Level I pollutants, which are usually heavy metals that are hazardous. Selective control items include pollutants which could have long term effects on the environment, or which have relatively high level of toxicity (relating to a total of 43 items which are listed in GB18918).

Adherence to standards for basic control items is mandatory. The selective control items can be chosen by local BEEs, based on the industrial pollutants, which are adopted by wastewater treatment plants and environmental quality requirements for different discharging directions. The general control items are listed in Table 2.

¹⁵ http://www.sohu.com/a/316081459_732811

¹⁶ <http://www.mohurd.gov.cn/>

¹⁷ http://www.mee.gov.cn/gkml/sthjbgw/stbgth/201809/t20180904_548690.htm

¹⁸ http://kjs.mee.gov.cn/hjbhzbz/bzwb/shjbh/swrwpfbz/200307/t20030701_66529.shtml

Table 2: The Highest Permissible Emission Concentration (Average Daily Value) of General Control Items

Item	Parameters		Units	Level I		Level II	Level III
				Standard A	Standard B		
1	Chemical oxygen demand (“COD”)		mg/L	50	60	100	120
2	Biochemical oxygen demand (“BOD ₅ ”)		mg/L	10	20	30	60
3	Suspended solids (“SS”)		mg/L	10	20	30	50
4	Animal and vegetable oil		mg/L	1	3	5	20
5	Petroleum oil		mg/L	1	3	5	15
6	Anionic surfactant		mg/L	0.5	1	2	5
7	Total Nitrogen (in terms of N)		mg/L	15	20	-	-
8	Ammonia nitrogen (in terms of N)		mg/L	5 (8)	8 (15)	25 (30)	-
9	Total phosphorus (in terms of P)	Plants built before 31 st December 2005	mg/L	1	1.5	3	5
		Plant built since 1 st January 2006	mg/L	0.5	1	3	5
10	Chroma (dilution ratio)		-	30	30	40	50
11	pH		-	6-9			
12	Number of Faecal coliforms		number/L	10 ³	10 ⁴	10 ⁴	-

Under the following situations, treatment should be carried out based on removal rate indications: when the COD of influent is more than 350 mg/L, the removal rate should be more than 60%; when BOD₅ is more than 160 mg/L, the removal rate should be more than 50%.

For ammonia nitrogen (the eighth item in Table 2), the data listed outside the brackets indicates the control standard when the temperature is over 12°C, while the data listed inside the brackets indicates the control standard when the temperature is no higher than 12°C.

The **standard values** can be divided into Level I, Level II, and Level III, according to the function, the protection goal, and the treatment process of the municipal wastewater treatment plants, respectively. Level I is further classified into Standard A and Standard B. Additional information relating to the three standard levels is outlined below:

- Standard A of GB18918 Level I should be followed for effluent discharged into rivers and lakes with less dilution capacity for urban landscape water use and general reuse purposes;

- Standard B of GB18918 Level I should be followed for effluent discharged into GB3838 surface water Standard III function water areas (excluding designated drinking water reserves and swimming areas), or into GB3097 seawater Standard II function water areas;
- GB18918 Level II should be followed when effluent from municipal wastewater treatment plants is discharged into GB3838 surface water Standard IV or V function water areas, or into G3097 seawater Standard III or IV function water areas;
- GB18918 Level III standards should be followed in the case of the wastewater treatment plants of some designated towns which are not inside designated water basins or water conservation areas should follow when they use enhanced primary treatment processes. However, the facilities for secondary treatment must be planned ahead of plant construction, in order to follow Level II standards in the future.

2.2. Provincial Policies

The following section will introduce subsidy policies while highlighting provincial-level regulations which are of more strict standards.

National-level subsidy policies were already issued in the past, and have recently been updated: the [Ministry of Finance of China](#) (财政部, “MOF”)¹⁹ issued the [Management Measures of the Subsidy Fund for Urban Pipeline Network and Sewage Treatment](#) (城市管网及污水处理补助资金管理办法) on 13th June 2019²⁰. This policy states that grants will be given to the relevant bureaus for the following projects or achievements:

- “Sponge city” construction pilot projects (effective period 2018-2020);
- Pilot projects for the construction of underground comprehensive pipeline corridors (effective period 2018-2020);
- Exemplary demonstrations of urban “black-odorous water” treatment (effective period 2018-2020);
- Regions in western and central China that have made successful improvements in the quality and efficiency of their urban sewage treatment (effective period 2018-2021).

The *Management Measures of the Subsidy Fund for Urban Pipeline Network and Sewage Treatment* offers subsidies to encourage the construction of wastewater treatment facilities in more Chinese cities. According to the policy, the overall implementation of the subsidy fund for all projects or achievements shall not exceed 5 years.

According to the [list of subsidy fund allocation](#) for the policy²¹ issued by the Ministry of Finance, RMB 200 million were allocated to the city of Qingdao specifically for the implementation of projects on exemplary demonstrations of urban “black-odorous water” treatment. Another RMB 400 million were allocated to two other cities in Shandong province.

The total amount of subsidy received by Sichuan province from the policy is RMB 886.14 million, of which RMB 366.14 million were allocated to projects focusing on the improvement in quality and efficiency of urban sewage treatment in central and west China. RMB 120 million has been allocated to “sponge city” construction projects in Sichuan province.

This policy is highly likely to influence provincial policies by providing incentives to provincial and local governments to further their efforts and resources in this sector. There are some past examples of provinces and municipalities that have implemented various incentives to accelerate sewage treatment construction, such as

¹⁹ <http://www.mof.gov.cn/index.htm>

²⁰ http://jjs.mof.gov.cn/zhengwuxinxi/zhengcefagui/201907/t20190702_3289396.html

²¹ http://jjs.mof.gov.cn/zxzyzf/csgwzxzj/201906/t20190627_3286119.html

Shanghai's [Subsidy Policy of Municipal Funds for Suburban Sewage Pipeline Network Construction](#) (上海市郊区污水管网完善工程市级资金补贴实施方案),²² in 2017, and the [Special Funds for Full Operated Sewage Treatment Facilities in Constructed Towns](#) (建制镇污水处理设施“全运行”以奖代补专项资金),²³ in Central and Northern Jiangsu in 2019.

Provinces that have issued their own policies for water pollution include both Shandong Province and Sichuan Province, which have stricter requirements than the national policies.

For Shandong Province, they include:

- [Regulations of Shandong Province on the Prevention and Control of Water Pollution \(September 2018\)](#) (山东省水污染防治条例),²⁴
- [Battle Plan of Shandong Province to Control Black Odorous Water \(2018-2020\)](#) (山东省打好黑臭水体治理攻坚战作战方案 (2018—2020年)),²⁵
- [Opinions on Strengthening Wastewater Treatment and Reuse in Shandong Province](#) (山东省关于加强污水处理回用工作的意见).²⁶

For Sichuan Province, they include:

- [Three-year Action Plan for the Construction of Industrial Wastewater Treatment Facilities in Industrial Parks](#) (四川省工业园区工业废水处理设施建设三年行动计划),²⁷ (2017-2020)
- [Battle Plan of Sichuan Province to Control Black Odorous Water](#) (四川省打好城市黑臭水体治理攻坚战实施方案),²⁸
- [Regulations on Water Environment Protection in the Tuojiang River Basin, Sichuan Province](#) (四川省沱江流域水环境保护条例).²⁹

2.3. Policies Related to Public-Private Partnership Projects

The following section will outline policies designed to encourage Public-Private Partnership (“PPP”) projects in China.

The use of PPP to deliver infrastructure projects started in China in the late 1990s in the water sector. Now it has become a mandatory cooperation method for all water and environment projects.

In the [Circular on Issues Concerning the Promotion and Application of the Public-Private Partnership Model](#) (关于推广运用政府和社会资本合作模式有关问题的通知) issued by the MOF in 2014, PPP is defined as a long-term cooperation relationship established in infrastructure and public service sectors.³⁰ This circular states that:

²² http://www.shcm.gov.cn/cmmh_web/html/shcm/shcm_xxgk_xzfbmyxzgk_xzfbm_xfzggwyh_ywgz/Info/Detail_1566378.htm

²³ http://jsszfbcxjst.jiangsu.gov.cn/art/2019/2/20/art_8639_8230081.html

²⁴ http://zfc.sdein.gov.cn/hjbhdfxfg/201809/t20180928_1477276.html

²⁵ http://www.shandong.gov.cn/art/2018/12/1/art_2259_29115.html

²⁶ <http://wrm.sdwr.gov.cn/tzgg/201712/P020171228660469209252.pdf>

²⁷ <http://www.sc.gov.cn/10462/10464/10465/10574/2017/11/14/10438104.shtml>

²⁸ <http://www.sc.gov.cn/zcwj/xxgk/NewT.aspx?i=20190116202300-549605-00-000>

²⁹ <http://www.sc.gov.cn/10462/10464/10797/2019/5/25/bfc93f972faf4971a65cf84fd60bb788.shtml?from=singlemessage>

³⁰ <http://www.cpppc.org/en/Guidelines/4712.jhtml>

“Generally, corporate partners undertake the most part of the design, construction, operation and maintenance of infrastructure, and obtain reasonable investment returns through ‘payment by users’ and necessary ‘payment by the government’; and governmental departments are responsible for the supervision over the prices and quality of infrastructure and public services to ensure the maximization of the public interest.”

In 2015, as agreed by both the MOF and the [National Development and Reform Commission](#) (国家发展和改革委员会, “NDRC”)³¹, the [Circular of the General Office of the State Council on Guiding Opinions on Promoting the Public-Private Partnership Mode in the Public Service Fields](#) (关于在公共服务领域推广政府和社会资本合作模式的指导意见) updated the PPP as:

“A government selects private partners with the capacity of investment and operation management in a competitive way; both parties arrive at a contract in the principle of equal negotiation to define the relations of responsibilities, rights and interests; the private partner provides public services, while the government pays the private partner corresponding consideration as per performance evaluation results of public services to guarantee reasonable earnings of the private partner.”³²

Both Shandong Province and Sichuan Province have made significant progress in launching PPP projects, encouraged by national- and provincial-level policies. The national-level [Circular on Further Advancing the Public-Private Partnership in Public Services](#) (关于在公共服务领域深入推进政府和社会资本合作工作的通知) issued by the MOF in 2016 calls for further expanding the application of the PPP model and actively channelling social capital into PPP projects.³³ This circular encourages businesses of all types of ownership, including state-owned holding enterprises, private enterprises, mixed-ownership enterprises, and foreign-invested enterprises, to participate in PPP projects under the same eligibility requirements and to receive equal treatment. This circular also asks for finance departments at all levels to implement the fiscal and tax preferential policies for PPP projects in public services approved by the state, and to cultivate a favourable environment for regulated implementation of PPP projects by providing preliminary subsidies and rewards.

Furthermore, MOF issued the [Circular on the Full Implementation of the PPP Model in Sewage and Waste Treatment Projects which the Government Participates in](#) (关于政府参与的污水、垃圾处理项目全面实施PPP模式的通知) in 2017, which strongly promotes implementation of the PPP model for all new wastewater and rubbish treatment projects that involve any form of government.³⁴

A selection of provincial-level policies related to PPP in Shandong Province includes:

- [Guidance on the Promotion of PPP in the Field of Public Services](#) (关于在公共服务领域推广政府和社会资本合作模式的指导意见);³⁵
- [Circular on Measures to Actively Utilise Foreign Capital in the New Period](#) (关于新时期积极利用外资若干措施的通知);³⁶
- [Interim Measures for Implementation of PPP Development Fund in Shandong Province](#) (山东省PPP发展基金实施暂行办法).³⁷

³¹ <http://en.ndrc.gov.cn/>

³² <http://www.cpppc.org/en/NationalPolicies/4001.jhtml>

³³ <http://www.cpppc.org/en/Guidelines/4698.jhtml>

³⁴ http://www.gov.cn/xinwen/2017-07/19/content_5211736.htm

³⁵ <http://www.jinan.gov.cn/module/download/downfile.jsp?classid=-1&filename=1804161919341793410.pdf>

³⁶ http://www.shandong.gov.cn/sdxxgk/publi/message/detail.do?identifier=ml_0122-04-2017-000167

³⁷ http://www.shandong.gov.cn/art/2017/9/1/art_2259_27722.html

There are also several provincial-level policies related to PPP in Sichuan Province, including:

- [*Suggestions on the Implementation of Sponge City Construction by the General Office of Sichuan Provincial People's Government*](#) (*四川省人民政府办公厅关于推进海绵城市建设的实施意见*);³⁸
- [*Circular on Actively Carrying Out Comprehensive Financial Services to Accelerate the Construction of Key projects Using the Model of PPP*](#) (*关于积极开展综合金融服务加快重点项目采用政府和社会资本合作模式建设的通知*);³⁹
- [*Management Measures of Comprehensive Subsidy Funds for PPP from Sichuan Provincial Finance Support*](#) (*四川省省级财政支持PPP综合补助资金管理办法*).⁴⁰

The revised [*Three-year Promotion Plan of Urban Sewage Treatment Facilities in Sichuan Province*](#) (*四川省城镇污水处理设施建设三年推进方案*) calls for an accelerated utilisation of the PPP model, and actively promotes PPP projects in Sichuan Province starting as soon as possible.⁴¹

The implementation of PPP sewage treatment projects has experienced continued success across China, and as such the wastewater treatment market is predicted to be further opened up.

2.4. Policy Implementation and Outlook

On November 25, Li Keqiang, member of the Standing Committee of the Political Bureau of the CPC Central Committee and Premier of the State Council of China, hosted a special meeting on the preparation and development of the fourteenth five-year plan for national economic and social development.⁴² The 14th five-year plan will be implemented starting from 2021, running up until 2025.

The "Five-Year Plans" is considered to be China's most important policy indicator. It is mainly to plan major national construction projects, productivity distribution and important national economic relations, etc., and set goals and directions for the national economic development. Since the first five-year plan formulated in 1953, China has issued 13 "five-year plans." Starting in the second half of 2019, approaching the end of the implementation period of the 13th Five-Year Plan, China has been summarising on the achievements, the unachieved goals as well as shifting the directions and starting with the planning of the new five-year plan.

In June 2019, the 2019 Annual General Meeting of the China Council for International Cooperation on Environment and Development was held in Hangzhou during which Ganjie Li, the Minister of MEE, addressed potential targets for development and strategies for the 14th five-year plan.

“Green development is an inevitable requirement for building a high-quality modern economic system, and it is also a fundamental strategy for solving ecological and environmental problems.” To a certain extent, ecological environmental protection has become an important force and grabber to promote high-quality economic development. In 2018, direct investment in key cities in China for the treatment of black and odorous water bodies reached 114.38 billion yuan; “coal-to-electricity” and “coal-to-gas” measures have been adopted to effectively stimulate investment and consumption.⁴³ In 2018, China’s investment in ecological protection and environmental governance increased by 43%.

³⁸ <http://pppxm.chengdu.com.cn/PPPWeb/ZCXX.aspx?pkid=239>

³⁹ <http://pppxm.chengdu.com.cn/PPPWeb/ZCXX.aspx?pkid=291>

⁴⁰ <http://www.cpppc.org/zh/dfwj/7286.jhtml>

⁴¹ <http://www.sc.gov.cn/zcwj/xxgk/NewT.aspx?i=20181113082445-990355-00-000>

⁴² http://www.gov.cn/premier/2019-11/26/content_5455849.htm

⁴³ <http://env.people.com.cn/n1/2019/0605/c1010-31120847.html>

It is estimated that the output value of China's green economy⁴⁴ in 2018 is about 6 trillion yuan, and it will reach 12 trillion yuan in 2025, accounting for about 8% of GDP. By 2035, it will reach more than 10% of GDP.

In the 14th five-year plan period, scientific and technological innovation will become central as solutions to ecological and environmental problems. China has made progress in fighting against pollution, but there are still many things to be done. In the planning stage of the 14th five-year plan for ecological environmental protection, it should be highlighted not only green development, but also technological innovation should be reflected. Scientific and technological innovation is a powerful tool for solving outstanding ecological and environmental problems. In the “Fourteenth Five-Year Plan” period, China will continue to carry out scientific and technological research in key areas, and to provide strong support for scientific decision-making, environmental management and pollution control. The transformation and application of major research results will drive the innovation of the ecological environment industry and help high-quality economic development.

⁴⁴ <https://www.unenvironment.org/explore-topics/green-economy>

3. Key Stakeholders

3.1. Government Oversight Departments and Local Design Institutes

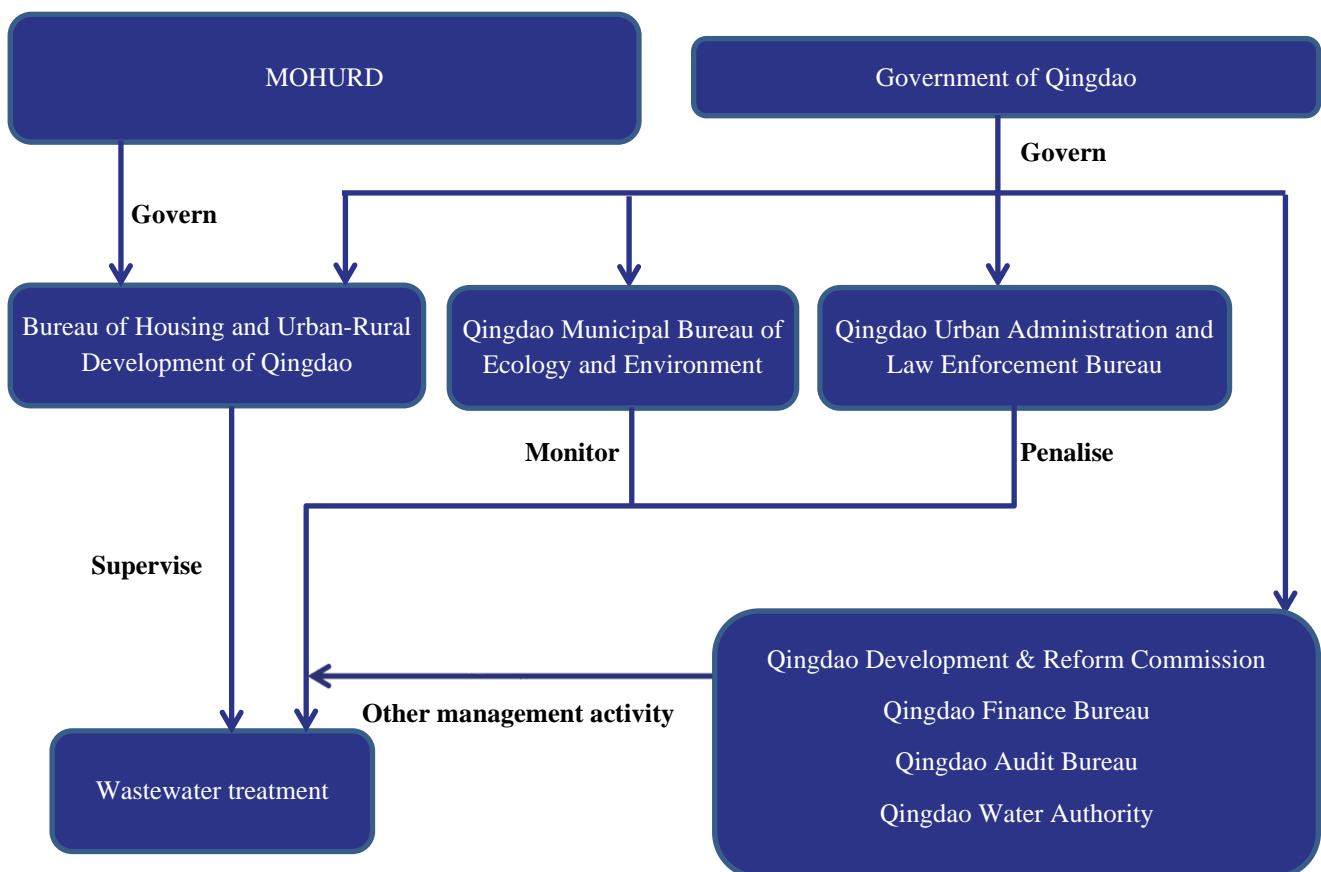
As the department responsible for urban and rural housing construction under the State Council, the MOHURD guides and supervises the work of urban drainage and wastewater treatment nationwide, with reference to the [Regulations on Urban Drainage and Sewage Treatment](#) (城镇排水与污水处理条例).⁴⁵

The local departments (at or above county level) of urban drainage and wastewater treatment, correspondingly governed by various levels of local government, are responsible for the supervision and administration of wastewater treatment within their respective administrative areas.

Other relevant departments of the local government, such as the BEE and the Urban Administration and Law Enforcement Bureau (城市管理行政执法局), at or above the county level, are responsible for the supervision and administration of wastewater treatment within their respective functions and duties.

Figure 1 uses Qingdao as an example to demonstrate how local government departments cooperate to supervise and manage wastewater treatment.

Figure 1: The Government Oversight Departments for Wastewater Treatment in Qingdao



⁴⁵ http://www.gov.cn/flfg/2013-10/16/content_2508291.htm

For Qingdao and Chengdu, the governmental oversight departments for industrial wastewater are the [BOHURDs of Qingdao](#)⁴⁶ and [Chengdu](#),⁴⁷ respectively, both of which are led by MOHURD. They are responsible for incorporating the relevant planning requirements for urban drainage and wastewater treatment into overall urban plans and guiding and supervising the implementation of these urban plans.

Municipal departments of environmental protection supervise the quality of wastewater by focusing their attention on key wastewater discharging units. These departments carry out inspections to check whether the water quality meets standard requirements for pollutant levels, including whether industrial wastewater discharged directly into natural waters meets the relevant standards. For Qingdao and Chengdu, the municipal departments are the [Qingdao Municipal Bureau of Ecology and Environment](#) (青岛市生态环境局)⁴⁸ and the [Chengdu Municipal Bureau of Ecology and Environment](#) (成都市生态环境局).⁴⁹

The relevant municipal administrative law enforcement departments for Qingdao and Chengdu are the [Qingdao Urban Administration and Law Enforcement Bureau](#) (青岛市城市管理行政执法局),⁵⁰ and the [Chengdu Urban Administration and Law Enforcement Bureau](#) (成都市城市管理行政执法局),⁵¹ respectively, which are responsible for investigating and dealing with violations of drainage regulations, as well as granting permission for discharge.

BOHURD assesses whether new wastewater treatment facilities need to be built, or whether existing facilities need to be expanded. It then compiles a project proposal for approval of the local Development and Reform Commission (发展和改革委员会), after completing its proposal plan and assessment. For certain large projects, national-level departments are also involved in this process. Design institutes are occasionally involved in the initial project proposal, in order to conduct feasibility studies, which entail producing detailed designs and feasibility demonstrations. During the planning phase, local design institutes are important stakeholders: both Qingdao and Chengdu have several large and famous design institutes, some of which are listed below.

Local design institutes in Qingdao:

- [Qingdao Municipal Engineering Design & Research Institute](#) (青岛市市政工程设计研究院);⁵²
- [Jinan Municipal Engineering Design & Research Institute \(Group\)](#), Qingdao Branch (济南市市政工程设计研究院青岛分院);⁵³
- [China Northeast Municipal Engineering Design & Research Institute](#), Qingdao Branch (中国市政工程东北设计研究总院青岛分公司);⁵⁴
- [North China Municipal Engineering Design & Research Institute](#), Qingdao Branch (中国市政工程华北设计研究总院青岛分公司);
- [Central and Southern China Municipal Engineering Design & Research Institute](#), Qingdao Branch (中国市政工程中南设计研究总院青岛分院).⁵⁵

⁴⁶ <http://sjw.qingdao.gov.cn/n28356047/index.html>

⁴⁷ <http://cdzj.chengdu.gov.cn/>

⁴⁸ <http://mbee.qingdao.gov.cn/n28356059/index.html>

⁴⁹ <http://sthj.chengdu.gov.cn/>

⁵⁰ <http://csglj.qingdao.gov.cn/n28356056/index.html>

⁵¹ <http://cgw.chengdu.gov.cn/>

⁵² <http://www.qmedi.cn/index.php>

⁵³ <http://www.jnszy.cn/index.php?c=content&a=list&catid=327>

⁵⁴ <http://nemd.com.cn/about.asp?MinID=3>

⁵⁵ <http://www.znszy.com.cn/Contact.asp>

Local design institutes in Chengdu:

- [Chengdu Municipal Engineering and Research Design Institute](#) (成都市市政工程设计研究院)⁵⁶;
- [Southwest Municipal Engineering Design & Research Institute of China](#) (中国市政工程西南设计研究总院);⁵⁷
- [North China Municipal Engineering Design & Research Institute](#), Chengdu Branch (中国市政工程华北设计研究总院成都分公司);⁵⁸
- [Shanghai Municipal Engineering Design Institute](#), Chengdu Branch (上海市市政工程设计研究总院成都分公司);⁵⁹
- Beijing General Municipal Engineering Design & Research Institute, Chengdu Branch (北京市市政工程设计研究总院成都分院);
- Central and Southern China Municipal Engineering Design & Research Institute, Sichuan Branch (中国市政工程中南设计研究总院四川分院).⁶⁰

3.2. Local Public Private Partnership Project or Build-operate-transfer Project Operational Bodies

Wastewater treatment projects were one of the earliest examples of infrastructure projects invested, constructed, and operated using the PPP model in China. At present, wastewater treatment PPP projects account for more than 15% of infrastructure-related PPP projects, the majority of which are build-operate-transfer (“BOT”) projects. PPP is highly likely to continue being widely used because of large demand in China for wastewater treatment investment, and the national-level requirement for the PPP model to be used in wastewater treatment projects.

In China, PPP projects are organised by the [China Public Private Partnerships Centre](#) (财政部政府和社会资本合作中心)⁶¹ under the supervision of the MOF, which offers the use of the [Project Management Database](#) (项目管理库)⁶² and the [Project Potential List](#) (项目储备清单).⁶³ The NDRC also participates in the initiation of PPP projects, and has a [Project Database](#) (项目库).⁶⁴

In July 2016, the scope of PPP implementation was formally defined in an executive meeting of the State Council: that the NDRC is in charge of PPP implementation in the infrastructure field, and the MOF is in charge of PPP implementation in the public service field. Correspondingly, the NDRC issued the [Circular of the NDRC on the Implementation of PPP in the Traditional Infrastructure Field](#) (国家发展改革委关于切实做好传统基础设施领域政府和社会资本合作有关工作的通知)⁶⁵, and the MOF issued the [Circular on Deeply Promoting PPP in the Public Services Field](#) (关于在公共服务领域深入推进政府和社会资本合作工作的通知).⁶⁶

⁵⁶ <http://www.cdmedi.com/index.aspx>

⁵⁷ <http://www.smedric.com/about.aspx?mid=14>

⁵⁸ <http://www.cnwg.com.cn/new/aboutus7.html>

⁵⁹ <http://www.smedi.com/about/branch.jsp>

⁶⁰ <http://www.znszy.com.cn/Contact.asp>

⁶¹ <http://www.cpppc.org/en/index.jhtml>

⁶² <http://www.cpppc.org:8086/pppcentral/map/toPPPMap.do>

⁶³ <http://www.cpppc.org:8086/pppcentral/map/toPPPPotentialList.do>

⁶⁴ <http://tzs.ndrc.gov.cn/zttp/PPPxm/xmk/>

⁶⁵ http://www.ndrc.gov.cn/zcfb/zcfbtz/201608/t20160830_816401.html

⁶⁶ http://jrs.mof.gov.cn/zhengwuxinxi/zhengcefabu/201610/t20161012_2433695.html

In Qingdao, the main oversight department for PPPs is the [Qingdao Finance Bureau](#) (青岛市财政局),⁶⁷ and its projects are listed in the [Project Database for PPP Comprehensive Information Platform Management System in Shandong Province](#) (山东省 PPP 综合信息平台管理系统项目库).⁶⁸ For Chengdu, the main oversight department for PPPs is [Chengdu Public Private Partnerships Centre](#) (成都市 PPP 中心),⁶⁹ under the supervision of the [Chengdu Municipal Development and Reform Commission](#) (成都市发展和改革委员会).⁷⁰ However, MOHURD and local BOHURDs are still the organisations responsible for project implementation of wastewater treatment projects across China. .

There are many companies involved in PPP projects in the wastewater treatment field in Shandong Province, including:

- [Shandong Huayuan Environmental Protection Group](#) (山东华源环保集团有限公司),⁷¹ which is operating Weifang Binhai Development Zone Wastewater Treatment Plant (潍坊滨海开发区污水处理厂) as a BOT project;
- [Qingdao City Construction Investment \(Group\) Co Ltd](#) (青岛城市建设投资集团有限责任公司),⁷² which is operating Qingdao Chengyang Wastewater Treatment Plant (青岛市城阳污水处理厂) as a BOT project;
- [Econ Technology Co Ltd](#) (毅康科技有限公司),⁷³ which is the owner of Rushan Yintan Water Supply and Drainage PPP Project (乳山市银滩供排水 PPP 项目);
- [Anhui Guozhen Environmental Protection Technology Joint Stock Co Ltd](#) (安徽国祯环保节能科技股份有限公司),⁷⁴ which is the owner of Sishui County Second Wastewater Treatment Plant PPP Project (泗水县第二污水处理厂 PPP 项目) and Jining Zouzcheng Functional Area Water Supply and Drainage PPP Project (济宁邹城功能区给排水 PPP 项目).

In Sichuan Province, there are also many companies involved in PPP projects in wastewater treatment field, including:

- [China Water Environment Group](#) (中国水环境集团),⁷⁵ which is the owner of the Guang'an Second Wastewater Treatment Plant (广安市第二污水处理厂), PPP Project and PPP Project for Comprehensive Improvement of Water Environment in Xindu Pi-River Basin (新都毗河流域水环境综合整治 PPP 项目);
- [Sichuan Water Affairs Investment Co Ltd](#) (四川能投水务投资有限公司),⁷⁶ which is the owner of Nanjiang County Second Water Plant PPP Project (南江县第二水厂 PPP 项目);
- [China Open City Environment Co Ltd](#) (中建城开环境建设有限公司);⁷⁷ which is involved in the PPP Project for Upgrading Urban Sewage Treatment Plant in Pengshan District, Meishan (眉山市彭山区城市生活污水处理厂提标升级改造 PPP 项目)

⁶⁷ <http://qdcz.qingdao.gov.cn/>

⁶⁸ <http://www.cpppc.org:8086/pppcentral/map/toPPPProList.do?distCode=37>

⁶⁹ <http://ppp.chengdu.com.cn/LMNR/LMNRDetail.aspx?LNID=935>

⁷⁰ <http://cddrc.chengdu.gov.cn>

⁷¹ <http://www.huayuanjituan.com>

⁷² <http://www.qdct.cn/index.html>

⁷³ <http://www.iecon.cn/index.html>

⁷⁴ <http://www.gzep.com.cn>

⁷⁵ <http://www.cwewater.com/indexs.html>

⁷⁶ <http://www.scntsw.com>

⁷⁷ <http://www.zjckjt.com/index.html>

- [Beijing OriginWater Technology Co Ltd](#) (北京碧水源科技股份有限公司),⁷⁸ which is the owner of the PPP Project of Municipal Public Engineering for Ecological Water Environment Comprehensive Treatment in Meigu County, Sichuan Province (四川省美姑县生态水环境综合治理市政公用工程 PPP 项目).

⁷⁸ <http://en.originwater.com/index.html>

4. Market Potential

4.1. Local Key Industrial Clusters

Qingdao has four key industrial clusters: The Smart Appliance Industrial Cluster, the Rail Transit Equipment Industrial Cluster, the Energy Saving and New Energy Vehicle Industrial Cluster, and the Marine Manufacturing Industrial Cluster.

Qingdao is renowned for being home to one of the earliest home appliance industrial clusters in China, and its well-established home appliance industry is now pioneering the development of smart appliances integrated with the latest modern technologies. In 2018, [COSMOPlat](https://www.cosmoplat.com),⁷⁹ an industrial Internet platform, researched and developed by [Haier](http://www.haier.net/en/) (海尔), was approved as the first national industrial demonstration platform, bringing together 320 million users and 3.9 million companies.⁸⁰ [Hisense](http://www.hisense.cn/index.aspx) (海信), a technology company, continues to focus on cutting-edge technologies; its new R&D centre, built in 2018, focuses on new displays, intelligent medical treatment, intelligent transportation, and other fields, and aims to develop world-class multimedia display technology.⁸¹

Commonly known as one of China's "four new great inventions", high-speed railway in China has become almost synonymous with Qingdao. Qingdao is home to Jihongtan Town in Chengyang District, which is often referred to as the "Bullet Train Town". At the beginning of 2018, the construction of the [National High-Speed Train Technology Innovation Centre](#) (国家高速列车技术创新中心) was officially completed.⁸² On 21st November 2018, ThyssenKrupp, a Fortune 500 company, opened its magnetic technology laboratory there, further strengthening the R&D capability of this national technology innovation centre.

Artificial intelligence and new energy vehicle technologies have shaped Qingdao's automotive industry, contributing to the formation of a RMB 100 billion (EUR 12.9 billion) vehicle and new energy vehicle industry cluster.⁸³ A multi-billion RMB new energy vehicle industrial chain is taking shape in Laixi in Qingdao, centring around the production base of the new energy vehicle producer [BAIC BJEV](https://www.bjev.com.cn) (北汽新能源).⁸⁴ According to the [Implementation Plan for Major Projects to Convert Driving Forces in Qingdao](#) (青岛市新旧动能转换重大工程实施规划), Qingdao's total automobile production capacity will exceed 1.8 million units by 2022, and the revenue of the automobile manufacturing industry will exceed RMB 170 billion (EUR 21.9 billion) in the same year.⁸⁵

As one of the most important marine engineering production bases in China, Qingdao's design, manufacturing, and final assembly capacity of marine engineering platforms has reached a world-class level. The shipbuilding industry has formed a complete industrial chain, including shipbuilding and repair, marine diesel engines, marine electric propulsion systems, ports, and marine machinery. In the field of marine biomedicine, Qingdao has successfully developed five new Class I medicines, 20 new medicines of other classes, and more than 200 functional marine products; while with the local development of the National Marine Gene Bank (国家海洋基

⁷⁹ <https://www.cosmoplat.com>

⁸⁰ <http://www.haier.net/en/>

⁸¹ <http://www.hisense.cn/index.aspx>

⁸² <http://www.innohst.com/active/list.php?tid=2>

⁸³ EUR 1 = RMB 7.75, <https://finance.yahoo.com/currency-converter/>, rate correct on 8th Aug 2019

⁸⁴ <https://www.bjev.com.cn>

⁸⁵ <http://www.shandong.gov.cn/module/download/downfile.jsp?classid=0&filename=7bdbc994fd8044768199c2a17416adc7.pdf>

因库), Qingdao has become one of the most important marine biotechnology and marine medicine research centres in China.

Chengdu has three key industrial clusters: the Electronic Information Industrial Cluster, the Equipment Manufacturing Industrial Cluster, and the Medical Health Industrial Cluster.

Chengdu plans to form a first RMB one trillion (EUR 129 billion) industrial cluster before the end of 2020: the Electronic Information Industrial Cluster. At present, more than 1,400 industrial companies, each with sales worth over RMB 20 million (EUR 2.6 million) annually, are based in the cluster, which has attracted more than 60 Fortune 500 companies, including Intel, IBM, and Microsoft. Chengdu has now formed a whole industrial chain that features integrated circuits, new displays, whole machine manufacturing, and software services. Chengdu is focusing on microchips and screen development to accelerate cluster formation and actively creating a "Made in China 2025" national demonstration zone.

The Equipment Manufacturing Industrial Cluster in Chengdu focuses on four areas: the automobile industry, the aerospace industry, rail transit, and intelligent manufacturing equipment. Significant efforts have also been made to build a national aviation high-tech industrial base; an intelligent, green automobile manufacturing demonstration area; and a pioneering rail transit industrial hub in Chengdu.

Chengdu is also aiming to establish itself as a global centre for biomedical innovation and creation, as a preferred location for medical and health services, and as a hub city for the pharmaceutical supply chain. This cluster is supported by several technology development platforms, and is centred on [Chengdu Tianfu International Biotown](#) (成都天府国际生物城, "CTIB"),⁸⁶ [Chengdu Medical City](#) (成都医学城),⁸⁷ and West China International Medical Wisdom Valley (环华西国际智慧医谷). It is likely to expand rapidly in the future, with the construction of the AppTec Life Science Industry Park (药明康德生命健康产业园), the BOE (Chengdu) Health Industry Park (京东方健康产业园), and other major projects already planned.

4.2. Key Industrial Parks and Zones

Four key industrial parks and zones in Qingdao are introduced in this section, each representing an industrial cluster:

[Qingdao Automobile Industry City](#) (青岛汽车产业新城, "QAIC")⁸⁸

QAIC is located in the north of Jimo District, with a total planned area of 93km². QAIC is the only area to specifically develop automobile and automobile accessories industries in Qingdao, focusing on the research, development, manufacturing, and sales of finished vehicles and accessories. QAIC is mainly formed by three finished automobile companies: [FAW-Volkswagen](#) (一汽大众),⁸⁹ [FAW Jiefang](#) (一汽解放),⁹⁰ and FAW Jiefang's New Energy Commercial Vehicle Project (一汽解放新能源), as well as four special vehicle companies: [Hilong](#) (海隆机械),⁹¹ [Haiyu](#) (海誉),⁹² [Qingte](#) (青特),⁹³ and [Jiuh Heavy Industry Machinery](#) (九合重工).⁹⁴

⁸⁶ <http://biotown.cdht.gov.cn/include.jsp?path=/pages/main>

⁸⁷ <http://www.cdyxc.cn/>

⁸⁸ <http://www.qdautocity.cn>

⁸⁹ <http://www.faw-vw.com/index.html>

⁹⁰ <http://www.fawjiefang.com.cn>

⁹¹ <http://www.qdhailong.com/>

⁹² <http://www.haiyucar.com>

⁹³ <http://en.qingtegroup.com>

⁹⁴ <http://www.jhgz99.com>

There are three wastewater treatment plants in Jimo District, with a total daily capacity of 210,000m³. The Jimo District plans to build a new wastewater treatment plant with a daily capacity of 30,000m³, and expand an existing wastewater treatment plant with an additional daily capacity of 50,000m³.

Pingdu South Village Electronic Appliance Industrial Park (平度南村家电产业园, “PEAIP”)

The planned area for the PEAIP is 55km², and is based in the Hisense (Shandong) Home Appliance Industrial Park (海信(山东)家电产业园), supported by a home appliance-related industrial park and a warehousing and logistics industrial park. PEAIP aims to create a thriving electronic home appliance industry in Qingdao, and has established Qingdao as the main production base for home appliances and electronic products in Northern China. The main companies located in this park include Hisense (Shandong) Refrigerator Co Ltd (海信(山东)冰箱有限公司), Hisense (Shandong) Air Conditioner Co Ltd (海信(山东)空调有限公司), and Qingdao Sanjin Electronic Co Ltd (青岛三进电子有限公司).

There is one wastewater treatment plant near the PEAIP: the Pingdu South Village Wastewater Treatment Plant, which has a daily capacity of 10,000m³, although it is undergoing expansion to raise this to 20,000m³.⁹⁵

Qingdao Rail Transit Industry Demonstration Zone (青岛轨道交通产业示范区, “RTIDZ”)

RTIDZ, a newly-constructed industrial park, is home to the rail transit industry in China, as well as the National Innovation Centre of the High-Speed Train, which is China’s first national technology innovation centre, and which was jointly established by the [Ministry of Science and Technology](#) (科学技术部)⁹⁶ and the [State-owned Assets Supervision and Administration Commission](#) (国务院国有资产监督管理委员会, “SASAC”).⁹⁷

There are four major companies based in this region: [CRRC Qingdao Sifang Co Ltd](#) (中车青岛四方机车车辆股份有限公司),⁹⁸ [CRRC Sifang Co Ltd](#) (中车四方车辆有限公司), [Bombardier Sifang \(Qingdao\) Transportation Ltd](#) (青岛四方庞巴迪铁路运输设备有限公司),⁹⁹ and [CRRC Qingdao Sifang Rolling Stock Research Institute Co Ltd](#) (中车青岛四方车辆研究所有限公司),¹⁰⁰ as well as more than 200 rail transit-related supporting companies. The RTIDZ accounts for 60% of China’s national production of bullet trains in operation and 25% of national urban rail subway vehicles in China.

There are three wastewater treatment plants providing wastewater treatment services for companies in the RTIDZ: the Chengyang Urban Wastewater Treatment Plant (current daily capacity: 100,000m³; planned daily capacity: 150,000m³), the Chengyang Export Processing Zone Wastewater Treatment Plant (current daily capacity: 20,000m³; planned daily capacity: 150,000m³), and the Chengyang Shangma Wastewater Treatment Plant (current daily capacity: 40,000m³; planned daily capacity: 150,000m³).

Qingdao Ocean Hi-Tech Zone (青岛海洋高新区, “QOHZ”)

As the most important part of the Marine Manufacturing Industrial Cluster of Qingdao, QOHZ consists of three different parks: the Marine Biological Industrial Park (海洋生物产业园), the Marine Industrial Park (海洋产业园), and the Marine Logistics Park (海洋物流园).

The Marine Biological Industrial Park covers marine biology, marine medicine, seawater desalination and other marine new technology industries. Well-known companies based in the park include [Mingyue Seaweed Group](#)

⁹⁵ <https://www.tianyancha.com/bid/1b76c598a8e111e985737cd30aeb144c>

⁹⁶ <http://www.most.gov.cn/eng/>

⁹⁷ <http://en.sasac.gov.cn/>

⁹⁸ <http://www.crrcgc.cc/sfgf>

⁹⁹ <http://www.bst-transportation.com/?lang=en>

¹⁰⁰ <http://www.crrcgc.cc/sfs>

(明月海藻集团),¹⁰¹ [Qingdao Langyatai Group](http://www.langyatai.com/) (青岛琅琊台集团),¹⁰² and Trittech (Qingdao) Membrane Industry Co Ltd (三泰(青岛)膜工业有限公司).

The Marine Industrial Park focuses on new marine materials, marine engineering equipment, yachts, automobiles, and other high-tech industries, and the planned area covers 15km². Well-known companies inside the park include Defontaine (Qingdao) Machinery Co Ltd (德枫丹(青岛)机械有限公司), [Qingdao Puhua Heavy Industrial Machinery Co Ltd](http://www.puhua.com/) (青岛普华重工机械有限公司),¹⁰³ and [Qingdao Beihai Shipbuilding Heavy Industry Co Ltd](http://www.bhshipyard.cn/en/Introduction/Introduction1/) (青岛北海船舶重工有限责任公司).¹⁰⁴

There are currently two wastewater treatment plants in the QOHZ. The wastewater from the Marine Industrial Park is discharged into the Jiaonan Zhongkecheng Wastewater Treatment Plant, which is run by Qingdao Jiaonan Zhongkecheng Wastewater Treatment Co Ltd (青岛胶南中科成污水净化有限公司) and has a daily capacity of 150,000m³. Wastewater from the Marine Biological Industrial Park is also discharged into the Jiaonan Zhongkecheng Wastewater Treatment Plant, as well as into the Jiaonan Haiqing Environment Wastewater Treatment Plant, which has a daily capacity of 30,000m³.

Three key industrial parks and zones in Chengdu are introduced below, with each representing an industrial cluster:

Qingbaijiang Industrial Concentration Development Area (青白江工业集中发展区, “QICDA”)

One of the most important parts of the Equipment Manufacturing Industrial Cluster in Chengdu and located in the northeast of the city over an area of 19km², QICDA is a base for Chengdu’s metallurgy, chemical, machinery, building material, and logistics industries. The main companies based here include Chengdu Iron & Steel Co Ltd of the Panzhihua Iron & Steel (Group) Co Ltd (攀钢集团成都钢铁有限责任公司), [Sichuan Chemical Works Group Ltd](http://www.sichuanchemical.com/) (川化集团有限责任公司),¹⁰⁵ and [TG Chengdu Glass Co Ltd](http://www.tgchengdu.com/) (台玻成都玻璃有限公司).¹⁰⁶

The industrial wastewater produced by each company in the southern area of the QICDA, as stipulated by national regulations, must undergo pre-treatment to reduce the concentration of main pollutants to the required level, and can then be discharged into the city wastewater pipe network after adhering to GB/T31962. The wastewater is centralised and then treated by Qingbaijiang Second Wastewater Treatment Plant.

The Qingbaijiang Second Wastewater Treatment Plant was designed to treat wastewater from the southern industrial zone of Qingbaijiang District in 2010. It is a BOT project that was constructed in February 2016 by Chengdu Huikai Water Treatment Co Ltd (成都汇凯水处理有限公司), and is now operated by the same company. This plant’s franchise period is 26 years, beginning in 2016. It is currently being refurbished and upgraded, so as to improve its Cyclic Activated Sludge System, build a new High Efficiency Sedimentation Tank; and create additional daily capacity of 49,500m³.

¹⁰¹ <http://www.bmsg.com/en>

¹⁰² <http://www.langyatai.com/>

¹⁰³ <http://www.puhua.com/>

¹⁰⁴ <http://www.bhshipyard.cn/en/Introduction/Introduction1/>

¹⁰⁵ <https://ch.scnyw.com/>

¹⁰⁶ http://www.taiwanglass.com/factory_detail.php?sid=88&id=244

Chengdu Hi-Tech Industrial Development Zone (成都高新区, “CHIDZ”)¹⁰⁷ Western Zone

Covering an area of 43km², the western zone of CHIDZ focuses on the [University of Electronic Science and Technology of China’s](#) (电子科技大学) collaborative innovation platform, and its industry ecosystem features integrated circuits, photoelectric displays, intelligent terminals, and network communication.¹⁰⁸

CHIDZ is the cornerstone of Chengdu’s Electronic Information Industrial Cluster. It aims to build an electronic information industrial hub that can compete at an international level, and the entire CHIDZ zone spans an extensive area that includes a western zone, eastern zone, southern zone and Chengdu Tianfu International Biotown.

A total of 88 industrial companies in CHIDZ’s southern and western zones discharge wastewater, all of which discharge it into an urban wastewater treatment plant. Industrial wastewater discharged by the western zone then enters the Hi-Tech Western Zone Wastewater Treatment Plant and the Chengdu Hezuo Wastewater Treatment Plant; industrial wastewater discharged by the southern zone then enters the Third Wastewater Treatment Plant and the Zhonghe Wastewater Treatment Station.

The annual industrial wastewater emissions of western and southern zones within the CHIDZ is 9.57 million tonnes. The largest wastewater pollutant emitting industry is the electronic information industry, which is mainly based in the western zone, with an annual wastewater emission of 7.97 million tonnes, accounting for 83% of the wastewater produced inside the zone.

The Hi-Tech Western Zone Wastewater Treatment Plant Phase I is operating with a daily capacity of 40,000m³, while Phase II, which will generate an additional daily capacity of 19,900m³, is currently being planned. Phase I (daily capacity: 50,000m³) and Phase II (additional daily capacity: 50,000m³) of Chengdu Hezuo Wastewater Treatment Plant have been completed and are operating normally. These two wastewater treatment plants follow Standard A of GB18918 Level I.

Chengdu Tianfu International Biotown (成都天府国际生物城, “CTIB”)

Covering an area of 44km², CTIB was approved and built by CHIDZ and Shuangliu District together, and it forms the core of Chengdu’s Medical Health Industrial Cluster. Its focus is on biotech medicine, chemicals, modern Chinese medicine, high performance medical instruments, and outsourced health services.

A new wastewater treatment plant, the Biotown Wastewater Treatment Plant, set to cater for the biomedicine industry, is currently being planned and will be specifically designed for the CTIB. Its total Phase I daily capacity will be 50,000m³ when completed; at present, the first part of Phase I is under construction and will have a daily capacity of 25,000m³.

4.3. New and Expanded Plants

Regulated by national and regional policies, all the industrial parks and zones in Qingdao and Chengdu introduced above have corresponding wastewater treatment plants, as these two cities are relatively well-developed in China. In order to meet the required treatment capacity, plants are being planned and constructed in these two cities. The vast majority of existing plants also have plans to expand, upgrade their standards, or undergo technological improvements.

As a result, there are opportunities arising from being involved in the construction of new wastewater treatment plants surrounding or inside the new industrial parks or zones; for example, the existing/under development Biotown Wastewater Treatment Plant near the CTIB. Treatment plants are highly integrated into specific parks

¹⁰⁷ <http://www.cdht.gov.cn/>

¹⁰⁸ <https://en.uestc.edu.cn/>

and zones, and therefore companies with experience in corresponding industrial wastewater treatment technology hold a substantial advantage in getting involved and expanding the market.

To illustrate this, in the CTIB there are many pharmaceutical companies, and wastewater produced by the pharmaceutical industry often includes antibiotic production wastewater, synthetic medicine production wastewater, Chinese patent medicine production wastewater, and wash water from the production process of various medical preparations. The pharmaceutical industry's wastewater is notably difficult to treat, as it has a complex composition, high organic content, high toxicity, deep colour, high salt content, especially poor biochemical properties, and intermittent discharging properties. Therefore, this industry requires more advanced wastewater treatment technology, which in turn offers opportunities to EU SMEs that focus on this kind of wastewater.

China has a large industrial sector, an increasingly leading role in combating global environmental challenges such as climate change, and a pioneering experience in adopting regulations and policies for green development, notably for industrial parks. These factors place China among the best positioned countries to take the lead in formulating effective standards and regulations that would not only guide the green development and transformation of Chinese industry parks, but also serve as a useful reference for the formulation of international standards.

However, the existing Chinese regulatory framework for industrial parks is relatively complex. There are multiple sets of standards implemented by different governmental ministries which creates uncertainty about which certification to strive for. While the different standards pursue closely related objectives, the responsible agencies have not yet coordinated and aligned their standards and indicators, which could slow the greening of industrial parks in China.

4.4. Zero Emissions

This section will introduce the development and application of the concept of zero emissions, introduce policies related to this concept in China, and estimate the potential market size of zero emissions.

The goal of achieving zero emissions is to improve technologies and processes to the point of maximum resource productivity with almost no waste output. Zero emissions in the industrial water sector is zero liquid discharge ("ZLD"). The goal/aim of a ZLD system is to eliminate all liquid discharge in a system by reducing the volume of wastewater that requires further treatment.

Industries can achieve ZLD if the relevant wastewater treatment technology has already been developed. However, in reality, companies are profit-making bodies, hence wastewater treatment must be feasible from both technical and financial perspectives. The cost the treatment of wastewater in order to turn it into the purest concentrated brine, to take out the crystallised salt, is high, and thus normally beyond the affordability of companies at this current stage.

There are already some worldwide developed ZLD policies, whose implementation is crucial when it comes to popularise them. The concept of ZLD was first enforced in the United States in the 1970s because of the impact that industrial wastewater had on the quality of the water in rivers. Since then, Australia's first zero-discharge industrial wastewater project has also been brought online and enforced by relevant policies that now play a prominent role in guiding zero emissions in many countries. In recent years, environmental protection laws and regulations in China have increased the requirements covering treatment and disposal of high-salt wastewater in both number and comprehensiveness, with high-salt wastewater being particularly prominent in China's coal chemical and thermal power industries. At present, some provinces strictly restrict the salt content of industrial wastewater.

Despite this, there are still no strict policies or standards regulating wastewater from either the coal chemical industry or coal desulphurisation that aim to achieve zero emissions. However, policies related to reusing

wastewater, rather than discharging it, in the coal chemical industry and the thermal power industry have increased in number in recent years. Most relevant industry companies believe that corresponding standards and technical specifications about ZLD will be released in the near future. Before such new ZLD standards and specifications are issued, EU SMEs could take the initiative to occupy the ZLD markets, therefore gaining an advantageous position in these markets.

There are already several ZLD projects in China, such as the mine drainage and coal chemical wastewater treatment and utilisation project in Ningdong Mining Area, the Guangdong Heyuan Power Plant's 2 x 600 MW Units ZLD project, and the Jincheng Petrochemical Group's 24000m³/d wastewater zero discharge project.

In Qingdao, there are several companies that have built ZLD systems for coal and thermal power industries, including [Qingdao New Pacific Energy Conservation and Environmental Protection Group](#) (青岛新太平洋节能环保集团有限公司),¹⁰⁹ [Congqinphi Group Co Ltd](#) (青岛康景辉环境科技集团),¹¹⁰ [Qingdao Lanqingyuan Environmental Technology Co Ltd](#) (青岛蓝清源环保科技有限公司),¹¹¹ and [Qingdao Wanyuan Environmental Technology Co Ltd](#) (青岛万源环境科技有限公司).¹¹² Furthermore, some institutes focus specifically on ZLD technology development, such as [Qingdao Institute of Bioenergy and Bioprocess Technology](#) (中国科学院青岛生物能源与过程研究所), which operates under the Chinese Academy of Sciences.¹¹³ ZLD projects in Qingdao include the reuse of reclaimed water and concentrated brine in Qingdao Shuangtao Fine Chemical (Group) Co Ltd (青岛双桃精细化工(集团)有限公司) and a 480 tonne per day ammonium sulphate wastewater MVR evaporation and concentration system in Qingdao Organic Chemical Co Ltd (青岛奥盖克化工股份有限公司).

In Chengdu, China Construction Commercial Concrete Chengdu Branch (中建商砼成都公司) became the first company in Southwestern China to achieve ZLD, having done so in 2013. There are currently several active/implemented ZLD projects in Chengdu, such as the one targeting wastewater containing cadmium, designed and constructed by Xiner Environment in 2016.

North America is currently the world's largest market for ZLD, followed by Europe, due to the high demand for zero-emission systems which control water quality in the food, beverage, and textile industries, amongst others. Compared with other regions, the Asia-Pacific region is predicted to have the highest compound growth rate in ZLD, particularly China and India. Large companies from Europe in the ZLD market include Veolia and SUEZ from France, GEA Group AG from Germany, Alfa Laval from Sweden, and 3V Green Eagle S.p.A from Italy. It is notable that companies in the ZLD sector from the United States and India have already developed the layout of commercial development and started investment in China, on a larger scale compared to European companies.

¹⁰⁹ <http://en.xtpyjt.com/>

¹¹⁰ <https://congqinphi.51pla.com/>

¹¹¹ <http://www.lanqingyuan.com/>

¹¹² <http://www.qdwater.cn/en/index.php>

¹¹³ <http://english.qibebt.cas.cn/>

5. Case Studies

5.1. Modern Water

[Modern Water Plc](https://www.modernwater.com/) (“Modern Water”) is a UK company which was first listed on the AIM submarket of the London Stock Exchange on 12th June 2007.¹¹⁴ It is a pioneering and innovative technology company, specialising in membrane water treatment solutions and advanced monitoring products. The main technology of its Membrane Division, which is called All Membrane Brine Concentrator (“AMBC”), can be used to tackle complex wastewater treatment problems at a reduced cost compared to standard processes, while being simple to operate. In addition, Modern Water's Monitoring Division has a portfolio of world-leading toxicity and trace metal monitoring products. Modern Water had been operating in the China market for over five years and is renowned for its monitoring and analytical instruments.

In 2017, Modern Water provided its proprietary AMBC technology to a Chinese power plant (shown in Figure 2) to treat flue-gas desulphurisation wastewater. The AMBC system was built into an existing facility, and is operated in conjunction with [Hangzhou Sunup Environmental Science and Technology Co Ltd](http://en.hzsunup.com/) (杭州上拓环境科技有限公司, “Sunup”).¹¹⁵ Using its AMBC technology, Modern Water has been ambitious in becoming competitive in China, which is an important market to the company as a result of its increasingly tight environmental requirements.

Figure 2: AMBC Applied to an Existing ZLD System in Guodian Hanchuan Power Plant (国电汉川电厂, “Hanchuan Plant”)



At the end of 2018, AMBC was successfully tested in Guodian Hanchuan Power Plant (国电汉川电厂, “Hanchuan Plant”). Wastewater desulphurisation in the Hanchuan Plant was originally achieved using a workflow consisting of softening pre-treatment, salt nanofiltration, reverse osmosis membrane concentration, high-pressure membrane concentration, and mechanical vapour recompression (“MVR”) evaporation. However, a 120-bar disc tube reverse osmosis (“DTRO”) system was adopted as part of the high-pressure membrane

¹¹⁴ <https://www.modernwater.com/>

¹¹⁵ <http://en.hzsunup.com/>

concentration process. It operated using a high pressure of up to 120-bar, therefore posing a high pressure risk, and also resulting in a low performance as the brine could only be condensed to an 11% sodium chloride concentration.

The newly applied AMBC technology from Modern Water achieves low operating pressure with high concentration, and a more than 13% sodium chloride concentration is now achieved at operating pressures below 70-bar. Compared with the previous DTRO system, energy consumption has been reduced by more than 30%. In addition, investment and operation costs of the evaporator have both decreased since the water intake of the evaporator has reduced.

Modern Water had worked with Sunup since 2017. Sunup is an environmental technology company integrating water and wastewater solutions for industrial clients, with saline water treatment at the core of its technologies. It is headquartered in Future Sci-Tech City in Hangzhou and has branches in Beijing, Changxing, and Zhoushan, as well as three offices in Northern China, Southern China, and Southwestern China.

Using AMBC technology, Hanchuan Plant demonstrates substantial improvements that Modern Water can offer to the flue-gas desulphurisation sector and also in other industries, thereby allowing Modern Water to make further sales to Sunup and target new markets.

In 2018 Modern Water entered into a joint venture with Sunup called [Encyclo Water Technology \(Zhejiang\) Co Ltd](#) (英拓水务技术（浙江）有限公司, “Encyclo”).¹¹⁶ Encyclo is promoting and commercialising Modern Water’s innovative and proprietary AMBC technology in China and the Asia-Pacific region. The partnership between Sunup and Modern Water will create value for both companies by combining Modern Water's innovative brine concentration technology with Sunup's extensive knowledge of the market in China, as well as its ability to execute projects effectively.

5.2. Pillaerator

The air compressor plays an important role in aeration treatment, a core process that occurs in wastewater treatment projects. Recently, [Pillaerator GmbH](#), a German company known for its magnetic levitation blower, sold three MP6000 Compressor units and three LP8000 Compressor units to the First Wastewater Treatment Plant of Chengdu Tianfu New Area.¹¹⁷ This plant is the first PPP water treatment project in Chengdu, as well as the first and largest underground wastewater treatment factory in Sichuan Province. It has been labelled a PPP demonstration project by the MOF and the Government of Sichuan Province.

¹¹⁶ <http://www.encyclowater.com/>

¹¹⁷ <http://www.pillaerator.com/us.html>

Figure 3: Six Pillaerator Magnetic Bearing Turbo Compressors, Installed in the First Wastewater Treatment Plant of Chengdu Tianfu New Area



Since their installation, the six Pillaerator magnetic bearing compressors shown in Figure 3 have run smoothly. Mr Li Zhanshu (Member of the Standing Committee of the Political Bureau of the CPC Central Committee, and Chairman of the Standing Committee of the National People's Congress) inspected this wastewater treatment project in April 2019.

The electricity input conversion efficiency of the Pillaerator can reach 84.5%, and compared with a traditional Roots blower can save between 15% and 40% of energy inputs, which is equivalent to saving between 15 and 40% of electricity for aeration treatment in sewage plants. The foundations of Pillaerator's technology were laid in 1992, when a generator with magnetic bearings was developed at [Piller Blowers & Compressors GmbH](https://www.piller.de/) ("Piller"), the parent company of Pillaerator GmbH.¹¹⁸ Piller Blowers & Compressors GmbH was founded in 1909, and it is now the world's largest manufacturer of magnetic levitation fans. In 1994, Piller entered the China market, supplying its products to Sinopec, PetroChina, and BaoSteel.

Piller was also the first company to introduce a centrifugal fan for mechanical steam recompression treatment in the field of steam equipment, and its MVR blowers are widely used in industrial wastewater treatment in China. The use of MVR technology can bring the energy efficiency process closer to the ZLD goal, and achievement within the ZLD field mean a more efficient purification and recycling in the evaporation system, which also guarantees the overall optimisation management of the wastewater treatment process. As a result of the reputation of Pillaerator, Piller holds a strong market position, with opportunities to expand its sales across different sectors in China.

¹¹⁸ <https://www.piller.de/>

About the EU SME Centre

The EU SME Centre helps EU SMEs prepare to do business in China, by providing them with a range of information, advice, training and support services. Established in October 2010 and funded by the European Union, the Centre has entered its second phase which will run until April 2020.

The Centre is implemented by a consortium of six partners – the China-Britain Business Council, the Benelux Chamber of Commerce, the China-Italy Chamber of Commerce, the French Chamber of Commerce in China, the Eurochambres, and the European Union Chamber of Commerce in China. All services are available on the Centre's website after registration, please visit: www.eusmecentre.org.cn.

About China Europe Water Platform (CEWP)

The China Europe Water Platform was launched at the 6th World Water Forum in Marseille, France, where a Joint Statement was signed between the Ministry of Water Resources of the People's Republic of China and the Presidency of the Council of the European Union, represented by the Danish Minister of the Environment.

The China Europe Water Platform is one of the principal outputs of the EU China River Basin Management Programme. It is designed to maintain the dialogue on water resources policy, management, research and commerce between China and the EU, its Member States and like-minded countries in Europe, when the EU China River Basin Management Programme closes in July 2012. The water platform is a component of a restructured EU Water Initiative and is seen as a potentially significant addition that over time could incorporate similar cooperation with other BRIC1 countries. In China the platform secretariat will be hosted by the Ministry of Water Resources, while Denmark as European lead nation will host the EU secretariat for an initial period of 3 years assisted by Portugal.

For further information see the website <http://www.cewp.org>.

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