*The information presented in this section is, including certain facts, statistics and data, derived from the CIC Report, which was commissioned by us and from various official government publications and other publicly available publications, unless otherwise indicated. We believe that these sources are appropriate for such information and we have taken reasonable care in extracting and reproducing such information. We have no reason to believe that such information is false or misleading in any material respect or that any fact has been omitted that would render such information false or misleading in any material respect. The information has not been independently verified by our Company, the Sponsor, the [REDACTED], the [REDACTED], the [REDACTED], any of our or their respective directors, officers or representatives or any other person involved in the [REDACTED] and no representation is given as to its accuracy, completeness or fairness. The information and statistics may not be consistent with other information and statistics compiled within or outside of the PRC. As a result, excessive reliance on the information contained in this section shall be avoided.*

## SOURCE OF INFORMATION

We commissioned CIC, a market research and consulting company and an Independent Third Party, to conduct an analysis of, and to report on wastewater treatment industry in the PRC, Ningxia and Yinchuan, being the capital city of Ningxia, for the period from 2013 to 2022. The CIC Report has been prepared by CIC independent of our influence. The fee payable to CIC for preparing the CIC Report is HK$400,000, which we believe reflects the market rate for similar services. CIC is a consulting firm founded in Hong Kong. It provides professional industry consulting services across multiple industries. CIC's services include industry consulting services, commercial due diligence and strategic consulting.

Our Directors are of the view that the information set forth in this section is reliable and not misleading as the information was extracted from the CIC Report and CIC is an independent market research company with extensive experience in their profession. The information and data collected by CIC have been analysed, assessed and validated using CIC's in-house analysis models and techniques. Primary research was conducted via interviews with key industry experts and leading industry participants. Secondary research involved analysis of market data obtained from several publicly available data sources, such as releases from the governments of the research countries, company reports, independent research reports and CIC's own internal database. The methodology used by CIC is based on information gathered from multiple levels and allows such information to be cross-referenced for accuracy. On the basis of the aforementioned, we consider the data and statistics to be reliable.

## ASSUMPTIONS

The CIC Report contains a variety of market projections which were produced with the following key assumptions: (i) the overall social, economic, and political environment in the research scope regions are expected to remain stable during the forecast period; (ii) related key industry drivers are likely to propel continued growth in wastewater treatment industry throughout the forecast period, including the favourable policy support, the continuous urbanization process, the sufficient public and private capital support, and the rising wastewater treatment tariff; and (iii) there is no extreme force majeure or unforeseen industry regulations in which the market may be affected in either a dramatic or fundamental way.

The CIC Report mainly focuses on the wastewater treatment industry in the PRC, Ningxia and Yinchuan. Our Directors confirm that after taking reasonable care, there is no material adverse change in the market information since the date of the relevant data contained in the CIC Report which may qualify, contradict or have an impact on the information in this section.

Except as otherwise noted, all of the data and forecasts contained in this section are derived from the CIC Report. Parameters used in the CIC Report include: (i) water consumption volume; (ii) municipal wastewater discharge volume; (iii) municipal wastewater treatment volume and treatment rate; and (iv) cost composition indices of electricity, raw materials, and wage.

## MACROECONOMIC ENVIRONMENT IN THE PRC, NINGXIA AND YINCHUAN

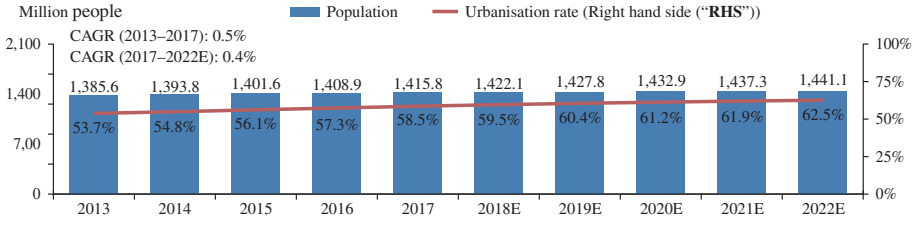
### Overview of macroeconomic environment in the PRC, Ningxia and Yinchuan

The PRC's economic growth has been readjusted to a sustainable level, with its real GDP growth rate expected to remain above 6.0% from 2017 to 2022; whereas, Ningxia and Yinchuan's economic growth was and is expected to remain above the national average. Increasingly higher consumption levels, continuous progress towards increased urbanisation, the maturity of economic restructuring and the implementation of the 13th Five-Year Plan (《"十三五"規劃》), which is a series of social and economic development blueprints drafted by central, provincial, local and district governments of the PRC for the period between 2016 and 2020, are expected to support continuous economic growth in Ningxia and Yinchuan. With an annual real GDP growth rate target of 7.5% and 8.0% set for Ningxia and Yinchuan, respectively from 2016 to 2020, the nominal GDP for Ningxia and Yinchuan is expected to reach RMB498.6 billion and RMB284.2 billion by 2022, respectively.

The PRC's population has remained stable from 2013 to 2017, with an increasing urbanisation rate from 53.7% in 2013 to 58.5% in 2017. Between 2013 and 2017, Ningxia's population increased from 6.54 million people to 6.82 million people, representing a CAGR of 1.0%. Yinchuan's population meanwhile increased from 2.08 million people in 2013 to reach 2.23 million people in 2017, representing a CAGR of 1.8%. Yinchuan is one of the largest cities in the northwest of the PRC and its urbanisation rate was 77.1% in 2017, which was notably higher than the average urbanisation rate of 58.5% in the PRC.

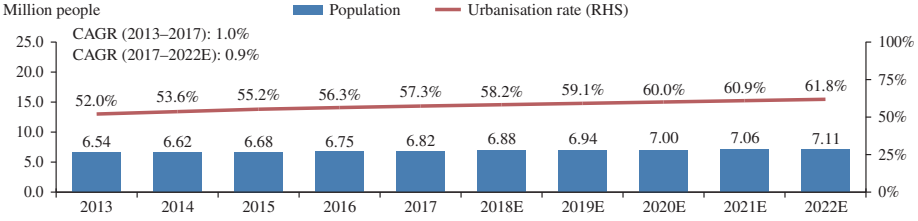
The steady development of the economy and the relatively higher population growth and urbanisation rate in Ningxia and Yinchuan are expected to promote a higher demand in terms of both industrial and domestic water supply, resulting in higher wastewater discharge volume, hence, the demand for wastewater treatment services is expected to increase in the near future.

**Population and urbanisation, the PRC, 2013–2022E**



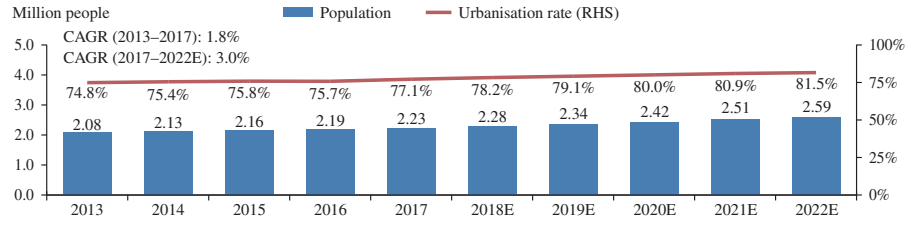

*Source: International Monetary Fund, CIC*

**Population and urbanisation, Ningxia, 2013–2022E**




*Source: National Bureau of Statistics of China, CIC*

**Population and urbanisation, Yinchuan, 2013–2022E**




*Source: National Bureau of Statistics of China, CIC*

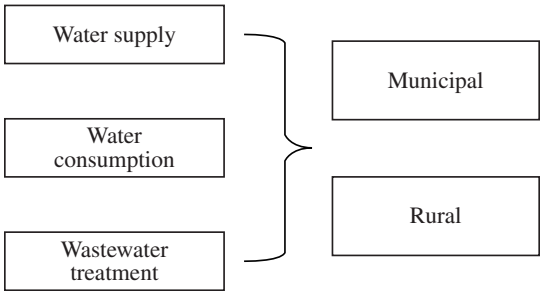
## WATER UTILITIES INDUSTRY

### Definition of the water utilities industry

The water utilities industry in the PRC provides clean water and wastewater treatment services mainly to agricultural, industrial, and domestic sectors of the economy. More specifically, the water utilities industry involves raw water collection and transportation, water treatment and supply, water conservation, water drainage, wastewater treatment and the use of recycled water.

### Categorization of the water utilities industry by administrative divisions

The water utilities industry can be divided into either municipal or rural use. The water utilities systems in the PRC are more developed in municipal areas as compared with rural areas, with the water supply penetration rate having reached 83.9% for municipal areas compared with a penetration rate of 71.9% for rural areas at the end of 2016. Municipal use can be further divided into urban and county use.




### Overview of water resource in the PRC

Water shortages are affecting the PRC's economic and social development. The volume of water resources per capita in the PRC was only 2,061.7 cubic metres in 2017 and ranked only 110th in the world. Water resources are not evenly distributed throughout the PRC. In particular, Southern China has more water resources in terms of its water volumes as compared with Northwestern China, where Yinchuan, Ningxia is located in. As a result, there is a pressing need to further develop the water utilities industry, especially in terms of a higher utilisation rate for reused water.

## WASTEWATER TREATMENT INDUSTRY

### Discharge standards of the wastewater treatment industry in the PRC, Ningxia and Yinchuan

Under the National Wastewater Discharge Standards (GB18918–2002) which was jointly promulgated by MEP and AQSIQ issued in December 2002 and amended in May 2006, wastewater discharged from municipal wastewater treatment plants are classified into three classes of wastewater discharge standards, namely Class I (一級), Class II (二級), and Class III (三級). Class I can be further divided into Class IA (一級A) and Class IB (一級B). As of December 2017, Class IA is the highest standard under the National Wastewater Discharge Standards. In January 2016, the government of Ningxia announced the requirement that all the wastewater treatment plants that are newly constructed after 1 January 2016 had to meet the Class IA, while all the existing treatment plants had to be upgraded to the Class IA.

The Surface Water Quality Standards (GB3838-2002) jointly promulgated by MEP and AQSIQ in 2002 is applicable to the surface water bodies such as rivers, lakes and reservoirs within the PRC. Water resources that meet Surface Water Quality Standard Class IV (四類水標準) are generally suitable for industrial use (工業用水) and entertainment use (娛樂用水) where such water does not come into contact with the human bodies, e.g., water used in scenery locations and fountains, and is a water standard higher than Class IA in the National Wastewater Discharge Standards. In recent years, a wastewater treatment discharge standard close to Surface Water Quality Standard Class IV is imposed on a number of advanced wastewater treatment plants in the PRC with a small amount of parameters below the standards set for Surface Water Quality Standard Class IV. Typically, the treated wastewater which meets such kind of standard being close to Surface Water Quality Standard Class IV is also permitted to be used for industrial and entertainment water use. In connection with the expansion of capacity for Yinchuan Wastewater Treatment Plant 4 as approved by the local governmental authorities in April 2018, the local government of Yinchuan has adopted the standard of discharge of the additional capacity of 100,000 cubic meters per day to be Quasi Surface Water Standard Class IV (準四類水標準) which is a standard of water with parameters set to be close to Surface Water Quality Standard Class IV, and such water is intended be used for water replenishment at scenery locations, street flushing and landscaping purposes.

**Wastewater treatment tariff**

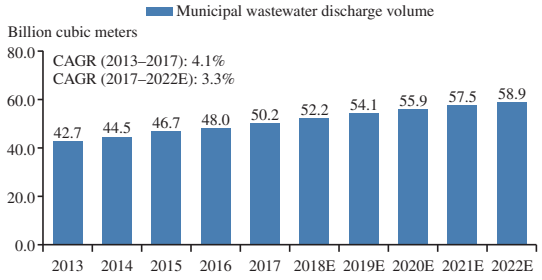
In the PRC, the consumer and commercial wastewater discharge tariff payable by residents and enterprises is different from wastewater treatment tariff charged by wastewater treatment plants with the government. The tariffs that are charged by wastewater treatment plants are normally pre-agreed in the concession agreement with the local government. The tariff determination and adjustment mechanism take into account factors, including social indices such as Consumer Price Index (CPI), Producer Price Index (PPI), as well as the construction and raw materials costs incurred by the wastewater treatment plant. Thus, such tariffs usually vary between different areas as well as different wastewater treatment plants.

**Municipal wastewater treatment industry in the PRC**

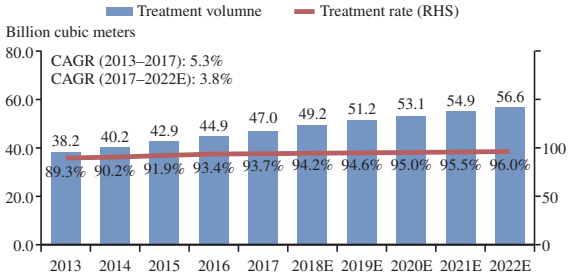
Between 2013 and 2017, the total municipal wastewater discharge volume in the PRC increased from 42.7 billion cubic meters to 50.2 billion cubic meters, representing a CAGR of 4.1%. During the same period, the total municipal wastewater treatment volume increased from 38.2 billion cubic meters to 47.0 billion cubic meters, representing a CAGR of 5.3%. The treatment rate for municipal wastewater also improved, increasing from 89.3% to 93.7%.

With a rising municipal wastewater discharge volume in the PRC as well as an improved treatment rate, the total municipal wastewater treatment volume in the PRC is expected to reach 56.6 billion cubic meters by 2022, with a CAGR of 3.8% between 2017 and 2022.

**Municipal wastewater discharge volume, the PRC, 2013–2022E**




**Municipal wastewater treatment volume and treatment rate, the PRC, 2013–2022E**




*Source: CIC*

### Wastewater treatment industry in Ningxia

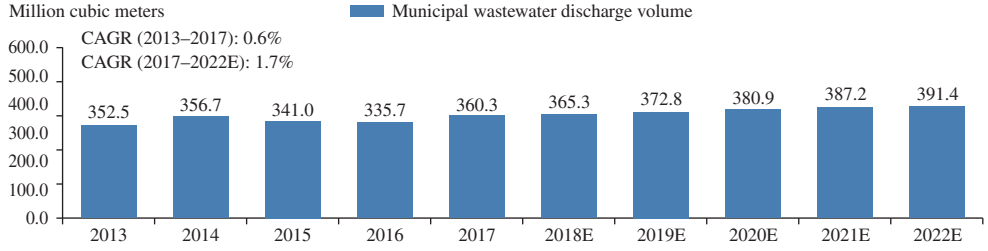
In Ningxia, municipal wastewater is mainly treated by two types of facilities, including wastewater treatment plants and other wastewater treatment facilities. Other wastewater treatment facilities refer to relatively smaller-scale wastewater treatment stations that are usually installed in residential areas and owned by the local government and in industrial facilities which are owned by the individual enterprise. Between 2013 and 2017, the total municipal wastewater discharge volume in Ningxia increased from 352.5 million cubic meters to 360.3 million cubic meters, representing a CAGR of 0.6%. During the same period, the total municipal wastewater treatment volume increased from 306.1 million cubic meters to 336.2 million cubic meters, representing a CAGR of 2.4%. The treatment rate for municipal wastewater increased from 86.8% to 93.3% over the same period. From 2013 to 2017, the treatment volume of wastewater treated by wastewater treatment plants in Ningxia increased from 224.2 million cubic meters to 277.4 million cubic meters, representing a CAGR of 5.5%.

The municipal wastewater discharge volume of Ningxia experienced a drop from 2013 to 2016, which was mainly caused by the water conservation plans and strategies that were implemented by the local government. However, from the year of 2017, the municipal wastewater discharge volume started to increase due to the economic growth, population growth and higher urbanisation rate that led to rising water consumption volume.

The government of Ningxia has been making efforts on expanding and upgrading existing wastewater treatment plants, and building new wastewater treatment plants, as result of which the wastewater treatment industry in Yinchuan (銀川市), Wuzhong (吳忠市) and Shizuishan (石嘴山市), being the three major cities of Ningxia, had experienced rapid development and expansion from 2013 to 2017, while other treatment facilities, i.e. those relatively smaller-scale wastewater treatment stations in residential area and industrial facilities had been on a decreasing trend. This was mainly due to those smaller-scale wastewater treatment stations do not have the economies of scale and professional management compared to wastewater treatment plants. Accordingly, the majority proportion of municipal wastewater discharged in Ningxia is expected to be treated by wastewater treatment plants in the foreseeable future. In addition, according to the 13th Five-Year Plan (《"十三五"規劃》) of Ningxia, the wastewater treatment rate of Ningxia is targeted to reach 95% by 2020. Thus, the rising trend of municipal wastewater treatment volume in Ningxia is expected to continue in the near future.

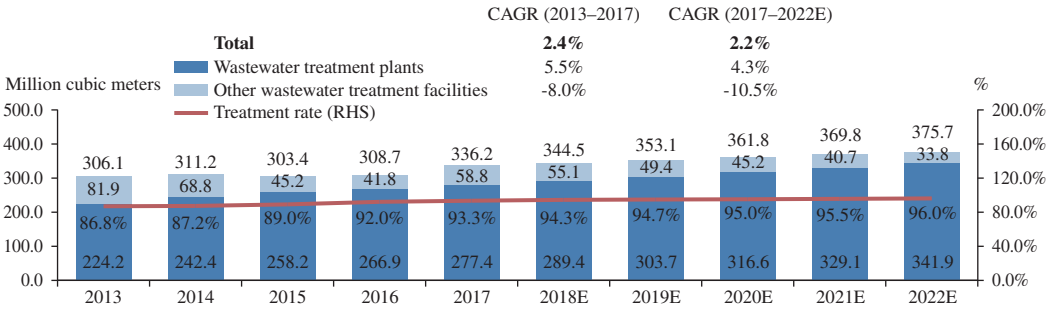
The total municipal wastewater treatment volume in Ningxia is expected to reach a further 375.7 million cubic meters by 2022, with a CAGR of 2.2% between 2017 and 2022. The total treatment volume handled by wastewater treatment plants in Ningxia is also expected to reach 341.9 million cubic meters by 2022, with a CAGR of 4.3% between 2017 and 2022.

**Municipal wastewater discharge volume, Ningxia, 2013–2022E**




*Source: CIC*

**Municipal wastewater treatment volume and treatment rate, Ningxia, 2013–2022E**




*Source: CIC*

## Wastewater treatment industry in Yinchuan

Yinchuan is located on the upstream of the Yellow River, with the wastewater discharged from Yinchuan having a large impact on downstream cities. Moreover, a large number of industrial enterprises are located in Yinchuan, and 80% of its shallow groundwater* (淺層地下水) was found to be polluted as of 2005. As one of the critical measures to improve the water body quality, it was an important task for the government to construct and expand the capacities of wastewater treatment plants.

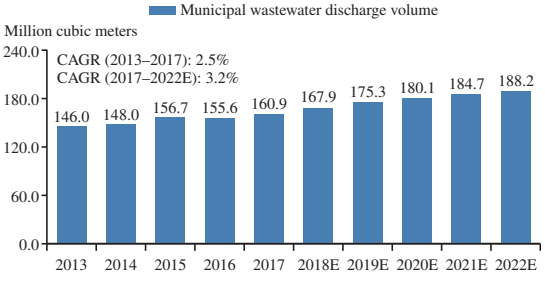
The first wastewater treatment plant in Yinchuan began operations in 2002. Over the years, an additional seven plants have been built. As of December 2017, there were eight wastewater treatment plants in Yinchuan with seven in operation, operated and managed by five wastewater treatment companies. In recent years, wastewater treatment plants in Yinchuan continue to expand their treatment capacities and upgrade discharge standards in order to meet the increasing municipal wastewater discharge volume as well as the rising discharge standard requirement of the local government.

Between 2013 and 2017, Yinchuan's total municipal wastewater discharge volume experienced a steady increase. However, a slight drop occurred in 2016 due to the commencement of transition and improvement works for industrial plants located in the Xixia District (西夏區), which is a municipal district in Yinchuan. The slight drop of the discharge volume did not affect the growth of the wastewater treatment rate and the treatment volume in Yinchuan. Between 2013 and 2017, the total municipal wastewater treatment volume increased from 135.8 million cubic meters to 154.4 million cubic meters, representing a CAGR of 3.3%. During the same period, the wastewater treatment rate in Yinchuan increased from 93.0% to 96.0%.

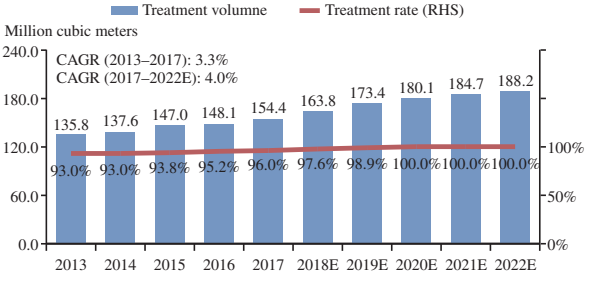
In order to protect the Yellow River from further pollution, MEP has set strict wastewater discharge standards for cities located along the Yellow River. As a city that locates on the upstream of the Yellow River, the government of Yinchuan implemented a new set of plans regarding wastewater treatment in 2015. Specifically, the government of Yinchuan set goals for resolving water problems associated with black, foul-smelling water by 2020, and has set a target to reach a 100% wastewater treatment rate by 2020. On the other hand, the population and urbanisation rates of Yinchuan are both expected to increase steadily from 2017 to 2022. Hence, the demand for wastewater treatment in Yinchuan is expected to rise in the near future.

By 2022, the total municipal wastewater treatment volume in Yinchuan is expected to reach 188.2 million cubic meters, with a CAGR of 4.0% between 2017 and 2022.

**Municipal wastewater discharge volume, Yinchuan, 2013–2022E**




**Municipal wastewater treatment volume and treatment rate, Yinchuan, 2013–2022E**




*Source: CIC*

**Drivers of the wastewater treatment industry in the PRC, Ningxia and Yinchuan**

(i) **Favourable policy support:** The 13th Five-Year Wastewater Treatment and Recycling Facilities Construction Plan* (《"十三五"全國城鎮污水處理及再生利用設施建設規劃》) specifically sets the targets relating to the wastewater treatment which include (i) targeting at a municipal wastewater treatment rate of 95% for all cities by 2020; (ii) investing an amount of approximately RMB193.8 billion in the construction of new wastewater treatment plants and improving wastewater discharge standards between 2016 and 2020; (iii) increasing the total wastewater treatment capacity of wastewater treatment plants by 50.2 million cubic meters per day; and (iv) improving the discharge standard of a total wastewater treatment capacity of 42.2 million cubic meters per day. Plans for Water Pollution Prevention and Control Projects in Key Drainage Basins (2016 to 2020)* (《重點流域水污染防治規劃(2016–2020年)》) (the "**Plan**") also lays down five key tasks ranging from prevention and control of industrial pollution, municipal pollution, agricultural and countryside pollution, ecological conservation of river basins, to the environmental protection of drinking water sources. The Yellow River is one of the key basins to be tackled by the Plan against water pollution and Ningxia is a key province which locates on the upstream of the Yellow River drainage basin. For these reasons, the government of Ningxia views surface water treatment as one of its major tasks in recent years and will continue its effort to improve the water quality in the near future. Wastewater treatment is a vital segment for surface water treatment, and thus with the support from policies and the government, the wastewater treatment industry of Ningxia and Yinchuan is expected to grow steadily in the future.

(ii) **Continuous urbanisation process:** The PRC's urbanisation rate has increased rapidly, and is projected to reach 62.5% by 2022. Yinchuan is one of the largest cities in the north-western region of the PRC, and had a high urbanisation rate of 77.1% in 2017 and is targeted to reach 81.5% by 2022. A growing urban population is expected to promote higher industrial and domestic water consumption. As a result, with a rising volume of wastewater being discharged as well as an improving wastewater treatment rate, the demand for wastewater treatment in Yinchuan is expected to further increase between 2017 and 2022.

(iii) **Sufficient public and private capital support:** Since 2014, the government authorities in the PRC have been promoting the PPP (Public-Private-Partnership) model for the implementation and development of infrastructure, public utilities and environmental protection projects. PPP projects can be categorized into eight sectors, namely municipal engineering* (市政工程), ecological conservation* (生態建設和環境保護), government infrastructure, environment, urban development, transportation* (交通運輸), tourism, and others. The construction and operation of wastewater treatment plants fall under the municipal engineering segment. From the end of 2016 to the end of 2017, the accumulative number of PPP projects in the PRC increased from 11,260 to 14,424, at an annual growth rate of 28.1%. As of the end of 2017, municipal engineering* (市政工程), transportation* (交通運輸) and ecological conservation* (生態建設和環境保護) were the three largest categories in terms of the number of approved PPP projects, representing approximately 37.5%, 14.1%, and 7.6%, respectively. As for Ningxia, an accumulative number of 140 projects have been approved by the end of 2017, with municipal engineering, ecological conservation and transportation being the three largest project categories. In 2018, the government of Ningxia plans to further promote the PPP model in a larger geographical coverage. As a result, an increasing number of wastewater treatment plants is expected to be available for private sector participation in the near future, and the wastewater treatment industry in Ningxia is expected to further develop.

(iv) **Rising wastewater treatment tariff:** The wastewater treatment plants in Ningxia charge wastewater treatment service fees with the local government according to pre-agreed treatment tariffs and tariff revision mechanism specified in the concession agreements. The wastewater treatment tariff revision mechanism mainly takes into account factors, including the change of social indices such as Consumer Price Index (CPI) and Producer Price Index (PPI), construction costs and raw materials costs incurred by the wastewater treatment plant. With the strong growth of Ningxia's economy and the continuous upgrading and expansion of the wastewater treatment facilities, the wastewater treatment service fees in Ningxia are expected to continue to grow in the future.

**Future trends of the wastewater treatment industry in the PRC, Ningxia and Yinchuan**

(i) **Higher treatment rate and discharge standards:** The wastewater treatment rate in the PRC is set to reach 95% or above according to the 13th Five-Year Plan (《"十三五"規劃》), while Yinchuan has adopted a higher treatment rate target of 100% by 2020. Apart from a higher treatment rate, higher discharge standards are also expected in future. Based on the discharge standards promulgated by the Action Plan for Prevention and Control of Water Pollution* (《水污染防治行動計劃》), since the quality of a large proportion of surface water in the PRC is still substantially below the Surface Water Quality Standard Class IV, the PRC government is aiming at higher quality of discharge to be achieved by the wastewater treatment industry, with the ultimate aim of attaining a reusable level in respect of all treated wastewater.

(ii) **Higher recycled water usage rate:** Recycled water resources are categorized as "unconventional water resources" (非常規水資源) according to the Guidance on Incorporating Unconventional Water Sources into Integrated Water Allocation* (《關於非常規水納入水資源統一配置的指導意見》), and have become more important in the PRC in recent years. As the 13th Five-Year Plan (《"十三五"規劃》) has set an RMB15.8 billion investment budget for water recycling, the future potential of supply of recycled water is expected to become more apparent in the future.

(iii) **More advanced technologies and equipment:** Higher treatment efficiencies, more reliable wastewater treatment processes, and stricter discharge standards are all expected to be the future trends in the wastewater treatment industry. The aim is to resolve on-going issues related to the increasingly severe water pollution in the PRC, especially in less developed areas. As a result, more advanced treatment technologies and equipment are expected to be adopted by wastewater treatment plants in Ningxia and Yinchuan.

(iv) **Further industry expansion:** The steady development of the economy and the growing urban population of the PRC, Ningxia and Yinchuan are expected to promote a higher demand in terms of both industrial and domestic water consumption, as well as the wastewater discharge volume. As a result, there will be an increasing demand for wastewater treatment services. Moreover, with capital support from both direct government investment and the private sector under the PPP model, the wastewater treatment industry in Ningxia and Yinchuan is expected to benefit from further capital investment in future.

**Major challenges for the wastewater treatment industry in the PRC, Ningxia and Yinchuan**

In July 2015, the State Council published the Notice on Issuing the Scheme for Building the Ecological Environment Monitoring Network* (《關於印發生態環境監測網路建設方案的通知》) (the "**Scheme**"). The aim of the Scheme is to set up a comprehensive and unified environment quality monitoring network, and to require local environmental departments to strictly monitor the pollutant discharge by related enterprises and plants. The daily wastewater discharge quality from wastewater treatment plants is one of the key areas to be monitored. Thus, in order to comply with related regulations under the close monitor of governmental authorities, to ensure the treated wastewater meets the prescribed discharge standards consistently and the steady operation of the wastewater treatment process without disruption are major challenges and objectives for wastewater treatment plants.

**Major raw materials for the wastewater treatment industry**

For wastewater treatment operations, key costs of operations include utilities, chemicals and labour costs. Utilities costs is a major part of the overall cost for wastewater treatment operations. In Ningxia, electricity prices for large industrial users had been adjusted downward three times during the period from 2013 to 2017, and this downward trend is expected to continue under the government's price control program.

Labour costs increased from RMB32,100 per person per year in 2013 to RMB38,900 per person per year in 2017, representing a CAGR of 4.9%. Labour costs are expected to maintain an upward trend in the near future due to continued economic development.

Flocculants, sodium hypochlorite, and sodium acetate are the major chemicals used in wastewater treatment processes. The price of flocculants has experienced a fluctuation in recent years according to market supply and demand conditions. The prices for sodium hypochlorite and sodium acetate have been relatively stable over the years, ranging from RMB815.0 per tonne to RMB960.0 per tonne, and RMB2,241.0 per tonne to RMB2,635.0 per tonne, respectively, during the period from 2013 to 2017. Raw material prices are expected to remain relatively stable in near future.

## COMPETITIVE LANDSCAPE OF WASTEWATER TREATMENT INDUSTRY IN NINGXIA AND YINCHUAN

### Overview of competitive landscape of wastewater treatment industry in Ningxia and Yinchuan

According to the Ningxia Hui Autonomous Region of Housing and Urban and Rural Construction Department* (寧夏回族自治區住房和城鄉建設廳), there were 36 wastewater treatment plants in Ningxia as of December 2017. Yinchuan (銀川市), Wuzhong (吳忠市), and Shizuishan (石嘴山市) are the three major cities of Ningxia, and they also contribute more than half of the total wastewater discharge volume in Ningxia.

As for Yinchuan, there were eight wastewater treatment plants, with seven of them in operation as of December 2017. The total designed treatment capacity has reached 575.0 thousand cubic metres per day, and the water discharge standard for all the eight plants is targeted to meet no lower than Class IA standard.

In Ningxia and Yinchuan, the operating companies of wastewater treatment plants usually enter into concession agreements with the local government. In the Concession Agreement entered with TYW, a pre-agreed tariff was determined, with a basic volume which is a contractually guaranteed minimum volume to be used as a parameter in the calculation of wastewater treatment service fees, and thereby TYW is safeguarded against fluctuations in the actual volumes of wastewater supplied to the Wastewater Treatment Plants. Furthermore, such kinds of concession agreements usually contain an exclusivity clause that the government cannot assign the concession right of the project company to other operators during the term of the concession, which is the case in our Concession Agreement. For this reason, instead of competing for the operation of existing wastewater treatment plants and treatment volume, the competition among industry players in Ningxia and Yinchuan is more focused on the bidding for new projects available in future.

### Top five wastewater treatment companies ranked by designed treatment capacity and actual treatment volume in Ningxia

As at 31 December 2017, the total designed treatment capacity of the wastewater treatment plants in Ningxia operated by the top five wastewater treatment companies in Ningxia was approximately 895,000 cubic meters per day, representing around 89.5% of the total designed treatment capacity of all the wastewater treatment plants in Ningxia. In terms of actual treatment volume, the total treated volume of these top five entities amounted to approximately 246.4 million cubic meters in 2017, representing a market share of approximately 88.8% out of the total wastewater volume treated by all the wastewater treatment plants in Ningxia.

TYW ranked first in terms of both designed treatment capacity and actual treatment volume in Ningxia. As at 31 December 2017, the wastewater treatment plants operated by TYW had a total designed treatment capacity of 375,000 cubic meters per day, representing a market share of 37.5% in Ningxia. In terms of actual treatment volume, in 2017, the wastewater treatment plants operated by TYW treated a total wastewater volume of 120.4 million cubic meters, representing a market share of 43.4% in Ningxia.

The following companies are ranked based on the (i) total designed treatment capacity as at 31 December 2007; and (ii) the total actual wastewater treatment volume in 2017 of wastewater treatment plants in Ningxia.

| Rank | Company name | # of plants | Total designed treatment capacity (thousand cubic meters per day) | Market share in terms of designed treatment capacity | Total actual treatment volume (million cubic meters) | Market share in terms of actual treatment volume | Geographical coverage in Ningxia |
|---|---|---|---|---|---|---|---|
| 1 | TYW | 4 | 375.0 | 37.5% | 120.4 | 43.4% | Yinchuan (銀川市) |
| 2 | Company A | 4 | 175.0 | 17.5% | 49.0 | 17.7% | Shizuishan (石嘴山市) |
| 3 | Company B | 2 | 150.0 | 15.0% | 37.7 | 13.6% | Yinchuan (銀川市); Binhe New District, Yinchuan (銀川市濱河新區) |
| 4 | Company C | 6 | 120.0 | 12.0% | 27.0 | 9.7% | Wuzhong (吳忠市); Shizuishan (石嘴山市) |
| 5 | Company D | 2 | 75.0 | 7.5% | 12.3 | 4.4% | Yinchuan (銀川市); Yongning County, Yinchuan (銀川市永寧縣) |
| | **Top five total** | | **895.0** | **89.5%** | **246.4** | **88.8%** | |
| | **Others** | | **105.0** | **10.5%** | **31.0** | **11.2%** | |
| | **Total** | | **1,000.0** | **100.0%** | **277.4** | **100.0%** | |

*Note:* The total treatment volume above only includes the wastewater treated by wastewater treatment plants.
*Source: CIC*

**Ranking of the five wastewater treatment companies operating a total of eight wastewater treatment plants in Yinchuan by designed treatment capacity and actual treatment volume**

As at 31 December 2017, there were eight wastewater treatment plants in Yinchuan operated by five wastewater treatment companies, including TYW, with seven in operation.

As at 31 December 2017, the total designed treatment capacity of all the eight wastewater treatment plants in Yinchuan was approximately 575,000 cubic meters per day, and the total designed treatment capacity of the four wastewater treatment plants operated by TYW amounted to 375,000 cubic meters per day, representing approximately 65.3% of the aforesaid total designed capacity.

In 2017, the total actual treatment volume in Yinchuan reached approximately 154.4 million cubic metres. As of December 2017, TYW ranked first in terms of total actual treatment volume, which constituted approximately 78.0% of the total actual wastewater treatment volume by all the eight wastewater treatment plants in Yinchuan.

The following companies are ranked based on the total actual wastewater treatment volume in 2017 of wastewater treatment plants in Yinchuan.

| Rank | Company name | # of plants | Total designed treatment capacity (thousand cubic meters/day) | Market share in terms of designed treatment capacity | Total actual treatment volume (million cubic meters) | Market share in terms of actual treatment volume | Geographical coverage in Yinchuan |
|---|---|---|---|---|---|---|---|
| 1 | TYW | 4 | 375.0 | 65.3% | 120.4 | 78.0% | Xingqing District (興慶區) Xixia District (西夏區) Jinfeng District (金鳳區) |
| 2 | Company B | 1 | 100.0 | 17.4% | 23.7 | 15.3% | Xingqing District (興慶區) |
| 3 | Company E | 1 | 25.0 | 4.3% | 6.8 | 4.4% | Jinfeng District (金鳳區) |
| 4 | Company F | 1 | 50.0 | 8.7% | 3.5 | 2.3% | Jinfeng District (金鳳區) |
| 4 | Company G | 1 | 25.0 | 4.3% | 0.0 | 0.0% | Jinfeng District (金鳳區) |
| | **Total** | **8** | **575.0** | **100.0%** | **154.4** | **100.0%** | |

*Note:* In 2017, Yinchuan Wastewater Treatment Plant 9 (銀川市第九污水處理廠) operated by Company G was not in operation.
*Source: CIC*

**Entry barriers of the wastewater treatment industry in the PRC, Ningxia and Yinchuan**

(i) **Strict regulations and certification requirements:** The wastewater treatment industry is considered to be part of the public utilities sector and operates in partnership with local governments, with the latter typically being responsible for offering concessions in order to operate wastewater treatment projects. Furthermore, wastewater treatment plants are closely supervised by local governmental authorities responsible for environmental protection and urban and rural development.

(ii) **High capital requirements:** The wastewater treatment industry is capital-intensive in nature and prevents potential entrants lacking the necessary financial backing to win project bids from local governments. In addition, wastewater treatment projects require a long-term commitment period (usually 25–30 years) and with growth potential being limited by treatment capacities and a continuously high operating cost.

(iii) **Good track record and credibility:** A good performance track record and credibility are important factors for wastewater treatment enterprises to be considered their eligibility to participate in tendering of potential projects. A good performance track record and credibility can only be established over a considerable period of time based on compliance record, expertise and experience, and most importantly the company's reputation.

(iv) **Abundant industry knowledge:** The wastewater treatment industry requires extensive industry knowledge and know-how in order to comply with increasingly stringent discharge standards as stipulated by the government. It normally takes a considerable amount of time to accumulate the relevant industry experience and know-how. Therefore, it is a challenge for a potential entrant to enter the industry without having accumulated such expertise.

(v) **Exclusivity in concession agreement:** Obtaining relevant approvals and authorisations, including the concession rights, from local government is a prerequisite for entering into the operation of wastewater treatment business in Ningxia. A concession agreement usually contains exclusivity clauses and a relatively long-concession term. Under a concession agreement, tariff and minimum basic volume are fixed and during the concession period the local government cannot assign the operation of the wastewater treatment plants to third parties unless under certain exceptional circumstances triggering the termination rights of the government.

**Future opportunities of the wastewater treatment industry in Ningxia and Yinchuan**

In future, the demand for wastewater treatment capacities in major cities of Ningxia including Yinchuan, Wuzhong, and Shizuishan will further increase. The wastewater discharge volume in these cities is expected to be boosted by the local economic growth as the developing macro economy and rising urbanisation rate are expected to increase the municipal water consumption.

Also, more new opportunities are expected to be available in Wuzhong and Shizuishan. In these two cities, certain number of wastewater treatment plants are still operated by the government, and with the wide implementation of PPP model as well as substantial financial burden of the local governments, these cities will likely to seek private funding for taking over their wastewater treatment plants in the near future.

Moreover, the wastewater treatment industry is expected to have more opportunities while penetrating rural areas. In April 2015, the State Council promulgated the Action Plan for Water Pollution Prevention and Control* (《水污染防治行動計劃》). This plan states that the environmental treatment work in rural areas needs to be expedited, and it also encourages the municipal wastewater treatment facilities and services to extend to rural areas.